

LUMMI NATION

INTEGRATED SOLID WASTE MANAGEMENT PLAN

2014 - 2024

Prepared For:
Lummi Indian Business Council
(LIBC)



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EXECUTIVE SUMMARY

The purpose of the Lummi Nation Integrated Solid Waste Management Plan (ISWMP) is to guide current and future efforts to effectively and efficiently manage solid waste on the Lummi Indian Reservation (Reservation) over the 10 year planning period from 2014 to 2024. The ISWMP is intended to guide efforts to protect and restore environmental trust resources including water resources, shorelines, tidelands, and uplands through the management and disposal of solid and hazardous waste.

The Lummi Nation finds that solid waste dumping on the Reservation has a direct, serious, and substantial adverse effect on the political integrity, economic security, health, and welfare of the Lummi Nation, its members, and all persons present on the Reservation. Further, the Lummi Nation finds that solid waste management has been a documented problem on the Reservation, particularly illegal dumping, and if left unregulated or unaddressed, will continue to have such adverse effects. Accordingly, the Lummi Natural Resources Department (LNR) and the Lummi Planning Department (Planning) are updating the Integrated Solid Waste Management Plan for the Reservation. The goal of the Lummi Nation ISWMP is to develop and implement a Reservation-wide solid waste management system to protect public health and the environment. This goal will be attained through the achievement of the following objectives:

1. Ensure convenient and reliable services for managing solid waste including providing convenient and cost-effective recycling opportunities to maximize participation.
2. Decrease illegal dumping on the Reservation.
3. Educate and involve citizens in solid waste management activities including waste reduction and recycling efforts.
4. Obtain funding for solid waste management services and facilities including enforcement actions against violators of applicable solid waste management laws.

Solid waste disposal, and in particular illegal dumping, has been a recognized problem on the Reservation for many years. To address this problem, the first solid waste management plan for the Reservation was developed in 1979 (Harper-Owes 1979). Prior to 1979, two unlined sanitary landfills that accepted solid waste from the Reservation and from adjacent Whatcom County were operated on the Reservation. Since the closure of these landfills, solid wastes generated on the Reservation have been disposed of off-Reservation, either through contracted curbside pick-up or by self-haul to one of the two local transfer facilities located less than two miles from the Reservation boundary. Despite these available disposal options, similar to other rural areas across the United States illegal solid waste dumping occurs and presents a public health threat and a threat to the quality of Reservation waters. Pollutants of concern include bacteria/pathogens, metals, nutrients, oil, grease, and other chemicals. The illegally dumped material originates both from on- and off- Reservation sources.

Over the last decade, the Lummi Nation has taken a pragmatic approach to stop illegal dumping activity and manage solid waste on the Reservation. Recognizing that cleaning up the dumpsites is the most direct way to remove the potential public health threat and the

threat to Reservation water quality, the LIBC initiated Project Clean-Up in 2002. Initially funded by the tribal government and then funded through a grant obtained from the Environmental Protection Agency (EPA), the Project Clean-Up program, later called the Lummi Waste Management program, removed and disposed of solid waste at illegal dumpsites, installed warning signs at dumpsite locations, installed gates to prevent access to dumpsite locations, provided community education, and provided assistance in residential solid waste removal. Over the January 1, 2003 through December 31, 2006 period a total of approximately 565 tons of mixed household waste, 215 appliances, approximately 500 tires, and over 70 abandoned vehicles were removed from the Reservation (LWRD 2006). The waste management activities continued to be partially funded by EPA Performance Partnership Grants from January 1, 2007 through December 31, 2008, before the cleanup program was disbanded due to funding cuts.

In addition, following its development and public hearings during 2003, during January 2004 the Lummi Nation passed the Solid Waste Control and Disposal Code (Title 18 of the Lummi Code of Laws [LCL]). Title 18 provides the policy framework and delegation of administrative authority for a coordinated program to address the accumulation, collection, and disposal of solid waste; the resource recovery, recycling, and utilization of recyclable materials; and the creation and operation of disposal sites and transfer stations.

The existing Reservation solid waste management system largely relies on individual residents and businesses to comply with LCL Title 18 and to dispose of their solid waste in an environmentally-sound manner with little assistance from the Lummi Nation. The Lummi Housing Authority (LHA) contracts weekly solid waste and recycling collection services with a private contractor for the 270 homes on the Reservation that are owned or managed by the LHA. As there are approximately 1,989 residences on the Reservation, this leaves approximately 1,719 homes (86% of the residences) that must self-haul to an off-Reservation transfer station or contract individually with a private company for collection. Assuming the Whatcom County disposal rate of 3.4 pounds per person per day (Whatcom County 2003), and using the Reservation population of 4,706 people from the 2010 Census, Reservation residents dispose of approximately 16,000 pounds (8 tons) of solid waste per day or approximately 2,920 tons of solid waste annually. Since a typical garbage truck for the local private solid waste collection service (Sanitary Service Company, Inc.) hauls approximately 12 tons of compacted garbage, the Reservation solid waste disposal rate is equivalent to approximately 5 garbage truck loads per week or 243 garbage truck loads per year.

Although the Lummi Nation has taken a pragmatic approach to address the immediate solid waste management challenges that are found on the Reservation, there has been a recognized need to also take a programmatic approach. Development of this ISWMP allows a more holistic review of the solid waste management issues on the Reservation and the development of alternative solutions that may provide a more effective reduction in the amount of illegal dumping on the Reservation. This ISWMP builds on the 1979 Lummi Solid Waste Management Plan (Harper-Owes 1979), the Solid Waste Control and Disposal Ordinance (LCL Title 18), Project Clean-Up, and past work by the Lummi Solid Waste Management Team formed through the Project Clean Up effort. The Plan development began with a literature review of technical background documents, solid waste audits, ordinances regarding solid waste management on the Lummi Reservation and for other tribal governments, and planning guidance documents. Solid waste management alternatives, including the status quo, were identified and evaluated against the goal and objectives of this

plan. The identified solid waste management problems, goals and objectives, and preferred alternatives were used to develop a broad scope 10-year action plan for the Reservation. From this 10-year plan, more specific actions were selected to develop a 5-year implementation plan.

As a result of this process, the key recommendations for designing and implementing a solid waste management system on the Lummi Indian Reservation that will protect public health and the environment are:

1. Adopt this plan by a Lummi Indian Business Council (LIBC) resolution that includes approval to join the Tribal Solid Waste Advisory Network (TSWAN). The TSWAN should be joined as soon as practicable to provide technical support from other tribal and solid waste management professionals during plan implementation and later plan updates.
2. Re-establish a Solid Waste Management Division within the Lummi Nation Planning and Public Works Department including:
 - a. Hiring a full time Solid Waste Management Specialist,
 - b. Hiring a part-time office assistant or re-allocating a portion of existing staff time to the re-established Solid Waste Management Division.
3. Fully subsidize weekly curbside solid waste and every other week recyclable collection or its equivalent (Solid Waste Collection Alternative A-3) in combination with an annual Community Clean-up Event (Transfer and Disposal Alternative 1).
4. Implement all of the Special Waste Recommendations presented in Table 6.3 and both encourage use of the existing Disposal of Toxics facility near the Bellingham Airport (Moderate Risk Waste Alternative B) and conduct an annual Community Clean-Up event (Transfer and Disposal Alternative 1) that includes collection and disposal of moderate risk wastes (Moderate Risk Waste Alternative C).
5. Implement a public education and outreach program that will inform the community on solid waste management and recycling on the Reservation following the recommendations presented in Section 8.2 and listed in Table 8.1.
6. Coordinate solid waste management with other jurisdictions as appropriate.
7. Pursue funding to implement the solid waste management alternatives described in the approved Integrated Solid Waste Management Plan.

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1. INTRODUCTION

The purpose of this section is to describe the goals of the Lummi Nation Integrated Solid Waste Management Plan (ISWMP), the 2014 update process, the importance of solid waste management on the Reservation, and to summarize the ISWMP organization. This ISWMP has been prepared by the Lummi Nation as a guide to develop and implement an effective, integrated solid waste management program specific to the needs of the Lummi Nation. The Lummi Nation ISWMP was developed by the Lummi Natural Resources and the Lummi Planning departments. This ISWMP includes a description of the planning area and existing laws and regulations; a characterization of solid waste; a description of the existing solid waste management systems including problem areas; the identification and evaluation of alternatives for solid, special, and hazardous waste; recycling; composting; public outreach and education; and an implementation plan. The aspects of solid waste planning covered in this ISWMP include collection, storage, and disposal; source reduction, recycling, and composting; facilities; and administration, budgeting, and financing.

1.1. Goals and Objectives of the ISWMP

During 2002, the governing body of the Lummi Nation, the Lummi Indian Business Council (LIBC), initiated a solid waste management program called “Project Clean-Up” to address illegal solid waste dumping on the Reservation. Project Clean-Up operated under the direction of the LIBC Vice-Chairman’s Office during 2003. In 2004, Project Clean-Up was institutionalized within the administrative structure of the LIBC by moving the solid waste management program from the Office of the Vice Chairman to the Lummi Planning Department. Within the Planning Department the solid waste management program was renamed “Lummi Waste Management” and a Lummi Solid Waste Management Team (LSWMT) was formed including the Land Development Division Manager as the Waste Management Team Lead and three field staff members. The primary goals of the LSWMT were to:

1. Implement to the fullest extent possible a solid waste management system that reduces the waste stream, promotes recycling, and minimizes the amount of land required for future waste disposal.
2. Minimize the detrimental effects of illegally dumped solid waste on the environment and the health and safety of the Lummi people and other Reservation residents.
3. Coordinate efforts within the tribal government and administrative departments to work towards effective and efficient solid waste management.

Similarly, the goal of this ISWMP is to design and implement a Reservation-wide solid waste management system to protect public health and the environment. This goal will be attained through achievement of the following objectives:

1. Ensure convenient and reliable services for disposing solid waste including providing convenient and cost-effective recycling opportunities to maximize participation.
2. Decrease illegal dumping on the Reservation.

3. Educate and involve citizens in solid waste management activities including waste reduction and recycling efforts.
4. Obtain funding for solid waste management services and facilities including enforcement actions against violators of existing solid waste management laws.

1.2. 2014 ISWMP Update

The Lummi Planning Office began the solid waste management planning process for the Lummi Indian Reservation in the mid-1970s with the preparation of the report entitled, *Solid Waste Disposal: A Preliminary Survey* (Lummi Planning Department 1978). This report was forwarded to the U.S. Environmental Protection Agency (EPA) for review in July 1978, and the Lummi Nation submitted a formal request for technical assistance to the EPA in September 1978. The 1979 Lummi Solid Waste Management Plan (Harper-Owes 1979) was prepared as part of an EPA technical assistance project under the provisions of the 1976 Resource Conservation and Recovery Act (RCRA). The LIBC-adopted 1979 Lummi Solid Waste Management Plan recommended closure of the Chief Martin Road Dump, continued voluntary solid waste collection, and construction of a drop box facility that would operate two days a week and would also provide resource conservation and recovery (recycling) services at the drop box facility. The Chief Martin Road Dump was closed during 1979 and the drop box facility concept has been implemented periodically on a temporary basis as part of community clean-up events. However, a permanent drop box facility has not been established on the Reservation. Recycling services have also been provided during community clean-up events.

The Water Resources Division of the Lummi Natural Resources Department obtained grant funding from the EPA to update the Lummi Integrated Solid Waste Management Plan. Part of the updated Integrated Solid Waste Management Plan development effort is to revisit the recommendations from 1979 and to identify integrated solid waste management practices that are aligned with current conditions on the Reservation.

The integrated solid waste management planning process for the Lummi Nation began in 2009 with a literature review conducted by Lummi Water Resources Division staff, administratively within the Lummi Natural Resources Department. Existing technical background documents, solid waste audits, and ordinances regarding solid waste management in Indian Country and on the Reservation were reviewed. The Whatcom County Comprehensive Solid Waste Management Plan (Whatcom County 1999), the Island County Solid Waste and Moderate Risk Waste Management Plan (Island County Public Works 2008), the Yakama Nation Waste Composition Study and Household Survey (Yakama Nation 2009), and the Final Integrated Waste Management Plan for Solid Waste Management on the Colville Indian Reservation (Confederated Tribes of the Colville Reservation 2009) were reviewed for information regarding solid waste generation rates, recycling rates, ordinances, and solid waste collection, transfer, and disposal alternatives for solid waste on the Reservation. The following EPA guides on solid waste management were also used as part of the planning process to help assess the current solid waste management system and to develop this ISWMP: *Tribal Decision-Maker's Guide to Solid Waste Management* (EPA 2004), *Decision-Makers' Guide to Solid Waste Management Volume II* (EPA 1995a), and *Recycling Guide for Native Nations* (EPA 1995b).

This ISWMP builds on the 1979 Lummi Solid Waste Management Plan (Harper-Owes 1979), the Solid Waste Control and Disposal Ordinance (LCL Title 18), Project Clean-up, and past work by the Lummi Solid Waste Management Team. Solid waste management activities, including the status quo, were identified and evaluated against the goal and objectives of this plan. Alternatives were evaluated and recommendations identified for municipal solid waste collection, transfer, and disposal; recycling; special and hazardous wastes; composting; and education and outreach. The identified solid waste management problems, goals and objectives, and preferred alternatives were used to develop a broad-scope 10-year action plan for the Reservation. From this 10-year plan, more specific actions were selected to develop a 5-year implementation plan.

A draft of this ISWMP was presented to the Lummi Natural Resources Commission, the Lummi Planning Commission, the Law and Justice Commission, the Cultural Resources Protection Commission, and the Lummi Housing Board for review, comment, and approval. Based on the recommendations and comments of the technical and policy staff and the membership of the four commissions and one board, the draft ISWMP was finalized and presented to the LIBC for approval.

1.3. Importance of Solid Waste Management

The Lummi Nation is the largest fishing tribe in the Puget Sound in terms of pounds of fish landed and number of species fished (NWIFC 2012). The waters of the Reservation and adjacent waters of Puget Sound and Georgia Strait (aka the Salish Sea) contain significant resources for both the Lummi Nation and the region. Numerous economically and culturally important species including: salmon, herring, oyster, manila clam, little neck clam, butter clam, horse clam, and Dungeness crab are present on the Lummi Reservation and adjacent waters (LNR 2010). The estuarine waters of the Nooksack and Lummi River deltas form the interface between marine and inland fresh water. Estuarine waters have a unique importance for fish habitat, as juvenile salmon reside in these waters for acclimatization to saltwater and adult salmon reside in these waters during their acclimatization to fresh water.

Reservation waters also contain large eelgrass meadows and habitat for numerous species of waterfowl, marine birds, and raptors (including bald eagle and peregrine falcon). Nonpoint source pollution can result in economic and cultural hardship by decreasing the health and abundance of fish, shellfish, and wildlife; cause harvest restrictions for shellfish beds relied on for commercial, ceremonial, and subsistence purposes; and affect human health through consumption of contaminated fish and shellfish. Because these water resources are vital for economic stability, growth, and the cultural and spiritual life of the community, the potential contamination of Lummi Nation surface waters by unlawful solid waste disposal practices has a direct, serious, and substantial effect on the health and welfare of the Lummi Nation, its members, and all persons present on the Reservation.

In addition, because of the geographic and hydrogeologic conditions in the area, ground water resources on the Reservation are vulnerable to pollution. Although there is an existing inter-tie with the City of Bellingham water supply system and a perpetual contractual relationship in place for up to 1.44 million gallons per day (MGD) of water from Bellingham, the Reservation aquifers are a critical source to meet the long term potable water demand on the Reservation. Over 95 percent of the residential water supply for the Reservation is currently pumped from local ground water wells. The contamination of the aquifers that

supply these wells would adversely affect the health of persons drinking or using water from these supplies. Ground water contamination could lead to the loss of the primary water supply source for the Reservation because contamination is expensive to treat, and some damages to ground water caused by contamination may preclude use of the resource.

1.4. Lummi Nation ISWMP Organization

The Lummi Nation Integrated Solid Waste Management Plan is organized into the following sections:

- Section 1 is this introductory section.
- Section 2 describes the physical characteristics, land use, and socioeconomic conditions of the Reservation.
- Section 3 describes the solid waste management administration and regulations that affect the Reservation.
- Section 4 discusses on-Reservation management of solid waste by characterizing the solid waste stream, projecting generation rates, describing the existing management system, identifying and evaluating management alternatives, and recommending a preferred alternative.
- Section 5 discusses on-Reservation management of recyclable materials by defining recycling principles, describing current and future recycling options on the Reservation, identifying and evaluating recycling alternatives, and recommending a preferred alternative.
- Section 6 describes the management of special and hazardous wastes on the Reservation and includes recommendations for these wastes.
- Section 7 describes composting alternatives and identifies recommendations for the Lummi Nation.
- Section 8 describes solid waste public education and outreach alternatives and recommendations.
- Section 9 presents the 10-year action plan and the 5-year implementation plan for this ISWMP.
- Section 10 presents a summary and conclusion.
- Section 11 is the list of references cited in this ISWMP.

The glossary, acronyms, and abbreviations used in this ISWMP and appendices follow Section 11.

2. DESCRIPTION OF THE LUMMI INDIAN RESERVATION

The Lummi Indian Reservation (Reservation) is located in northwest Washington State, approximately eight miles west of Bellingham, Washington (Figure 2.1). The Reservation is located along the western border of Whatcom County and at the southern extent of Georgia Strait and the northern extent of Puget Sound. Approximately 38 miles of highly productive marine shoreline surround the Reservation uplands on all but the north and northeast borders. The Reservation includes approximately 12,500 acres of uplands and 7,000 acres of tidelands. The Nooksack River drains a watershed of approximately 786 square miles, flows through the Reservation near the mouth of the river, and discharges to Bellingham Bay (and partially to Lummi Bay during high flows). The Reservation is comprised of a five-mile long peninsula (Lummi Peninsula), which separates Lummi Bay on the west and Bellingham Bay on the east; a northern upland area and the smaller Sandy Point peninsula that separates Georgia Strait on the west and Lummi Bay on the east; the floodplains and deltas of the Lummi River and the Nooksack River; Portage Island; and associated tidelands.

The climate, topography, geology, soils, surface and ground water resources, and land use affect and are affected by the management of solid waste on the Reservation. This section briefly describes each of these elements. More detailed descriptions can be found in the following documents: Lummi Nation Wellhead Protection Program (LWRD 2011b); Lummi Reservation Storm Water Management Program Technical Background Document (LWRD 2011a); Lummi Indian Reservation Wetland Management Program Technical Background Document (LWRD 2000); the Lummi Nation Nonpoint Source Management Plan (LWRD 2001), and the Lummi Nation Nonpoint Source Assessment Report (LWRD 2002).

2.1. Climate

The Pacific Northwest climate and ecology are largely shaped by the interactions that occur between seasonally varying precipitation patterns and the region's mountain ranges. Approximately 75 percent of the regions precipitation occurs in just half the year (October – April) when the Pacific Northwest is on the receiving end of the Pacific storm track. Based on climate data collected at the nearby Bellingham International Airport, the average annual precipitation on the Reservation is approximately 36 inches. On average, November, December, and January are the wettest months; June, July, and August are the driest months.

Temperature on the Reservation is relatively mild year round. Temperature data collected at the Bellingham Airport from 1949 – 2005 indicate that the warmest months are July and August. During these months the average maximum daily temperature is approximately 71 degrees Fahrenheit (°F). December and January are the coldest months when the average minimum daily temperatures are about 32°F. The growing season is “the portion of the year when soil temperature (measured 20 inches below the surface) is above biological zero (5°Celsius [C] or 41°F)”. May through September is the approximate growing season for agricultural crops in the area (Gillies 1998).

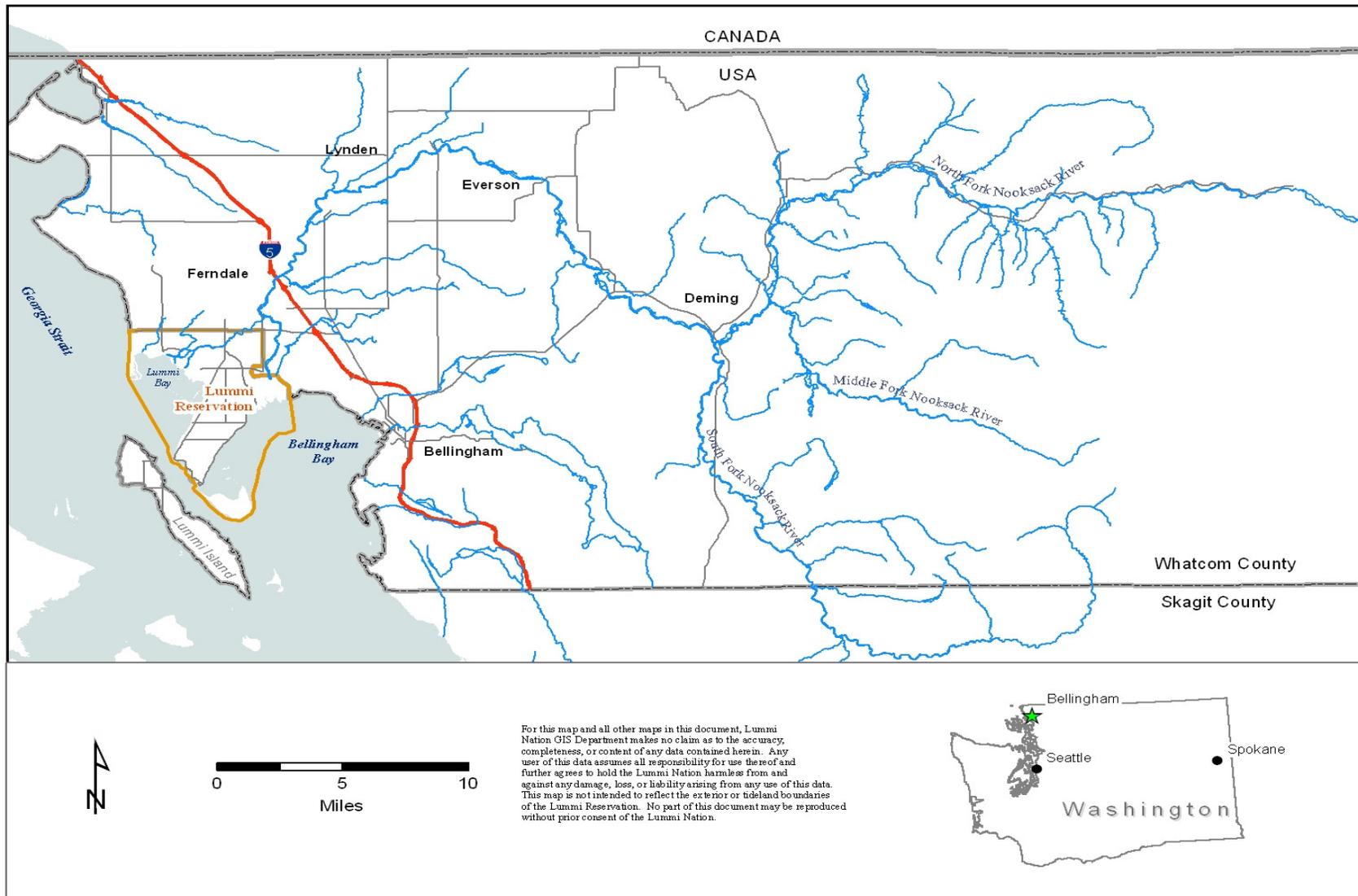


Figure 2.1 Regional Location of the Lummi Indian Reservation.

Wind data for Bellingham indicate that the prevailing wind direction on the Reservation is from the south and southeast with gusts upward of 80 miles per hour. Winds from the west are not as common and generally not as strong (U.S. Army Corps of Engineers 1997). Wind roses developed from meteorological data collected at two locations on the Reservation as part of a wind energy development feasibility assessment over the January 2011 through January 2012 period (DNV KEMA 2012) indicate that the wind direction is from the south-southeast or south about 50 percent of the time and from the north or northeast about 15 percent of the time.

The Reservation experiences a variety of infrequent weather patterns. A typical but infrequent weather pattern is generated from the northeast by cold air masses moving down the Fraser River valley. Strong winds from this pattern, blowing across the Fraser and Nooksack river basins, have caused damage to the residents and businesses of the Reservation (USDA 1992). Another typical but infrequent weather pattern involves continental air masses from the east that bring unusually dry weather that can last a few days or weeks (USDA 1992). During the summer, these air masses bring unusually warm temperatures (mid to upper 90s Fahrenheit). During the winter, these air masses usually bring cold temperatures (0°F and colder).

2.2. Topography

The Lummi Indian Reservation is comprised of two relatively large upland areas, a smaller upland area on Portage Island, and the two distinct lowland areas (the floodplains) of the Lummi and Nooksack rivers and the Sandy Point Peninsula as shown in Figure 2.2. The maximum elevation of the northwestern upland area of the Reservation is about 216 feet above the North American Vertical Datum 1988 (ft NAVD88). The southern upland area is the Lummi Peninsula with a maximum elevation of about 178 ft NAVD88. The floodplain of the Lummi and Nooksack rivers, with an average elevation of approximately 10 ft NAVD88, lies between the northern and southern upland areas. The Nooksack River and the Nooksack River delta are located along the northeastern extent of the Reservation. The Sandy Point Peninsula lies to the southwest of the northwestern upland. Portage Island lies at the southeastern tip of the Lummi Peninsula and has a maximum elevation of approximately 209 feet NAVD88.

The upland and lowland areas of the Reservation total about 12,500 acres; the associated Reservation tidelands total approximately 7,000 acres. Individual tribal members or the Lummi Indian Business Council (LIBC) own more than 75 percent of the upland area; 100 percent of the tideland areas are held in trust by the United States for the Lummi Nation.

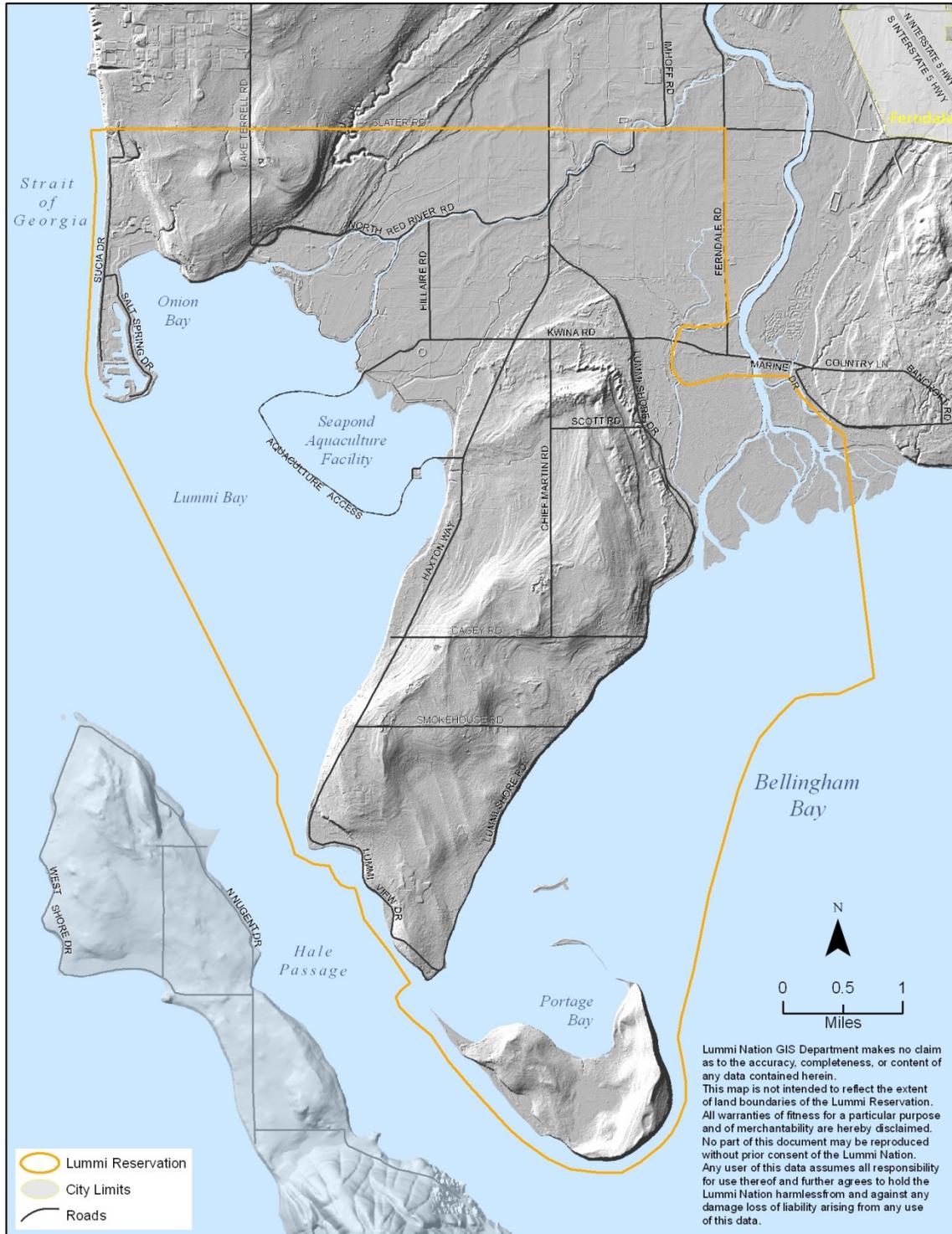


Figure 2.2 Topography of the Lummi Reservation and Adjacent Areas

2.3. Geology

The Reservation is underlain by unconsolidated sediments deposited as glacial outwash, glaciomarine drift, glacial till, and floodplain or delta deposits of Quaternary age (Washburn 1957). During the Pleistocene, the sea level rose and fell dramatically as the climate changed and the earth's crust warped. Inundation by seawater caused the glaciers to float and deposit layers of clay, silt, sand, gravel, and boulders. After the glacier receded, the Nooksack River occupied an old channel formed by the glacial melt-water and began depositing material on either side of the Lummi Peninsula (then an island). As the river delta grew, it connected the Lummi Peninsula to the mainland.

The sediment units that occur on the Reservation, as described by Cline (1974) and Easterbrook (1976) in order from youngest to oldest, are summarized below.

- **Alluvium:** The alluvium is derived from sediment carried by the Lummi and Nooksack rivers and deposited on the floodplain. It is comprised mostly of clay, silt, sand, and some gravel.
- **Beach Deposits:** The beach deposits are laid by littoral drift processes. The deposits are mostly sand with some gravel and occur mainly at the western part of the Reservation from Neptune Beach to Sandy Point and at Gooseberry Point.
- **Older Alluvium:** The older alluvium was deposited by the Lummi River and Nooksack Rivers when the valley floor was relatively higher than at present. The unit consists mostly of fine sand with some silt and clay located on stream terraces flanking the uplands above the floodplain. These deposits occur along the southeast flank of the Mountain View Upland and the northeast flank of the Lummi Peninsula.
- **Gravel:** A thin unsaturated gravel unit is exposed at the surface at several locations on the Reservation. The unit consists of gravel and sand/gravel. In places, this unit appears to have been reworked by beach processes during post-glacial uplift and overlies glaciomarine drift.
- **Glaciomarine Drift:** The Glaciomarine Drift unit was deposited late in the Fraser Glaciation (from about 20,000 years ago to about 10,000 years ago [Easterbrook 1973]). The drift is comprised of unsorted clay, silt, sand, gravel, and some cobbles and boulders. The deposits include both Kulshan and Bellingham drifts.
- **Glacial Till:** The glacial till from the Vashon Stade of the Fraser Glaciation is comprised of poorly sorted clay, silt, sand, gravel, and some cobbles and boulders. Because the presence of till is noted in only a few well logs and has been observed at only a few locations along the Lummi Peninsula bluffs, the occurrence of till is believed to be limited.
- **Esperance Sand:** The Esperance Sand unit (Easterbrook 1976), formerly named Mountain View Sand and Gravel, is advance outwash comprised of stratified beds of sand and gravel with stratified lenses of sand. The unit overlies the Cherry Point Silt unit and underlies the glaciomarine drift and till; it is the major water-yielding unit beneath the Reservation.

- **Cherry Point Silt:** The Cherry Point Silt unit is the oldest known unconsolidated stratigraphic unit in the northern Puget Sound lowland. The unit is comprised of a thick sequence of blue to brownish gray stratified clay and silt with minor sandy beds.
- **Bedrock:** The bedrock underlying the Reservation consists mostly of sedimentary rocks such as sandstone, siltstone, shale, and conglomerate. The bedrock is deeply buried by unconsolidated glacial deposits.

2.4. Soils

Soil scientists have identified seventeen general soil units in Whatcom County, six of which are found on the Lummi Indian Reservation (Figure 2.3). The United States Department of Agriculture (USDA) – Natural Resource Conservation Service (NRCS) has further identified and described forty different soil types on the Reservation from the general soil units (USDA 1992). The eight general soil units are:

Mt. Vernon-Puyallup: Very deep, moderately well drained, nearly level soils; located on river terraces and floodplains covered with shrubs or conifers.

Eliza-Tacoma: Very deep, very poorly drained, level soils that generally have been artificially drained; located on floodplains, deltas, and tidal flats lower than 20 feet of elevation.

Kickerville-Barston-Everett: Very deep, well drained and somewhat excessively drained, level to very steep soils; located on outwash terraces and glacial moraines.

Lynden-Hale-Tromp: Very deep, well drained to somewhat poorly drained, level to generally sloping soils; located on outwash terraces at 50 to 300 hundred feet in elevation.

Whatcom-Labounty: Very deep, moderately well drained and poorly drained, level to very steep soils; located dominantly on glaciomarine drift.

Birchbay-Whitehorn: Very deep, moderately well drained and poorly drained, level to gently sloping soils; located on glaciomarine drift plains.

Estuarine Unit: Very deep, poorly drained, level, located on tidal flats.

Unstable Soil Unit: Moderately deep to very deep, well drained soils, very steep slopes, located on mountainsides, canyonsides, and ridges.

As part of the characterization, each soil type was assigned to one of four hydrologic soil groups based on their runoff-producing characteristics (USDA 1992). The hydrologic soil group, along with the cover type, drainage area, channel length, and land slope, can be used in the USDA Curve Number Method (USDA 1970) to estimate runoff volumes, peak discharge, and hydrographs for specified storms. The primary consideration in assigning a soil to a hydrologic soil group is the inherent infiltration capacity of the soil with no vegetation (USDA 1992). The hydrologic soil groups, which are labeled A, B, C, or D are described in Table 2.1. In essence, Group A soils have a low runoff potential and a high infiltration potential whereas Group D soils have a high runoff potential and a low infiltration potential.

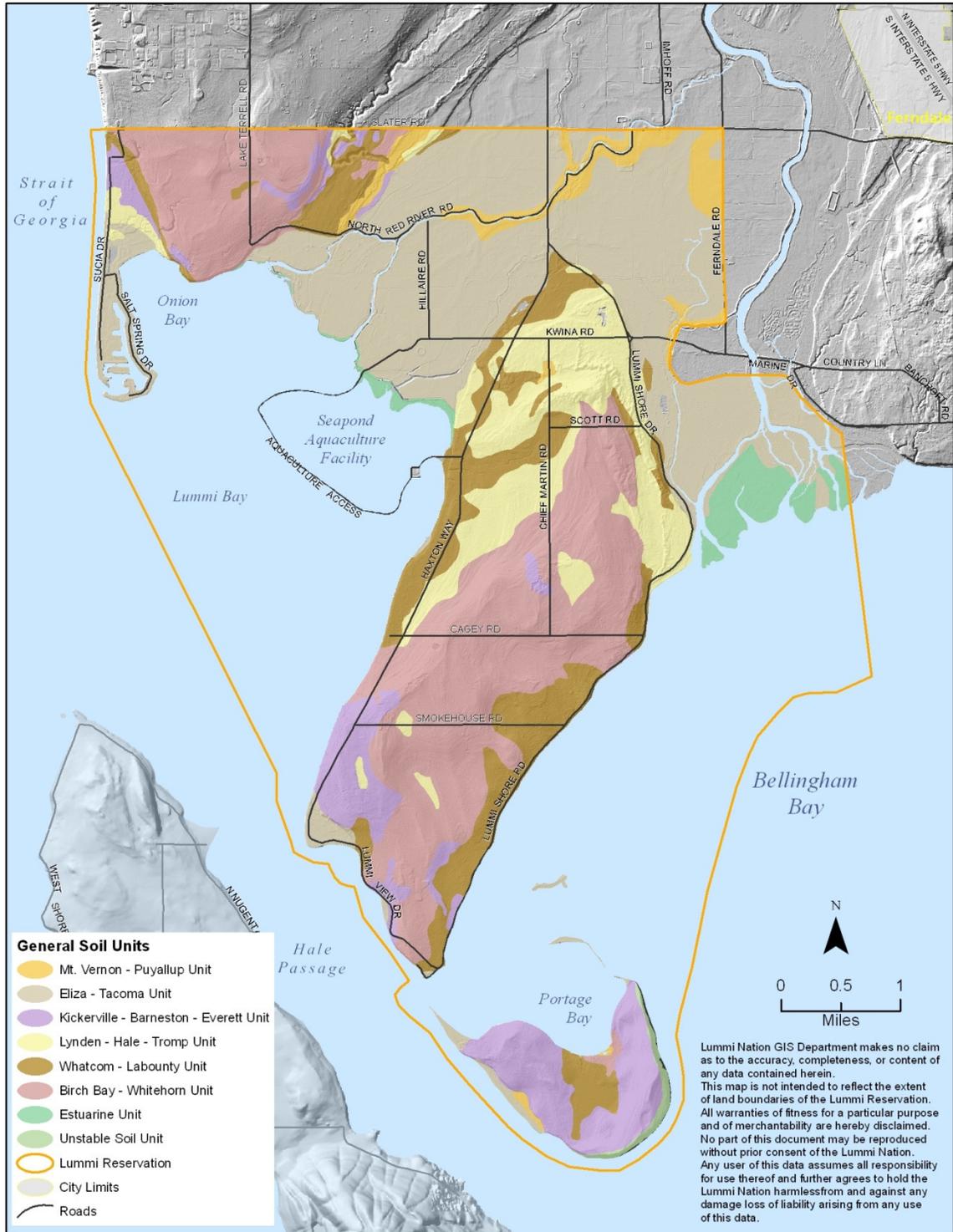


Figure 2.3 Reservation Soils

Table 2.1 Descriptions of Hydrologic Soil Groups of the Reservation Watersheds

Hydrologic Soil Group	Description²	Percent of Reservation Soils
A	Soils having high infiltration rates even when thoroughly wetted, consisting chiefly of deep (3 to 6+ ft), well to excessively drained sands (loamy sands, sandy loam, and sands) and/or gravel. These soils have a high rate of water transmission and a low runoff potential.	2.0
B	Soils having moderate infiltration rates when thoroughly wetted; consisting chiefly of moderately deep (20+ inches) and moderately well to well drained soils with moderately fine to moderately coarse textures (loam, silt loam). These soils have a moderate rate of water transmission and a moderately low runoff potential.	7.5
C	Soils having slow infiltration rates when thoroughly wetted; consisting chiefly of: 1) soils with a layer that impedes the downward movement of water, and 2) soils with moderately fine to fine texture (sandy clay loam) and slow infiltration rates. These soils have a slow rate of water transmission and a moderately high runoff potential.	45.3
D	Soils having slow infiltration rates when thoroughly wetted; consisting chiefly of: 1) clay soils with high swelling potential, 2) soils with a high permanent water table, 3) soils with clay pan or clay layer at or near the surface, and 4) shallow soils over nearly impervious materials. These soils have a very slow rate of water transmission and a high runoff potential.	45.2

¹Not including the off-Reservation extents of Watershed S (Nooksack River watershed)

² USDA 1992

2.5. Reservation Watersheds

Reservation watersheds were initially delineated and mapped during the development of the 1998 Lummi Reservation Storm Water Management Program (SWMP) Technical Background Document based on available 7.5 minute quadrangle mapping with a 20-foot contour interval and field observations (LWRD 2011a). The watershed boundary map developed as part of the SWMP is a working map that was intended to change as new information is acquired. The initial map was first modified to account for field observations made during the field verification element of the comprehensive wetland inventory of the Reservation (Harper 1999; LWRD 2000). During 2010 the watershed delineation map was modified to incorporate the results of a Light Detection and Ranging (LiDAR) data collection effort (LWRD 2011a) and the resultant digital elevation models of the Reservation and the areas adjacent to the Reservation (Figure 2.4).

Alphabetic letters A through S identified the Reservation watersheds that resulted from the initial evaluation. The watershed delineations that resulted from the LiDAR based digital elevation models resulted in the incorporation of two of the initial watersheds (Watershed N and Watershed M) into other watersheds (Figure 2.4). It is anticipated that names will be assigned to each watershed over time. Seventeen watersheds drain the Reservation uplands into Lummi and Bellingham bays, Hale Passage, and Georgia Strait. The watersheds vary in size from 134 acres up to 4,097 acres not including the Nooksack River watershed. The Nooksack River discharges to Reservation tidelands, but most of the approximately 786 square mile (503,040 acres) Nooksack River watershed is upstream of the Reservation. Seven of the watersheds originate off-Reservation and the remaining ten occur entirely within the Reservation.

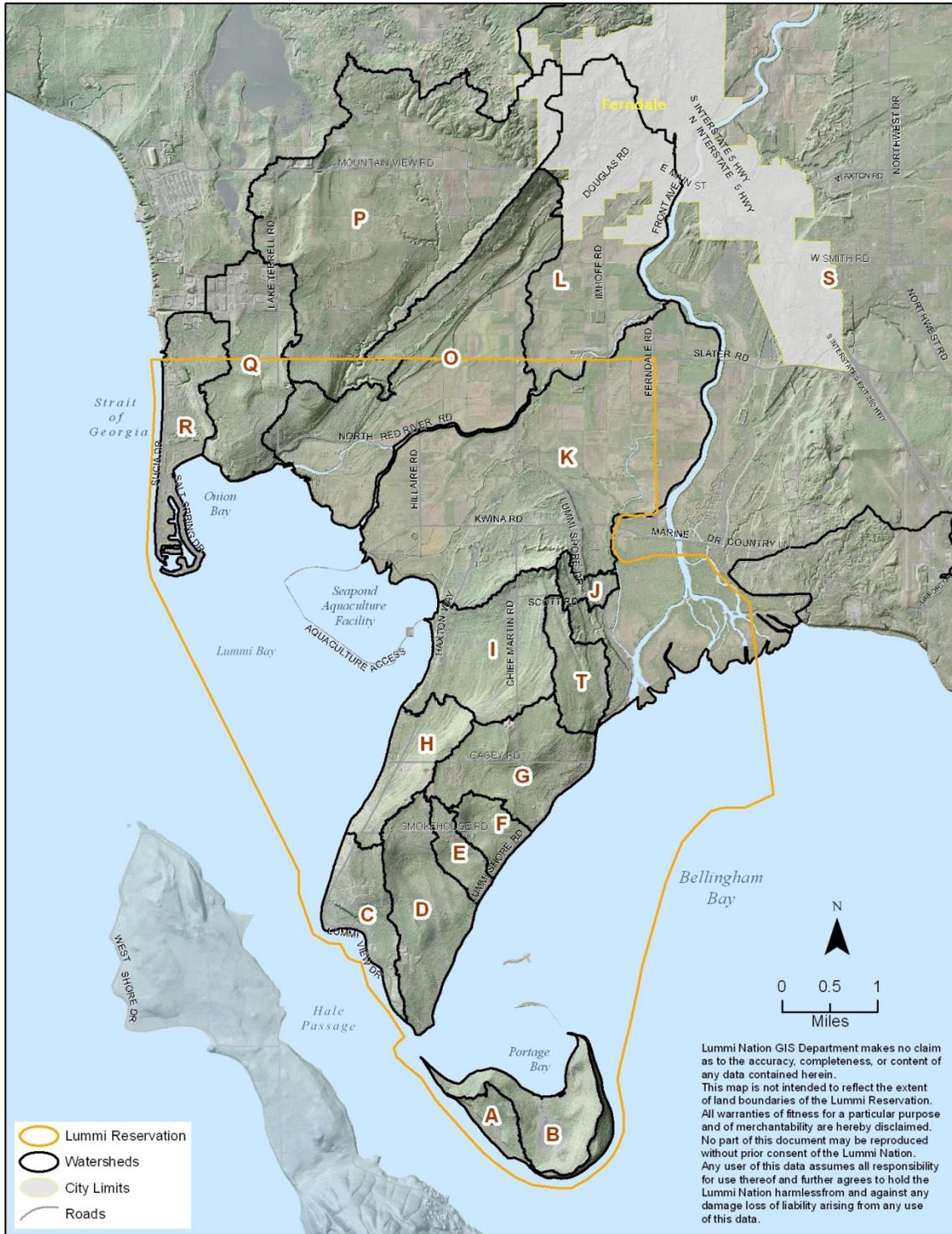


Figure 2.4 Lummi Indian Reservation Watersheds from the 2010 Delineation

2.6. Surface Water Resources

The Lummi Nation is the largest fishing tribe in the Puget Sound in terms of pounds of fish landed and number of species fished (NWIFC 2012), and has relied on their water resources since time immemorial for ceremonial, subsistence, and commercial purposes. Surface waters in the study area include the Nooksack River, the Lummi River, sloughs, small streams, roadside and agricultural ditches, springs, wetlands, estuaries, and marine waters. There are approximately 38 miles of marine shoreline surrounding the Reservation (except along portions of the east boundary and the northern boundary). The associated tidelands extend from the Georgia Strait to Lummi Bay, Hale Passage, Portage Bay, and Bellingham Bay. In addition to marine waters, there are approximately 24.4 miles of rivers, streams, sloughs, and drainages on the Reservation including the multiple distributary channels of the Nooksack River delta (Figure 2.5). There are no lakes on the Reservation, but there are approximately 13 ponds. Finfish and shellfish spawn, incubate, and grow within and adjacent to Lummi Nation Waters (LNR 2010).

2.6.1. Rivers, Sloughs, Streams, and Ditches

The Nooksack River drains most of western Whatcom County and currently flows through the Reservation and discharges into the marine water of Bellingham Bay near the eastern extent of the Reservation. The Nooksack River reach located on the Reservation is tidally influenced. Streamside levees are in place to protect adjacent lands from flooding and agricultural lands from saline water. Several named sloughs, which are the remains of former river channels, have been incorporated into the agricultural drainage network built on the floodplain of the Lummi and Nooksack rivers.

The Lummi River currently carries storm water runoff from the Ferndale upland as well as the drainage from a complex network of agricultural ditches in the floodplain. Tidal waters enter the Lummi River from Lummi Bay twice daily and during the late dry season saline water extends upstream to at least Slater Road. Although Nooksack River water currently flows through a collapsed four-foot diameter culvert into the Lummi River channel only during high-flow events (greater than approximately 9,600 cfs), available data indicate that the Lummi River flow was around 200 cfs as recently as June 1955 (WSDC 1964), when a 5-foot culvert allowed fresh water to flow from the Nooksack River into the Lummi River channel (Deardorff 1992).

There are several mapped and previously unmapped streams on the Reservation. Most of the unmapped streams have poorly defined channels and contain surface flow only during the October through May period (wet season). The approximate locations of these streams were identified as part of the inventory of storm water facilities. No flow conditions were observed in all of the streams during a field survey of all Reservation streams in late August 1996.

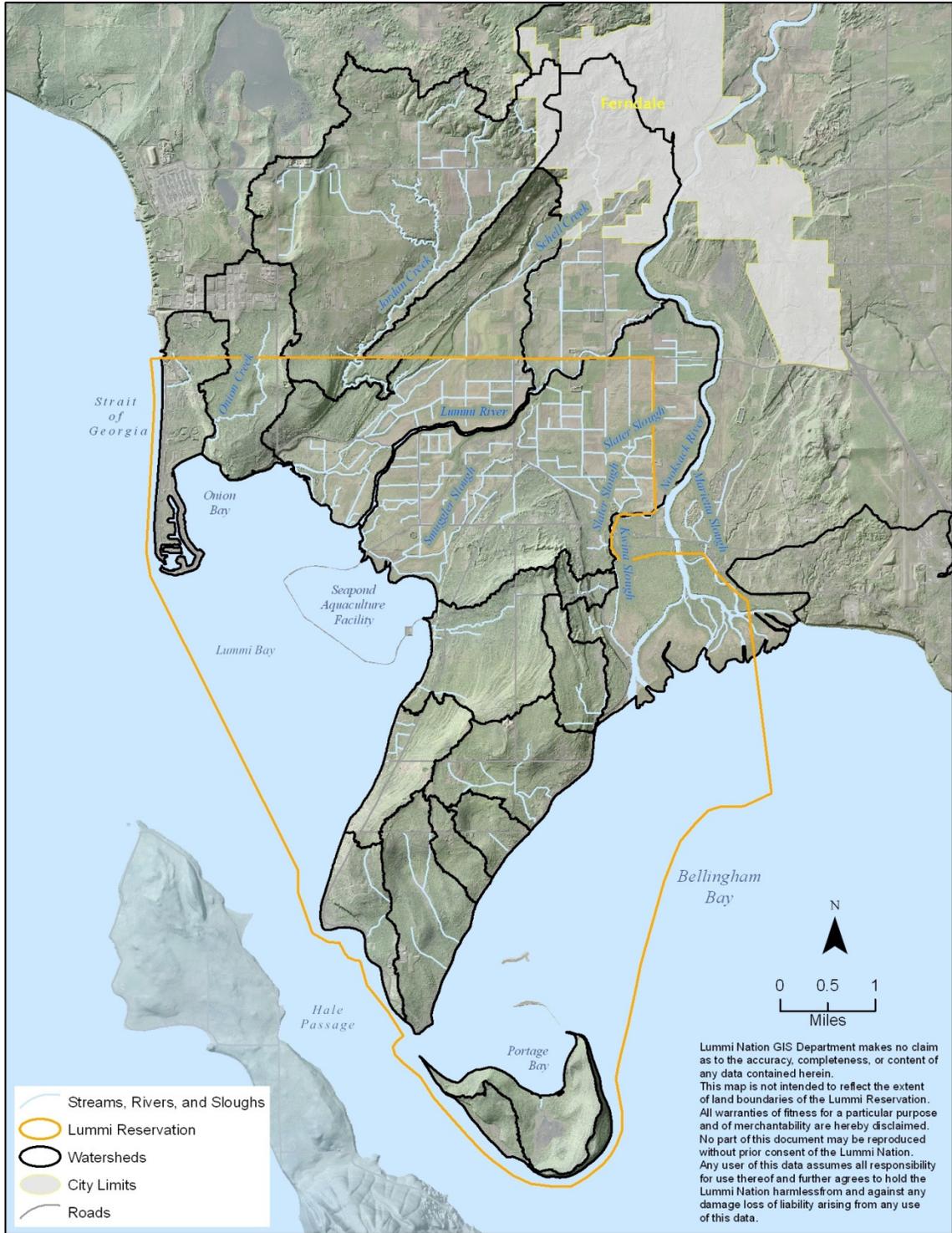


Figure 2.5 Reservation Watersheds, Streams, Rivers, and Sloughs

2.6.2. Springs and Wetlands

Upland springs are found throughout the Reservation and are commonly ground water discharge zones for shallow, perched aquifers. A seep or spring occurs if the land surface intercepts the aquifer, and wetlands may occur at the seep or spring if conditions are favorable (e.g., clayey soils, shallow slope). In addition to upland springs, springs occur along the shoreline or below the ordinary high water line (vegetation line) at numerous locations on the Reservation.

Historically, springs emerging in the uplands served as a water supply for the Lummi people. In many cases, the springs are part of a wetland system in which the water reinfilters along the lower terraces to return to ground water. The springs are important for wildlife habitat and for aquifer recharge and protection. Upland aquifers, which provide the primary Reservation drinking water supply as well as water for salmon egg incubation and rearing in the hatchery program, have experienced depletion and saltwater intrusion. Where it occurs, the infiltration of fresh water above the shorelines provides a buffer against saltwater intrusion.

The 1999 comprehensive inventory of Reservation wetlands (Harper 1999, LWRD 2000) indicated that approximately 43 percent of the Reservation land area is either wetlands or wetland complexes. Wetland complexes are areas where wetlands and uplands form a highly interspersed mosaic. During the wetland inventory, boundaries were drawn around the outer edges of the mosaic of upland and wetland areas and the entire area was labeled as a “wetland complex”. Consequently, the estimated total wetland area identified in the inventory represents more wetland area than actually exists. Approximately 60 percent of the floodplain on the Reservation was classified as wetlands or wetland complexes (Lynch 2001). An update to the 1999 wetlands inventory is currently underway. The update includes using Global Positioning System (GPS) technology to refine the locations and extent of all wetlands on the Reservation and the collection of additional information on the functions and classifications of these wetlands. As of December 31, 2012 approximately 241 wetlands and 3,217 acres of wetland area have been evaluated as part of the update to the 1999 wetland inventory (LWRD 2013). Figure 2.6 presents the results of the 1999 wetland inventory as currently updated by the ongoing GPS-based wetland inventory.

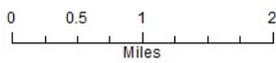
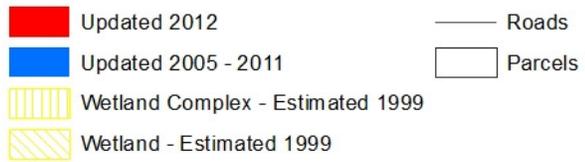
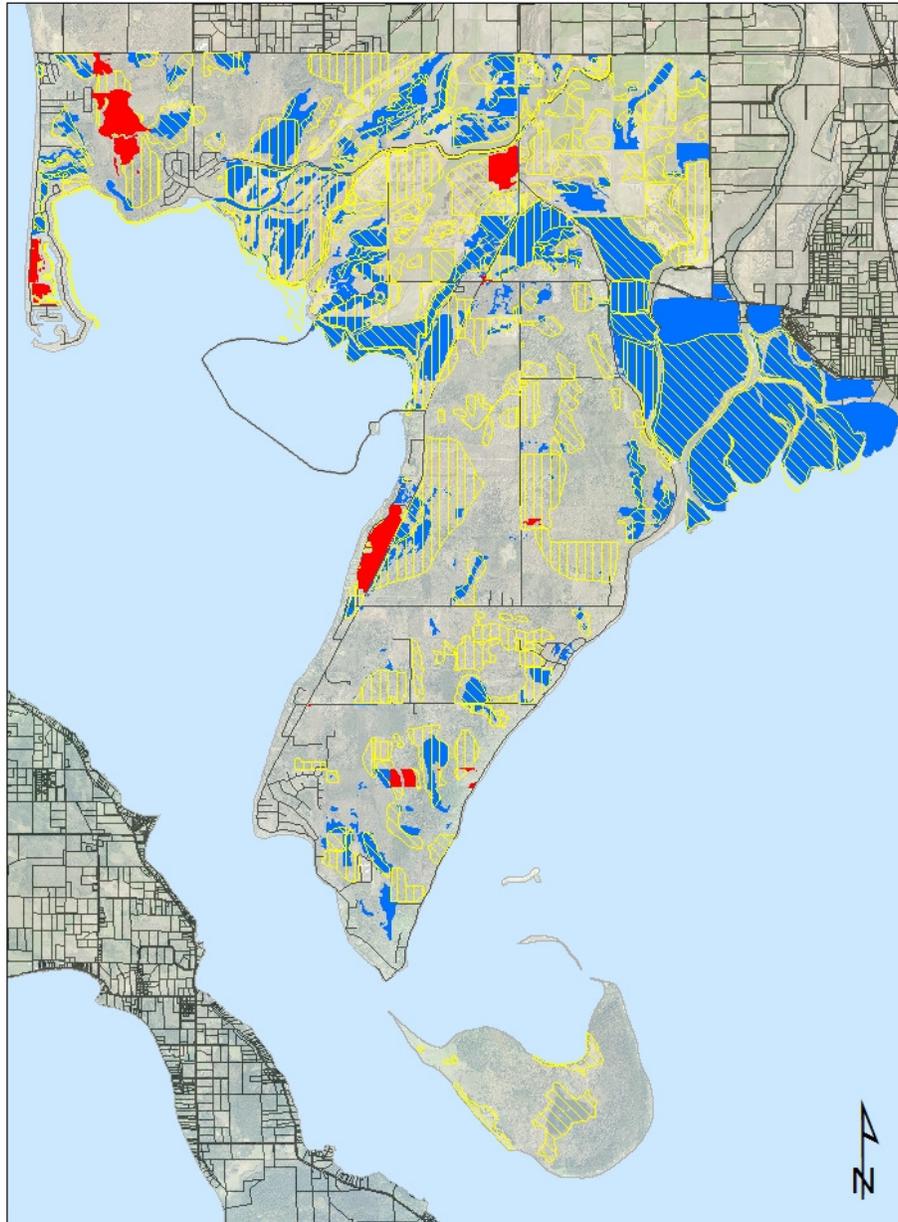
Most of the once extensive floodplain wetlands of the Lummi and Nooksack rivers have been diked, drained, filled, and cultivated since the late 1800s. Low areas near some of the sloughs still reflect the rich and complex wetland habitat that likely covered most of the lower floodplain before human alteration. Small estuarine wetlands lie in sheltered, low energy areas at Onion Bay, Neptune Beach, Portage Island, the Lummi River floodplain, the Nooksack River delta, and adjacent to the Seaponds Aquaculture Facility dike. Road construction and agricultural activity have altered the wetlands that are north of Marine Drive and adjacent to the Nooksack River. South of Marine Drive, many of the wetlands in the Nooksack River delta have been physically altered by the accumulation of sediment deposited by the Nooksack River as it discharged to the marine waters of Bellingham Bay. The Nooksack River delta was identified as the fastest growing delta relative to its basin size in Puget Sound, with a progradation of approximately one mile over the 1888-1973 period (Bortleson et al. 1980). Consequently, a large area that was once intertidal is now supratidal

and new wetlands have been formed. In addition to the delta progradation, the wetlands of the Nooksack River delta are likely affected by the low instream flows and poor water quality that characterizes the river during some summer months.

The majority of the estuarine wetlands of the Lummi and Nooksack rivers will be protected and functionally improved in the future through the implementation of the Lummi Nation Wetland and Habitat Mitigation Bank. The mitigation bank will be developed in phases. Phase 1A, which encompasses most of the Nooksack River estuary, became operational during 2012. The area will be protected into perpetuity through a conservation easement and enhancement measures like invasive species control and under planting with conifers will improve the ecological functions of the estuary. The mitigation bank will be used to mitigate unavoidable impacts to habitat and wetlands on the Reservation, but credits will also be available to buyers in the service area surrounding the Reservation (LWRD 2008).

Remnants of what were once extensive high-value wetlands are located on the Sandy Point Peninsula between Sucia Drive and the private Sandy Point marina. The private Sandy Point marina and its associated canal system were excavated in the 1960s from uplands that were periodically inundated by marine waters. Road construction, dense residential development and associated shore defense works, and drainage facilities now limit tidal inundation, but wildlife and wetland vegetation is abundant. Plants of traditional cultural significance have been identified in this area. Further north along Sucia Drive, formerly dry and seasonally wet areas are now permanently flooded as a result of road construction that blocked natural drainage.

These palustrine/estuarine emergent wetlands of the lowlands/floodplains are significant for storm water attenuation, floodwater storage, water quality enhancement, fish habitat, wildlife habitat, and for plants with traditional cultural importance. The estuarine wetlands provide critical rearing habitat for migrating salmon, herring, smelt, and other finfish and shellfish. The significance of these wetlands is increasing as wetlands upstream from the Reservation are altered and destroyed. These Reservation wetlands reduce the water quality impacts of land uses on Lummi commercial, ceremonial, and subsistence shellfish beds in Portage and Lummi bays. Protecting and enhancing floodplain and estuarine wetlands is essential to preserving and/or restoring interdependent fish, shellfish, and wildlife habitats in addition to reducing flood damage.



Lummi Nation makes no claim as to the accuracy, completeness, or content of any data contained herein. This map is not intended to reflect the extent of land boundaries of the Lummi Reservation. All warranties of fitness for a particular purpose and of merchantability are hereby disclaimed.

Figure 2.6 Reservation Wetland Areas

2.6.3. Marine and Estuarine Waters

Brackish estuarine waters grade to marine waters of the Reservation in Lummi Bay, Portage Bay, portions of Bellingham Bay and Hale Passage, and the shoreline along Georgia Strait. Saline water moves across tideflats and into the Lummi and Nooksack river channels twice daily with the tidal cycle. The salt water underlies the less dense fresh water and moves as a wedge upstream. Salt water has been observed upstream as far as Slater Road in the Lummi River but has not been observed along Marine Drive in the Nooksack River. Tidal effects on the water level (backwater effects) in the Nooksack and Lummi rivers have been observed even further upstream and possibly occur as far upstream as Ferndale during certain flow and tidal conditions.

Estuarine waters of the Nooksack and Lummi river deltas form the interface between marine and fresh water. Estuarine waters are important habitat for juvenile and adult salmon as they acclimate to either saline or fresh waters during their seaward and landward/spawning grounds migrations, respectively. Estuaries also serve as habitat for juvenile and adult individuals of many other important aquatic species (LNR 2010).

The complex and rich aquatic resources that provide feeding grounds for fish also attract a large variety of wildlife. The estuaries of the Lummi and Nooksack rivers are a part of the Pacific Coast flyway for ducks, geese, swans, and shorebirds. These estuaries are also habitat for peregrine falcon and bald eagle; both formerly listed species under the Endangered Species Act (ESA). Estuarine wetland ecosystems in general, including saltwater marshes, are considered among the most productive (in biomass production per unit area) natural ecosystems on earth. In addition to providing rearing habitat for juvenile salmonids and other species, these ecosystems export a large amount of biomass to estuaries. This biomass can form a large portion, sometimes the majority, of the base of the estuarine food web (Mitsch and Gosselink 1993). Small estuarine marshes in Lummi Bay also occur in sheltered fringes of diked areas.

Lummi Bay tideflats are extensive and rich in resources for tribal commercial, subsistence, and ceremonial purposes and as feeding areas for wildlife. Less extensive tideflats at Gooseberry Point, the Stommish Grounds, and Portage Bay are also important to the tribal economy and culture. The Lummi Intertidal Baseline Inventory (LIBI) was completed in 2010 in order to document the existing diversity, abundance, distribution, and habitats of the biological resources that are found on the Reservation tidelands. The LIBI integrates the results from six surveys that were conducted in 2008 and 2009 with compatible pre-existing information. Over 242 separate taxa were documented on the Reservation during the LIBI (LNR 2010).

2.7. Ground Water Resources

Ground water in Reservation aquifers is obtained primarily from outwash deposits of sand and gravel in the unconsolidated glacial sediments, which are recharged by local precipitation. Glaciomarine drift is at or near the ground surface over much of the upland areas on the Reservation. The glaciomarine drift overlays the outwash deposits and contains substantial amounts of clay. This clay restricts the recharge to the underlying aquifer and promotes storm water runoff.

Two (apparently separate) potable ground water systems occur on the Reservation. One system is located in the northern upland area (Figure 2.7). This northern system appears to flow onto the Reservation from the north and drains to the west, south, and east. The second potable ground-water system is located in the southern upland area of the Reservation (Lummi Peninsula) and is completely contained within the Reservation boundaries (LWRD 2011b). The floodplain of the Lummi and Nooksack rivers, which contains a surface aquifer that is saline (Cline 1974), separates the two potable water systems. A third potable water system may exist on Portage Island, but information on the water quality and the potential yield of this system is limited and inconclusive (LWRD 2011b).

In general, both the northern and southern ground water systems contain two aquifer types (Washburn 1957, Easterbrook 1976). The upper aquifer type is comprised primarily of lenses of sand or sand and gravel that are in or above the glaciomarine drift. These relatively permeable lenses are not continuous throughout the area. The lower aquifer layer is comprised of advance outwash sand and gravel. The thickness of the lower aquifer, which appears to be semi-confined in places and unconfined in other places, is not known. The pebbly clay in the drift sediments and scattered deposits of till greatly slow the downward percolation of water to the lower aquifer and may act locally as a confining layer.

Because the hydrogeologic conditions on the Reservation vary considerably over short distances, the precise locations of the aquifer recharge zones are not definitively known at this time. It is likely that aquifer recharge areas are distributed over the upland areas. However, given the low infiltration potential of the glaciomarine drift that covers much of the Reservation upland, it is also possible that aquifer recharge areas are of limited areal extent and are located primarily in only a few locations around the Reservation. Until information that is more precise is developed, all of the northern and southern upland areas on the Reservation are assumed to be aquifer recharge zones.

As a finite resource, ground water is one of the most important and critical of the Lummi Nation's resources. Over 95 percent of the residential water supply for the Reservation is pumped from local ground water wells. Reservation ground water resources are particularly vulnerable to pollution due to geographic and hydrogeologic conditions, which may be exacerbated by future growth and development on the Reservation. The Reservation is located in a coastal area along the inland marine waters of the Puget Sound and Georgia Strait. Most of the existing water supply wells on the Reservation are located within a half mile of marine waters. Progressive salt water intrusion already has led to the closure of several public water supply wells. Increased pumping, possible future reductions in ground water recharge areas as the forested uplands of the Reservation are converted to residential or municipal uses, and rapid economic and population growth could further threaten the Lummi Nation's ground water resources if such activities are not managed effectively.

Ground water resources are vulnerable to contamination by pollutants introduced on or near the ground surface by human activities (e.g., illegal solid or hazardous waste dumping). Agricultural, residential, municipal, commercial, and industrial land uses increase the

potential for ground water contamination. Ground water contamination could lead to the loss of the primary water supply source for the Reservation because water supply wells are difficult to replace, ground water contamination is very expensive to treat, and some damages to ground water caused by contamination may be impossible or unmitigable.

2.8. Land Use and Socioeconomic Conditions

Like most places, land use changes on the Reservation have been associated with changes in vegetation types, decreases in the areas covered by vegetation, changes in natural drainage patterns, and increases in impervious surfaces. With the arrival of Euro-Americans, forested land was logged, cleared, and drained for agriculture development, homes, municipal development, and commercial enterprises. Historic and current land uses in the Reservation watersheds and socioeconomic conditions on the Reservation are described below. Much of the information about historic land uses and socioeconomic conditions comes from the *Lummi Nation Comprehensive Environmental Land Use Plan: Background Document* (LIBC 1996).

2.8.1. Historic Land Use

Before the arrival of Euro-Americans, the Lummi people were a fishing, hunting, and gathering society. Based on the accounts of Lummi Elders, early European explorers, and early photographs of the region, before 1850 old-growth forests of massive Douglas fir, western hemlock, spruce, and western red cedar dominated what was to become the Lummi Reservation. Deciduous trees such as western big leaf maple, black cottonwood, red alder, and western paper birch were also likely present along the rivers, streams, and open areas. Understory vegetation probably included vine maple, Oregon grape, several different willows, ocean spray, salmon berry, thimbleberry, soapberry, and many others. Wetlands, streams, and rivers supported a unique array of plants adapted to wet environments. The marine shoreline was also a unique environment, where only plants adapted to a saltwater-influenced environment thrived.

The forces that shaped vegetation patterns in the Northwest before the arrival of Euro-Americans were forest succession, fires, windstorms, ice storms, floods, and traditional use of natural vegetation by the indigenous peoples. Native American uses of vegetation included the gathering of medicinal plants, the use of willows and other shrubs for fishing, and the extensive use of western red cedar trees for many things, including clothing, baskets, buildings, and canoes. Many plants were also sources of food to complement the traditional diet of fish, shellfish, elk, and deer. Native Americans cultivated some of these plants, such as ferns, camas, and wapato, in prairies along the Nooksack River.

Similar to most areas in the lower Nooksack River watershed downstream from Everson, conversion of forestland to agricultural land occurred on the Lummi Reservation following the arrival of Euro-Americans. In 1896, approximately 1,222 acres were reportedly under cultivation on the Reservation. Along with clearing the forested land for agriculture, Euro-Americans constructed ditches, drained wetland areas, cleared logjams, diverted the Nooksack River to drain into Bellingham Bay, built a levee that cut off the Lummi River delta from the Nooksack River, and built a seawall along Lummi Bay. These changes in the natural hydrology of the Lummi Reservation changed the distribution and patterns of

watercourses and of wetland- and riparian-associated plant communities. Figure 2.5 shows the extent of the agricultural drainage network on the Reservation in the Lummi and Nooksack river floodplain.

Much of the cedar on the Reservation was cut into shingle bolts and shipped to local shingle mills. The old-growth trees on Portage Island were cut down to fuel steamboats traveling the Nooksack River. One or more large fires swept through the Reservation area between 1850 and 1900. These fires destroyed nearly all of the remaining old growth forests. Since reforestation was not practiced during the early logging period and did not begin until approximately 1980, pioneer tree species, such as alder, willows, and cottonwoods, soon replaced the conifer forests and dominated the landscape (Leckman 1990).

Historically, the Nooksack River flowed (alternately or simultaneously) to both Lummi and Bellingham bays (effectively making the Lummi Peninsula an “island”). Before 1860, the Nooksack River discharged primarily into Lummi Bay by way of the present Lummi River channel, with smaller distributaries flowing into Bellingham Bay (WSDC 1960; Deardorff 1992). In 1860 a logjam blocked the Nooksack River near present day Ferndale and diverted it to a small stream that flowed into Bellingham Bay (WSDC 1960). Since that time, considerable effort has been expended to keep the Nooksack River discharging into Bellingham Bay because of the increased commercial value of the river that resulted from its proximity to sawmills along Bellingham Bay (Deardorff 1992). Until the early 1900s, the Nooksack River was also the primary transportation corridor to as far upstream as present day Lynden. The water body remaining in the old channel of the Nooksack River has been called the Lummi River or the Red River (WSDC 1960).

In the 1920s, a reclamation project was initiated both to construct a dike/seawall to keep back the sea along the shore of Lummi Bay and to construct a levee along the west side of the Nooksack River (Deardorff 1992). This project, which was started in 1926 and completed in 1934, initially resulted in the nearly complete separation of the Lummi River from the Nooksack River. However, when saltwater intrusion onto the newly reclaimed farmlands and damage to the dam at the head of the Lummi River occurred during flooding, the dam was replaced with a dam and spillway structure (Deardorff 1992). This spillway structure was also damaged over the years during high-flow conditions and was replaced in 1951 by a five-foot-diameter culvert (FEMA 2004) that allowed flow from the Nooksack River into the Lummi River. Currently a partially collapsed four-foot diameter culvert (Deardorff 1992) allows flow to the Lummi River only during relatively high-flow conditions (approximately 9,600 cfs). Levees were also constructed along the Lummi River to prevent saltwater from Lummi Bay from flowing onto adjacent farmlands during higher tides. The dike and levee construction activities were accompanied by agricultural ditching to drain fields and wetland areas. Based on 1887-88 topographic surveys, Bortleson et al. (1980) estimated that wetlands located landward of the general saltwater shoreline in the lower Lummi River watershed have decreased from approximately 2.0 square miles to 0.1 square miles (approximately 95 percent) over the 1888-1973 period.

Between 1920 and 1960 several new public roads providing access to Ferndale and Bellingham as well as a toll ferry to Lummi Island were constructed and led to an increase in development on the Reservation. Since 1960 there has been a significant increase in the total

population on the Reservation and the number of tribal members living on the Reservation. The increase in the number of enrolled Lummi tribal members living on the Reservation has been attributed to improved economic conditions within the community, the beginning of tribal self-governance, the increased rate of house construction, and a renewed sense of Lummi cultural identity.

2.8.2. Current Land Use

Over the last century, the increase in population, the construction of extensive road networks, development of wastewater collection and treatment systems, the construction of the Sandy Point Marina, and several Tribal housing projects have fostered a trend towards higher density neighborhoods throughout the Reservation. Several distinct residential neighborhoods now exist, mainly along the shores of the Reservation including Sandy Point, Neptune Beach, Sandy Point Heights, and Gooseberry Point. Higher density residential neighborhoods can also be accessed from the numerous spur roads along Haxton Way and Lummi Shore Road, which are the primary roads along the perimeter of the Lummi Peninsula. Although increased residential and commercial development has occurred on the Reservation in the last few decades, the majority of the Reservation remains rural.

The approximation of the current land cover and land use in the Reservation watersheds is shown in Figure 2.8. This map was derived from the 2006 National Oceanic and Atmospheric Administration (NOAA) database, Classification of Coastal Washington, which is part of the Coastal Change Analysis Program (C-CAP) of the NOAA Coastal Services Center (NOAA 2006). The map gives an overview of the extent of forest and agricultural lands, residential areas, and wetlands in these watersheds. The estimated distribution of land cover/land use types within the Reservation boundaries is summarized in Table 2.2.

Table 2.2 Current Land Cover/Land Use Types on the Lummi Reservation

Land Cover/Land Use	Percent of Area ¹
Residential	2.59
Forest	20.88
Scrub-Shrub	47.79
Wetlands	3.46
Cultivated Land/Grassland	25.28

¹ Does not include the off-Reservation portions of the Lummi Watersheds or tribal tidelands

The majority of the forested areas are on the Lummi Peninsula, Portage Island, and the Northwest Uplands. Although there are some conifer groves and Douglas fir plantations, the 2007 inventory of Reservation forests showed that present day forests are largely comprised of deciduous trees, with some mixed deciduous/conifer stands (International Forestry Consultants, Inc. 2007).

The floodplains of the Lummi and Nooksack Rivers are sparsely developed. The most important commercial enterprise in the floodplains is the Silver Reef Hotel, Casino & Spa

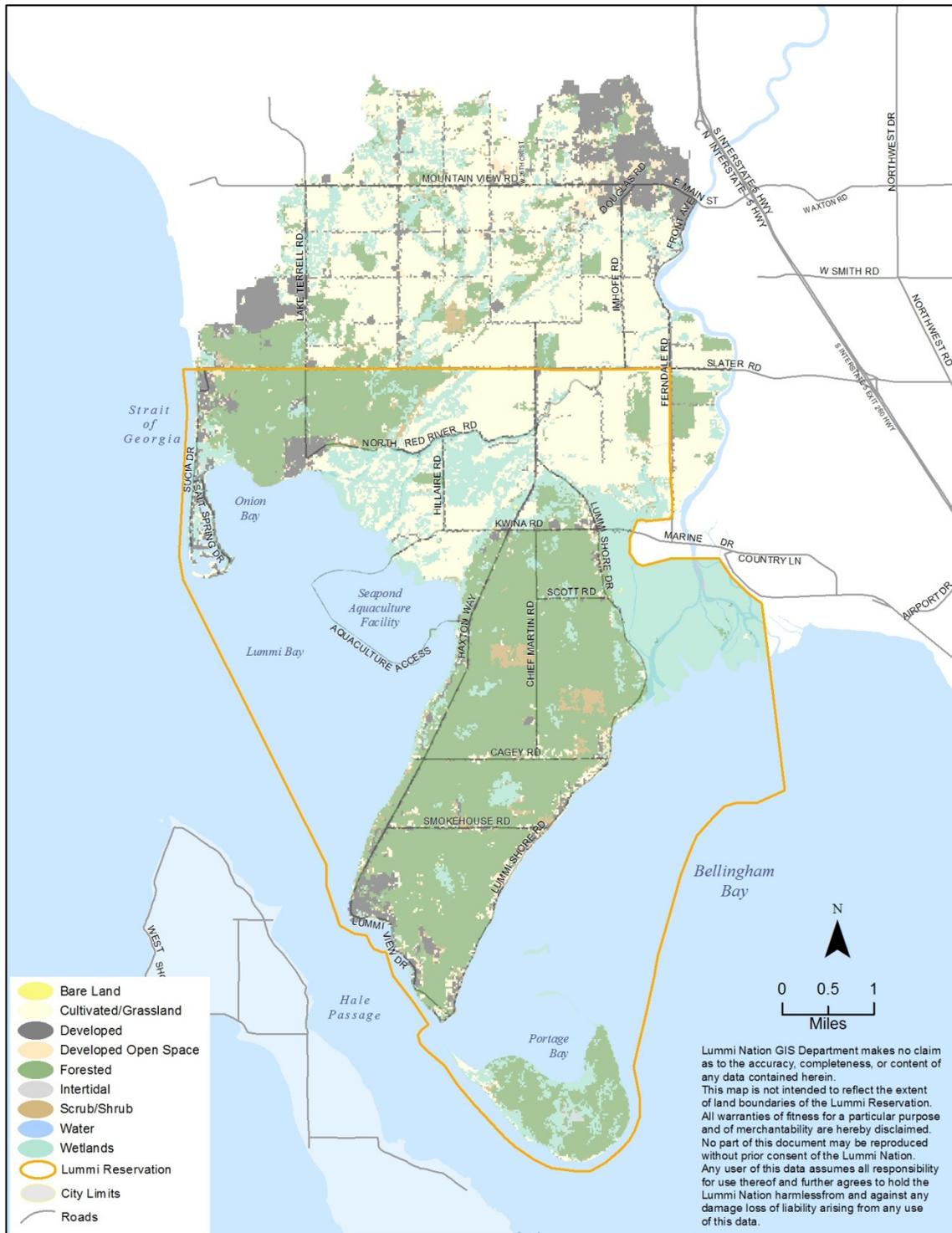


Figure 2.8 Upland Use/Land Cover of the Lummi Watersheds

and the adjacent gas station and mini-mart. This commercial center is located at the intersection of Haxton Way and Slater Road. The floodplains are dominated by agricultural lands and wetlands, both fresh water and estuarine. The tribal center along Kwina Road includes the LIBC offices and the Northwest Indian College (NWIC). The Northwest Indian College and the LIBC offices are undergoing an expansion along the south side of Kwina Road.

Figure 2.8 also displays an important feature of the Reservation, the extent of the tidelands which are essential to the *Schelangen* (“way-of-life”) of the Lummi Nation. The seaward boundary of the Reservation is defined as the extent of the tidelands to -4.5 feet Mean Lower Low Water (ft MLLW).

Based on estimates of land cover in Whatcom County (Whatcom County 2005), land cover/use in the Nooksack River watershed is generally dominated by forested areas upstream from the town of Deming and agricultural lands downstream from Deming. The agricultural lands in the lowlands were largely forested before the arrival of Euro-Americans and had been largely denuded of trees by 1925 (Pierson 1953, as cited in Smelser 1970). Population centers such as Ferndale, Lynden, Everson, and Deming are located adjacent to the Nooksack River.

2.8.3. Future Land Use

Future development on the Reservation is guided by a number of tribal laws and associated regulations including:

- LCL Title 15: Land Use, Development, and Zoning Code
- LCL Title 15A: Flood Damage Prevention Code
- LCL Title 16: Sewer and Water District Code
- LCL Title 17: Water Resources Protection Code
- LCL Title 22: Building Code
- LCL Title 40: Cultural Resources Preservation Code

Figure 2.9 shows the current official zoning map of the Lummi Reservation. This zoning map was revised and adopted by the LIBC in 2004 as part of the comprehensive planning effort currently underway by the Planning Department. The zoning update incorporated comments from tribal departments and commissions and from public comments received during four community meetings.

The Lummi Planning Department is developing a Comprehensive Plan for the Lummi Reservation. The plan will show, in general, how land on the Reservation will be used over the next 20 years. The Comprehensive Plan will identify areas that will be developed for residential, commercial, mixed uses, industrial, and agricultural purposes, as well as show areas that require protection (e.g., Special Flood Hazard Areas, wetlands, and aquifer recharge zones). To date, a technical background document (LIBC 1996) has been developed, public opinion surveys conducted, drafts of the Comprehensive Plan and maps developed, and focused planning workshops and meetings with commissions and community

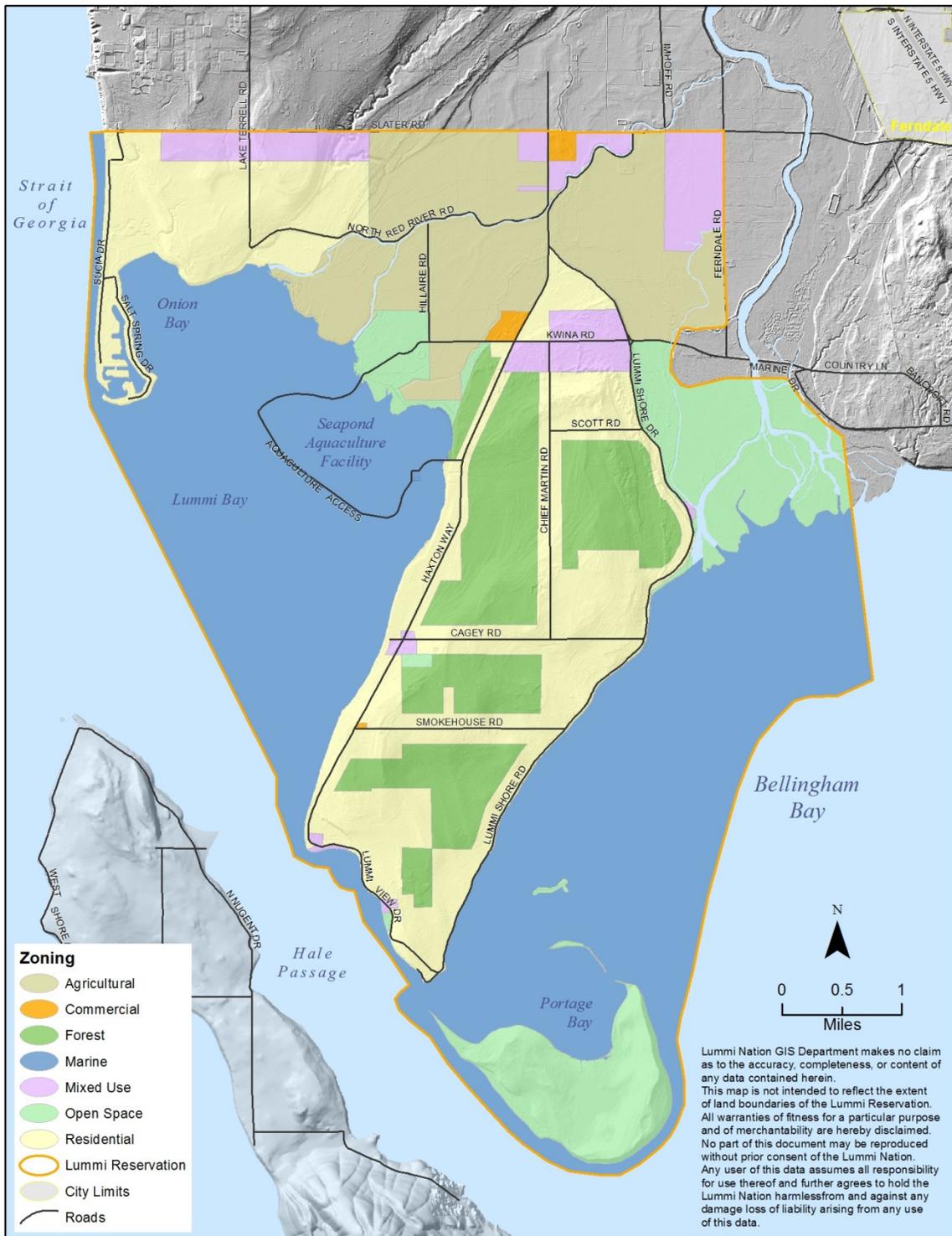


Figure 2.9 Current Land Use Zones on the Reservation

groups have occurred. The Comprehensive Plan is codified in LCL Title 15 (Land Use, Development, and Zoning Code). Title 15 also formalizes an environmental review process that was already largely in place pursuant to LIBC resolutions.

2.8.4. Socioeconomic Conditions

Fishing, logging, farming, and other natural resource work have historically provided most of the jobs for Lummi tribal members. Until the 1974 Boldt Decision, Lummi tribal members were systematically precluded from the profitable salmon fishery in Puget Sound. Once the treaty fishing right was upheld by the U. S. Supreme Court, commercial fishing and fish processing began to expand on the Reservation resulting in increasing numbers of fishermen, fish processing, and increased overall tribal revenue from salmon fisheries.

The Lummi Nation is the largest fishing tribe in the Puget Sound in terms of pounds of fish landed and number of species fished (NWIFC 2012). However, the recent declines in salmon stocks have dramatically altered the tribal reliance on salmon fishing as an economic mainstay. In 1985, the average Lummi fisherman made \$22,796 (\$49,000 in 2011 dollars). In 1993, the average income from fishing was only \$5,555 (\$8,500 in 2011 dollars). During this period, about 30 percent of the tribal work force relied on fishing for their sole source of income (LIBC 1996). In the 10-year period between 1995 and 2005, on average there were 592 fishing registrations and 126 crabbing registrations each year. During the 2012-2013 harvest management year (July 1 – June 30) there were 404 vessels registered with the Lummi Nation.

Over the last ten years, the crab fishery has provided the largest percentage of the yearly fishery revenue followed by sockeye salmon and manila clams. Since 1993, further reductions in salmon stocks have resulted in closure of some fisheries and a further reduction in tribal fishery incomes (LIBC 1996). During 1999, 2007, 2009, and 2013 the sockeye salmon fishery was closed entirely due to low fish runs. The loss or reduction of a fishery increases the importance of the other fisheries to the Lummi economy. Although there are annual variations, 2001 is representative of the most recent 10 years. In 1985, the Lummi Fishing Fleet landed about 15.3 million pounds of finfish and shellfish. In 2001, the combined harvest was about 3.9 million pounds of finfish and shellfish.

In addition to catching fish and harvesting shellfish, the Lummi Nation owns and operates three salmon hatchery facilities. These facilities produce millions of young salmon each year and help offset the decline of fish stocks due to loss of natural habitat and historic over-fishing. The tribe also owns an on-Reservation shellfish hatchery, producing over one billion oyster and clam seeds annually. The tribe owns 7,000 acres of tidelands, much of which is suitable for productive shellfish beds (LIBC 1996). All of these tidelands are held in trust by the United States for the exclusive use of the Lummi Nation.

The tribal commercial shellfish enterprise and the commercial, subsistence, and ceremonial harvest of shellfish by the Lummi Nation and individual tribal members was severely impacted by the closure of 60 acres of tidelands in 1996 and 120 additional acres in 1997. These closures occurred in Portage Bay and were largely attributed to poor dairy waste management practices in the Nooksack River watershed (DOH 1997). Not considering the multiplier effects on the economy, the lost value of the shellfish products alone was

estimated to be approximately \$825,000 per year. In response to the 1996 closure, the EPA conducted compliance enforcement inspections of dairy operations in the Nooksack River watershed starting in 1997, the State of Washington passed the 1998 Dairy Nutrient Management Act (RCW 90.64), and dairy farmers developed and implemented nutrient management plans (a.k.a. farm plans). As a result of these reactions and additional compliance inspections by the Washington State Department of Ecology (Ecology), water quality in the Nooksack River improved. In November 2003, approximately 75 percent of the previously closed shellfish beds in Portage Bay were reopened to commercial harvest. In May 2006, the remaining closed shellfish growing areas were reclassified as “approved” for harvest.

The Lummi Casino project began in 1983 in an effort to diversify the Reservation economy. The casino operation was upgraded significantly in 1994 with the opening of the Lummi Casino at Fisherman’s Cove. The casino flourished initially, employing approximately 400 people, 65 percent of whom were Native American (LIBC 1996). However, competition and changing economic conditions resulted in the closure of the casino on August 26, 1997. With 238 workers losing their jobs, the Lummi unemployment rate grew to approximately 50 percent.

A new casino opened in April 2002 at a new location (the corner of Haxton Way and Slater Road) closer to the Interstate 5 highway. The new casino (the Silver Reef Casino) initially was 28,000 square feet and employed approximately 200 people. The casino was expanded in 2004 (Phase II) to a total of 55,000 square feet with the addition of additional gaming space, a restaurant, and a 400 seat pavilion. The casino was expanded again in 2006 (Phase III) to 135,000 square feet with the addition of restaurant, additional gaming space, a spa and fitness room, and a six floor, 109 room hotel (NEI 2005). Following this expansion, the Silver Reef Casino was renamed the Silver Reef Hotel, Casino & Spa. A smaller expansion (Phase IV) of approximately 9,000 square feet occurred in 2008 to add gaming space and an additional restaurant. The Phase V expansion was additional parking only. The most recent expansion was completed in 2013 (Phase VI) and included the addition of 50,000 square feet of additional gaming area, a new restaurant, theater, and event center. In 2005, after the first expansion, the casino employed 382 workers of which 274 were full-time employees and 108 were part-time employees (NEI 2005). In 2007, after the addition of the hotel and spa, the casino employed 500 people (Werner 2007). By 2010, the Silver Reef Hotel, Casino & Spa employed 550 people; following the opening of the Phase VI expansion in 2013 there are 675 employees. Construction of a second hotel tower began during 2014. The LIBC operates a gas station and mini-mart adjacent to the Silver Reef Hotel, Casino & Spa.

Other employment opportunities for Reservation residents exist at the two oil refineries and the aluminum smelter just north of the Reservation and nearby in the communities of Ferndale and Bellingham. In 2004, 40.8 percent (131) of the 321 businesses licensed to operate on the Reservation were owned by enrolled tribal members (NEI 2005). These businesses included fireworks sales, food preparation and retail, wholesale, and trade businesses. In 2009, 249 businesses were licensed to operate on the Reservation according to the LIBC Accounting Department. These businesses range from large employers (Silver Reef) to long established fish buying and processing enterprises, trades, native arts, and food catering.

In 2011, the LIBC was the 10th largest employer in Whatcom County and the Silver Reef Casino was the 13th largest employer (WWU 2011). Most of the LIBC and Northwest Indian College (NWIC) employees are tribal members. In 2003, native employees made up 70 percent of LIBC staff (55 percent enrolled Lummi) and 61 percent of NWIC staff (33 percent enrolled Lummi) (Valz 2003). The LIBC provides community, administrative, education, and health services to the tribal population in order to help achieve the tribal economic and social development goals. These goals include job creation for tribal members, income generation to fund community development programs, and diversification and stabilization of the local economy by creating alternatives to fishing. Revenue generation is needed in order for the Lummi Nation to develop economic self-sufficiency.

In 1993, 56 percent of the 2,500 working-age Lummi tribal members were unemployed, under employed, full time students, or no longer seeking work (LIBC 1996). Since 1993, the combined effect of the decline in the fishery and the closure of the original casino have had a substantial negative impact on the Lummi economy. The BIA reported that the unemployment rate on the Reservation in 1999 was 21 percent (BIA 1999). Table 2.3 presents the results of a survey of 2,054, over the age of 18, enrolled tribal members conducted by the LIBC in 2003 (LIBC 2003). This survey indicates that 28 percent of adult tribal members are unemployed and up to 14 percent may be underemployed (part-time plus seasonally employed). In 2004, 74.6 percent of enrolled Lummi tribal members in Whatcom County ages 18 through 64 were employed and 15.9 percent were unemployed (NEI 2005).

Table 2.3 Employment Status of Lummi Tribal Members, 2003

Employment Status	Number in Status	Percentage of Survey Individuals
Employed full-time	825	40.2
Employed part-time	156	7.6
Employed seasonally	133	6.5
Self-employed	84	4.1
Retired	127	6.2
Unemployed	567	28.0
Not available for employment	153	7.4

¹2003 Lummi Tribal Survey, LIBC Statistics Office

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3. ADMINISTRATION AND REGULATIONS

The United States government has a unique legal relationship with tribal governments based on the U.S. Constitution, treaties, statutes, executive orders, and court decisions. Indian tribes have sovereign powers separate and independent from federal and state governments. Tribal sovereignty refers to the inherent authority of indigenous tribes to govern themselves, thus tribes have the same power as the federal and state governments to regulate their internal affairs, with a few exceptions. For example, tribes have the power to form a government, to decide their own membership, the right to regulate property, the right to maintain law and order, and the right to regulate commerce. As a result of tribal sovereignty, specific federal legislation, and the trust responsibility of the United States that resulted from treaties, various federal government agencies are involved in assisting tribes.

3.1. Lummi Nation Government

The Lummi Nation is governed by an elected 11-member council, the Lummi Indian Business Council (LIBC), and the General Council which consists of all enrolled tribal members of voting age (18 years old). The LIBC is supported by several administrative departments including Planning and Public Works, Economic Development, Police, Office of the Reservation Attorney, Cultural Resources, and Natural Resources. The Lummi Nation was one of ten tribes that initiated the Self-Government Demonstration Project in 1988 and maintains an independent Tribal Court System.

3.2. Federal Agency Roles

The development and operation of an integrated solid waste management program within the boundaries of the Reservation has been the responsibility of the Lummi Nation with support from the Indian Health Service (IHS), Bureau of Indian Affairs (BIA), Environmental Protection Agency (EPA), the American Indian Environmental Office (AIEO), and the Tribal Solid Waste Advisory Network (TSWAN). The following section briefly describes the role of each agency or organization.

Indian Health Service (IHS)

The Indian Health Service (IHS) is a federal agency within the Department of Health and Human Services. The IHS is responsible for providing federal health services to American Indians and Alaska Natives and is the principle federal health care provider and health advocate for Indian People. The main goal of the IHS is to raise the health status of Indian people to the highest level possible. The IHS is supposed to provide a comprehensive health service delivery system for approximately 1.9 million American Indian and Alaska Natives. A part of the IHS, the Sanitation Facilities Construction program, is the environmental engineering component to the health delivery system. The Sanitation Facilities Construction program provides American Indian and Alaska Native homes and communities with essential water supply, sewage disposal, and solid waste disposal facilities. The Sanitation Facilities Construction program can provide both technical and financial assistance related to solid waste management on the Reservation.

Bureau of Indian Affairs

The Bureau of Indian Affairs (BIA) is an agency within the United States Department of the Interior. The BIA is responsible for the administration and management of 66 million acres of land held in trust by the United States for approximately 1.9 million American Indians and Alaska Natives from the 566 federally recognized tribes. The BIA's responsibilities include assisting with development of forestlands, directing agriculture programs, protecting water and land rights, developing and maintaining infrastructure, and supporting economic development. The overall BIA goal is to provide long-term sustainable development that helps to improve the quality of life for tribal members.

Environmental Protection Agency

The Environmental Protection Agency (EPA) leads the United States' environmental science, research, education, and assessment efforts. The goal of the EPA is to protect human health and the environment. The EPA works with federally recognized tribes on a government-to-government basis to ensure special consideration of tribal interests in making EPA policy, and to ensure the close involvement of tribal governments in making decisions and managing environmental programs affecting reservation lands. In 1984, the EPA became the first federal agency to formally adopt an Indian Policy, which was intended to provide guidance to EPA staff and managers in dealing with tribal governments and in responding to the challenge of environmental management on Indian reservations. The EPA's goal is to effectively protect tribal health and environments.

American Indian Environmental Office (AIEO)

The American Indian Environmental Office (AIEO) is an office within the EPA that coordinates the agency-wide effort to strengthen public health and environmental protection in Indian country, with special emphasis on helping tribes administer their own environmental programs. The AIEO works with federally recognized Tribes on a government-to-government basis to protect, restore, and preserve the environment for present and future generations.

Tribal Solid Waste Advisory Network (TSWAN)

Created in 1997, the Tribal Solid Waste Advisory Network (TSWAN) is a non-profit alliance of Indian tribes and Alaska natives from throughout the Pacific Northwest and Alaska. The TSWAN was established to address solid waste and environmental issues in Indian Country. The primary goal of the TSWAN is to work toward sharing technical expertise, information, and opportunities on solid waste management policies and principles between member tribes. Currently, 34 federally recognized tribes and other tribal consortia throughout Washington, Oregon, Idaho, and Alaska are members of TSWAN. The TSWAN has created a model program of inter-tribal partnership by promoting the commonality of tribal lands and the desire to protect and enhance natural resources. A recommendation of this integrated solid waste management plan is that the Lummi Nation join TSWAN.

3.3. Solid Waste Laws and Regulations

This section gives a brief overview of the federal, tribal, state, and local laws and regulations that address solid waste management. These laws and regulations are described in further detail in Appendices A through F.

3.3.1. Federal

Pursuant to numerous federal laws passed by Congress, the Environmental Protection Agency (EPA) retains jurisdiction over the management of all pollution sources until a program has been delegated to a state or tribe. The EPA's primary role in solid waste management is to set national goals, provide leadership, provide technical assistance, and develop guidance and educational materials. The Resource Conservation and Recovery Act of 1976 (RCRA), as amended by the Solid Waste Disposal Act Amendments of 1980 (42 U.S.C. §6901 et seq.), is the primary body of federal legislation related to solid waste management. Subtitle C of the RCRA (40 CFR Parts 260-279) authorizes the EPA to regulate hazardous waste generation, transportation, treatment, storage, and disposal and identifies the requirements and procedures to authorize states to administer the RCRA program. Subtitle D of the RCRA authorizes the EPA to regulate the design, siting, and operation of solid waste disposal facilities, including specific criteria for municipal solid waste landfills. These include specific provisions on location, operation, design, ground water monitoring, corrective action, closure and post-closure, and financial assurance. The EPA is authorized to delegate authority to administer the RCRA programs to states. The RCRA defines Tribes as "Municipalities" and as a result, the courts have ruled that the EPA cannot approve tribal solid waste programs. This does not prevent a tribe from using its own sovereignty to develop a solid waste program providing that the standards are at least equal to or exceed the minimal federal standards found in 40 CFR part 257 and 40 CFR part 258.

In conjunction with the RCRA, the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) 42 U.S.C. §9601 et seq, the Clean Water Act (CWA) 33 U.S.C. §1251 et seq., the Clean Air Act 42 U.S.C. §7401 et seq (CAA), and the Safe Drinking Water Act (SDWA) 42 U.S.C. §300f et seq. assist in protecting human health and the environment from solid waste pollution. The EPA adopted the Federal Air Rules for Reservations (FARR) in 2005, which apply a set of basic air quality regulations established under the Clean Air Act to Indian Reservations. The FARR applies to tribal members and non tribal members and businesses on 39 reservations in Idaho, Oregon, and Washington. A list of Federal laws and regulation concerning solid waste management is included in Appendix A.

3.3.2. Lummi Nation

The Lummi Indian Business Council (LIBC), through the Planning Department and the Natural Resources Department, is the solid waste planning and regulatory authority on the Reservation. A solid waste management program called "Project Clean-Up" was initiated in 2002 by the LIBC and initially operated under the direction of the Vice Chairman's office. Project Clean-Up continued through 2003 and was institutionalized within the administrative structure of the LIBC by moving the program from the Office of the Vice Chairman to the Lummi Planning Department. As part of this administrative shift, the program was renamed "Lummi Waste Management." The Lummi Solid Waste Management Team (LSWMT) was

created out of this program consisting of a Waste Management Team Lead, the Water Resources Division Manager, the Land Development Division Manager, and the Lummi Housing Authority Director. The Forestry Division of the Lummi Natural Resources Department and the Lummi Police Department supported the LSWMT by regulating outdoor burning and abandoned vehicles, respectively. The Lummi Housing Authority (LHA) provides assistance by organizing community and neighborhood solid waste clean-up events and contracting solid waste and recycling collection and disposal services for all LHA-owned properties.

Lummi Code of Laws

Many tribes have adopted codes, laws, and regulations to address solid waste management challenges. Codes, laws, and regulations generally have the goal of promoting waste reduction, recycling, and appropriate solid and hazardous waste disposal and preventing behaviors such as improper burning or illegal dumping. In 2004, the Lummi Nation enacted Title 18 of the Lummi Code of Laws (LCL), the Solid Waste Control and Disposal Code. LCL Title 18 provides the policy framework and delegation of administrative authority for a coordinated program to address the accumulation, collection, and disposal of solid waste; the resource recovery, recycling, and utilization of recyclable materials; and the creation and operation of disposal sites and transfer stations. The Lummi Planning Department is the local enforcement agency for Title 18, and the Planning Department Director was designated as the Health Officer through LIBC Resolution 2004-114 (Appendix E). The Health Officer or his designee has the authority to conduct inspections to determine whether the requirements of Title 18 are being fulfilled, to declare an area a health and safety hazard, and to remove or abate nuisances as described in Title 18. A copy of LCL Title 18, Solid Waste Control and Disposal Code, is included in Appendix D.

The Natural Resources Code (LCL Title 10) and the Water Resources Protection Code (LCL Title 17) assist in regulating solid waste management on the Reservation. The Natural Resources Code allows the Natural Resources Department to regulate outdoor burning by issuing burn bans, requiring a permit prior to burning, and limiting the type of products allowed to be burned on the Reservation. Additional information regarding outdoor burning regulations and permit information on the Reservation is summarized in Appendix F. LCL Title 17 protects Lummi Nation waters from over-appropriation, contamination, degradation, and any acts injurious to the quantity, quality, or integrity of the water. The Lummi Police Department assists the Health Officer with the removal of unregistered and non-operational vehicles pursuant to the procedures of LCL Title 7 (Motor Vehicle Impoundment Code). Table 3.1 summarizes the Lummi laws that apply to solid waste management.

Table 3.1 Lummi Nation Solid Waste Management Related Laws

Lummi Code of Laws	Solid Waste Application	Administration
Title 18 Solid Waste Control and Disposal	<ul style="list-style-type: none"> • Provides for proper control and disposal of solid wastes on the Reservation. • Makes dumping of solid waste into water unlawful. • Prohibits the accumulation of solid waste. • Regulates the siting of landfills on the Reservation. 	Lummi Planning Department – Health Officer
Title 17 Water Resources Protection	<ul style="list-style-type: none"> • Prohibits unauthorized discharges to Lummi Nation water. • Provides wellhead protection. • Provides storm water management regulations. • Provides stream and wetland management regulations. • Provides water quality standards to protect Reservation surface waters. 	Lummi Natural Resources Department – Water Resources Division
Title 15 Land Use, Zoning, and Development	<ul style="list-style-type: none"> • Forms Technical Review Committee which reviews land use permit applications and stipulates project design standards and best management practices to reduce the potential for hazardous material spills and solid waste accumulation. • Limits where land use activities that store, use, or generate hazardous materials and solid waste can be located on the Reservation. 	Lummi Planning Department
Title 10 Natural Resources	<ul style="list-style-type: none"> • Regulates solid waste burning. 	Lummi Natural Resource Department – Forestry Division
Title 7 Motor Vehicle Impoundment	<ul style="list-style-type: none"> • Provides procedure for abandoned vehicle removal. 	Lummi Police Department

3.3.3. Washington State

In the absence of tribal laws, federal laws generally apply to solid waste management and regulatory activities on Indian reservations; states laws related to solid waste management do not apply.

In Washington State, Chapter 70.95 of the Revised Code of Washington (RCW) assigns primary responsibility for solid waste management to local governments. The legislation established statewide priorities for managing solid waste and authorized the Washington State Department of Ecology (Ecology) to promulgate regulations for solid waste handling. Ecology is the principle environmental management agency for Washington State. The Solid Waste and Financial Assistance Program is one of Ecology’s ten major environmental management programs. The goal of this program is to reduce the amount of solid waste and effects of wastes generated in Washington State. The Washington State solid waste

regulations are included in Chapter 173-350 of the Washington Administrative Code (WAC) as the Solid Waste Handling Standards.

Washington State also provides financial assistance through the Coordinated Prevention Grant (CPG) program. The CPG program provides grants for eligible projects and programs that conform to recommendations included in local solid and hazardous waste management plans. Funding is also provided to local health jurisdictions for solid waste surveillance and control programs. These grants are authorized by RCW 70.105D.070, the Toxics Control Act, and the funds for these grants and for several state responsibilities are derived primarily from fees “on the privilege of possession of hazardous substances in this state” (RCW 82.21.030).

The Washington Utilities and Transportation Commission regulates private garbage collection companies under state jurisdiction. The Utilities and Transportation Commission oversees waste collection certificates (franchises) and approves rates for garbage collection service in unincorporated jurisdictions. A list of state laws and regulations concerning solid waste management issues is included in Appendix B.

3.3.4. Whatcom County

Under federal and state law, counties, cities, and towns have a broad range of authority to determine how solid waste generated within their jurisdiction is managed. In Whatcom County (County), all cities and towns have delegated responsibility for solid waste planning, transfer, and disposal to the County. The Solid Waste Management Division of the Whatcom County Department of Public Works is the primary solid waste planning agency. The Whatcom County Health Department is the County’s regulatory authority for environmental and public health aspects of solid waste management. The County drafted a revised Comprehensive Solid Waste Management Plan in 2007. The Lummi Indian Reservation is not subject to the Whatcom County Comprehensive Solid Waste Management Plan or associated solid waste ordinances and regulations, although some interpretations indicate that residents that are not enrolled Lummi tribal members but live within the Reservation boundaries are subject to provisions of County solid waste ordinances. Whatcom County operates the Disposal of Toxics facility near the Bellingham Airport that accepts hazardous waste from households and from small businesses throughout the county including the Reservation. There are no longer any open landfills in Whatcom County, and the closed Cedarville and Y Road landfills have ongoing programs for ground and surface water monitoring and gas monitoring. The Lummi Nation works in conjunction with the County to protect human health and the environment on the Reservation. A list of county codes concerning solid waste management issues is included in Appendix C.

4. ON-RESERVATION SOLID WASTE MANAGEMENT

This section discusses on-Reservation management of solid waste by characterizing the solid waste stream, estimating generation rates, describing the existing management system, identifying and evaluating management alternatives, and recommending preferred alternatives. Sections 4.1 and 4.2 present descriptions of the existing solid waste management system and the solid waste management needs on the Reservation. Section 4.3 provides descriptions and planning level cost estimates for six solid waste collection alternatives and five transfer or disposal alternatives. Section 4.3 concludes with an analysis of the 11 alternatives and a recommendation to improve solid waste management on the Lummi Indian Reservation.

4.1. Solid Waste Characterization

This section examines the overall amount and types of solid waste generated on the Reservation. In general, the number of people living and working within a geographic area has a direct impact on the amount of waste produced in that area (EPA 2004). The types of employment are also a factor, since jobs in the service sector for example may produce less waste than jobs in the manufacturing sector. Other factors that affect the amount of waste produced in an area include: reuse and recycling program effectiveness, the amount of construction activity, and weather related impacts (i.e., more rainfall means more vegetative wastes, events such as windstorms and floods can create large periodic quantities of waste). There are also seasonal fluctuations in the types and amounts of waste caused by changes in activities from summer to winter, holiday seasons, vacation schedules, hunting and fishing seasons, and other factors.

4.1.1. Population

The total population of the Reservation was 4,193 in the 2000 Census, which is nearly a six-fold increase from the total population of 721 identified in the 1960 Census. In the 2000 Census, 2,240 people identified themselves as American Indian alone or in combination with other races (53.4 percent of the total Reservation population). Corrected for the estimated rate of undercount (4.74 percent), the estimated actual American Indian population on the Reservation was approximately 2,346 in the year 2000 (Northwest Economic Associates 2003).

According to the 2010 Census, a total of 4,706 people lived on the Reservation during 2010, which is an eleven percent increase from the 2000 Census population of 4,193. In the 2010 Census, 2,510 people identified themselves as American Indian alone or in combination with other races (53.3 percent of the total Reservation population).

Households

Over the last century, the construction of an extensive road network, the development of water distribution and sewer collection and treatment systems, the excavation of the canal

system and associated Sandy Point Marina, the limited land base, and several tribal housing projects have fostered a trend towards higher density neighborhoods throughout the Reservation. Figure 4.1 shows the distribution of households on the Reservation in 1910, 1950, 1976, and 2010. The 2010 Census found 1,989 housing units on the Reservation; 357 of these housing units (17.9%) were vacant. The Lummi Nation Statistics Department estimated that 697 homes were occupied by tribal members in 2005 (BHC Consultants 2007).

Commercial and Industrial Facilities

Although the primary areas zoned for commercial and industrial uses are located along the northern boundary of the Reservation, there are many small businesses registered throughout the Reservation. Based on the number of Lummi Nation business licenses issued for the Reservation during 2012, a total of 485 tribal and non-tribal businesses operated on the Reservation. These businesses range from long established fish buying and processing enterprises to trades, native arts, firework stands, professional services, and food catering. Tribal commercial fishers, which are small private businesses, are required to obtain fishing registrations but are not required to obtain business licenses unless they are also registered as fish buyers.

The Lummi Nation, through its Lummi Commercial Company (LCC), owns and operates the largest commercial business on the Reservation, the Silver Reef Hotel, Casino & Spa and two gas station/mini marts, one on the corner of Haxton Way and Slater Road and the other at Gooseberry Point. The Lummi Island Ferry Terminal (operated by Whatcom County), a boat launch, a boat lift, and a seafood buying facility are also located at Gooseberry Point. Further south near the Stommish Grounds, Finkbonner Shellfish is a seasonally operated shellfish, finfish, and crab buying facility. The Native Shellfish Company along Lummi Shore Road near the Nooksack River is another seafood buying facility. The LIBC shellfish and salmon hatcheries and the Seapond Aquaculture Facility are located along the shores of Lummi Bay. The shellfish hatchery is a self-supporting operation for the Lummi Nation; both hatcheries play an important role in supporting the commercial, ceremonial, and subsistence fisheries on the Reservation and throughout the Lummi Nation's Usual and Accustomed (U&A) grounds and stations. Although there are a few stands that operate year round, a seasonally large commercial activity on the Reservation is selling fireworks. During the July 4th holiday season there are approximately 65 fireworks stands on the Reservation.

There are currently no major industrial facilities on the Reservation. A small gravel mine operates along Chief Martin Road and an automobile recycling facility formerly operated along Cagey Road. There is a Heavy Impact Industrial Zone in Whatcom County located immediately adjacent to the northern Reservation boundary where two oil refineries (Phillips 66 and BP-Cherry Point) and an aluminum smelter facility (Alcoa Intalco Works) operate. Another important industry on the Reservation is agriculture. Approximately 25 percent of the Reservation is cultivated land or grassland with most farms and agricultural land located in the Nooksack and Lummi river floodplains.

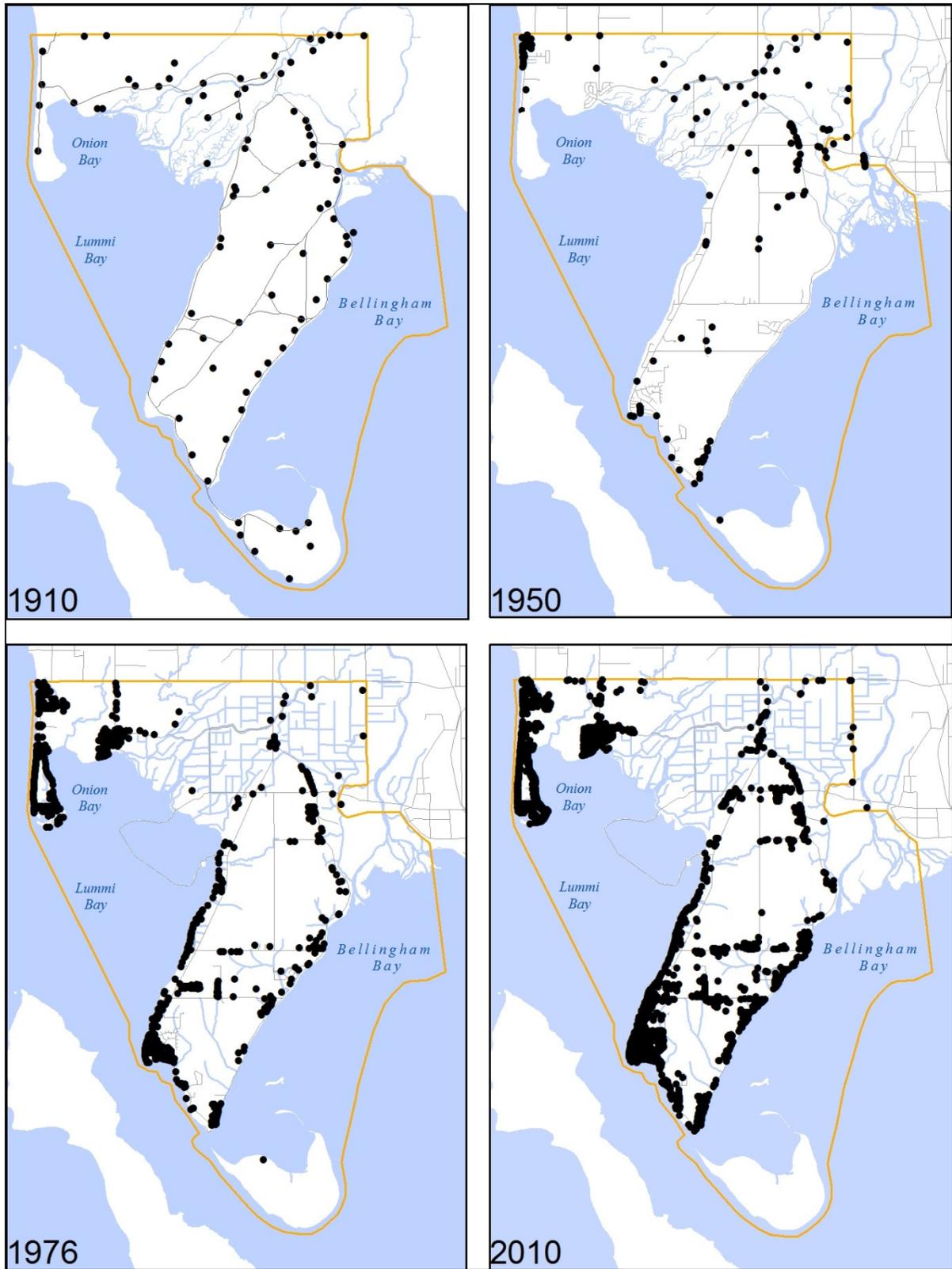


Figure 4.1 Households on the Lummi Indian Reservation 1910–2010

Education, Government, and Community Organizations

The new Tribal Administrative Building opened in mid-2013 and largely consolidated the governmental services which had previously been provided by staff members located in approximately 27 separate buildings spread over three campuses along Kwina Road. The new Lummi Head Start building is located immediately adjacent to the new Tribal Administrative Building. The Lummi Tribal Sewer and Water Districts (LTSWD) office is located along Lummi View Drive near the southern extent of the Lummi Peninsula and the Lummi Housing Authority (LHA) office is located along Kwina Road. There are approximately 825 staff members working for the LIBC.

In addition to the tribal governmental offices, there are approximately 32 community buildings including churches, schools, a fire station, and other facilities on the Reservation. These buildings include the Little Bear Creek Assisted Living facility, the Lummi K-12 school, St. Joachim Catholic Church, the *Wex li em* Community Building, and the Stommish Grounds facilities.

Primary, secondary, and college level education programs are available on the Reservation. The Lummi K-12 school and the Lummi Youth Academy are located near the southern extent of the Lummi Peninsula adjacent to the *Wex li em* Community Building; the Northwest Indian College (NWIC) is located near the northern extent of the Lummi Peninsula. The NWIC was recently accredited as a four year college for several programs. Including their distant learning program, approximately 1,200 students attend the NWIC each year. The NWIC is in the process of expanding their campus facilities to include additional class rooms and a dormitory at their location along Kwina Road and Lummi Shore Road.

Population Projections

One approach to estimate future solid waste generation and disposal is to rely on per capita generation and disposal rate information. Using this approach, the per capita solid waste generation and disposal rate is multiplied by the population to estimate the total quantity of solid wastes that are generated and the total quantity that are disposed. To apply this methodology, population projections are needed.

Similar to regional trends, residential development and population growth on the Reservation has increased significantly since the mid-1980s. Approximately 36 percent of the 1,480 housing units on the Reservation in 1995 were constructed over the 1986 through 1995 period (BHC Consultants 2007). This increased level of residential development is expected to continue in response to the housing shortage on the Reservation and the expressed desire by tribal members living off of the Reservation to relocate to the Reservation.

A 2003 study projected that the number of American Indians living on the Reservation will increase from 2,346 in 2000, to 2,986 by 2010, and to 3,802 in 2020 (NEA 2003). The NEA study, which was focused on population growth of enrolled Lummi tribal members, predicted that the Indian population on the Reservation would grow at a faster rate than the non-Indian population due to the relatively younger age of the Indian population and differences in migration rates onto the Reservation. If the non-Indian population is assumed to remain constant at approximately 2,000 people, the Reservation population would increase to 5,802

people by 2020. As noted previously, in the 2010 Census, 2,510 people identified themselves as American Indian alone or in combination with other races.

4.1.2. Waste Stream Generation and Composition

Because conducting a waste stream generation study is time consuming, data from a county or statewide study are often utilized in lieu of conducting a site-specific study to determine the amount of waste (EPA 2004). National, Washington State, Whatcom County, and Yakama Nation waste characterization data were reviewed to estimate the amount of waste generated on the Lummi Reservation. Resource constraints precluded conducting a Lummi Reservation-specific waste stream generation study.

Waste Stream Generation

The solid waste generation rate refers to the quantity of solid waste materials produced within a period of time. The solid waste generation rate considers all material, both recycled and disposed. There are currently no legal solid waste disposal locations on the Reservation and no Reservation-specific disposal records available to determine the solid waste generation rate. As a result, solid waste generation data from several sources were reviewed to estimate a likely generation rate for Reservation residents. The waste generation and recycling rates for the Yakama Nation, Whatcom County, Washington State, and the United States are summarized in Table 4.1. As discussed below, comparing waste generation rates from other areas and national rates is difficult because the definitions for wastes included in the calculations differ significantly depending on the area.

The Yakama Nation, which conducted a solid waste composition and household survey during 2008, is one of the few tribes in the Pacific Northwest that has conducted a reservation-specific solid waste composition study. The Yakama Nation Reservation is comprised of 1.4 million acres in south central Washington (on the east side of the Cascade Mountain range) and includes two cities and a town. The Yakama Nation Reservation population was estimated to be 33,800 people (Yakama Nation 2009). The Yakama Nation project included waste composition (weighing and sorting) tests and an analysis of waste quantities generated on their reservation. A survey of the reservation residents was also conducted to collect information on disposal habits and on preferences for future recycling and waste disposal services. The estimated solid waste disposal rate on the Yakama Reservation was 4.9 pounds per resident per day (Yakama Nation, 2009).

Whatcom County utilized reports submitted by transfer stations and disposal facilities in the county to estimate that approximately 126,800 tons of solid waste was disposed of by Whatcom County residents during the 2002 calendar year (Whatcom County 2003). Since Lummi Reservation residents use the same transfer stations and disposal facilities, the estimated solid waste disposal rate for Whatcom County includes solid wastes from the Reservation. Whatcom County divided the solid waste disposal stream into four different sectors: residential waste, commercial waste, self-hauled waste, and construction and demolition (C&D) waste. Residents were recycling 28 percent of their waste and businesses were recycling 46 percent during 2001 (Whatcom County 2003). The residential, commercial, and self-hauled waste streams were combined and the C&D wastes excluded to

estimate a Whatcom County solid waste disposal rate of 3.4 pounds per resident per day (Whatcom County 2003).

The estimated total annual waste generation for the State of Washington was 17,182 tons during 2008 (Ecology 2009). The *per capita* generation of municipal solid waste (MSW) in Washington State during 2008 was 7.5 pounds per person per day; 4.1 pounds per person per day were disposed of and 3.4 pounds per person per day were recovered through recycling, which is equivalent to a 45.3 percent recycling rate (Ecology 2009).

The EPA estimated that citizens of the United States generated approximately 250 million tons of Municipal Solid Waste (MSW) and recycled and composted 83 million tons during 2008, which is equivalent to a 33.2 percent recycling rate (EPA 2009). The EPA determined that the average MSW generation rate in the United States during 2008 was 4.5 pounds per person per day. Of this 4.5 pounds per person per day, 1.5 pounds per person per day were recycled and 3.0 pounds of solid waste per person per day were disposed.

The Whatcom County's waste disposal rate of 3.4 pounds per person per day was used to estimate the solid waste disposal rate on the Reservation. The Whatcom County disposal rate was chosen because the majority of the Reservation households dispose of wastes at the facilities surveyed in the Whatcom County study and the Reservation climate is the same as the low-lying areas of Whatcom County where most people live. The EPA and Ecology disposal rates were not used because the estimates cover substantially larger population and climate ranges. The Yakama Nation rates were not used, even though they represent an Indian reservation in Washington, because the Yakama Reservation has a larger land base, larger population, and a different climate (i.e., a continental climate versus the maritime climate of the Lummi Indian Reservation). The adopted Whatcom County disposal rate is a little less than the average of the disposal rates estimated for Washington State and the United States, which is 3.6 pounds per person per day.

Table 4.1 Municipal Waste Disposal Rates

Area	Waste Generation Rate (pounds per person per day)*	Waste Disposal Rate (pounds per person per day)	Source	Comments
Yakama Nation Reservation	4.9	4.9	Yakama Nation Waste Composition Study and Household Survey (March 2009)	Figure is for 2008, based on 30,519 tons per year and 33,800 people.
Whatcom County	4.4	3.4	Whatcom County Recycling Potential Assessment (2003)	Figure is for 2002, based on 107,200 tons per year of residential/commercial waste and 170,600 people. Residents are currently recycling 28 percent of their waste.
Washington State	7.5	4.1	WA Department of Ecology (2009)	Estimated for 2008, based on a 7.5 lb/person/day generation minus 3.4 lb/person/day recycled and composted.
United States	4.5	3.0	U.S. EPA (2009)	Estimated for 2008, based on 4.5 lb/person/day generation rate minus 1.5 lb/person/day recycled and composted

* Includes solid wastes, recycling, and composting rates.

Waste Stream Composition

Due to resource constraints, a Lummi Indian Reservation-specific study was not conducted to determine the composition of solid waste generated on the Reservation. The composition of waste generated on the Reservation was estimated based on the waste characterization data from the Yakama Nation, Whatcom County, Washington State, and United States studies. Table 4.2 shows the waste composition from these four study sites. As shown in Table 4.2, the largest components of MSW are paper and organics. For the State of Washington, organic materials (food, yard wastes, and other organics) comprise the largest component at 25.1%, followed closely by paper at 23.7%, and other wastes at 13.7%. Whatcom County has a higher percentage of C&D waste than the three other waste characterizations because the Whatcom County C&D waste percentage includes wood waste. In addition, the average population growth rate for Whatcom County from 2000 through 2008 was 13.5 percent, which is higher than the 11.1 percent average growth rate for Washington State (OFM 2011). Increases in population lead to an increase in new home construction and as a result more C&D waste. The percentage of special/hazardous waste for Whatcom County is higher because this category includes tires, rubber, cosmetics, diapers, textiles, carpeting, leather, furniture, ash/dust, miscellaneous organics, and inorganics along with hazardous and special waste. The three other waste composition studies included these wastes in other categories. The estimated waste composition from Whatcom County was chosen as the most representative waste composition for the Lummi Indian Reservation.

Table 4.2 Estimated Waste Composition

Waste Material Type	National Percentage of Waste Disposed	Washington State Percentage of Waste Disposed	Whatcom County Percentage of Waste Disposed	Yakama Nation Percentage of Waste Disposed
Paper	31.0	23.7	23.0	20.0
Plastic	12.0	11.6	9.1	10.2
Glass	4.9	4.0	2.8	5.6
Ferrous Metals	6.3	6.4	7.4	7.3
Non-Ferrous Metals	2.1	1.0	--- ¹	1.5
Organics	25.9	25.1	20.8	25.3
Construction and Demolition	--- ¹	4.9	19.6	3.2
Wood	6.6	8.7	--- ²	7.0
Hazardous and Special Waste	1.5	0.9	13.6	2.5
Other Wastes	9.7	13.7	3.7	17.5

¹ Not reported

²Included in the percentage for C&D waste.

4.1.3. Projected Solid Waste Stream

Projections of future amounts of solid waste are typically based on population projections and current waste generation rates. The use of current waste generation rates assumes that waste quantities and waste composition will remain unchanged into the future, whereas in reality there will be changes in both the quantity and composition of solid waste generation. For example, in recent years there is a trend to package more beverages in plastic rather than

glass, causing household garbage to be slightly lighter. Also, as the values of recyclable materials rise or fall, there is more or less incentive to remove those materials from the waste stream. In addition, if the disposal costs of solid wastes is higher than the cost to recycle, recycling rates can be expected to increase. In terms of immediate impact, however, these examples pale in comparison to the effect of the economic downturn that started during 2008, which caused a reduction in waste quantity in many areas of 10 percent or more. Part of the reduction appears to be as result of lower construction levels and other lost jobs, but it is also due to lower consumer spending (less consumption results in less packaging and less waste).

Combining the estimated waste disposal rate for the Reservation (3.4 pounds of solid waste per person per day as estimated for Whatcom County during 2002) with future population projections allows future waste quantities to be estimated. A population of approximately 4,706 people on the Reservation (2010 Census) disposing an average of 3.4 pounds per day during 2010 would dispose approximately 2,920 tons of municipal solid waste annually. By 2020, with an estimated Reservation population of 5,802 (NEA 2003) and assuming no change in the 2002 disposal rate, a total of approximately 3,600 tons of solid waste will be disposed of annually. The projected solid waste disposal quantities assume that the waste disposal rate remains constant; economic and other factors may lead to additional recycling and could cause the waste disposal rate to change in the future.

A Lummi Nation specific waste stream study and household survey should be considered to better understand the quantity of solid waste disposed by homes and businesses. The data collected as a part of a Lummi Nation waste stream study could be used to evaluate current waste management programs, plan future disposal and recycling programs, provide baseline data for evaluating future waste reduction and recycling goals, and provide information needed to assess current and future levels of service to the public.

4.2. Existing Solid Waste Management System

Similar to other rural areas throughout the world, illegal solid waste dumping occurs on the Lummi Reservation. Because of the relative isolation of some Reservation areas, it is generally easy to dump solid wastes without being detected, difficult to identify the offenders, and difficult to stop the illegal dumping. Illegal solid waste dumpsites can be a public health threat and a threat to the quality of Reservation waters. In 1979, the Lummi Nation developed a solid waste management plan to address current and future solid waste management needs on the Reservation. In the last 30+ years since the previous plan was developed, a number of changes have occurred, including the closure of the Chief Martin Road Dump, substantial population growth, and substantial economic and social development activities. Although there have been numerous and substantial changes on the Reservation since 1979, solid waste management continues to be a challenge.

4.2.1. Waste Collection Services

The Lummi tribal government currently does not operate or provide a regular solid waste collection service or facility on the Reservation. Although the tribal government has sponsored solid waste collection events (e.g., Community Clean-Up) where the governmental agencies have provided dumpsters and recycling facilities for several consecutive days for the use by Reservation residents, in general, solid waste collection is available to Reservation

residents and businesses through individual service agreements with private collection companies or through self-haul/drop-off at transfer facilities located off-Reservation.

There are three private collection services in Whatcom County: Sanitary Service Company, Inc. (SSC), Nooksack Valley Disposal, Inc., and Waste Management of Washington, Inc. Of these three companies, the SSC provides solid waste, recycling, and compost collection service on the Reservation. Approximately 734 households on the Reservation have private service agreements with SSC for solid waste and recycling collection services, or approximately 37 percent of the 1,989 housing units (Pemble 2010). This includes the approximately 270 homes owned and operated by the LHA (LHA 2012). Subtracting the LHA households from the estimated number of 697 on-Reservation tribal households and assuming the 37 percent contracting rate for the remaining 427 tribal households, approximately 300 on-Reservation tribal households currently do not contract for curbside collection. Residents and businesses may also choose to self-haul and dispose of solid waste at one of the six drop off locations in Whatcom County: Birch Bay Recycling, Cedarville Recycling, Nooksack Valley Disposal, Recycling and Disposal Services (RDS), and Regional Disposal Company (RECOMP). The closest facilities to the Reservation are RDS and RECOMP (subsidiaries of Allied Waste, Inc), which are transfer stations located along Slater Road less than two miles from the northeastern corner of the Reservation. Both RECOMP and RDS ship the solid waste collected at the transfer stations via rail to the Roosevelt Regional Landfill near Roosevelt, Washington (Klickitat County in eastern Washington).

4.2.2. Disposal

Solid waste disposal on the Reservation has been a documented problem since before the 1970s. Two unlined sanitary landfills were previously operated on the Reservation for self-hauled household waste disposal (Figure 4.2). The Lummi Shore Road Dump was operated from 1961 to 1972. It was located on the east side of Lummi Shore Road near the intersection of Lummi Shore Road and Scott Road. This unsupervised open dump was operated without maintenance and reportedly received solid wastes originating both on- and off-Reservation. To improve solid waste disposal management, in 1972 the Lummi Nation closed the Lummi Shore Road Dump and opened a new sanitary landfill on ten acres along Chief Martin Road. The Chief Martin Road Dump was projected to have a useable life of about six years and was closed on May 26, 1979. Prior to the closure of the Chief Martin Road Dump during 1979, limited tribal resources affected the operation and maintenance of the facility. Operational and maintenance problems included a lack of available cover material, which led to vector problems, blowing litter, and fires. There has not been a permitted solid waste landfill or transfer station within the Reservation boundary since the closure of the Chief Martin Road dump.

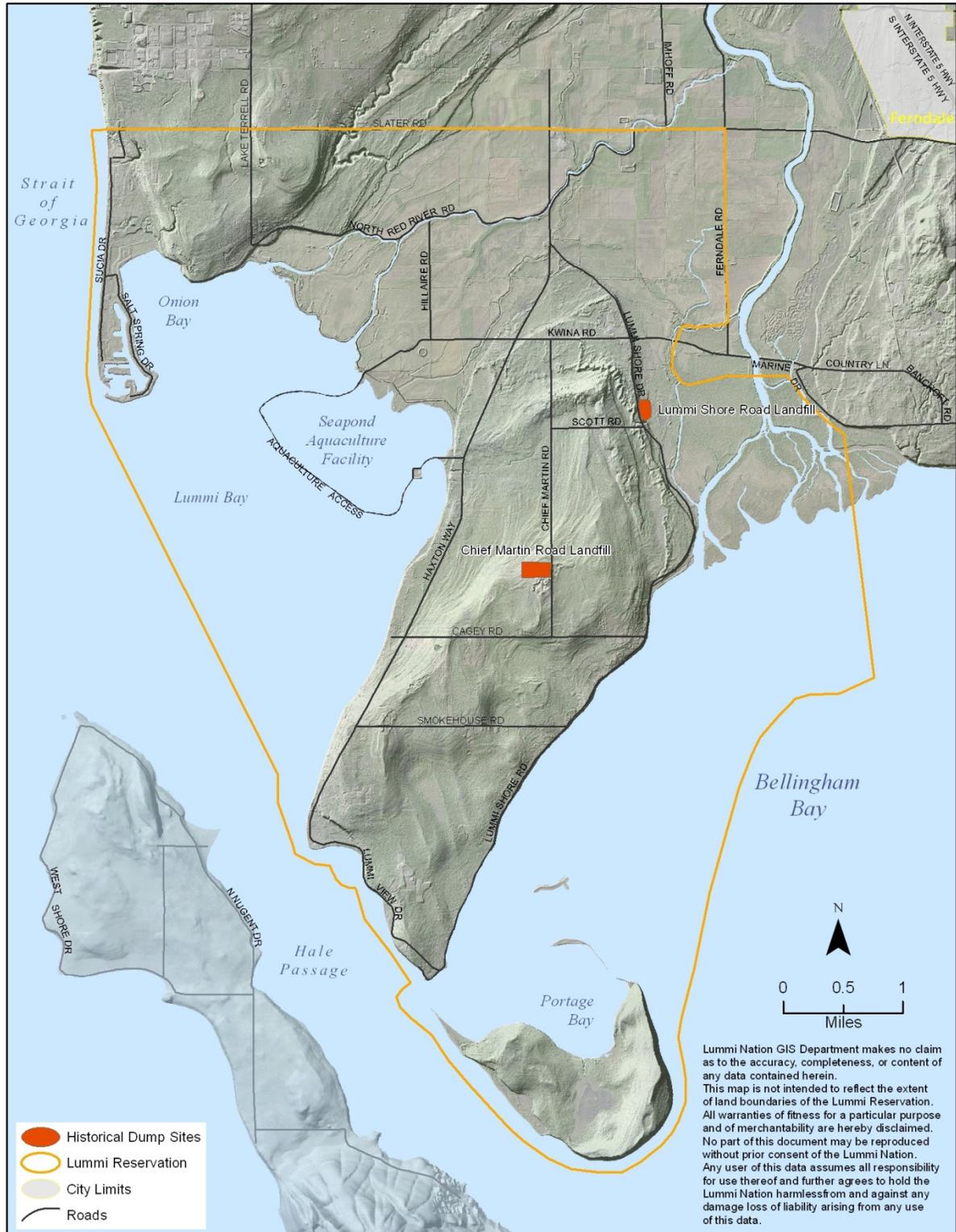


Figure 4.2 Closed Unlined Sanitary Landfills on the Reservation.

4.2.3. *Illegal Dumping*

Illegal dumping refers to the depositing of solid waste (on land or in water) anywhere other than at approved solid waste disposal facilities. Illegal dumping is also referred to as “open dumping”, “fly dumping”, and “midnight dumping” because materials are often dumped in open areas, from vehicles along roadsides, and late at night. Illegally dumped wastes are primarily household wastes or nonhazardous materials that are dumped to avoid either disposal fees or the time and effort required for proper disposal. Illegally dumped materials typically include:

- Construction and demolition waste such as drywall, roofing shingles, lumber, bricks, concrete, and siding
- Abandoned automobiles, auto parts, and scrap tires
- Appliances or “white goods”
- Furniture
- Yard waste
- Household trash
- Medical waste

Areas used for illegal dumping vary, but generally include abandoned industrial, residential, or commercial buildings; vacant lots on public or private property; and areas along rural roads. Along Whatcom County roads, approximately 814,907 pounds (407 tons) of solid waste were removed by the Juvenile Youth Division Program and the Adopt-A-Road program from July 1998 through December 2007 (Whatcom County Public Works 2007). If illegal dumping is not addressed, it often attracts more dumping and more waste, including hazardous waste. Rural areas and communities with limited access to convenient, affordable waste disposal facilities or services tend to be hotspots for illegal dumping.

Solid waste dumpsites are a public health threat and a threat to water quality. Illegal dumpsites can discharge hazardous leachate into the ground water and streams, which could contaminate drinking water supplies or negatively affect commercial, subsistence, and ceremonial fishing and shellfish harvesting. In the Pacific Northwest the high amounts of rainfall can accelerate the leaching process of pollutants. Illegal dumpsites can impact the drainage of storm water runoff, making areas more susceptible to flooding when wastes block ravines, creeks, culverts, road side drainage ditches, and drainage catch basins. Decomposing solid waste can provide food and habitat for scavenging wild animals and insects that can potentially spread diseases affecting public health. Residential neighborhoods near dumpsites have an increased risk of property damage due to waste that catches on fire, either by spontaneous combustion or, more commonly, by arson. Illegal dumping also creates eyesores, reducing quality of life, property values, and the feeling of safety and well being in the community.

Project Clean-Up

Over the last decade, the Lummi Nation has focused on cleaning up dumpsites as the most direct way to remove the potential health threat and threat to Reservation water quality. The LIBC initiated Project Clean-Up in late 2002 to remove illegally dumped solid waste throughout the Reservation. Project Clean-Up operated under the direction of the LIBC Vice-Chairman’s Office during 2003. In 2004, Project Clean-Up was institutionalized within

the administrative structure of the LIBC by moving the program from the Office of the Vice-Chairman to the Lummi Planning Department. Within the Planning Department it was renamed “Lummi Waste Management” and a Lummi Solid Waste Management Team (LSWMT) was formed to help manage solid waste on the Reservation. Over the 2002 through 2006 period, Project Clean-Up and the LSWMT placed signs, installed 11 gates to prevent access to repeat dumpsite locations, provided community education, and provided assistance in solid waste removal from residences.

As a part of the Project Clean-Up program, waste management staff picked up material from illegal solid waste dumpsites either by hand, with hand tools, or with the use of a small front-end loader. The loader was purchased for Project Clean-Up in 2003 and replaced with a new tractor in 2006. Over the January 1, 2003 through December 31, 2006 period a total of approximately 565 tons of mixed household waste/garbage, 215 appliances, approximately 500 tires, and over 70 abandoned vehicles (Table 4.3) were removed from the Reservation and disposed of at RDS or a local vehicle scrap yard (LWRD 2006). Figure 4.3 shows the locations where access gates were installed during 2003 and 2006 and where solid waste was removed from illegal dumpsites during 2006. Hazardous materials (e.g., paint, oil, car batteries, pesticides, household cleaners) were separated from the collected waste and transported to the hazardous waste collection site (Disposal of Toxics) operated by Whatcom County near the Bellingham International Airport.

During 2006 the LSWMT also supported four beach clean-up efforts. Two of these efforts were held in conjunction with the Northwest Indian College (NWIC) and two with local residents near Gooseberry Point. Together, the beach cleanup events removed 13.7 tons of solid waste from Reservation shorelines. Along with ongoing work to clean up the illegal dumpsites, waste management staff also assisted elder and disabled tribal members with their residential waste removal. Waste removal was provided for a total of 193 residences of elder and/or disabled tribal members during 2005. During 2006, several homes were provided with clean-up services on more than one occasion.

In addition, waste management staff developed a series of articles for the monthly Lummi Nation newspaper (the *Squol Quol*) that described the program and encouraged recycling and proper waste disposal of household solid waste. The waste management activities continued to be partially funded by EPA Performance Partnership Grants from January 1, 2007 through December 31, 2008, before the cleanup program was disbanded due to a lack of funds.

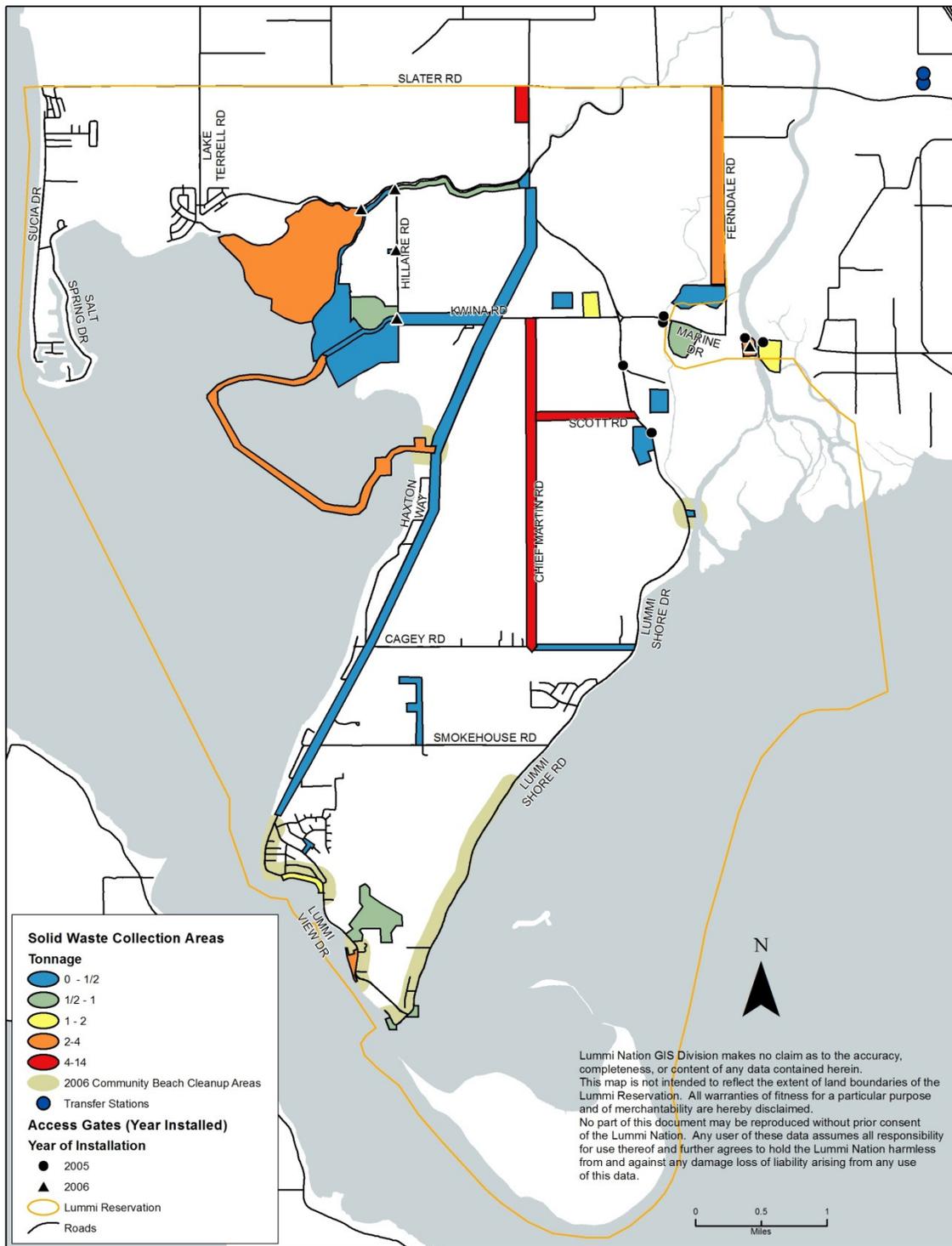


Figure 4.3 Locations of Solid Waste Dump Sites and Clean-Up Activity During 2006

Table 4.3 Summary of Solid Waste Disposal from Remote Dump Sites and Mixed Household Waste on the Reservation over the January 1, 2003 through December 31, 2006 Period

Solid Waste Category	2003¹	2004	2005	2006	Total
Mixed Household Waste/Garage	154 tons	179 tons	108 tons	124 tons	565 tons
Yard Waste ²		17 tons	8 tons		25 tons
Wood ²		0.6 tons	1.7 tons		2.3 tons
Metal ²		0.0 tons	0.3 tons		0.3 tons
Washers/Dryers		50 Units	29 Units	42 Units	121 Units
Refrigerators		45 Units	22 Units	26 Units	93 Units
Tires (Rim Off)		68 Units	34 Units	88 Units	190 Units
Tires (Rim On)		132 Units	62 Units	107 Units	301 Units
Abandoned Vehicle		32 Units	21 Units	20 Units	73 Units

¹Types of solid waste were not categorized during 2003

²Yard waste, wood, and metals were not separately accounted for on the weight tickets from the transfer station during 2006.

Additional Clean-Up Projects

The Lummi Housing Authority (LHA), in conjunction with the LIBC, organized Community Clean-Up days in 2008, 2009, and 2011. The community clean-up event during May 2008 was comprised of distributing twenty 40-yard containers for household waste and ten metal containers for recycling at eight locations on the Reservation in close proximity to residential areas. At one location, freezers and refrigerators were also accepted for disposal. In addition, the LHA removed all solid waste burn barrels from tribally owned housing units. During May 2009, the LHA sponsored a clean-up event in the Mackenzie neighborhood.

Also during May 2009, the Lummi Natural Resources Department (LNR) was contacted regarding a property on the Reservation with large quantities of solid waste that was becoming a public nuisance and potential health hazard. In coordination with the property owner and as a demonstration project, the LNR staff utilized EPA grant funding and arranged for the delivery of a 40-yard waste container and the payment of the dumping fees. The property owners were responsible for filling the waste container. A total of 4.45 tons of solid waste, a mobile trailer home, and two automobiles were removed from the property.

During October and November 2009, the LNR worked in conjunction with the LHA to sponsor a Community Clean-up event that took place from November 4th through 8th. This clean-up event included twenty 30-yard containers for household waste, four metal recycling containers, and an area for special waste disposal (e.g., tires, refrigerators, and propane tanks) at a single collection station (the Stommish Grounds). As part of this Community Clean-up event, the LHA also provided remote solid waste pickup from individual homes that needed assistance and removed an abandoned trailer in the right-of-way on North Red River Road. A total of 148 tons of mixed household waste, 506 tires, 37 refrigerators, and 4 washer/dryers were disposed of and 19 tons of metal were recycled during the November 2009 Community Clean-up event. A comparison of the solid wastes removed during the 4-day 2009 Community Clean-up event and the solid wastes removed over the January 1, 2003 through December 31, 2006 period indicates that more tires were removed during the 4-day event than during all four years of Project Clean-up (506 units versus 491 units).

During April 2011 the LNR again worked in conjunction with the LHA to sponsor a Community Clean-up event. Community members filled 24 dumpsters with solid waste from Reservation lands. This was the largest community clean-up event to date. Nearly 1,000 tires were removed and recycled. Approximately 270 tons of solid wastes were removed, nearly twice the 148 tons removed during the 2009 Community Clean-up event. More than 9 tons of metal were recycled, including appliances. Staff members from the LHA were on hand to help unload trucks at the collection sites, make house calls, and clean-up illegal dumpsites on the Reservation. Considering that approximately 1,000 tires had already been removed from the Reservation during prior clean-up events, there was suspicion that “entrepreneurs” may have taken advantage of the opportunity for free tire disposal by charging others either on- or off-Reservation a discounted tire disposal fee and then unloading the collected tires at the Community Clean-up event.

The Lummi Nation Court system has jail alternative/community services work crews assigned to clean-up litter. These work crews are primarily youth offenders and have removed litter along the Reservation roads and around LIBC buildings. During these community service clean-up efforts from 2003 through 2006, Lummi Waste Management staff provided informal education about the potential affects that illegal dumping can have on their community and their lifestyle and also provided written information/brochures to these crew members. Currently, the jail alternative/community services program continues without the added education element. Other miscellaneous clean-up events have occurred including several annual litter pick-ups sponsored by different tribal organizations. For example, on Earth Day 2009 and 2010, the Lummi Fitness Center sponsored a clean up along Kwina Road and the LNR staff have removed solid waste near the Nooksack River boat launch and near the old blockhouse site in the Lummi River floodplain.

Solid Waste Control and Disposal Code

The Solid Waste Control and Disposal Code (LCL Title 18) is intended to protect the health, safety, and welfare of all Reservation residents and respond to the need for proper control and disposal of solid wastes on the Reservation. Title 18 (Appendix D) prohibits any person from dumping solid waste onto or under the surface of the ground or into the waters of the Reservation anywhere other than approved solid waste disposal sites (which currently do not exist on the Reservation). Title 18 also prohibits any persons from accumulating, storing, and maintaining or displaying waste or solid waste on private property that is offensive or hazardous to the health and safety of Reservation residents. Violations can result in civil penalties and/or cost recovery of LIBC–led response actions. Through LIBC Resolution 2004-114 (Appendix F), the Lummi Planning Department Director, who is also designated the Health Officer, has the authority to enforce the provisions of LCL Title 18.

4.2.4. Solid Waste Management System Challenges

Similar to other jurisdictions, the existing Reservation solid waste management system relies primarily on individual residents and businesses to dispose of the solid waste that they generate in an environmentally-sound manner with little financial or programmatic assistance from the government. The Lummi government does not currently own and/or operate solid waste collection or disposal facilities. Instead, residents and businesses either self-haul to one of the two transfer stations located less than two miles from the Reservation boundary or

privately contract with Sanitary Service Company for curb-side collection services. However, illegal dumping at the numerous isolated areas on the Reservation continues to occur. The illegal dumping is a continuing problem that needs to be addressed with both a pragmatic and programmatic approach.

The Lummi Solid Waste Management Plan that was adopted in 1979 recommended the construction of a drop box station which would use roll off boxes for solid waste disposal with an inclined ramp for cars and pickups. Although this recommendation has been implemented on a temporary basis as part of specific clean-up activities, a permanent drop box station has not been developed on the Reservation. Part of this ISWMP development effort was to revisit the drop box station and other recommendations from the 1979 plan and to identify integrated solid waste management practices that are aligned with current needs on the Reservation.

The large quantities of wastes removed from illegal dump sites and private residences indicate a need to change solid waste management on the Reservation. The approximately 4,700 Reservation residents are estimated to dispose of nearly 3,000 tons of solid waste a year. Sanitary Service Company (SSC) has service agreements with 734 residences on the Reservation, including the 270 units where this service is paid for by the Lummi Housing Authority. Therefore, 63 percent of the 1,989 housing units on the Reservation and approximately 425 tribal households do not have contracted waste removal service. Most of these tribal households self-haul solid wastes to one of two solid waste transfer stations located less than two miles from the Reservation boundary.

Based on the amount of illegally dumped waste removed (an average of approximately 141 tons per year) and the large amount of waste (147 tons of mixed waste) disposed at community clean-up events, there appears to be a continued need for improved solid waste management on the Reservation. Community members have expressed at community clean-up events the need and desire for a solid waste and recycling facility on the Reservation with reduced fees for tribal members. Continued funding for cleaning up illegal dumpsites and enforcement of LCL Title 18 is also needed. Community clean-up events are needed annually to assist residents in properly disposing of household hazardous waste and special wastes (i.e., tires, electronic waste, and bulky household waste such as mattresses, furniture, and appliances). A recycling and composting program is needed to reduce the amount of waste being disposed of in landfills and to protect natural resources of the Reservation for future generations. Development and implementation of successful solid waste management and recycling programs depends on effective public education/community outreach initiatives, and community participation. Well planned initiatives can help to generate understanding, support, and cooperation/participation for waste management issues that benefit the entire community. Increased education and outreach to residents typically results in higher levels of participation in solid waste programs and lower levels of incidents of illegal dumping and contamination of collected materials.

This ISWMP has taken a holistic review of the solid waste management issues on the Reservation and has developed alternative solutions and recommendations that are intended to meet the needs of the Reservation community. In the remainder of this chapter and in Chapters 6, 7, and 8, alternatives are analyzed and actions recommended for solid, special,

and hazardous waste collection and disposal, recycling, composting, and public education and outreach. The recommendations are intended to protect the Reservation environment and public health by reducing the amount of illegal dumping and the quantity of solid waste generated on the Reservation.

4.2.5. Past Solid Waste Management Expenses

The current solid waste management system described above includes annual community clean-up events and funding for the clean-up of illegal dumpsites. A summary of the Waste Management Program expenditures for a representative tribal fiscal year (January 1 – December 31, 2006) is presented in Table 4.4. These expenditures did not include a Community Clean-Up event. Expenditures for solid waste management by the Lummi Housing Authority are also not included in Table 4.4.

Table 4.4 Waste Management Program Expense Summary for FY 2006

Line Item Budget	FY 2006
Personnel	\$52,955
Fringe Benefits	\$22,299
Travel	\$2,561
Equipment	\$16,790
Supplies	\$10,259
Contractual (Transfer Station Disposal Fees)	\$15,672
Construction (Gates)	\$0
Other (Vehicles/ Equipment Repair and Maintenance)	\$0
Indirect Charges	\$15,061
TOTAL	\$135,597

4.3. Alternatives for Future Solid Waste Management

Based on the review of the existing collection and disposal system, the recommendations of the 1979 Lummi Solid Waste Management Plan, and identified community needs, several alternatives have been identified to address the solid waste management challenges of the Lummi Nation. The proposed alternatives are based on the goals and objectives stated in Chapter 1 of this ISWMP. This section includes:

- Alternative administration and financing systems
- A description of alternatives, planning level cost estimates, and an alternatives analysis for solid waste collection
- A description of alternatives, planning level cost estimates, and an alternatives analysis for solid waste transfer and disposal

4.3.1. Alternative Administration and Financing Systems

The level of administrative support required for the selected system will depend primarily upon the method used to recover operating costs. Alternatives that include the collection of user fees by the tribal government will require higher levels of administrative support than alternatives that rely upon private contractors (e.g., SSC) to collect fees or that rely on tribal government subsidies. Three alternative administrative/financing situations were identified in the 1979 Lummi Solid Waste Management Plan (Harper-Owes 1979) and are updated in this section. In addition, due to the importance of education and outreach efforts and the overall challenges of implementing the various elements of this integrated solid waste management plan, a permanent full-time (1 FTE) Solid Waste Management Specialist should be hired regardless of the alternative selected. The three administrative/financing situations described in the 1979 Solid Waste Management plan were the following:

1. No-fee systems
2. Disposal fee systems
3. Household fee or subsidy systems

In addition to direct clerical and administrative needs, all of the alternatives would require the LIBC to incur indirect costs (e.g., office space, utilities, accounting/payroll services). In most local government units, general support services are allocated and charged for service activities. These service activities are generally operated as enterprise funds that are intended to reflect the full cost of the services provided. For the Lummi Nation, indirect cost rates are computed annually based on costs incurred during the previous year by the different LIBC departments. The indirect cost rates are then negotiated with the U.S. Department of Interior National Business Center and final rates determined and approved for each LIBC department for each year. As a result, the indirect charges can vary annually and for each LIBC administrative department. Since the Lummi Solid Waste Control and Disposal Code (LCL Title 18) identifies the Planning Department as the responsible department, the average indirect cost rate for the Planning Department over the most recent five year period (2008 to

2012) was used in this analysis. The indirect cost rate for the Planning Department over the last five years ranged from 12.95% to 19.56% of the direct charges and averaged 15.62% over the five-year period.

No-Fee Systems

Alternatives that do not require direct fee collection by the LIBC from service recipients include contracted collection systems and systems that are entirely operated on a non-user fee basis. Examples of non-user fee alternatives include solid waste management systems that require residents to contract with a private collection service or to self-haul and dispose of solid waste at an off-Reservation transfer station, community clean-up events, and removal and disposal of illegally dumped waste. The 1979 Lummi Solid Waste Management Plan (Harper-Owes 1979) estimated that these types of systems will require about a 0.25 full-time equivalent (FTE) or 520 hours per year of administrative support. An Administrative Support person would be hired as a Grade 5 in the LIBC Salary and Wage Scale, which has a salary range from \$14.35 to \$16.07 per hour. The starting annual administrative cost of these no-fee systems will be approximately \$12,889 (520 hours at \$14.35/hr, plus fringe benefits and indirect charges on the salary and fringe benefits).

Disposal Fee System

Systems that include the collection of disposal fees require administrative support to control, bank, and account for the fees collected at the disposal site. Harper-Owes (1979) estimated that a 0.5 FTE (1,040 hours) of administrative support staff time would be required for this purpose. The annual administrative costs will be about \$25,779 (1,040 hours at \$14.35/hr, plus fringe benefits and indirect charges on the salary and fringe benefits).

Household Fee or Subsidy System

Systems that require household billing or that include direct subsidy provisions for portions of the user community require correspondingly higher levels of administrative support. Increased supervision costs may also be encountered. Harper-Owes (1979) estimated that about 0.75 FTE would be required for a LIBC solid waste operation, resulting in an annual cost of approximately \$38,669 (1,560 hours at \$14.35/hr, plus fringe benefits and indirect charges on the salary and fringe benefits). If the billing process can be combined with existing system administration, costs may be somewhat lower.

4.3.2. Solid Waste Collection Alternatives and Estimated Costs

This section evaluates alternative solid waste collection strategies and estimated costs. The status quo of individual, voluntary, contracted collection or self-haul is evaluated against five collection alternatives which are combinations of the following two options:

- Whether or not the solid waste collection is mandatory under LCL Title 18, and
- Whether or not the tribal member resident, or LIBC, or both are responsible for the collection fees and/or self-haul disposal costs.

All six collection alternatives are based on the costs for curbside collection and use the current Sanitary Service Company (SSC) rate of \$22.11 per month for once-a-week

collection of solid waste in a 60 gallon Toter and every other week collection of recycling in three bins (one for newspaper, one for mixed paper, and one for cans, bottles, and plastic). Monthly self-haul costs are variable and depend on a number of factors including the frequency of self-haul trips; the distance traveled to the transfer facility located less than two miles from the Reservation boundary (i.e., mileage costs from actual residence location); the value of the time required to load, travel, dispose, travel, and unload the storage containers; and the amount and types of waste disposed of at the transfer station (i.e., municipal solid wastes or bulk items associated with specific fees). Since there is a minimum \$5.00 dumping fee at the transfer station, and mileage costs associated with a representative distance of 16-miles round trip at \$0.565 per mile would be \$9.04, the cost for a single self-haul trip would be a minimum of approximately \$14.00 (not including the value of the time expended) and potentially more depending on the quantity and types of dumped solid waste. However, since a trip to the transfer station would commonly be combined with a trip into Bellingham, Ferndale, or elsewhere for other purposes, and since bulk items are not collected curbside, for the purpose of this analysis it is assumed that self-haul of solid wastes to one of the off-Reservation transfer facilities occur twice per month and the average costs over a year are essentially the same as the curbside collection cost. If the self-haul of solid wastes to the local transfer facilities occur more frequently than twice per month, the average cost would be higher than the curbside collection costs.

Curbside collection offers convenience for community members, should increase recycling rates, and may reduce some illegal dumping incidents. However, additional measures are needed for the disposal of bulk items (e.g., mattresses/box springs, appliances, furniture, tires) as they are not collected curbside. Curbside collection can reduce litter, odor, and vermin problems because waste is stored outside in a closed/secured tote for only a week (EPA 2004) and recycling is encouraged because it is included, albeit every other week rather than once each week, with the service (Pemble 2012). Individual self-haul approaches also can reduce litter, odor, and vermin problems because waste is stored outside in closed/secured containers. However, anecdotal information indicates that separate containers are generally not maintained for recyclables and recyclables are generally not separated from the solid wastes by individuals that self-haul. This practice both increases the dumping costs for the individual (newspaper, mixed paper, bottles, and cans can be disposed of at no cost at the local transfer stations) and increases the overall impacts to the environment of solid waste generation. Central collection sites, such as temporary and permanent drop box sites, are evaluated in Section 4.3.3 under transfer and disposal alternatives.

Alternative A-1: Voluntary Collection, Resident's Responsibility (Status Quo)

The status quo for solid waste collection on the Lummi Indian Reservation is the voluntary subscription with an off-Reservation contractor (SSC) by individual residents for routine curb-side collection of garbage and recycling or self-haul of solid wastes to nearby off-Reservation transfer facilities. Currently, LCL Title 18 does not require residents to have garbage collection but does make dumping and the accumulation of solid waste unlawful.

Alternative A-2: Voluntary Collection, Partial LIBC Subsidy

Collection Alternative A-2 is voluntary subscription with a collection service by individual residents for routine curb-side collection or self-haul but with half of the collection or disposal costs paid by the LIBC for enrolled tribal members. The LIBC would pay half of

the monthly bill, approximately \$11.06 per household, for weekly garbage collection and every other week recycling by SSC for members who select the curbside collection option. In addition, the LIBC would issue a purchase order with one of the nearby transfer stations for the remainder of the cost associated with a 50 percent subsidy for curbside collection. For example, if the LIBC provided a 50 percent subsidy on the cost of curbside collection, the total annual cost for the estimated 427 tribal member households that currently do not have curbside collection service would be \$72,560. If only about a third of the households (142 households) took the subsidy and subscribed for the curbside collection, the annual cost would be \$24,140. The remaining budget would be \$48,420, which would be the value of the purchase order established with one of the transfer stations for one year. Lummi tribal members who self-haul would have to provide proof of membership to the transfer station and the dumping charges would be made against the purchase order. Once the value of the purchase order was exhausted, the dumping fees would be the resident's responsibility. It is noted that an enrolled tribal member could receive the subsidy for curbside collection and also self-haul bulk items to the transfer station at no cost.

Alternative A-3: Voluntary Collection, Full LIBC Subsidy

Collection Alternative A-3 is similar to Alternative A-2 except that there would be a full LIBC subsidy to encourage enrolled tribal members to voluntarily subscribe with a collection service for routine curb-side collection. That is, the LIBC would pay the monthly bill of \$22.11 per household for weekly garbage collection and every other week recycling. Additional contractor services and any overage fees would be the resident's responsibility. Similar to Alternative A-2, the LIBC would also issue a purchase order with one of the nearby transfer stations for the remainder of the cost associated with a 100 percent subsidy for curbside collection. For example, if the LIBC provided a full subsidy on the cost of curbside collection, the total annual cost for the estimated 427 tribal member households that currently do not have curbside collection service would be \$129,181. If only about a third of the households (142 households) took the subsidy and subscribed for the curbside collection, the annual cost would be \$37,630. The remaining budget would be \$91,551, which would be the value of the purchase order established with one of the transfer stations for one year. Lummi tribal members who self-haul would have to provide proof of membership to the transfer station and the dumping charges would be made against the purchase order. Once the value of the purchase order was exhausted, the dumping fees would be the resident's responsibility. Similar to Alternative A-2, a tribal member could receive the subsidy for curbside collection and also self-hauling bulk items to the transfer station at no cost.

Alternative B-1: Mandatory Collection, Resident Responsibility

Collection Alternative B-1 is the required deposit and collection of solid waste under LCL Title 18, paid for in full by the resident. Revisions would be made to Title 18, similar to City of Bellingham Municipal Code sections 9.12.030 and 9.12.040 to require every owner, occupant, or tenant within the Reservation boundaries to deposit or cause to be deposited all garbage in a covered container and make the universal use of garbage collection and disposal mandatory. Under Alternative B-1, the collection (either with SSC or an individual tribal member-owned service) would be paid for in full by the resident. The self-haul of household solid wastes would not occur under this alternative although the self-haul of bulk items (e.g., mattresses/box springs, appliances, furniture, tires) would continue.

Alternative B-2: Mandatory Collection: Partial LIBC Subsidy

Collection Alternative B-2 is the required deposit and collection of solid waste under LCL Title 18, paid in part by LIBC for enrolled tribal members. Revisions would be made to LCL Title 18, similar to City of Bellingham Municipal Code sections 9.12.030 and 9.12.040, to require every owner, occupant, or tenant within the Reservation boundaries to deposit or cause to be deposited all garbage in a covered container and to make the universal use of garbage collection and disposal mandatory. Under Alternative B-2, the LIBC would pay half of the monthly bill for enrolled tribal members, approximately \$11.06 per household, to either SSC or an individual tribal member-owned service, if it is available. Additional contractor services and any overage fees would be the residents' responsibility. Reservation residents that are not tribal members are subject to the Lummi Code of Laws and would therefore be required to have their garbage collected but would not be eligible for the LIBC subsidy. The self-haul of household solid wastes would not occur under this alternative although the self-haul of bulk items (e.g., mattresses/box springs, appliances, furniture, tires) would continue.

Alternative B-3: Mandatory Collection, Full LIBC Subsidy

Collection Alternative B-3 is the required deposit and collection of solid waste under LCL Title 18, paid in full by LIBC for enrolled tribal members. Revisions would be made to Title 18, similar to City of Bellingham Municipal Code sections 9.12.030 and 9.12.040, to require every owner, occupant, or tenant within the Reservation boundaries to deposit or cause to be deposited all garbage in a covered container and to make the universal use of garbage collection and disposal mandatory. Under Alternative B-3, the LIBC would pay the full monthly bill, approximately \$22.11 per household, to either SSC or an individual tribal member-owned service, if it is available, for enrolled tribal members. Additional contractor services and any overage fees would be the residents' responsibility. Reservation residents that are not tribal members are subject to the Lummi Code of Laws and would therefore be required to have their garbage collected but would not be eligible for the LIBC subsidy. The self-haul of household solid wastes would not occur under this alternative although the self-haul of bulk items (e.g., mattresses/box springs, appliances, furniture, tires) would continue.

The estimated costs of the Reservation solid waste collection alternatives are summarized in Table 4.5. The contracted collection costs were obtained from the off-Reservation private collection contractor and the personnel costs were determined using the Fiscal Year 2013 LIBC-LNSO Budget Form and include fringe benefits and indirect charges. The personnel costs do not include the costs of a Solid Waste Management Specialist who would be charged with ensuring the effective implementation of the selected alternative. The estimated cost of supplies and training were determined by examining past Lummi Waste Management budgets and other tribal solid waste budgets providing similar services.

Table 4.5. Detailed Cost Estimate for Collection Alternatives

Item	Collection Alternatives					
	A-1. Voluntary, no subsidy ⁴	A-2. Voluntary, partial LIBC subsidy ⁵	A-3. Voluntary, full LIBC subsidy ⁵	B-1. Mandatory, No subsidy ⁴	B-2. Mandatory, Partial LIBC subsidy	B-3. Mandatory, full LIBC subsidy
Estimated Number of Households Served¹	427	427	427	427	427	427
LIBC Staff Costs²	\$0	\$12,889	\$12,889	\$0	\$12,889	\$12,889
Supplies and Training	\$0	\$3,000	\$3,000	\$0	\$3,000	\$3,000
Collection and Disposal Costs^{3,4}	\$113,292	\$113,292	\$113,292	\$113,292	\$113,292	\$113,292
Total Annual Cost	\$113,292	\$129,181	\$129,181	\$113,292	\$129,181	\$129,181
Percent Subsidy Provided by LIBC	0%	50%	100%	0%	50%	100%
Total Annual Cost to LIBC⁶	\$0	\$72,560	\$129,181	\$0	\$72,560	\$129,181
Total Annual Cost to Household	\$265	\$170	\$0	\$265	\$170	\$0

¹ The total number of tribal residences 697(BHC Consultants 2007) minus the 270 LHA residences with contracted services (LHA 2012).

² Assumes a 0.25 FTE Administrative Assistant paid \$14.25/hour; Fringe Benefits at 49.40%; Indirect Charges at 15.62% to manage payment of subsidies.

³ Based on monthly curbside collection costs of \$22.11 per month for weekly collection of a 60 gallon Toter and every other week recycling pick up (SSC 2013).

⁴ Assumes collection and disposal costs are essentially the same whether through curbside collection or self-haul (including dumping fees and mileage costs).

⁵ Assumes 100% participation of households to maximize benefit of the LIBC subsidy and to reduce household costs.

⁶ Does not include costs for any Community Clean-Up events or the clean-up of illegal dump sites.

4.3.3. Solid Waste Transfer and Disposal Alternatives and Estimated Costs

Five alternatives that provide for the transfer of wastes to a disposal site off-Reservation are evaluated below. These alternatives involve various degrees of ownership by the Lummi government. It is assumed that all five of the alternative transfer facilities would be available to all Reservation residents (both Lummi tribal members and non-members). It is noted that some mechanism is needed for participants to provide proof of residency on the Reservation to preclude individuals from off-Reservation from bringing outside solid wastes to the Reservation. Because the cost of a Solid Waste Management Specialist would be incurred regardless of the alternative selected, the personnel costs for this individual are not included in the cost estimates for the alternatives described below – only the costs for additional staff associated with particular alternatives. This individual would have a wide range of duties, which makes it difficult to apportion and attribute the costs of this particular staff person among the alternatives.

Alternative 1: Contracted Curbside Collection and Self Haul (Status Quo) with Annual Community Clean-up Event

Disposal Alternative 1 is more or less the status quo of solid waste being regularly collected, transferred, and disposed of by a contracted curbside collection service or residents self-hauling wastes to one of the two nearby off-Reservation transfer stations. In addition, the LIBC and the LHA would sponsor a single 5-day Community Clean-Up event each year similar to what has happened periodically over the last 10 years. The cost analysis assumes that the Community Clean-Up event is conducted simultaneously with neighborhood clean-up events. The neighborhood clean-up events would allow residents to take advantage of available equipment, supplies, and manpower by collaborating over one weekend to clean up their neighborhood. Bulk items (e.g., mattresses/box springs, appliances, furniture, tires) would be accepted and disposed of as part of these events. Containers and supplies would be provided by the LIBC and LHA as part of the Community Clean-up event. For this alternative, it is assumed that the costs of the Community Clean-up event are similar to the most recent similar event in April 2011.

Alternative 2: Contractor-Operated Drop-Site (Compaction Trucks)

Under Disposal Alternative 2, a private contractor would provide compaction trucks at a central location on the Reservation for household solid waste collection and disposal. Every two weeks on Saturday from 9 am to 2 pm, the private contractor would provide four compaction trucks for all Reservation residents to drop household solid waste. When the compaction trucks working in tandem (a total of four lines for vehicles dropping off solid waste [one line on each side of each truck]) are full, they would be replaced by the second set of trucks while the waste from the first set of trucks is delivered to and disposed of at Regional Disposal Services (RDS). The compaction trucks would then return to the central location and would be refilled as the second set of trucks transports and disposes of the collected and compacted solid wastes. Because special wastes and household hazardous waste (HHW) cannot be collected and disposed of with municipal solid waste (MSW) due to special handling requirements, only household garbage would be accepted. Bulk items (e.g., mattresses/box springs, appliances, furniture, tires) would not be accepted and would still need to be self-hauled to one of the two nearby off-Reservation transfer facilities. Although

a nominal dumping fee could be charged to offset the program costs, the management of the fee collection and accounting would also be associated with additional administrative costs. Consequently, for this alternative it is assumed that this service would be provided at no cost for all Reservation residents (tribal and non-tribal members).

Alternative 3: Tribally-Operated Temporary Drop Box Facility

Under Disposal Alternative 3, a temporary drop box facility would be constructed and operated by the LIBC from June through September when the climate is drier and community events are more frequent. The facility would operate as a no-cost disposal and recycling service for Reservation residents (tribal members and non-tribal members) who will drop off their own waste. Bulk items (e.g., mattresses/box springs, appliances, furniture, tires) would be accepted similar to during the Community Clean-Up events.

The facility would be centrally located and require minimal site development. Site development would include temporary fencing to provide security and discourage dumping outside of operating hours. This fencing would be rented for the four month duration that the facility is operational each year. A portable toilet would also be rented for the facility. Within the fenced area would be four leased drop box containers for collection of solid waste, arranged to allow convenient drop-off from private vehicles. The recycling capabilities at the site would include four additional containers for cardboard (1), aluminum cans and plastics (1), glass (1), as well as a separate container for scrap metal (1). The scrap metal container would accommodate bulky items such as appliances, although appliances containing chlorofluorocarbon (CFC) (i.e., refrigerators) would need to be kept separate or not be accepted.

Two solid waste management technicians would be needed to operate the temporary drop-box facility. The proposed hours are from noon until 6 pm Thursday through Sunday, allowing convenient access after work and on the weekends. The two technicians would oversee dumping operations on site, ensure only Reservation residents are disposing acceptable wastes, maintain the site in a clean and orderly condition, and contact the private contractor to empty the drop boxes when they are full. The minimum requirements for the site layout and design of the program enable separation of recycled materials, hazardous wastes, and other special materials from regular solid wastes. Although revenue earned through recycling of materials and charging a user fee could be used to recover some of the temporary drop-box facility costs, these revenue sources are not included in the evaluation of this alternative other than assuming that the revenue from metal recycling would offset the hauling/disposal costs of the other recyclables. This alternative is intended to reduce the amount of illegal dumping and lead to increased appropriate disposal of solid waste. This alternative also allows evaluation of community awareness and of the effectiveness of a drop box facility with minimal capital development costs.

Alternative 4: Tribally-Operated Permanent Drop Box Facility

A permanent solid waste drop box facility would be constructed and operated by the LIBC, similar to the temporary drop box facility. The facility would operate as a free disposal and recycling service for Reservation residents (tribal members and non-tribal members). Bulk items (e.g., mattresses/box springs, appliances, furniture, tires) would be accepted.

The facility would consist of four drop boxes for household solid waste disposal and a backhoe for compaction of the solid waste in the containers. The recycling capabilities at the site would include containers for cardboard and mixed paper, newspaper, and aluminum cans, glass bottles, plastics. A separate container would be needed for scrap metal. The scrap metal container would accommodate bulky items such as appliances, although appliances containing chlorofluorocarbon (CFC) (i.e. refrigerators) would need to be kept separate or not be accepted. The drop boxes and recycling containers would be leased from a local contractor by the LIBC.

The new drop box station would include:

- A prepared site (cleared and graveled) to fit the waste disposal ramp, municipal solid waste (MSW) drop boxes, scrap metal and other recycling containers, maintenance building, and construction debris and tire collection sites.
- Chain link fencing surrounding the site, with two large gates (one for the main entrance and the other for the exit so that vehicles can flow through the site).
- A small office for supplies and a rented portable toilet.
- Four rented drop boxes for MSW, one container for scrap metal, and three containers for recycling.
- Wood and tire collection sites.
- A used backhoe for MSW compaction.
- Covered areas for storing recyclables (paper, plastic, aluminum, and cardboard).
- Staffing.

Alternative 5: Municipal Solid Waste Landfill

Disposal Alternative 5 is the construction and operation of an on-Reservation Municipal Solid Waste (MSW) landfill. Waste collected by a private contractor (tribal or non-tribally owned) would be hauled to a new on-Reservation landfill. Systems for material separation would need to be installed at the new landfill. Separated garbage would be disposed of in a regulatory-compliant and state-of-the-art composite lined landfill. The landfill would be designed, constructed and operated in compliance with Federal RCRA Subtitle D standards. Recovered recyclable materials would be stored and then shipped to various markets for sale.

However, because of the geographic and hydrogeologic conditions in the area, and therefore the prohibition of new landfills in LCL 17.04.050 and LCL 18.04.040, a new municipal solid waste landfill is not a feasible alternative within the Reservation. Over 95 percent of the residential water supply for the Reservation is currently pumped from local ground water wells. The contamination of the aquifers would adversely affect the health of persons drinking or using water from these supplies. Because this alternative is not feasible on the Reservation, no cost estimate was calculated and it is not further evaluated against the other transfer and disposal alternatives.

The estimated cost of the Reservation solid waste transfer/disposal alternatives is summarized in Table 4.6 and detailed in Table 4.7 and Appendix I. The disposal cost and contracted hauling of solid waste to a transfer station costs were obtained from the off-

Reservation transfer station and private contractors. The personnel costs were determined using the Fiscal Year 2013 LIBC-LNSO Budget Form and include fringe benefits and indirect costs. The estimated cost of supplies, training, and vehicle equipment repair and maintenance was determined by examining past Lummi Waste Management budgets and other tribal solid waste budgets providing similar services.

Table 4.6 Summary of Estimated Annual Costs for Disposal Alternatives

Disposal Alternative		Estimated Solid Wastes Disposed per Year (tons)	Annual Cost to LIBC (\$/ton)	Total Annual Cost to LIBC
Alternative 1	Contracted Curbside Collection (Status Quo) with One Annual Clean-up Event	269	\$231	\$62,198
Alternative 2	Contractor-Operated Every Other Week Drop Site	2,920	\$79	\$229,996
Alternative 3	Tribally-Operated Temporary Drop Box Site	1,008	\$152	\$152,924
Alternative 4	Tribally-Operated Permanent Drop Box Site	2,920	\$461	\$464,281

Table 4.7 Solid Waste Transfer Facility Alternatives Cost Estimates

Alternatives	Initial Cost	Personnel Cost	Supplies and Training	Vehicles & Equipment Rental, Repair and Maintenance	Contract Haul ²	Contract Disposal ^{2,3}	Total Annual Cost ²	Cost Per Ton ²
1. Contracted Curbside Collection and Self-Haul (Status Quo) and Single Annual Community Clean-up event ^{1, 3}	\$0	\$26,787	\$2,000	\$2,441	\$17,035	\$13,935	\$62,198 per Community Clean-Up event	\$231
2. Contractor Operated Drop Site (Compaction Trucks)	\$0	\$0	\$0	\$0	\$19,656	\$210,340	\$229,996	\$79
3. Tribally-Operated Temporary Drop Box Facility (4 months)	\$0	\$45,798	\$2,891	\$7,953	\$25,723	\$70,560	\$152,924	\$152
4. Tribally-Operated Permanent Drop Box Facility	\$45,769	\$116,836	\$2,891	\$20,634	\$74,311	\$203,840	\$464,281	\$461

¹ Community Clean-Up Event Costs based on actual costs of the Lummi Nation Community Clean-Up Event from April 13-17, 2011.

² Estimated quantity of solid wastes removed is variable for each alternative. Alternative 1 cost includes cost to dispose of 269 tons of solid waste and disposal costs for bulk items (e.g., mattresses, furniture, appliances, tires). Alternatives 2 and 4 assume all solid wastes generated on the Reservation (2,920 tons per year computed by multiplying average waste generation rate of 3.4 lbs/person/day by 4,706 Reservation residents [Census 2010]) are disposed of using the provided facility. Alternative 3 assumes all solid wastes generated on Reservation by all residents during 18 week period (1,008 tons) are disposed of at the facility.

³ Cost do not include contracted curbside collection or self-haul costs incurred by Reservation residents.

4.3.4. Alternatives Analysis and Recommendations

Six solid waste collection alternatives and five solid waste transfer or disposal alternatives were identified after literature reviews, review of the 1979 Solid Waste Management Plan alternatives, and consideration of comments from LIBC staff and community members. Sections 4.1 and 4.2 presented descriptions of the existing solid waste management system and the solid waste management needs on the Reservation. Sections 4.3 provided descriptions and planning level cost estimates for the six solid waste collection alternatives and the five transfer and disposal alternatives. Table 4.8 and Table 4.9 provide an analysis of these alternatives against the goals and objectives of this Integrated Solid Waste Management Plan (ISWMP). Weighted values of Low (1), Medium (2), and High (3) were assigned to each alternative for each objective of the ISWMP in Table 4.8 and Table 4.9 to determine the likelihood that the alternative will satisfy the objective. For example, there is a low likelihood that Collection Alternative A-1 (individual contracts for collection) will reduce illegal dumping because it is the status quo and illegal dumpsites are currently a problem. The alternatives analysis is followed by a discussion of the preferred alternatives that are recommended to the Lummi Natural Resources Commission, the Lummi Planning and Public Works Commission, the Lummi Cultural Resources Protection Commission, the Law and Order Commission, and the Lummi Indian Business Council.

Table 4.8 Solid Waste Collection Alternatives Analysis for the Lummi Reservation

ISWMP Objectives	Collection Alternatives					
	A-1. Voluntary, no subsidy	A-2. Voluntary, partial LIBC subsidy	A-3. Voluntary, full LIBC subsidy	B-1. Mandatory, No subsidy	B-2. Mandatory, Partial LIBC subsidy	B-3. Mandatory, full LIBC subsidy
Convenience	High Curbside collection	High Curbside collection	High Curbside collection	High Curbside collection	High Curbside collection	High Curbside collection
Minimize Litter, Odor, Dust, Vermin	Low Illegal dumping is occurring	Medium Deposit and collection not mandatory, expect only partial participation even with partial subsidy	High Deposit and collection not mandatory but fully paid for tribal members that subscribe	Medium Deposit and collection are required. Collection fees are the responsibility of the individual	High Deposit and collection are required. Cost to individual is reduced	High Deposit and collection are required. Collection fee fully paid for tribal members
Potential for Source Reduction and Recycling	Low Included with SSC collection but is not being used fully as shown by continued illegal dumping	Medium Included with SSC collection. Contract not mandatory, expect only partial participation even with partial subsidy	High Included with SSC collection. Contract not required but fully paid for tribal members that subscribe	Medium Included with required collection but collection fees are the responsibility of the individual	High Included with required collection and cost to individual is reduced	High Included with required collection and collection fees are fully paid for tribal members
Maximize Participation	Low Full cost is borne by resident and there is no requirement	Medium Half cost and no requirement but provides convenience and cost reduction	High No cost and no requirement but provides convenience and cost reduction	Medium Full cost to individual and deposit and collection required	High Half cost to individual and deposit and collection required	High No cost to individual and deposit and collection required.
Affordable for Community Members	Low	Medium	High	Low	Medium	High

Table 4.8 Solid Waste Collection Alternatives Analysis for the Lummi Reservation

ISWMP Objectives	Collection Alternatives					
	A-1. Voluntary, no subsidy	A-2. Voluntary, partial LIBC subsidy	A-3. Voluntary, full LIBC subsidy	B-1. Mandatory, No subsidy	B-2. Mandatory, Partial LIBC subsidy	B-3. Mandatory, full LIBC subsidy
Decrease Illegal Dumping	Low Illegal dumping is occurring. Bulk items (e.g., mattresses/box springs, appliances, furniture, tires) not collected curbside	Medium Deposit and collection not mandatory, expect only partial participation even with partial subsidy. Bulk items (e.g., mattresses/box springs, appliances, furniture, tires) not collected curbside	Medium Deposit and collection not mandatory but fully paid for tribal members that subscribe. Bulk items (e.g., mattresses/box springs, appliances, furniture, tires) not collected curbside	Medium Deposit and collection are required. Collection fees are the responsibility of the individual. Bulk items (e.g., mattresses/box springs, appliances, furniture, tires) not collected curbside	Medium Deposit and collection are required. Cost to individual is reduced. Bulk items (e.g., mattresses/box springs, appliances, furniture, tires) not collected curbside	Medium Deposit and collection are required. Collection fee fully paid for tribal members. Bulk items (e.g., mattresses/box springs, appliances, furniture, tires) not collected curbside
Overall likelihood of alternative meeting ISWMP objectives	Low (1.3) Pros – low cost to LIBC, convenience Cons – cost to tribal members, illegal dumping is occurring	Medium (2.2) Pros – low cost to tribal members, convenience Cons – partial cost to tribal member, likelihood of continued low participation, does not address bulk items commonly found at illegal dump sites.	High (2.8) Pros – no cost to tribal member, convenience, greater participation, reduced compliance and enforcement costs Cons – cost to LIBC, does not address bulk items commonly found at illegal dump sites	Medium (2.0) Pros – low cost to LIBC, convenience, greater participation through Title 18 changes Cons – cost to tribal members, need for compliance and enforcement, does not address bulk items commonly found at illegal dump sites	High (2.7) Pros – lower cost to tribal members, convenience, greater participation through Title 18 changes Cons – cost to tribal members, need for compliance and enforcement, does not address bulk items commonly found at illegal dump sites	High (2.8) Pros – no cost to tribal members, convenience, greater participation through Title 18 changes Cons – cost to LIBC, need for compliance and enforcement, does not address bulk items commonly found at illegal dump sites
Annual LIBC Cost	\$0	\$72,560	\$129,181	\$0	\$72,560	\$129,181

Table 4.9 Solid Waste Transfer and Disposal Alternatives Analysis for the Reservation

ISWMP Objectives	Transfer and Disposal Alternatives			
	1. Contracted Curbside Collection and Self-Haul (Status Quo) and Clean-up Events	2. Contractor Operated Drop Site (Compaction Trucks)	3. Tribally-Operated Temporary Drop Site (4 months)	4. Tribally-Operated Permanent Drop Box Facility
Convenience	High Most convenient option, minimal effort for resident; community clean-up events are multiple days, included remote collections, allow for the disposal of bulk goods, centrally located disposal sites.	Medium Site is on-Reservation but requires individual to transfer waste from residence to site. Bulk items not accepted. More convenient than individual transfer to off-Reservation transfer station.	Medium Site is on-Reservation but requires individual to transfer waste from residence to site. Bulk items and recyclables can be dropped off but only during summer months. More convenient than individual transfer to off-Reservation transfer station.	High Site is on-Reservation but requires individual to transfer waste from residence to site. Bulk items and recyclables can be dropped off. More convenient than individual transfer to off-Reservation transfer station.
Minimize Litter, Odor, Dust, Vermin	High Waste reliably and routinely transferred by contractor. Covered container provided by contractor.	Medium Waste driven away on pick-up days by contractor. Waste may accumulate at residences or site in two week span between pick-up days.	Low Waste may accumulate at residences or dump sites during 8 months when site is closed.	Medium Potential for litter and vermin at site if not maintained well. Potential at residences if waste is not delivered to site.
Potential for Source Reduction and Recycling	High Every other week recycling is currently included with residential curbside service. Recycling is conducted by established contractor. Recycling promoted during community clean-up events	Low Only provides mechanism for solid waste disposal.	Medium Encouraged by presence of recycling containers. Would need to be stored separately and transferred from residences to drop-box site.	Medium Encouraged by presence of recycling containers. Would need to be stored separately and transferred from residences to drop-box site.
Maximize Participation	Medium Full cost is borne by resident for curbside collection but community clean-up event offers opportunity to dispose of bulk items at no cost	High No cost except for the disposal of bulk items	Medium No cost but only operated part of the year	High No cost and allows disposal of bulk items

Table 4.9 Solid Waste Transfer and Disposal Alternatives Analysis for the Reservation

ISWMP Objectives	Transfer and Disposal Alternatives			
	1. Contracted Curbside Collection and Self-Haul (Status Quo) and Clean-up Events	2. Contractor Operated Drop Site (Compaction Trucks)	3. Tribally-Operated Temporary Drop Site (4 months)	4. Tribally-Operated Permanent Drop Box Facility
Affordable for Community Members	High Curbside collection costs (\$22.11 per month) less than self-haul costs if self-haul occurs two or more times per month and mileage, time, and dumping fees considered. No cost disposal of bulk items during community clean-up events	High	High	High
Decrease Illegal Dumping	Medium Illegal dumping is currently occurring although it could be reduced with regularly scheduled community clean-up events.	Low Collection every two weeks. Waste could be dumped illegally in between pick up days; does not address bulk items commonly found at illegal dump sites.	Medium Only operated part of the year. Although accepts bulk items (e.g., mattresses/box springs, appliances, furniture, tires) commonly found at illegal dump sites, illegal dumping could be expected to continue when site is not operating.	High Drop boxes would be available weekly at no cost and would accept bulk items (e.g., mattresses/box springs, appliances, furniture, tires) commonly found at illegal dump sites
Overall likelihood of alternative meeting ISWMP objectives	High (2.7) Pros – convenience, frequency, reliability, recycling, addresses bulk items commonly found at illegal dump sites, little effort required by LIBC, creates temporary jobs. Cons – low participation in curb side collection (currently), cost to residents	Medium (2.0) Pros – no cost to tribal members, contracted transfer Cons – frequency, medium convenience, does not address bulk item disposal, medium effort for LIBC	Medium (2.0) Pros – low cost to tribal members, create jobs, addresses bulk items commonly found at illegal dump sites Cons – seasonal, convenience, medium effort for LIBC	High (2.7) Pros – low cost to tribal members, create jobs addresses bulk items commonly found at illegal dump sites; encourages recycling Cons – cost to LIBC, high effort for LIBC
Estimated Annual Cost to LIBC	\$62,198 per event	\$229,996	\$152,924	\$464,281

Collection Alternative A-3 (fully subsidized voluntary) and Alternative B-3 (fully subsidized mandatory collection) and Transfer and Disposal Alternative 1 (regularly scheduled community clean-up events) and Alternative 4 (tribally-operated permanent drop box facility) are the highest ranked alternatives for meeting the objectives of the plan. However, since the curb-side collection alternatives do not include collection of bulk items (e.g., mattresses/box springs, appliances, furniture, tires), and these bulk items are commonly encountered at illegal dump sites, implementing one of these collection alternatives in isolation is unlikely to substantially reduce illegal dumping activities. In addition, Alternative B-3 would require revisions to Lummi Code of Laws Title 18 to require every owner, occupant, or tenant within the Reservation boundaries to deposit or cause to be deposited all garbage in a covered container and make the universal use of garbage collection and disposal mandatory similar to the City of Bellingham Municipal Code.

Collection Alternative B-3 is not recommended for a number of reasons including: many Reservation residents currently self-haul to one of the two transfer stations located less than two miles from the Reservation boundary – these residents would understandably resent being forced to discontinue this responsible practice; bulk items can be disposed of at the transfer station but not through the contracted curb side collection alternative; and compliance and enforcement costs would be associated with this option.

Transfer and Disposal Alternative 4 is not recommended due to the high cost associated with this alternative and the fact that it would essentially just replicate existing facilities that are currently available less than two miles from the Reservation boundary.

Recommendation: Based on the analysis conducted, Collection Alternative A-3 in combination with Transfer and Disposal Alternative 1 would best achieve the objectives of this Integrated Solid Waste Management Plan. Curbside collection is the most convenient; is the most likely to reduce vermin, dust, and odor; should increase recycling and source reduction because recycling is included in the service; will be the most affordable to residents as the cost will be partially or fully paid by LIBC; and it should contribute to reduced illegal dumping from Reservation residents. Due to both the time and cost savings, a full subsidy for the costs of weekly curbside collection and every other week recycling should encourage more tribal members to contract this service rather than self-haul. In addition, by establishing a predictable annual Community Clean-Up Event, residents can plan and regularly dispose of bulk items or household hazardous wastes that may accumulate over the year. The estimated cost, assuming full participation of Collection Alternative A-3 in combination with Transfer and Disposal Alternative 1 would be approximately \$191,000 per year. It is noted however that such a subsidy may be a taxable benefit under current federal tax laws unless the financial status of the recipient is less than the poverty level.

5. RECYCLING

This section describes means of reducing solid waste, provides an overview of the existing Lummi Nation recycling efforts, describes recycling program alternatives, and provides a recommendation for improving recycling on the Lummi Indian Reservation.

In 2002, the EPA initiated the Resource Conservation Challenge (RCC); a national effort to conserve natural resources and energy by managing material more efficiently. The goals of the RCC are to: prevent pollution and promote reuse and recycling; reduce priority and toxic chemicals in products and waste; and conserve energy and materials. One of the focus areas for the RCC is municipal solid waste (MSW) management. The EPA issued a nationwide goal for consumers, businesses, organizations, and industries to recycle 35 percent of America's municipal solid waste by 2005. In response to this challenge, communities are using the concept of integrated solid waste management as they plan for the future solid waste management needs. The EPA's 1989 Agenda for Action endorsed the concept of integrated waste management, by which MSW is reduced or managed through a tiered strategy including the following components (EPA 1989):

- Source reduction (or waste prevention), including reuse of products on-site (or backyard composting of yard trimmings);
- Recycling, including offsite (or community) composting;
- Combustion with energy recovery; and
- Disposal through land filling.

During 2011 the EPA changed the name and focus of the RCC to Sustainable Materials Management (SMM). The SMM program represents a shift from waste management to materials management and is focused on the following components (EPA 2009b):

- Knowing and reducing the lifecycle impacts across the supply chain;
- Using less material inputs (reduce, reuse, recycle);
- Using less toxic and more renewable materials; and
- Considering whether services can be substituted for products.

5.1. Reduce, Reuse, and Recycle

The most effective way to stop the trend of increasing solid waste generation is by preventing waste from being generated. The three preferred means of waste management are source reduction, reuse, and recycling, known as the "Three R's". The goal of waste management is to reduce the amount and toxicity of trash thrown away, reusing as many containers and products as possible, recycling as much as possible, and buying products with recycled content. Waste reduction and recycling are two different concepts, both with the same goal of reducing the amount of solid waste being disposed of in landfills. Waste reduction refers to not creating waste or minimizing waste at its source of generation. Recycling diverts materials from the waste stream for processing into new goods.

5.1.1. Reduce Waste

Source reduction, often called “waste prevention” or “waste minimization”, is defined by the EPA (2004) as “any change in the design, manufacturing, purchase, or use of materials or products (including packaging) to reduce their amount or toxicity before they become municipal solid waste. Prevention also refers to the reuse of products or materials.” Source reduction includes a broad range of activities by private citizens, communities, commercial businesses, institutional agencies, manufacturers, and distributors. Examples of source reduction activities include:

- Redesigning products or packages to reduce the quantity of material or the toxicity of the material used, by substituting lighter material for heavier ones and lengthening the life of products to postpone disposal.
- Using packaging that reduces the amount of damage or spoilage to the product.
- Reducing amounts of products or packages used through modification of current practices by processors and consumers.
- Reusing products or packages already manufactured.
- Managing non-product organic wastes (food scraps, yard trimmings) through backyard composting or other on-site alternatives.

Waste reduction and reuse activities can assist in reducing solid waste management expenses by avoiding the costs associated with collecting, transporting, processing, and disposing of solid waste. One means of reducing waste is to implement a pay-as-you-throw (PAYT) program where households are charged for each bag or can of trash rather than a flat fee. Larger fees are levied for larger amounts of trash therefore incentivizing trash reduction through smarter purchasing, reuse, and recycling. The SSC offers a PAYT program and transfer stations do not charge for recycling but do charge by the pound for MSW. In principle, the more that household wastes are separated and recycled, the lower the disposal costs.

Business waste reduction programs are typically custom designed for each specific operation – an example is the Silver Reef Hotel, Casino & Spa waste reduction program described in Section 5.2.3. At an institutional level, governments can achieve waste reduction through waste audits of their operations and through procurement policies that make waste reduction a purchasing priority. A waste audit is an assessment of how materials flow through an institution and includes an accounting of the quantity of materials purchased, used, recycled, and disposed. Waste audits help identify the points at which changes in purchasing, consumption, or use can reduce or eliminate material. Government agencies also may implement waste reduction activities with consumer and business programs such as on-site composting of yard and garden waste and changing office procedures to reduce paper consumption. Currently, some LIBC departments do use recycled paper, copy many documents double sided to save paper, and reuse office supplies (e.g., binders, file folders, and furniture).

5.1.2. Reuse Waste

Reuse of wastes is preferred to recycling because the materials do not need to be reprocessed before they can be used again. Items normally discarded as waste such as appliances,

furniture, and office supplies can be reused as originally intended or for a different use. Reusing items by repairing them, donating them to charity and community groups, or selling them, reduces waste. Reuse can also be a good alternative to disposal for those materials for which recycling markets are far away.

Another reuse method is a materials exchange program. Materials exchange is a program that offers a market for buying, selling, or trading slightly used or new unwanted goods. Tribal members can sell or donate unwanted goods, saving members time and money by not having to dispose of the unwanted goods. Other tribal members then benefit by obtaining goods at little to no cost. Examples of materials exchanges used by communities include:

- Reuse centers, secondhand stores, garage/yard sales, or flea markets where residents donate or sell unwanted goods to others
- Websites designed to show listings of goods and that connect buyers and sellers
- Word of mouth communication or signage

Many communities schedule exchange events or setup temporary or permanent exchange centers. No formal exchange center or event occurs on the Reservation; however the LIBC maintains an informal materials exchange program. The LIBC departments will e-mail tribal employees when residents or employees bring in used items available for reuse or exchange. In addition there are frequent garage/yard sales and a number of consignment and second-hand stores in the surrounding communities.

5.1.3. Recycle

Recycling includes collecting recyclable materials that would otherwise be considered waste, processing them into new materials, manufacturing new products, and selling and purchasing the new products. All four steps are necessary for recycling to occur.

Recycling has been the primary focus of municipal solid waste programs over the past several years. Recycling has been promoted as a means of resource conservation and pollution prevention as well as a cost-effective alternative to waste disposal. Recycling has also been identified as a remedy for the negative consequences of waste disposal (EPA 2010).

Unfortunately, recycling does not solve all of the problems of solid waste disposal. Recycling can be more expensive than waste disposal (i.e., when there is a limited market for a product or when raw materials are less expensive than recycled materials). Recycling also has environmental costs because collection, processing, transportation, and remanufacture of recyclable materials all require the use of nonrenewable energy and generates pollution. Moreover, recycling is not an endless loop because there is always some loss of materials. The costs and benefits of recycling must be balanced with those of waste disposal to make recycling a useful waste management tool.

5.2. Present Recycling Program

This section identifies current recycling opportunities for residents, businesses, and institutions on the Lummi Indian Reservation. The recycling rate in Whatcom County is approximately 49% by weight. Residents are recycling approximately 28% of their waste, businesses are recycling 46%, and those handling C&D materials are recycling 75% of their

waste (Whatcom County 2003). Although curbside and transfer station drop-off recycling services are available to Reservation residents, it is difficult to determine a recycling rate for the Reservation as there is no stand-alone Reservation recycling program.

5.2.1. Single-Family

Single-family Reservation residences have two options for recycling. The Sanitary Service Company (SSC) provides recycling collection on the Reservation along with solid waste collection but at a reduced collection interval (every other week for recycling and weekly for solid waste). The Lummi Housing Authority (LHA) contracts solid waste and recycling services through SSC for 270 single-family residences on the Reservation. For LHA-owned residences, garbage and recycling services are included as a portion of rental fees. Other Reservation residents have to individually contract with SSC for garbage and recycling materials collection or self-haul to an off-Reservation transfer station. Recycling materials (newspaper, bottles, and cans) are sold and the value SSC receives (if any) from these materials is applied to the collection bill in the form of a recycling credit or recycling charge. The recycling credit or charge is determined by market value prices for recyclables from the previous year and is adjusted annually. The SSC provides three stacking bins (white – mixed paper, red – newspaper only, and blue – cans, glass, and plastic) at the request of the customer. In these containers customers can recycle the following materials: mixed scrap paper, newspaper, glass bottles and jars (all colors), aluminum cans and foil, tin cans, plastic bottles and containers (all numbers and colors), and cardboard. The SSC will also collect vehicle batteries, scrap metal, and used motor oil in separate containers.

Alternatively, residents may choose to take their recyclables to off-Reservation transfer stations or businesses. Appendix H is a list of Whatcom County facilities and the materials accepted for recycling. The two transfer stations closest to the Reservation are RDS and RECOMP. Both accept materials for recycling at no charge. The RDS accepts cardboard, mixed paper, newspaper, aluminum and tin cans, glass in bottle or jar form, and plastics that have necks. In addition, residents have had the opportunity to recycle metal materials at the periodic community clean-up events on the Reservation. Even with recycling opportunities on and off the Reservation, many residents do not segregate their waste stream and simply dispose recyclable items in their household waste for disposal in a landfill. This practice, while easier than separating recyclables from solid wastes, can be costly as the weight of the potentially recyclable materials is not subtracted from the weight of the solid waste when computing the dumping fee at the transfer station.

5.2.2. Multi-Family

Multi-family residences are apartments, condominiums, or homes providing five or more dwelling units. All tribal multi-family residences have recycling collection services provided by SSC through the Lummi Housing Authority. Like single-family residences, multi-family recycling collection is part of the garbage collection service and automatically included in the base rate paid for garbage collection service. For multi-family residences, recycling Toters are located near building garbage disposal areas. Recycling is collected every other week just like for single-family residences; materials accepted include: mixed scrap paper, newspaper, cardboard, glass bottle and jars, aluminum cans and foil, tin cans, plastic containers, vehicle batteries, scrap metal, and used motor oil.

5.2.3. Commercial and Institutional

Similar to single- or multi-family residences, commercial businesses and government institutions on the Reservation have two recycling options: collection services by a private collector or dropping off recyclable materials at off-Reservation transfer stations or recycling facilities. Commercial recycling collection is available to all business on the Reservation through contracted services. When contracting with SSC, businesses can choose from four different container styles, including stacking bins (same as residential), Toters, containers, and drop box services.

Prior to completion of the new Tribal Administrative Building in mid-2013, the LIBC, LHA, and LTSWD campuses contained approximately 32 office buildings. The LIBC offices had several cages for cardboard provided by SSC and which were emptied on an as-needed basis. Since 1998, the LIBC has contracted with Sound Shredding & Recycling for the shredding and recycling of confidential paper and recycling of non-shredded paper. Each department is provided with one or more collection containers, and the paper is collected once a week, once a month, or on an as-needed basis depending on the needs of each department. The collected paper is bound and sent to a Georgia–Pacific pulp and paper mill in Oregon for reuse in toilet paper. The LIBC facilities, including the Lummi Nation School (LNS), recycled 32,754 pounds (16.4 tons) of paper over the December 1, 2008 through November 30, 2009 period, which is a monthly average of 2,729 pounds (1.4 tons) of recycled paper (Rasco 2009).

The Northwest Indian College (NWIC) has a cage container provided by SSC to recycle cardboard boxes from the dormitory and other campus facilities. Sound Shedding & Recycling has also provided paper-recycling services on campus since 1998. Over the December 1, 2008 through November 30, 2009 period, Sound Shredding & Recycling collected 16,248 lbs (8.1 tons) of paper for recycling from the NWIC (Rasco 2009), which is a monthly average of 1,354 pounds (0.7 tons). In 2005, the NWIC began a recycling program that distributed a small grey plastic tote to each of the College’s eleven buildings. Students and faculty can recycle plastic, aluminum, and glass in the totes. A NWIC staff member collected these totes approximately every two weeks and recycled them at the RDS transfer station off-Reservation. Beginning in February 2009, the student president at the time organized a student project to collect and sort recycled materials to quantify the amount of materials being recycled. Table 5.1 summarizes the data collected over the February 2009 through September 2009 period. Beginning in 2011, the NWIC contracted with SSC for plastic, aluminum and tin can, glass, and food waste recycling.

The Lummi Nation School (LNS) has paper products collected and recycled by Sound Shredding and Recycling. The Sanitary Service Company also provides cardboard, plastic, aluminum, glass, and food waste recycling for the LNS.

The Lummi Commercial Company (LCC) operates a gas station and convenience store, a liquor store/smoke shop, and the Fisherman’s Cove gas station and mini-mart. The LCC has a container for cardboard provided by SSC for each of these facilities. No other materials are recycled at LCC-owned facilities and offices.

Table 5.1 Material Recycled at the NWIC (February 2009 through September 2009)

Date Collected	Plastic Beverage Bottles	Aluminum Cans	Glass Bottles*
February 6, 2009	81 lb. 4 oz.	15 lb. 9 oz.	38 lb 7 oz.
February 18, 2009	41 lb. 7 oz.	6 lb. 3 oz.	28 lb. 4 oz.
March 5, 2009	37 lb. 7 oz.	9 lb. 1 oz.	17 lb. 5 oz.
March 18, 2009	26 lb. 5 oz.	7 lb. 8 Oz.	19 lb. 3 oz.
April 7, 2009	39 lb. 6 oz.	13 lb. 1 oz.	23 lb. 5 oz.
April 21, 2009	34 lb. 8 oz.	8 lb. 5 oz.	12 lb. 5 oz.
May 7, 2009	56 lb. 2 oz.	8 lb. 6 oz.	12 lb. 7 oz.
May 20, 2009	30 lb. 4 oz.	4 lb. 2 oz.	18 lb. 6 oz.
June 6, 2009	34 lb. 3 oz.	5 lb. 8 oz.	31 lb. 1 oz.
June 17, 2009	22 lb. 7 oz.	15 lb. 1 oz.	41 lb. 6 oz.
July 5, 2009	31 lb. 9 oz.	31 lb. 9 oz.	31 lb. 2 oz.
July 16, 2009	23 lb. 4 oz.	12 lb. 1 Oz.	16 lb. 7 oz.
July 29, 2009	45 lb. 1 oz.	8 lb. 9 oz.	21 lb. 5 oz.
August 11, 2009	34 lb. 6 oz.	9 lb. 3 oz.	25 lb. 6 oz.
August 17, 2009	42 lb. 1 oz.	8 lb. 9 oz.	19 lb. 4 oz.
September 10, 2009	56 lb. 8 oz.	14 lb. 12 oz.	107 lb. 4 oz.
September 25, 2009	25 lb. 14oz	113 lb. 10 oz.	11 lb.
Total	662 lbs	291 lbs 1 oz	473 lbs 13 oz

*One glass bottle weighs 22 ounces.

The Silver Reef Hotel, Casino & Spa is the second largest commercial/governmental operation on the Reservation and generates approximately 488 tons of solid waste annually (Sherfey 2010). Sound Shredding & Recycling collects paper from the Silver Reef Hotel, Casino & Spa. Over the December 1, 2008 through November 30, 2009 period, the Silver Reef Hotel, Casino & Spa recycled 22,440 pounds (11.2 tons) of paper, which is a monthly average of 1,870 pounds (0.9 tons) (Rasco 2009). The casino also contracts with SSC to recycle glass, plastic, newspaper, mixed paper, electronics, printer cartridges and food waste. Approximately 50 tons of cardboard and 47 tons of glass and plastic are recycled at the casino annually (Sherfey 2010).

In addition, the Silver Reef Hotel, Casino & Spa has started green initiatives throughout the facility which include:

- Discontinued use of Styrofoam cups in employee dining rooms (20,000 per month)
- Recycling glass, cardboard, and mixed paper
- Food composting program in the Panasia Restaurant
- Reduced paper towel usage in all guest restrooms through the installation of Dyson Airblade hand dryers
- Recycled paper for all printing
- Property-wide high efficiency lighting, more efficient lighting and heating of event rooms
- Hotel room heat turned down when not rented
- Towel reuse program in hotel rooms
- Electric vehicle for security staff

- New gaming machines equipped with high-efficiency LED lights
- A water conservation plan in the Red River Café kitchen.

5.3. Alternatives Analysis and Recommendation for Recycling

To have a successful recycling program, it must be easy and convenient and residents and employees must understand how to recycle and why recycling is worthwhile both financially and for the environment. Recycling is considerably easier and convenient if the material does not need to be separated (i.e., all recyclables are combined into a single bin or tote). Increased community education and awareness on recycling and waste reduction options on and off the Reservation are needed for an effective solid waste management program. Community education and outreach are further discussed in Chapter 8.

The primary recycling alternatives on the Reservation are curbside collection for residents, self-haul to one of the off-Reservation transfer stations, participation in the periodic Community Clean-Up events, and contracted recycling services for commercial and institutional enterprises. Since all of these alternatives reduce the amount of waste disposed of in landfills and reduce the disposal costs for residents – particularly residents that self-haul their solid wastes to the off-Reservation transfer stations and/or when disposal fees are based on weight, all of these alternatives are recommended.

In addition, recycling opportunities and outreach should continue to be made available during Community Clean-Up events. Recycling opportunities and outreach should be increased at community events such as the Stomish Water Festival and associated Kwina Mile Fun Run, Community Breakfasts, Pow-Wows, Canoe Races, 4th of July celebrations and at associated fireworks stands, the First Salmon Ceremony, at the annual LIBC employee picnic, and at similar community gatherings. Utilizing compostable plates, cups, napkins, and utensils at these community events and other events where food is served (e.g., funerals, weddings) and providing easy access to recycling receptacles alongside solid waste and food waste receptacles and easy access to information about what is suitable for disposal in each receptacle will help maximize recycling. Educational signs and posting students or volunteers at the receptacles to help direct disposal practices at community events and ensuring that maintenance staff and volunteers helping at funerals and weddings understand the appropriate disposal practices should also help maximize recycling.

One incentive to increase recycling is lowering solid waste disposal costs. If recyclables are separated from solid wastes, disposal costs are reduced since the recyclables can be disposed of at no costs and the weight of the recyclable material is subtracted from the weight of the solid wastes. As described previously, the current costs for curbside collection by Sanitary Service Company (SSC) is \$22.11 per month for once-a-week collection of solid waste in a 60 gallon Toter and every other week collection of recycling in three bins (one for newspaper, one for mixed paper, and one for cans, bottles, and plastic). Monthly self-haul costs are variable and depend on a number of factors including the frequency of self-haul trips; the distance traveled to the transfer facility located less than two miles from the Reservation boundary (i.e., mileage costs from actual residence location); the value of the time required to load, travel, dispose, travel, and unload the storage containers; and the amount and types of waste disposed of at the transfer station (i.e., municipal solid wastes or

bulk items associated with specific fees). Since there is a minimum \$5.00 dumping fee at the transfer station, and mileage costs associated with a representative distance of 16-miles round trip at \$0.565 per mile would be \$9.04, the cost for a single self-haul trip would be a minimum of approximately \$14.00 (not including the value of the time expended) and potentially more depending on the quantity and types of dumped solid waste. Since a trip to the transfer station is commonly combined with a trip into Bellingham, Ferndale, or elsewhere for other purposes, it is assumed that the average costs over a year to self-haul solid wastes to one of the off-Reservation transfer facilities twice a month are essentially the same as the weekly curbside collection and every other week recycling costs. If recyclable materials are not segregated from solid wastes, the costs to self-haul are increased because the weight of the potentially recyclable material is included in the overall weight of the disposed of solid wastes. Anecdotal information suggests that many people who self-haul do not separate recyclables from other wastes. Consequently, encouraging residents who self-haul to also have separate containers for the different types of recyclables (e.g., bottles and cans, newspaper, mixed paper and cardboard) will both reduce their disposal costs and decrease the amount of material dumped in a landfill.

The previously recommended solid waste management alternatives of fully subsidized, voluntary curbside collection (Collection Alternative A-3) in combination with regularly scheduled community clean-up events (Transfer and Disposal Alternative 1) should increase recycling on the Reservation. Implementing these alternatives along with the community education and outreach activities described in Chapter 8 are recommended to help achieve the objectives of this Integrated Solid Waste Management Plan.

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6. SPECIAL AND HAZARDOUS WASTES

The generation, handling, and disposal methods for special wastes and hazardous wastes on the Reservation are described below along with recommendations for improving management practices for these specific types of wastes.

6.1. Special Wastes

The purpose of this section is to review the generation, handling, and disposal methods for special wastes that are generated or found on the Reservation. These wastes generally require special handling and disposal due to regulatory requirements. The following special wastes are addressed:

- Agricultural Wastes and Animal Carcasses
- Biomedical Wastes
- Construction and Demolition Debris and Inert Waste
- Biosolids (Sewage Sludge and Septage)
- Tires, Vehicles, and Boats
- Electronic Wastes

The nature and source for each of these special wastes is described in this section, as well as the existing on-Reservation programs and methods for handling these wastes and recommendations for improved handling. The special wastes recommendations are summarized in Table 6.3.

6.1.1. Agricultural Wastes and Animal Carcasses

Agricultural wastes result from farming and ranching activities, and consist primarily of crop residues and manure. Crop wastes include residue from small grains, hay, silage corn, potatoes, vegetables, and seed crops. The three primary ways for disposing of crop wastes are to plow them back into the soil, burn them on site, or use them as livestock feed. Manure waste is typically sprayed as slurry on a cover crop using a “big gun” sprinkler and/or incorporated into the soil to enhance fertility. Since the mid-1990s there has been a growing concern from the public, Indian tribes, the EPA, local governments, and environmental groups throughout Washington State over the impacts posed by agricultural waste to water quality and salmon habitat (Ecology 2000). The awareness of this issue was raised following the closure of shellfish beds due to high bacteria levels attributed to the agricultural industry and the listing of several salmon runs as endangered species in March 1999. The result of these closures and listings was a broad range of remedial activities for farms and urban areas (Ecology 2000).

Existing Activities and Regulations for Agricultural Wastes

The majority of agricultural waste generated on the Reservation never enters the Reservation solid waste stream. Instead the waste is often disposed on-site through land applications. Approximately 2.87 percent of the Reservation area is cultivated land or grassland with most farms and agricultural land located in the Nooksack and Lummi river floodplains. Four livestock (cattle) farms with less than 40 head of cattle are operated on the Reservation. In

addition, approximately 63 head of feral cattle lived on Portage Island during June 2008. Portage Island is an uninhabited island south of the Lummi Peninsula that is zoned as open space and primarily used by tribal members for recreation and shellfish harvesting. However, the cattle on Portage Island contributed to the fecal coliform bacteria contamination of surface waters on the island that discharge to Portage Bay. The LIBC took ownership of the cattle in 2009 and hired a contractor to remove the cattle from Portage Island due to the potential contamination of shellfish beds and decreased water quality. The cattle were largely removed by February 2012.

Manure handling and application is a major concern both on the Reservation and in the surrounding areas due to the potential contamination of nearby and downstream surface and marine waters. While on-land application of manure and other agricultural wastes is generally an acceptable practice, the timing of the application creates problems due to wet weather and seasonal fluctuations in nutrient demand. Improperly managed land applications also could create vermin and odor problems. Agricultural waste, especially produced by dairy operations off-Reservation in the Nooksack River watershed, was identified as the primary source of fecal coliform bacteria that resulted in the closure of a portion of Portage Bay shellfish beds to commercial harvest beginning in 1996 (DOH 1997, Ecology 2000).

Following the initial closure of Lummi shellfish bed in Portage Bay in November 1996 and the subsequent series of compliance enforcement actions by the EPA in early 1997, Washington State enacted the Dairy Nutrient Management Act in 1998. This legislation required compliance enforcement inspections by Washington State Department of Ecology (Ecology) staff and the development and implementation of nutrient management plans. Appropriate nutrient management results in the utilization of manure in a way that maximizes forage and crop growth, protects natural resources (soil, water, and air), and increases the efficiency and productivity of farms. On July 1, 2003 the Ecology Livestock Management Program was eliminated and the responsibility to implement the Dairy Nutrient Management Act was transferred to the Washington State Department of Agriculture (WSDA). The WSDA only addresses animal wastes from dairy farms – not beef cattle or hobby farms. The WSDA conducts compliance inspections and enforcement actions against water quality violations and nutrient management plan violations. Small operations (i.e., hobby farms) are not required by State law to implement nutrient management plans, which can lead to mismanagement of agricultural waste and increased levels of bacteria in water bodies. The Whatcom County Conservation District (WCD) is continuing to educate small operation owners about Best Management Practices (BMPs) and the benefits of designing and implementing a farm plan. A farm plan is a document assessing site-specific aspects of a property and identifying BMPs that are necessary to avoid potential negative environmental impacts from agricultural practices. These practices often involve the use of low-technology approaches including keeping livestock away from waterways, rotating use of pastures, and planting cover crops.

Recommendations for Agricultural Wastes

To address concerns about agricultural waste impacts on water quality, LNR staff should partner with the Natural Resources Conservation Service (NRCS) or the WCD to assist all on-Reservation small farms and animal operations to create farm plans. Off-Reservation, the Whatcom Conservation District staff is available to assist farmers with farm management options and help owners and operators understand current environmental laws that have been

put in place to protect water quality and habitat associated with environmentally sensitive areas. Implementing a farm plan that incorporates BMPs will help ensure compliance with environmental. The Whatcom Conservation District is a non-regulatory agency. Based on current funding (largely funded through grant monies), the WCD and the LNR may be able to provide education and technical assistance with the development of farm plans for Reservation farms and animal operations.

Existing Activities and Regulations for Animal Carcasses

The primary generators of animal carcasses on the Reservation are:

Farm Animals: Dairy cows and other animals are usually slaughtered for meat when they become non-productive or reach a certain age. The animals that die from accidents or disease are handled by rendering companies or are allowed to be buried onsite as long as safe distances are maintained from surface waters or wells.

Household Pets: Pets are allowed to be buried on private property as long as safe distances are maintained from surface waters or wells.

Game Animals: Carcasses from deer, elk, and other game animals have been disposed of on-Reservation near illegal dump sites. These carcasses are generally scavenged over a relatively short period.

Road Kill: Dead animals collected from the roadside are buried, picked up by rendering services, or cremated through local veterinary offices or animal shelters depending on the type of animal (rendering companies are prohibited from accepting wild game).

Pursuant to LCL 18.05.05, carcasses of animals shall be buried within 24 hours of death. All such burials shall take place on the property of the animal's owner and in a manner that avoids attracting or harboring disease vectors and prevents offensive odors. If such burial is not possible, the animal's owner shall otherwise dispose, or arrange for the disposal, of the carcass in a lawful manner within 48 hours of the animal's death.

Recommendations for Animal Carcasses

Current methods used for disposal of animal carcasses on the Reservation are effective and no additional options need to be addressed at this time.

6.1.2. Biomedical Waste

Biomedical wastes are the potentially infectious and injurious wastes from medical, veterinary, or intermediate care facilities as well as "sharps" (e.g., syringes) from residential sources and/or illegal drug use activities. These wastes require special handling and disposal practices to protect the health and safety of both medical and solid waste disposal personnel. Medical facilities have the responsibility to determine which medical wastes are considered biomedical, and then arrange for the proper handling and disposal of these wastes. All syringes and other "sharps", plus wastes that have had contact with blood and certain other bodily fluids, are generally classified as biomedical wastes. These wastes are placed in special bags or rigid plastic containers, and then removed by licensed biomedical waste collectors. Body parts are also classified as biomedical wastes.

Existing Activities and Regulations for Biomedical Waste

The largest generators of biomedical waste on the Reservation are the Lummi Health Clinic and the Lummi Dental Clinic. These facilities use the services of a licensed biomedical waste hauler to transport and dispose of this waste. Another source of biomedical wastes is home health care providers and the Little Bear Creek Assisted Living Facility, an assisted living facility. In more serious health cases, biomedical wastes from the sources are often generated under a nurse's supervision and are brought back to the primary hospital or other facility that employs the nurse. However, in other cases, the medical wastes from home use may not be disposed of properly. Sharps, likely from residential sources, have been found illegally dumped throughout the Reservation and mixed in with household waste.

Off-Reservation transporters of infectious wastes are regulated by the Washington State Utilities and Transportation Commission (WUTC) under WAC 480-70. These regulations also allow regular solid waste haulers to refuse to haul wastes they observe to contain infectious wastes as defined by the WUTC.

Recommendations for Biomedical Waste

The disposal of residential sharps is an area where improvements are needed. The new Tribal Administrative Building includes disposal bins for sharps in all restrooms, which is an important improvement. It also is recommended that the Lummi Clinic include educational programs to promote safe handling and disposal of sharps, that the clinic institute a collection program and continues to provide containers at the clinic for proper disposal of sharps, and that any workers who help clean up illegal dumpsites are trained in the safe handling and disposal of sharps.

6.1.3. Construction and Demolition Debris and Inert Waste

Construction and demolition (C&D) wastes are defined simply as the wastes that are generated from construction and demolition activities. These wastes consist primarily of new and used building materials (wood, drywall, pipe, metals, shingles, concrete, and asphalt). Land clearing wastes, including soil, stumps, and brush, are also sometimes included in this category, but these materials are rarely treated as waste.

Inert wastes are a category closely related to C&D waste. The criteria for inert wastes are that they will not burn and they will not create harmful leachate or gases. Inert waste is defined to include some types of construction wastes (e.g., concrete, asphalt, brick, tiles, wood, roofing, and demolition wastes) but specifically excludes drywall. Inert wastes also include glass, stainless steel, aluminum, and other wastes that can meet the criteria for inert wastes.

Some C&D waste may be classified as hazardous waste because it contains hazardous materials such as lead, chromium, asbestos, or has been contaminated by other hazardous waste. Hazardous C&D debris must be disposed of in a hazardous waste landfill. Other toxic materials, such as asbestos and polychlorinated biphenyls (PCBs), must also be managed in accordance with federal regulations, specifically the Toxic Substances Control Act (TSCA). Hazardous waste disposal is discussed in more detail in Section 6.2.

Existing Activities and Regulations for C&D Wastes

In Washington State, 1.4 million tons of C&D wastes are placed in landfills annually. Approximately 74 percent of C&D waste is divertible, through recycling and reusing construction materials. The total amount of C&D waste generated on the Reservation is unknown, but most communities generate C&D waste in quantities equal to half or more of the regular solid waste stream. Because C&D wastes are generated at a rate proportional to construction activity on the Reservation, annual quantities generated vary depending on population growth, the economic climate, and other factors. Large commercial, industrial, or residential developments can have a one-time significant impact on annual quantities generated, as can disasters such as floods. Table 6.1 provides information on the number of Lummi Land Use Permits (LUP) issued on the Reservation as an indication of the amount of C&D waste generated over the past 11 years. With increased population growth and development on the Reservation, C&D wastes will continue to be a prominent special waste issue.

Managing C&D waste presents a major challenge for many tribes including the Lummi Nation. The Reservation has no specific program to address C&D waste and C&D debris is apparent at many of the illegal dumps throughout the Reservation. In 1993 and 1995, proposals for an inert and C&D waste recycling and disposal facility were submitted to the Lummi Planning Department by private companies. No facility was ever established on the Reservation due to the substantial environmental impacts a landfill would have on the Reservation's natural resources and aesthetics. Reservation residents, business owners, and contractors can dispose of and recycle C&D debris at transfer stations, waste facilities, and businesses throughout the nearby communities (Appendix H).

Table 6.1 Number of Lummi Land Use Permits Issued on the Reservation

Year	Single Family Permits¹	Manufacture/Mobile Homes	All Other²	Total
2002	14	20	33	67
2003	11	25	61	97
2004	10	17	62	89
2005	9	25	75	109
2006	9	16	55	80
2007	16	18	67	91
2008	14	20	61	95
2009	10	26	36	72
2010	6	11	55	72
2011	12	8	55	75
2012	12	10	78	100

Notes: Data are from Lummi Planning Department (2013)

¹ Includes site built homes, garages, shops, and additions.

² Includes multi-family dwellings, timber harvest, clearing, fill material, and miscellaneous projects.

One C&D reuse facility near the Reservation is the Bellingham RE Store, a non-profit organization with a licensed salvage and demolition crew. The RE Store diverts usable building material from landfills and resells the material at a reduced price. The C&D waste can be dropped off, picked-up, or removed from the construction site by RE Store employees. People or businesses bringing in construction material to the RE Store will either receive in-store trade credit or a tax receipt for material donated. The RE Store currently diverts approximately 570 tons of C&D waste per year from landfills. The Sanitary Service

Company also provides construction-recycling services. Construction sites are supplied with drop boxes that accept multiple recyclable materials and each jobsite is also supplied with a small garbage container for any remaining solid waste materials that cannot be recycled. The following materials from a construction site can be recycled in a SSC drop box:

- Asphalt
- Brick
- Tile/Porcelain
- Cardboard
- Concrete (with or without rebar)
- Pallets/crating
- Plastics:
 - Film (lumber wrap with no paper backing)
 - Bags (insulation, Visqueen, sheeting, tarps, etc.)
 - Pipe (PVC, HDPE/drain tile)
 - Buckets (clean, metal handles removed)
- Scrap wood (plywood, OSB, dimensional lumber, particle board); all unpainted and untreated wood including fasteners
- Scrap metal (all types including wire)
- Small quantities of paper

In addition, separate drop boxes are available from SSC and other private businesses to recycle land-clearing debris/branches and for unpainted wood roofing.

The C&D wastes are regulated under LCL Title 18, which requires that construction-related materials that do not contain asbestos must be separated into uncontaminated combustible material and other waste for collection or hauling to an approved disposal site. Uncontaminated combustible material may be burned pursuant to LCL 18.04.030. Asbestos wastes must be collected and disposed of in accordance with 40 CFR61.156 as amended, and the National Emission Standards for Hazardous Air Pollutants (NESHAP) regulations. Any person who generates asbestos wastes must properly dispose of it or arrange for its proper disposal.

Recommendations for C&D Waste

Greater control or more convenient recycling and disposal opportunities for C&D material are recommended to prevent C&D material from being illegally dumped on the Reservation or elsewhere. The following four alternatives were evaluated for improving C&D waste management on the Lummi Indian Reservation:

Alternative A: Status Quo

The C&D Alternative A is the status quo of having no specific collection or recycling program for C&D wastes and continuing to regulate C&D wastes pursuant to Title 18.

Alternative B: Increased Permitting Conditions

The C&D Alternative B is the establishment of an additional requirement for project proponents when applying for a Lummi Land Use Permit through the Lummi Planning Department. Project proponents would be required to submit a Solid Waste Disposal and Recycling Plan which would describe where and how C&D debris would be disposed. This

Plan would have to be reviewed and approved prior to issuance of a land use permit. The major benefits of recycling C&D debris are the reduction in the cost of materials used in construction and the reduction in the volume and cost of disposal.

Alternative C: Contractual Requirements

Under C&D Alternative C, the LIBC, LCC, LTSWD, and LHA would incorporate recycling clauses into their construction project contracts that would require contractors to separate out and recycle or reuse as much C&D debris as practicable. A tribal representative would attend pre-construction meetings for projects to provide information and guidance regarding the LIBC requirements for disposal, recycling, or reuse of C&D debris.

Alternative D: Partner with Local Communities or Organizations

Under C&D Alternative D, the LIBC would partner with the County, local organizations, and local businesses to educate project proponents about C&D waste and provide information on the off-Reservation locations for proper disposal. Although this alternative is currently being implemented on the Reservation, through the distribution of brochures on C&D waste recycling facilities at LNR and the Planning Department, efforts could be improved with increased public education on C&D waste to residents, businesses, and construction contractors to improve building material reuse and recycling.

The C&D Alternative C (contractual requirements) is recommended for implementation in the next five years together with a public education campaign to promote C&D waste disposal and recycling opportunities. The public education effort should include articles in the *Squol Quol* informing the public on C&D waste. Alternative C is currently being implemented by the Planning Department and LNR and will continue in the next five years.

6.1.4. Biosolids (Sewage Sludge and Septage)

Sewage sludge that has been treated to meet standards for beneficial use (such as land application) is called “biosolids.” This type of material is specifically excluded from the definition of solid waste, although other wastes from waste water treatment processes (such as grit, screenings, sludge, and ash) are still classified as solid waste. Biosolids are defined by 40 CFR Part 503 as solid, semi-solid, or liquid residue generated during the treatment of domestic sewage in a treatment works. Biosolids includes septic tank sludge, also known as septage, which can be beneficially recycled and meets all applicable requirements. Biosolids are further categorized by federal regulations into Class A and Class B based on pathogen reduction measures and metals contamination levels. The federal regulations (40 CFR Part 503) are self-implementing, which means that the requirements must be met regardless of the permit status of a facility.

Existing Activities and Regulations for Biosolids

Land application of biosolids on the Reservation is permitted under federal regulations and allowable pursuant to tribal laws. The Lummi Tribal Sewer and Water District (LTSWD) operates two separate wastewater collection and treatment systems known respectively as the Gooseberry Point system and the Sandy Point System. The Gooseberry Point system includes two wastewater treatment plants, one of which is a Membrane Bioreactor (MBR) wastewater treatment plant. Combined, the Gooseberry Point system and the Sandy Point system serve over 90 percent of the approximately 2,000 households located on the

Reservation. The remaining households on the Reservation rely on septic tank systems for wastewater disposal. Biosolids from the three treatment plants have been land applied to a 12.5-acre (5.06 hectare) dedicated and enclosed forested site situated on a 38.8-acre (17.5 hectare) tract owned by the LIBC. The biosolid application site on the Reservation has been operational since November 1987. The average application rate of biosolids for 2008 was about 6.5 metric tons per hectare. Class B pathogen reduction is achieved at the three Publicly Owned Treatment Works using aerobic digestion prior to land application.

A sewage lagoon used for wastewater treatment for the former U. S. Navy installation located on the Reservation in the 1960's is located in the Lummi River floodplain. The Naval Security Group Marietta Radio Direction Frequency Finder (RDFF) sewage lagoon was contaminated with PCBs (Corps 2010). Through the United States Army Corps of Engineers (Corps) Formerly Used Defense Sites (FUDS) program, the sediments contaminated with PCBs in the RDFF sewage lagoon were removed, and the lagoon remediated during the summer of 2010 by a private contractor hired by the Corps. The clean-up resulted in the former sewage lagoon area being classified for "unrestricted use".

While biosolids are being properly managed by the Lummi Tribal Sewer and Water District, there are occurrences where human and animal feces in the form of disposable diapers and pet feces are directly exposed to the environment. Diapers and pet feces can be found mixed with regular garbage, along roadsides as litter, in parks, and in other public trash cans. Improperly handled, these wastes present the potential for human exposure to disease-causing organisms and a potential cause for increased bacteria levels in surface and marine waters.

Recommendations for Biosolids

In general, biosolids on the Reservation are handled through beneficial use programs and do not significantly impact the solid waste system. As more households are removed from on-site septic systems and connected to the Lummi sewer system, with increased residential and commercial development, and the increased value of land for municipal purposes on the limited land base of the Reservation, the biosolid land application site may need to be re-evaluated. Although it is expected that illegal dumping and improper disposal of human and pet feces will be reduced with implementation of the solid waste recommendations in Section 4.3.4 of this report, community education on the risks to human health and water quality from fecal waste is also recommended.

6.1.5. Tires, Vehicles, and Boats

Tire disposal has long been a nationwide problem because tires are difficult to compact at landfills and they are often accumulated at commercial or residential sites because of perceived value. Scrap tires are frequently illegally dumped or stockpiled at residences throughout the Reservation. In Washington state, approximately 5 million waste tires were generated in 2007 and over 54 percent of the reported waste tires were recycled or reused (Ecology 2009).

A tire's physical structure, durability, and heat retaining characteristics make scrap tire stockpiles a potential threat to human health and the environment. The curved shape of a tire allows rainwater to collect and creates an ideal habitat for rodents and mosquitoes. Illegal dumping of tires pollutes ravines, woods, beaches, and empty lots. Scrap tires are also prone

to heat retention, and tires in stock piles can ignite, creating fires that are difficult to extinguish and can burn for months, generating unhealthy smoke and toxic oils. Once a tire fire occurs, tires break down into hazardous compounds including gases, heavy metals, and oil, which may then trigger Superfund cleanup status. Cleaning up scrap tire stockpiles is time consuming and expensive.

Abandoned vehicles and vehicle parts are a prevalent waste management concern for many tribes, including the Lummi Nation. A vehicle is any car, truck, motorcycle, other wheeled machine or boat that was designed to be, or which at one time was, self-propelled or towed, or in the case of boats, propelled by mechanical, natural, or human force and which was capable of being operated over land, a roadway, or water. Unregistered non-operational vehicles and boats are scattered throughout the Reservation on vacant parcels and near households. These vehicles and boats are a problem on the Reservation for a number of reasons including: they are unattractive, reduce property values, can be used to collect garbage, can be targets for arson and vandalism, can be a safety hazard to children and pets, and can attract wildlife that can spread disease. In addition to the vehicles themselves, vehicle-related waste including gasoline, diesel fuel, oil, transmission fluid, and power steering and brake fluids can leak and pollute soil, ground water, and surface water. Table 6.2 lists vehicle components, potential contaminants, and proper disposal methods.

Table 6.2 Wastes Associated with Abandoned Vehicles

Vehicle Components	Potential Contaminant	Proper Disposal
Switches and lamps	Mercury	Licensed metal recycler that reclaims
Fluids such as gasoline, diesel fuel, oil, transmission fluid, and power steering and fluid,	Hydrocarbons, Polyethylene glycol, solvents, polychlorinated biphenyl compounds (PCBs)	Used oil or fluids recycler
Filters	Fuel, transmission oil, used oil	Recycle through scrap metal recycler or landfill
Lead-acid batteries	Lead, battery acid	Battery recycler
Wheel weights	Lead	Lead recycler
Battery cables	Lead	Lead recycler
Air conditioning units	Chlorofluorocarbons, other refrigerants	Certified technicians or certified reclamations facilities
Undeployed air bags	Sodium azide	Properly deploy by trained technicians prior to shredding and scrap with the vehicle
Brake shoes, clutches	Asbestos	Certified landfill
Waste tires	Polycyclic aromatic hydrocarbons	Waste tire processor
Closed refrigerated tractor trailers	Interior is a nitrogen-rich, oxygen depleted atmosphere	Ventilate tractor trailers prior to entering

Existing Activities and Regulations for Scrap Tires

Some organizations encourage proper tire disposal by allowing citizens to drop off a limited number of tires at recycling centers, or conduct tire amnesty days where any citizen can bring a limited number of tires to a drop off location free of charge. State or federal scrap tire programs may provide financial help to fund such events.

The Washington State has made the removal of illegal tire piles a priority. In 2005, the Washington State Legislature passed Substitute House Bill (SHB) 2085 creating a Waste Tire Removal Account with funds for cleanup of unauthorized and unlicensed tire piles. Funds for this account come from a one dollar fee for each new replacement tire sold in Washington. However, to be eligible for tire pile removal under this account, tire piles must contain more than 800 waste tires (or the combined weight of 16,000 pounds of waste tires) (Ecology 2009).

Currently, no specific scrap tire collection program exists on the Reservation. Illegally dumped and single resident tire stockpiles were removed as a part of Project Clean-Up. Approximately 491 tires were removed from 2004 through 2006 and 506 tires were properly disposed of during the 2009 Community Clean-Up event. As nearly 1,000 tires were removed from the Reservation during the 2011 Community Clean-Up event, and over 1,000 tires had been previously removed from the Reservation during previous clean-up activities, there was suspicion that some of the tires removed during the 2011 event were imported to the Reservation and disposed of to avoid disposal costs. The RDS facility (located less than 2 miles from the Reservation boundary) accepts passenger tires for a five-dollar fee and oversized tires for a fee based on size and ply. At least six additional tire businesses throughout Whatcom County accept scrap tires for a fee that ranges from two to five dollars.

In order to develop a program that meets the needs of the Lummi Nation, a number of issues need to be examined, including the types and quantities of tires generated on the Reservation; availability of collection, hauling, and processing operations; and available markets or permitted disposal sites.

Recommendations for Scrap Tires

Four alternatives are presented below for scrap tire management on the Reservation.

Alternative A: Status Quo

Scrap Tire Alternative A is the status quo of not having a specific collection or disposal program on-Reservation and relying on individuals to bring tires to off-Reservation businesses that collect scrap tires for a fee and/or to Community Clean-Up events.

Alternative B: Local Community Partnership

Under Scrap Tire Alternative B, the LIBC would partner with county or state organizations when they have a tire collection event or a tire amnesty day. Reservation residents and businesses would be encouraged to take their tires to these events through community outreach.

Alternative C: Periodic Scrap Tire Events on the Reservation

Under Scrap Tire Alternative C, the LIBC would host on-Reservation scrap tire collection events. Reservation residents would be encouraged to take used tires to these events for proper disposal. The LIBC would purchase a tire shredder and all tires would be handled by a contractor, trained tribal employees, or through a partnership with other governments or businesses.

Alternative D: Permanent Scrap Tire Collection on the Reservation

Under Scrap Tire Alternative D, the LIBC would establish a permanent on-Reservation area for collection of scrap tires. The site would be located at a convenient and suitable location for proper disposal. The LIBC would purchase a tire shredder and all tires would be handled by a contractor, trained tribal employees, or through a partnership with other governments or businesses.

A combination of Alternatives A (Status Quo) and Alternative B (promotion of ongoing, off-Reservation tire disposal events) is recommended for the next five years. A periodic scrap tire event or a permanent scrap tire collection site on the Reservation would be more expensive and require greater planning and increased staff time. In addition, a permanent scrap tire collection site could become the environmental and health hazards described above. A public education campaign for tires is also recommended to promote proper tire maintenance (keeping tires balanced and inflated) to extend the life of tires and reduce the number of tires disposed. The campaign could also promote reuse of tires and publicize proper recycling and disposal options.

Existing Activities and Regulations for Vehicles

Abandoned and non-operational vehicles are regulated on the Reservation under LCL Title 7 (Motor Vehicle Impoundment Code) and LCL Title 18 (Solid Waste Control and Disposal Code). Pursuant to LCL Title 18.05.030, owners of vehicles that are unregistered or not operational for a period of six months must arrange for sale of the vehicle, placement of the vehicle in a closed garage, or transportation of the vehicle to a junkyard that is licensed to accept vehicles. In addition, LCL Title 18.05.030 states that persons holding a valid tribal business license for the repair or sale of vehicles must operate in compliance with LCL Title 15 (Land Use Zoning and Development Code) and must operate in a manner so as not to pollute the ground, water, or air. If the business does not operate in this manner, any and all vehicles will be presumed non-operational and subject to removal pursuant to Title 7 and Title 18 of the Lummi Code of Laws.

No formal service for the removal of abandoned and non-operational vehicles is established on the Reservation. However, Project Clean-Up staff with the assistance of the Lummi Police Department removed 73 vehicles from 2004 through 2006. In Whatcom County, there are several different businesses that will remove vehicles from properties at no cost or will pay the owner for vehicle removal.

Recommendations for Abandoned or Non-Operational Vehicles

Five alternatives are presented below for the removal of abandoned and non-operational vehicles from the Reservation.

Alternative A: Status Quo

Under Abandoned and Non-Operational Vehicle Alternative A, the LIBC would continue regulating the storage and removal of abandoned and non-operational vehicles under LCL Title 18. Reservation residents would continue to be responsible for vehicle removal or have the vehicles subject to removal under Title 18.

Alternative B: Status Quo with Improved Enforcement of Title 18

Under Abandoned and Non-Operational Vehicle Alternative B, the LIBC would improve the enforcement of, and compliance with, LCL Title 18.05.030. The law already provides the Health Officer with the authority to impound and dispose of unregistered or nonoperational vehicles. Lummi police officers would observe and document their observations of non-operational vehicles and provide this record to the Health Officer. The Health Officer would provide a warning to the resident that the vehicle will be removed and disposed of by the LIBC if the resident does not remove it themselves within a specified period of time. The resident would be provided with a list of auto recyclers that would remove the vehicle at no charge. If it is not removed, the Health Officer would simply contact a recycler and have the vehicle removed.

Alternative C: LIBC Collection and Processing

Under Abandoned and Non-Operational Vehicle Alternative C, the LIBC would collect and process vehicles and sell scrap metal to a metal scrapping company. This alternative would increase the likelihood of vehicles being removed because the LIBC would be taking over the responsibility from the individual. In addition, the LIBC would receive the funds from the scrap metal to fund the program. The tribe may get a higher price for the scrap metal by processing the cars itself (draining the fluids and crushing the cars) rather than having the metal recycler perform these services. The disadvantages of this option are the requirements for trained and experienced tribal staff to process the vehicles, the equipment and space required for collection and processing, and that the tribe is responsible for the proper disposal of all fluids and hazardous materials.

Alternative D: LIBC Collection and Transport to a Recycler

Under Abandoned and Non-Operational Vehicle Alternative D, the LIBC would collect the vehicles and transport them to a contracted metal recycler for crushing, hazardous waste removal, and recycling. Similar to Alternative C, this alternative would increase the likelihood of vehicles being removed because the LIBC would be taking over the responsibility from the individual. In addition, the LIBC would receive the funds from the scrap metal although this income would be lower because of the services provided by the recycler. The benefits of this option are that the metals recycler is responsible for fluid removal and disposal and fewer trained tribal staff are required than for Alternative C. The disadvantages are the staffing and equipment required for collection and transport and the potential for a lower scrap metal price.

Alternative E: LIBC Contracts for Transport and Processing

Under Abandoned and Non-Operational Vehicle Alternative E, the LIBC would contract with a metals recycler for all transport, crushing, hazardous waste removal, and metal recycling. The advantages of having the entire program contracted are that the metals recycler or subcontractor is responsible for all activities and tribal staff only needs to provide oversight of activities occurring on tribal lands. The disadvantage of this option is it may cost the tribe money, because the cost to pay for all activities may be greater than the price obtained for the scrap metal.

Alternative B (status quo with improved enforcement of Title 18) is recommended to improve the removal of abandoned and non-operational vehicles on the Reservation. In addition, a public education and outreach program on abandoned vehicles should be

implemented. The focus would be on the problems with abandoned or non-operational vehicles, the process of removing a vehicle, and financial, community, and health benefits. A list of local vehicle removal businesses should be periodically collected and made publicly available by publishing the list in the *Squol Quol* (Lummi Nation Newspaper) or providing the list upon request.

6.1.6. Electronic Wastes

The use of electronics has grown substantially over the past two decades. As a result electronics are quickly becoming a significant portion of waste sent to local landfills every year. According to the Consumers Electronics Association (CEA), in 2008 Americans owned approximately 24 electronic products per household (CEA 2008). Electronic waste (e-waste) items include televisions, radios, fax machines, telephones, cellular phones, computers, and Personal Digital Assistants (PDAs). As technology continues to advance and electronic prices decrease, the amount of outdated electronics that require proper disposal increases. According to the EPA, components in a number of electronic devices contain one or more of the following pollutants: mercury, lead, cadmium, and polychlorinated biphenyls (PCBs). The largest concern with e-waste is cathode ray tubes, which are found in older model televisions and computer monitors, and contain high levels of lead and mercury. Computer monitors and older TV picture tubes contain an average of two to four pounds of lead that require special disposal (EPA 2010). Some states have banned electronic waste from landfills, thereby increasing the need to find appropriate diversion options.

Existing Activities and Regulations

There is no formal program for recycling or collecting electronic waste on the Reservation. However, effective January 1, 2009 in the State of Washington, electronics manufacturers began to pay for recycling computers, monitors, laptops, and televisions through the new E-Cycle Washington program. Electronic manufacturers, collectors, recyclers, retailers, local and state government and non-profit groups are working together in the E-Cycle Washington program and plans are well underway to carry out the provisions of the Electronic Product Recycling Act passed in July 2006. The law allows households, small businesses, schools, school districts, small governments, special purpose districts, and charities to recycle electronic products free of charge at designated recycling locations. There are many locations in Whatcom County that are collectors for E-Cycling. To see a complete list, visit <http://1800RECYCLE.wa.gov> or call 1-800-RECYCLE.

Recommendations for Electronic Waste

Four alternatives are presented below for improving the disposal of electronic wastes from the Reservation.

Alternative A: Status Quo

Electronic Waste Alternative A is the status quo of relying on residents, schools, LIBC offices, and on-Reservation businesses to properly dispose of electronic wastes.

Alternative B: Support State of Washington E-Cycling Program

Under Electronic Waste Alternative B, the LIBC would support the Washington State E-Cycle program by providing outreach and education to the Reservation residents regarding program details. The education and outreach program would include informing residents on

where to take their e-waste and the benefits of keeping these materials out of the local waste stream and eventually out of the regional landfill. This could be done in part by holding a community outreach event with a speaker from the state E-Cycle program or a local recycler such as RElectronics. One advantage to supporting the State E-Cycling program is the limited staff time and resources required. The following businesses in Whatcom County are currently participating in the State E-Cycling program: Goodwill Bellingham Store, Safe and Easy Recycling, Salvation Army Bellingham, RDS, and Salvation Army Lynden. RElectronics in Bellingham also accepts e-waste and recycles and re-builds computers for reuse.

Alternative C: Incorporate E-Cycling in Community Clean-Up Events

Under Electronic Waste Alternative C, the LIBC would sponsor a collection event for e-waste once or twice a year. These events would be combined with the Community Clean-Up events sponsored by the LHA and LNR. The LIBC would partner with the state E-Cycle program and a local retailer or electronics-recycling business that already collects electronic waste. Collection events offer a convenient alternative to residents to be able to divert their e-waste from the solid waste stream.

Alternative D: Reservation Operated Collection Site

Under Electronic Waste Alternative D, the LIBC would operate a permanent collection site for e-waste on the Reservation. A central location, staff, hours, and resources would be needed to implement this alternative. In addition, once the included electronics are collected, a transporter and processor would be necessary to dispose of the e-waste in a safe and environmentally beneficial manner. This option requires additional time, staff, and resources for the LIBC. If the LIBC becomes a collector through Washington State's E-Cycle program, computer and television manufacturers will pay the LIBC for the collection of covered electronic waste.

A combination of Alternatives B (support Washington State E-Cycle program) and Alternative C (incorporate e-cycling in community clean-up events) is recommended to improve electronic waste disposal and recycling on the Reservation. Community outreach through written materials will raise awareness of the need to separate e-waste from the solid waste stream and events held together with the state program and local recyclers should ensure proper e-waste disposal.

6.1.7. Summary of Special Waste Recommendations

Table 6.3 summarizes the recommendations for the management of special wastes.

Table 6.3 Summary of Special Waste Recommendations

Special Waste Category	Preferred Alternative
Agricultural Wastes and Animal Carcasses	The LNR Department partners with the NRCS and/or the WCD to assist on-Reservation farms and animal operations to create farm plans.
Biomedical Waste	Improve sharps disposal through educational programs provided by the clinic and provision of containers for disposal.
Construction and Demolition Debris and Inert Wastes	Incorporate C&D recycling clauses into construction project contracts requiring recycling and reuse of C&D debris. Conduct a public education campaign to promote C&D disposal and recycling opportunities in Whatcom County.
Biosolids	Re-evaluate the biosolids land application site as connections to the sewer system continue to increase and provide community education on the risks to human health and water quality from fecal waste.
Tires	Promote ongoing, off-Reservation, tire collection and tire amnesty events and conduct public education on tire maintenance for source reduction.
Vehicles and Boats	Improve the enforcement of LCL Title 18.05.030, conduct public education to raise awareness of the problems of storing non-operational vehicles, and publicize removal options.
Electronic Waste	Support the Washington State E-Cycle program including raising public awareness of disposal opportunities and holding an e-waste disposal event.

6.2. Hazardous Waste

This section gives a brief overview of moderate risk waste (MRW) sources, MRW management on the Reservation, and recommendations for on-Reservation MRW disposal. The applicable laws and regulations are described in further detail in Appendix A and Appendix B.

Hazardous waste is waste that is dangerous or potentially harmful to human health or the environment as identified in the Resource Conservation and Recovery Act (RCRA) (40 CFR 261.3). The RCRA deals with the proper handling of solid and hazardous waste and underground storage tanks. RCRA Subtitle C establishes a federal program to manage hazardous waste from cradle to grave. Subtitle C regulates the generation, transportation, and treatment, storage, or disposal of hazardous wastes. Industries, farming operations, businesses, and homes throughout the Reservation produce small amounts of hazardous waste but there are no large quantity generators of hazardous waste on the Reservation. The most significant operations using hazardous materials are two oil refineries and one aluminum smelter located just north of the Reservation. One of the main transportation routes to and from these operations is Slater Road, which is located along the northern boundary of the Reservation. In response to a major hazardous material spill on the

Reservation or in Reservation waters, experts from the EPA, the United States Coast Guard (USCG), and local industries would be called in to help control the damage. The Lummi Nation Spill Prevention and Response Plan, developed in 2005 by the Lummi Water Resources Division (LWRD 2005), further describes the types and quantities of hazardous wastes associated with these nearby industries and the spill response capabilities and responsibilities of these industries and response agencies. Since the mid-1990s the Lummi Natural Resources Department has developed response capabilities focused on spills of petroleum oil (see <http://lnnr.lummi-nsn.gov/LummiWebsite/Website.php?PageID=67>).

Small quantities of hazardous material are used on and transported through the Reservation on a regular basis by residents, small businesses, and government facilities. The quantities of hazardous waste produced on the Reservation fall below federally regulated quantities and consequently are classified as “moderate risk waste” (MRW). Moderate risk waste includes household hazardous wastes and wastes from small quantity generators. The LCL Title 18 defines hazardous waste and prohibits dumping any solid waste onto the surface of the ground or into the water.

6.2.1. Household Hazardous Waste

Hazardous waste generated by residences on the Reservation is classified as household hazardous waste (HHW). Leftover household products that contain corrosive, toxic, ignitable, or reactive ingredients are considered to be HHW. As summarized in Table 6.4, these HHW can include products that contain mercury (e.g., thermostats, thermometers, and fluorescent light bulbs), certain paints (latex or oil-based), organic solvents, household cleaners, fuels, lead-acid batteries, motor oil, antifreeze, herbicides, and pesticides. The average home in the United States can accumulate as much as 100 pounds of HHW in the garage, basement, and/or storage closets (EPA 2010).

Household Hazardous Waste can harm the environment and human health when a product is improperly used, stored, handled, or disposed. For example, high application rates (greater than specified on the label) of herbicides and pesticides may enter surface waters and kill aquatic life or contaminate drinking water. Improperly stored HHW products can result in accidental poisonings of children and animals. Storage of flammable products (e.g., fuels, solvents, or oil based paints) in residences increases chances of fire, can add to the fuel load of buildings, and may endanger firefighter safety. Other HHWs such as pool chemicals are highly reactive and can release a poison gas, which could injure or endanger solid waste collection personnel; flammable products may ignite inside the collection vehicle or disposal facility. Environmental damage can occur in several ways, including direct releases to the environment (dumping outside), releases from disposal sites (landfills and incinerators), and releases from wastewater treatment facilities. Used oil dumped on the ground, automotive batteries thrown in ditches or waterways, and cleaning products dumped or washed down storm drains may occur on the Reservation.

Table 6.4 Potential Household Hazardous Wastes (EPA 2010)

Cleaning Products	Indoor Insecticides	Automotive Products	Workshop/ Painting Supplies	Lawn and Garden Products	Miscellaneous	Other Flammable Products
<ul style="list-style-type: none"> • Oven cleaners • Drain cleaners • Wood and metal cleaners and polishers • Toilet cleaners • Tub, tile, and shower cleaners • Bleach (laundry) • Pool chemicals 	<ul style="list-style-type: none"> • Ant sprays and baits • Cockroach sprays and baits • Flea repellents and shampoos • Bug repellent • Household plant insecticides • Moth repellents • Mouse and rat poisons and bait 	<ul style="list-style-type: none"> • Motor Oil • Fuel additives • Carburetor and fuel injection cleaners • Air conditioning refrigerants • Starter fluids • Automotive batteries • Transmission and brake fluid 	<ul style="list-style-type: none"> • Adhesives and glues • Furniture strippers • Paint strippers and removers • Stains and finishes • Paint thinners and turpentine • Oil or latex based paint • Photographic chemicals • Fixatives and other solvents 	<ul style="list-style-type: none"> • Herbicides • Insecticides • Fungicides/ wood preservatives 	<ul style="list-style-type: none"> • Batteries • Mercury thermostats or thermometers • Florescent light bulbs • Driveway sealer 	<ul style="list-style-type: none"> • Propane tanks and other compressed gas • Gas cylinders • Kerosene • Home heating oil • Diesel fuel • Gas/oil mix • Lighter Fluid

Because of the associated public health and environmental risks associated with HHW, many communities implement public education and collection programs to discourage HHW disposal in the municipal solid waste stream. In 1997, there were more than 3,000 permanent HHW programs and collection events throughout the United States (EPA 2010). In 1998, Whatcom County built the Disposal of Toxics Facility (DoT) to accept and properly handle moderate risk waste from households and businesses. The facility, which is located approximately four miles east of the Reservation boundary near the Bellingham International Airport, is operated by a contracted service and is open weekdays from 9 am to 4 pm and the first Saturday of every month from 9 am to 4 pm.

Table 6.5 lists accepted and unaccepted wastes at the Disposal of Toxics (DoT) facility. Residents can dispose of 55 gallons or less of HHW for free, but businesses must first call for authorization and pricing. The DoT also has oil and antifreeze collection stations set up at the following locations in Whatcom County: Lake Whatcom Water & Sewer District, SSC Transfer Stations, and Nooksack Valley Disposal. The SSC will collect motor oil in well marked, tightly sealed plastic jugs placed curbside next to recyclables from current customers. The Whatcom County Health Department, in cooperation with the Department of Ecology, is responsible for ensuring that MRW generated in Whatcom County is handled and disposed of in a safe manner.

Table 6.5 Disposal of Toxics Facility Acceptable Hazardous Wastes Types

Accepted Toxic Waste	Unaccepted Toxic Waste
Used oil and fuels	Asbestos
Oil based paint and paint products	Ammunition
Fluorescent lamps	Radioactive waste
Cleaners	Biomedical waste
Lawn and garden chemicals	Empty containers
Solvents	Explosives
Mercury thermometers	Unapproved business waste
Good, usable latex-based paint	Unusable latex paint

6.2.2. Small Quantity Generators

Small quantity generators (SQG) are facilities or businesses that generate and/or accumulate a small amount of hazardous waste. To qualify as a SQG, the business or facility may not generate more than the following amounts of waste per month or as a batch:

- 220 pounds (100 kilograms; equal to approximately 25 gallons of liquid) of most dangerous wastes (e.g., paint, fuels, inks and toners, certain solvents and photographic chemicals), or
- 2.2 pounds (1 kilogram; equal to approximately 1 quart of liquid) of extremely hazardous waste (certain original unused products such as mercury, cyanides, certain pesticides and chlorinated solvents with greater than 1 percent chloride).

The business or facility may not store more than:

- 2,200 pounds (1,000 kilograms; equal to approximately 250 gallons of liquid) of most dangerous wastes (used products), or
- 2.2 pounds (1 kilogram; equal to approximately 1 quart of liquid) of extremely hazardous wastes.

Small Quantity Generators are exempt from most state and federal regulations if they do not exceed the generation and accumulation limits. The Disposal of Toxics program also provides a SQG hazardous waste program for Whatcom County businesses. A SQG must fill out an application form and resolve pricing issues with DoT before hazardous waste will be accepted. While the Whatcom County DoT facility provides residential MRW generators disposal services for no charge or at a low cost, small businesses must pay for disposing any MRW they generate. Moreover, Ecology grants that subsidize household MRW disposal cannot be used for SQG waste disposal. Table 6.6 lists the quantities of HHW collected at the Whatcom County DoT facility from residential customers and small quantity generators over the 2000 through 2006 period.

Table 6.6 Whatcom County Disposal of Toxics Facility Utilization 2000 Through 2006

Year	Residential Customers	Small Quantity Generator Customers	Pounds of HHW Collected
2000	3,353	429	250,751
2001	4,368	472	347,982
2002	5,013	425	411,097
2003	5,410	514	428,430
2004	5,689	515	504,962
2005	6,151	596	530,783
2006	5,994	534	476,398

(Whatcom County 2007)

6.2.3. Recommendations for Moderate Risk Waste Disposal

Currently, there is not a separate MRW disposal program provided on the Reservation. Each resident and small business must properly dispose of the hazardous waste generated using appropriate off-Reservation facilities such as the Whatcom County DoT facility. The Lummi Natural Resources Department investigates and resolves complaints involving improper storage and disposal of wastes such as oil, gasoline, paint, and paint related products. The LIBC alternatives for implementation of a MRW collection program include the following:

Alternative A: Status Quo

The MRW Disposal Alternative A is the status quo of trusting that households and SQGs properly store and dispose of moderate risk wastes and investigating and resolving complaints as they are received.

Alternative B: Partner with Local Communities

Under MRW Disposal Alternative B, the LIBC would encourage residents to participate or would actively partner with county-wide opportunities including MRW collection and disposal events. The LIBC would encourage all residents to take their HHW to Whatcom County DoT facility or County satellite disposal facilities through public outreach.

Alternative C: Periodic On-Reservation MRW Events

Under MRW Disposal Alternative C, the LIBC would hold MRW disposal events on the Reservation on a periodic basis in conjunction with the Community Clean-Up events. Residents would be encouraged to take their HHW to these events for proper disposal. A contractor, tribal employees, and/or a partnership with other governments or businesses would handle the waste. These multi-day collection events generally are the lowest cost for an on-Reservation collection program, but they also can have the lowest amount of MRW

collected. The multi-day Community Clean-Up events have low fixed costs because they do not require permanent structures; however they require higher costs for program promotion and advertising. Participation rates, quantities collected, and customer satisfaction can be affected by the weather on the collection days, travel distance, promotion level, receiving area wait time, and ease of access to the event location. Ensuring that the collection event is a part of a Community Clean-Up event would ensure that no additional staff time and resources would be needed.

Alternative D: Permanent On-Reservation MRW Facility

Under MRW Disposal Alternative D, the LIBC would establish a permanent MRW facility located at a central and convenient location. Residents and businesses would be encouraged to take their waste to these facilities for proper disposal. A contractor, tribal employees and/or a partnership with other governments or businesses, would handle all collected waste. Most permanent programs provide at least three days a week for acceptance, often operating on weekends. Many permanent programs continue to provide periodic community collection days. A permanent facility would require several staff, either contracted, tribal employees, or a combination of both. Permanent facilities tend to have higher public participation rates than periodic collection programs; however, they also incur significant costs.

Alternatives B (encourage use of DoT) and C (periodic on-Reservation collection events) are recommended to be implemented during the next five years. Alternative D is not recommended because of expense (i.e., environmental permitting, staffing, and transportation and disposal of HHW) and the current availability and proximity of the Whatcom County DoT. Alternative B is already being minimally implemented by the LNR as the department provides DoT brochures to Reservation residents and businesses.

7. COMPOSTING

Composting is the controlled biological decomposition of organic materials to produce a beneficial product (compost), which is used as a soil amendment to provide organic matter and nutrients, loosen soil, and help retain moisture. Yard trimmings and food residuals constitute 23 percent of the U.S. municipal solid waste stream. An estimated 56.9 percent of yard trimmings were recovered for composting or grasscycled in 2000, a large increase from the 12 percent recovery rate in 1990 (EPA 2010). In contrast to yard trimmings recovery, only 2 percent of food waste was composted in 2000. Washington State has adopted a goal of eliminating “residential or commercial yard debris from landfill by 2012 in those areas where alternatives to disposal are readily available and effective” (RCW 70.95.010 [10]).

7.1. Yard Waste

Yard waste includes materials such as lawn clippings, leaves, weeds, vegetable garden debris, branches (under four inches in diameter), and brush. As yard wastes are relatively clean and biodegradable, disposal in landfills may be unnecessary and wastes landfill space. In addition, as yard debris decomposes in landfills it generates methane gas and acidic leachate. Methane is an explosive greenhouse gas that is released as bacteria decompose organic materials in landfills. Yard waste can also increase the acidity of the soil and water, which can make other waste constituents more mobile and therefore more toxic. Diverting yard debris from landfills through composting is one way of reducing organic materials from entering landfills and reducing the solid waste stream.

There is no formal yard waste composting program on the Reservation. Most of the Reservation composting is conducted by private companies located off-Reservation; however, some residents compost in their backyards and burn yard debris when permitted. One simple method for backyard composting is grasscycling; simply leaving grass clippings on the lawn when mowing. Mulching is another method to reuse yard waste, by chipping or shredding wood waste (branches, trees stumps), grass clippings, or dried leaves, and spreading thin layers of the yard chipped or shredded material around the base of plants. Residents have also create their own backyard compost piles and use the compost to fertilize gardens and plants.

One off-Reservation option for yard waste disposal is the Clean Green Transfer Station operated seasonally by the Bellingham Public Works Department. The transfer site, located on Woburn Street at the intersection with Lakeway Drive, is for all Whatcom County residents and is open on weekends from March through November. There is a dumping fee of \$4 per load. Residents can also take yard waste to a transfer station (RDS) to be recycled for a fee. Residents who are customers of SSC can arrange to have yard waste picked up as part of a program called FoodPlus! Recycling described below.

7.2. Food Waste

Food wastes are the organic residues generated by the handling, storage, sale, preparation, cooking, and serving of foods. Food waste includes uneaten food and food preparation scraps from households and commercial establishments (e.g., restaurants, grocery stores).

Americans throw away more than 25 percent of all food prepared, amounting to approximately 96 billion pounds of food waste each year (EPA 2009) and which makes food waste the third largest waste stream after paper and yard waste. In 2008, approximately 12.7 percent of the total MSW generated in America was food scraps (EPA 2009). Similar to yard waste, food waste decomposition in landfills is a source of methane gas and diverting food waste will reduce the amount of waste produced and disposed of in a regional landfill.

Although there is no formal food waste composting program on the Reservation operated by the Lummi government, residents can include food waste with yard waste to create their own compost piles. Customers of SSC can also arrange to join the FoodPlus! Recycling program. The SSC began the program in 1995 as an expanded version of their original yard waste recycling service. FoodPlus! Recycling is SSC's all-in-one Toter service for recycling yard waste, food scraps, and compostable, biodegradable, and food-soiled paper. FoodPlus! Recycling pickup is every other week on the same day of the week as garbage pickup (SSC 2010). Service includes the use of a wheeled, lidded, 60-gallon Toter with a weight limit of 100 pounds. Extra fees are charged for Toters weighing over 100 pounds. Table 7.1 lists the material that can be composted through the SSC's FoodPlus! Recycling program. All materials collected are composted at Green Earth Technologies (GET) in Lynden, Washington. In 2007, Green Earth Technologies composted 9,580 tons of waste (SSC 2010). The Silver Reef Hotel, Casino & Spa and the Northwest Indian College currently participate in this food waste recycling program.

In 2006, SSC launched a second food waste recycling program called Food to Flowers to provide food-composting at the elementary schools in the Bellingham School District. Food to Flowers is modeled after a program operating in the San Francisco public schools (SSC 2010) and is an extension of SSC's Food Plus! Recycling program. SSC provides Toters to collect food scraps, soiled papers, bathroom paper towels, and yard debris which are then delivered to Green Earth Technology for composting. The Lummi Nation School currently participates in the Food to Flowers program.

Table 7.1 SSC's FoodPlus! Recycling and Food to Flowers Programs Wastes

Accepted Materials	Unacceptable Materials
<ul style="list-style-type: none"> • All foods including meat, dairy, fish, seafood, shells, and bones • All kitchen prep items; trimmings, peelings, egg shells, table scraps, and leftovers • Spoiled, outdated, and moldy foods • Paper coffee filters and grounds • All compostable, biodegradable, food-soiled paper including pizza boxes • Waxed paper milk/juice/ice cream/soy cartons, frozen food cartons, and paper deli/take-out cartons • Paper napkins, towels, plates, and cups • Tissue paper, parchment/waxed paper/bags. • Cardboard bakery liners and compostable plastic items like cups, lids, and utensils • Yard debris – grass clippings, garden trimmings, branches, leaves, and weeds • Seasonal greens including pumpkins, cornstalks, apples, garlands, swags, wreaths, and grapevines • Larger branches are accepted if cut into 4 foot lengths and tied in bundles 	<ul style="list-style-type: none"> • Plastics • Foil and plastic juice pouches • Metal and foil • Styrofoam, liquids, diapers, wet wastes, and kitty litter • Rocks, bricks, concrete, dirt, sod, root balls, tires, lumber, and garden hoses • Household garbage • Pet feces

7.3. Recommendations for Composting

Three alternatives are presented below to improve composting on the Lummi Indian Reservation. An evaluation of how each of these alternatives achieve the primary objectives of this ISWMP is presented in Table 7.2.

Alternative A: Voluntary Collection or Transfer, Resident’s Responsibility (Status Quo)

Composting Alternative A is the status quo for food scrap and yard waste collection on the Lummi Indian Reservation, which is either voluntary subscription with a contractor (SSC) by individual residents and businesses for routine curbside collection, or transport of items to off-Reservation facilities such as the Clean Green transfer station and RDS. Although SSC is the status quo contractor for curbside collection of compostable materials, this alternative could also be met through a tribal-member owned company. This alternative includes the tribe providing community education and promotion of other local composting programs.

Alternative B: Tribally-Operated Temporary Drop Box Facility

Composting Alternative B includes LIBC sponsored collection days for yard waste and food waste at advertised locations. Residents can transport their yard waste to the site and drop it off for little or no fee. The required collection equipment would be 30-yard roll off boxes that would be hauled to a yard waste processing facility when full.

Alternative C: Tribally-Operated Permanent Drop Box Facility

Composting Alternative C is a permanent, designated, on-Reservation drop-off site for yard and food waste. This alternative could be combined with MSW Transfer and Disposal Alternatives 4 (Tribally operated permanent drop box facility), and Recycling Alternative D

(On-Reservation drop-off station) if chosen. At the previously described drop box facilities, a separate area would be provided for compostable materials.

Table 7.2 Alternatives Analysis for Composting on the Lummi Indian Reservation

ISWMP Objectives	Composting Alternatives		
	A Curbside collection or self-haul, voluntary (status quo)	B Temporary Drop-Box Sites	C Permanent Drop Box Site
Convenience	High Curbside collection.	Medium Requires Transport.	Medium Requires Transport.
Minimize Litter, Odor, Dust, Vermin	High Curbside collection minimizes chance of debris to pile up. Toter provides containment.	Medium Debris piles up at residence in between collection days.	Medium Debris piles up at residence in between collection days.
Maximize Participation	Low Because illegal dumping is occurring, participation in contract services may currently be low. Also, FoodPlus! collection is an additional fee to curbside MSW and recyclable collection	Medium Short distance to drop-off site. Little to no fee charged.	Medium Short distance to drop-off site. Little to no fee charged.
Affordable for Community Members	Medium Requires contract fee with SSC or fee to drop off waste at a transfer station.	High Cost covered in part or in full by LIBC for tribal members.	High Cost covered in part or in full by LIBC for tribal members
Decrease Illegal Dumping	Low Illegal dumping is occurring.	Medium Still requires collection and transfer of compostables.	Medium Still requires collection and transfer of compostables.
Minimize costs to LIBC	High Collection costs are the responsibility of the individual.	Medium LIBC would cover part or all of drop-box rental and waste transfer and disposal.	Low LIBC would cover part or all of drop-box rental and waste transfer and disposal plus site development.
Overall likelihood of alternative meeting ISWMP objectives	Medium (2.2) Pros – existing services are available Cons – some fee to residents	Medium (2.2) Pros – proximity of drop-off site to residences Cons – effort and cost required by LIBC	Medium (2.0) Pros – proximity of drop-off site to residences Cons – effort and cost required by LIBC

From this analysis, Composting Alternative A (Status Quo of contracted curbside collection or self-haul) is recommended along with additional community outreach especially about

food waste reduction and composting. Although Composting Alternatives A and B rank the same in the above analysis, Alternative A is preferred because the necessary services are already in place for food and yard waste composting. The available yard waste collection sites (Clean Green and RDS) could be promoted through the *Squol Quol*. With the implementation of MSW Collection Alternatives B-2 or B-3 (subsidized mandatory curbside collection) the costs for MSW and recyclables collection would be reduced for tribal members and individual subscription to the FoodPlus! Recycling program could increase.

In addition, FoodPlus! Recycling should be provided for all community events such as the First Salmon Ceremony, events at *Wex li em*, the Lummi Stommish Water Festival, the LIBC annual employee picnic and similar community gatherings. Event organizers should be encouraged to use compostable plates and utensils for food service and ensure that compostables, recyclables, and trash are sorted properly.

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8. PUBLIC EDUCATION AND OUTREACH

One objective of this ISWMP is to further educate and involve the Reservation community in solid waste management activities including waste reduction and recycling efforts.

The steps to achieve this objective are:

1. Ensure community members know how to use the existing solid waste and recycling collection system and facilities.
2. Communicate the value and importance of solid waste management and recycling programs.
3. Serve as an informational resource for community members regarding waste management and recycling.
4. Promote recycling, reuse, and source reduction.

Development and implementation of successful solid waste management and recycling programs depend on effective public education and community outreach initiatives. Well planned initiatives can help to generate understanding, support, and participation in efforts to improve waste management practices. Increased education and outreach to community members typically results in higher levels of participation in solid waste programs and lower levels of illegal dumping and contamination of collected materials (EPA 2004).

8.1. Existing Programs

There are currently no formal programs in place for educating residents, businesses, and visitors about solid waste management, recycling, or waste reduction programs on the Reservation. Previously, as part of Project Clean-Up, a quarterly newsletter provided community education on solid waste management. Lummi Solid Waste Management staff also provided informal education to jail alternative participants and community service work crews about the potential effects that illegal dumping can have on their community and their lifestyle, and also provided written information.

Informal education and outreach efforts exist on the Reservation. For example, the Lummi Nation School (LNS) participates in the SSC Food to Flowers program, which includes an educational program about composting. The Natural Resources and the Planning departments provide brochures and pamphlets about solid waste and recycling programs in Whatcom County (off-Reservation) for community members. The educational material includes information on household hazardous waste disposal at the Disposal of Toxics facility operated by Whatcom County, reuse and recycling opportunities, construction waste recycling, and automotive waste disposal. Previous community solid waste events have been advertised in the *Squol Quol* and the LHA newsletter, and flyers are posted throughout the community and in government departments. Beginning in 2010, LNR staff members have provided recycling and solid waste management information in the *Squol Quol*.

8.2. Future Programs

Public education about solid waste management should be a high priority activity and an integral part of the solid waste management program. A formal solid waste and recycling education and outreach program should be implemented beginning with the identification of outreach objectives. The next step is determining the specific message and means of effectively communicating that message to the community. Five approaches typically used to deliver messages are:

- Verbal (door to door, school outreach)
- Printed materials (fact sheets, newsletters, articles, flyers, inserts)
- Visual (signage, posters, charts)
- Electronic (websites, list serves, texting services, face book)
- Special events (meetings and community gatherings, workshops and training sessions, tribal events)

Using multiple methods to convey outreach messages is likely to have more impact because the message is heard more than once and in multiple formats. Different approaches and recommendations for educating community members, youth, government, and businesses about solid waste management are presented below.

8.2.1. Community Members

There are a variety of methods to engage and inform community members. These methods range from a public information campaign to semi-annual community education events. The recommendations described below should help the solid waste program to inform and better serve the community.

Articles in the *Squol Quol*

Short articles or environmental tips about solid waste issues concerning the Reservation community should be provided for publication in the monthly tribal newspaper (*Squol Quol*). This public information campaign has been sporadically implemented beginning in the March 2010 issue of the *Squol Quol*. The article described the results of a Community Solid Waste Clean-Up event during November 2009. Future articles can address solid waste management practices including burning, recycling, composting, illegal dumping, and waste management concepts.

Quarterly Solid Waste Management Newsletter

From 2004 through 2006, a Project Clean-Up newsletter was produced and distributed throughout the community. A solid waste newsletter should again be printed and distributed quarterly with the *Squol Quol* and throughout the community. The newsletter would include the range of services and goals of a re-established waste management division and tips on solid waste reduction, reuse, and recycling. Notifications of future solid waste community events, workshops, and training seminars could be included in the newsletter.

Solid Waste Management Website

The re-established Lummi Solid Waste Management Division (LSWMD) should coordinate with the LIBC Information Services Department to create a webpage or link on the Lummi

Nation website for solid waste management and recycling information, including a point of contact to obtain additional information. This site can provide links to other solid waste information providers, such as Whatcom County, the EPA, the BIA solid waste program, and local transfer stations and solid waste collectors. The web page or link will require ongoing maintenance and updates to keep the information current.

Displays at Special Community Events

Special community events offer an opportunity to attract attention and increase awareness of solid waste management and recycling issues and opportunities. The LIBC should plan special education and awareness communications for special events such as Earth Day in April, America Recycles Day in November, Fourth of July fireworks sales, the Stommish Water Festival, and the “Safe Streets” walk program. Displays or booths could illustrate accepted and unaccepted items for the recycling program, products made from recycled materials, demonstrations of compost and worm bins, and hazardous wastes that must be diverted from the waste stream. These booths could possibly be set up and staffed by other organizations such as SSC, the Disposal of toxics, and Washington State’s E-Cycle Program.

Zero Waste at Community Events

Community events also offer an opportunity to attract attention and increase awareness of solid waste management and recycling. At community events (e.g., monthly community breakfast, the Stommish Water Festival, high school football and basketball games, the First Salmon Ceremony, annual employee picnic) the LSWMD would provide food scrap composting, recycling, and trash services. Volunteers should be stationed at trash, recycling, and food compost receptacles to provide guidance to individuals regarding the proper receptacle for solid waste disposal. Flyers or pamphlets should be distributed at the beginning of the event describing what should be placed in each receptacle. A raffle could also take place at these events and raffle prizes could include related items such as: six months of SSC solid waste collection service, reusable grocery bags, reusable drinking water bottles, gift certificates to local restaurants, and wheeled carts for recycling bins. Following the events, the amounts of recycled and composted materials could be reported in the *Squol Quol*.

Workshops and Training Sessions

Workshops and training sessions are valuable ways to educate community members about a new program, policy, or waste management options. These sessions would provide a hands-on learning experience for participants, as well as an opportunity to ask questions or try out new techniques. For example, a Master Composter/Recycler could provide a workshop on creating a compost area in the backyard or worm recycling boxes. Training sessions could also be held to educate tribal officials and representatives about the illegal dumping provisions of the LCL Title 18 Solid Waste Management Code and enforcement methods.

Organize a Clean-Yard and/or Vehicle Redemption Contest

The LIBC could sponsor a competition for Reservation residents to make significant changes to their land by conducting coordinated clean-up activities. The purpose of the event would be to teach community members the importance and benefits of recycling, controlling abandoned and non-operational vehicles, and continuing solid waste disposal. The program activities should include the disposal of cars, boats, and accumulated solid waste on private

property. The contest should include awards for the greatest achievement, based on published contest rules and standards of performance. A proposed award distribution of \$800, \$500, and \$200 for the three top efforts, plus \$50 participation awards for smaller but notable efforts, would provide an incentive to ensure participation. Clean-up activities should be supported by the waste management program's equipment and supplies in conjunction with a neighborhood or community clean-up event.

Assisted Clean-Up Program

The Lummi Waste Management Program assisted elder and disabled tribal members with their waste management from 2004 until 2006 when the assisted clean-up ended due to lack of funding. This program should be reinstated and expanded. In the assisted clean-up program, waste management staff would assist elders and disabled tribal members remove and dispose of solid waste around their homes. The renewed program should also extend the services to non-disabled tribal members who would be expected to assist the waste management staff. The LIBC would need to establish the terms of a barter system and rules governing the work so residents could work alongside waste management staff in exchange for clean-up activities occurring on their properties. Tribal members have voiced a desire for this program during community clean-up events. This program would also provide the opportunity for waste management staff to educate individuals on waste management and recycling on a one-to-one basis.

8.2.2. Youth

As noted previously, the Lummi Nation School is participating in the SSC's Food to Flowers program. As part of this composting program, students are educated about solid waste, recycling, and composting. Additional solid waste management education efforts at schools would help teach children about effectively managing waste, the benefits of recycling, and environmental concerns such as illegal dumping. In concept, the children will teach their family what they learn in school, take personal responsibility for the waste they generate, and continue to manage waste properly as adults. Of the many different education programs available, recommended programs for the Lummi K-12 school include those that are summarized below.

Host a K-6 Presentation and Continuing Curriculum

The purpose of a K-6 presentation and continuing curriculum program is to standardize the presentation of solid waste management information and inspire recycling and waste control ethics in youth. At least two informal presentations in the fall and spring would be given to K-6 students of the LNS, hosted by waste management division staff, and based on the EPA curriculum. Youth education programs are intended to be low-cost, grass roots outreach, that target the community's youth and provide family-oriented information. These sessions are intended to provide short-term effects that will be integrated into the student's values and lifestyle in the long term. The education sessions should occur a few weeks before a community clean-up event or in conjunction with other education programs.

Lummi Solid Waste Management Logo Contest

Solid Waste Management staff could hold a contest for Lummi Nation School students to design a logo, symbol, or emblem or create a mascot. Prizes could be given to the most creative design for each grade level. The community would then be given a chance to vote

on their favorite design. The design with the most votes would become the Lummi Solid Waste Management logo, symbol, or emblem.

Partner with RE Sources for Education Programs

RE Sources is a local non-profit organization that provides solid waste management outreach materials and hands-on multimedia presentations for schools. The Lummi solid waste management staff could partner with RE Sources to adapt educational information to solid waste management concerns on the Reservation. The program would comprehensively teach about disposal, recycling, composting, and planned salvage in Reservation homes and workplaces. All presentations by RE Sources are 30-45 minutes for primary grades and one hour for third grade and above. The following are elements of the solid waste education program provided by RE Sources in 2010 (RE Sources 2012):

“Garbology 101”: Designed for grades K-6, the Garbology 101 presentations make age-appropriate use of puppetry, storytelling, games, and poems to convey the problems with garbage, the solutions to those problems, and how students can make a difference by reducing, reusing, and recycling their family’s trash.

“Hey Waiter, There’s a Worm in My Dirt”: In the “Hey Waiter, There’s a Worm in My Dirt” program, students in grades 3-6 use microscopes, scientific drawing, and a portable worm bin to learn how composting fits into the larger waste reduction picture.

“Got Pulp?”: In the “Got Pulp?” program, students make one-of-a kind paper treasures while learning about the connections between recycling, reuse, and resource conservation. Papermaking is available to grades K-6.

“Toxin’ Trash”: Most households have a variety of hazardous products around the house. In the “Toxin’ Trash” program, students learn how to identify potentially hazardous materials and how to properly use, store, and dispose of them through an interactive group game. Students get a chance to prepare and use safer alternatives made from non-toxic household supplies such as salt, vinegar, baking soda, and elbow grease. Available to students in grades 3-6.

“Garbologists in Training” 6th Grade Recycling Unit: Students in 6th grade gain in-depth knowledge about waste reduction, recycling, and hazardous products during this week long “Garbologists in Training” program. The five-contact unit includes each of the following presentations: live worms, paper pulp, a version of the game “Jeopardy”, as well as a final wrap-up and review day.

“Think Twice Before You Buy”: Teens are buying more than ever before, and the effects of increased levels of consumption are at the core of many of the environmental and social challenges we face today. Through a fast-paced multimedia presentation, discussion, and activities that promote critical thinking, the “Think Twice Before You Buy” program provides students information about the issue of over-consumption, the role they play as consumers, and the sound decisions they can make regarding their own consumer habits. This program is aimed at students in grades 8-12.

Sponsor a Recycled Materials Drive at LNS

Solid Waste Management Division staff could develop and organize a recycling program at the LNS as a fundraiser together with students or student organizations. Upper grade level

students could be involved in leadership roles or youth organizations could be encouraged to lead and coordinate projects over a 2-3 month trial period. The intent of this effort would be to involve at least one youth group and instill a strong, internalized disposal/recycling ethic in 20 or more future Lummi leaders. The solid waste management program could coordinate transport and disposal of collected recyclables and provide collection containers and incentives for participation. This collection could be performed as a competition and the LIBC could subsidize the project by paying a refund premium of five cents per container collected. This would be a relatively low-cost program designed to encourage participation. Costs would be limited to supplies and staff coordination.

Use Social Media

Solid Waste Management Division staff could use social media tools like Facebook and/or twitter to inform the community about solid waste management in general and related activities, events, and accomplishments.

8.2.3. Government and Businesses

Government offices and businesses have numerous opportunities to prevent waste when purchasing supplies and food, serving customers, or educating employees. The LIBC, NWIC, and the Silver Reef Hotel, Casino & Spa are the largest employers and solid waste producers on the Reservation. Increased education of employees on reducing, reusing, and recycling principles will help reduce solid waste generation in the work place and on the Reservation. The desired outcome is for the principles and actions learned by employees at the workplace will be taken home and integrated into their values and lifestyle in the long term. Two available programs that are recommended for use by the LIBC offices and on-Reservation businesses are the Sustainable Connections' Toward Zero Waste effort and Whatcom County's EnviroStars program.

Sustainable Connections is a non-profit network of local, independently-owned, Whatcom County businesses and supporters that facilitate sustainable economic development by providing education, connections, and market development. Sustainable Connection's campaign, Toward Zero Waste (TZW), aims to reduce the amount of waste going into landfills, increase reuse and recycling of existing resources, and increase purchasing of recycled and environmentally preferable products. Businesses and governments that participate in TZW must commit to at least a 50 percent reduction of waste and are supported with free technical assistance and promotional materials to help achieve this goal. The TZW program is an opportunity for LIBC offices, the Silver Reef Hotel, Casino & Spa, and the NWIC to educate employees and improve solid waste disposal and recycling practices.

Another local program focused on solid waste reduction in businesses is the EnviroStars Program. The EnviroStars program is a recognition program for businesses that are small quantity generators of hazardous waste and is a joint effort of the Whatcom County Health Department and the regional EnviroStars Cooperative. Through this program, Whatcom County provides technical assistance to businesses on proper hazardous waste handling and on strategies to conserve resources. Businesses are awarded "stars" according to their level of effort in waste reduction, resource conservation, and community outreach. For businesses that qualify at the four star and five star levels, Whatcom County sponsors special recognition in local media advertisements and community events.

8.2.4. Summary of Recommendations for Public Education and Outreach

A summary of the public education and outreach recommendations is presented in Table 8.1.

Table 8.1 Summary of Public Education and Outreach Recommendations

Community	<i>Squol Quol</i> articles
	Quarterly solid waste management newsletter (<i>Squol Quol</i> insert)
	Solid waste management website
	Displays at special events
	Zero waste at community events
	Workshops and training sessions
	Clean yard contests (including abandoned vehicle removal)
	Assisted clean-up program
Youth	K-6 Presentations and continuing curriculum
	Lummi Nation solid waste management logo contest
	RE Sources education programs
	Lummi Nation School recycling drive
	Use Social Media
Government and Business	Sustainable Connections' Towards Zero Waste Program
	EnviroStars Program

8.3. Measuring Education and Outreach Effectiveness

Integral to any information and education program is being able to measure how effective the program is in achieving the desired outcome. A reliable method of measuring program effectiveness is needed to determine whether or not a particular strategy should be continued, revised, or eliminated. A variety of evaluation approaches are available including the following examples:

- Establish a baseline of the amount of recyclables collected before implementation of new public education and outreach programs and compare to the quantities of recyclable collected after the program has been established for a year or two.
- Monitor the quantity of contaminants in solid waste and recycling containers before and after information and education activities are conducted.
- Conduct a solid waste survey before and after education activities.
- Provide opportunities for participants and community members to provide feedback about the program.

Measuring the effectiveness of the program is essential to helping the tribal educators decide if there is a need to implement more education efforts or change the education approach.

Effectiveness measurements can also be used as an assessment and planning tool for future solid waste management alternatives.

8.4. Budget and Financing

Prior to implementing changes or expansions to the solid waste management and/or recycling program, a designated person must ensure that material, personnel, and budget are available. The LIBC does not currently have a budget in place for public education and outreach programs on issues such as solid waste management, recycling, or waste reduction. Tribal funds and grants would need to be identified by the LSWMD to support implementation of educational and outreach programs beginning in 2014.

9. ISWMP IMPLEMENTATION

This section describes how this Integrated Solid Waste Management Plan (ISWMP) could be implemented by recommending roles and responsibilities of personnel, identifying funding opportunities, summarizing the recommended alternatives from the previous sections, and presenting both a summary 10-year solid waste management plan and a more detailed 5-year implementation plan.

9.1. Administration

Clearly defining the roles and responsibilities of staff members assigned to administer the integrated solid waste management program is an important part of implementing this ISWMP. This includes the planning, development, contracting, legal aspects, technical aspects, record keeping, staffing, and public education responsibilities that are involved. The LIBC has assigned the primary solid waste administrative function to the Lummi Planning Department through LCL Title 18 and Resolution 2004-114 (Appendix E). The duties and responsibilities of key staff positions needed for the effective administration of a Lummi Indian Reservation solid waste management program are described below. In summary, a “champion” needs to be identified to lead the effort to improve solid waste management on the Reservation and to address illegal dumping.

Lummi Solid Waste Management Team (LSWMT)

Originally, the LSWMT consisted of the Waste Management Team Lead, the Water Resources Division Manager, and the Land Development Division Manager and, more recently, the LHA Director. Until its activity was suspended due to lack of financial support, the primary responsibilities of the LSWMT were to:

- Budget – Prepare an annual budget of anticipated capital and operating expenditures and anticipated revenues/expenses from grant funds, tribal funds, and disposal fees.
- Plan – Arrange for solid waste studies and plan development, obtain grants to support planning, contract for outside services (if needed), assign staff to solid waste and recycling programs and committees, and present planning documents and recommendations to the LIBC.
- Finance – Perform rate studies and projections on needed revenues and apply for available grant funds as appropriate.
- Public outreach and education – Develop and provide outreach campaigns and education programs and represent the Lummi Waste Management Program to the public.

Health Officer

- Enforcement – Investigate health and safety hazards related to solid waste and provide enforcement of the Solid Waste Control and Disposal Code (LCL Title 18).

Although the Lummi waste management program was downsized in recent years due to a lack of funding, the need for an extensive solid waste management program on the Reservation is still a priority. As this ISWMP is implemented and the waste management program is re-established, additional funding, staff, and facilities will be needed. Since August 1, 2010 there have been no staff assigned full time to implementing the solid waste management program. Following a summary of funding opportunities, staffing recommendations for the 5-year implementation plan are described.

9.2. Funding Opportunities

External and internal funding are the two primary sources of solid waste funding. Most tribal governments require a combination of both sources to support their solid waste programs.

- External – External funding sources may include grants or loans from state or federal agencies. There are also private organizations that provide grants to Indian tribes for solid waste and other environmental programs.
- Internal – Internal funding sources may include allocation from the tribal general fund, solid waste service user fees, revenue generated from the sale of recyclable materials, and tipping fees from accepting waste at a transfer station or landfill.

Available external funding sources (Washington State and Federal) and internal funding sources (Lummi Nation) are summarized below.

9.2.1. State of Washington

The Washington Department of Ecology Solid Waste and Financial Assistance Program (Waste 2 Resources) includes four programs that provide financial assistance to local governments and non-profit organizations:

- The Community Litter Cleanup Program provides funding to local governments to cleanup illegal dumps and to educate the public about the consequences of littering. It is a contracted funding program that provides financial support to communities through interagency agreements. The contracts are awarded once every two years.
- The Coordinated Prevention Grant Program helps local governments to develop and implement their hazardous and solid waste management plans. These grants are awarded once every two years. Two types of grants can be awarded to local governments:
 - Solid waste planning and implementation grants which are used to carry out local government solid and hazardous waste management plans and pollution prevention plans.
 - Solid waste enforcement grants which are used to enforce solid waste rules and regulations.
- The Remedial Action Grants and Loans are designed to help local governments clean up contaminated sites and to lessen the effect of the clean-up costs on ratepayers and

taxpayers. These grants are awarded on an on-going basis throughout a two-year time span.

- The Public Participation Grants provide funding to citizen groups and not-for-profit public interest organizations to provide public involvement in monitoring the clean-up of contaminated sites and in pollution prevention by reducing or eliminating waste at the source. An application period is opened every two years.

9.2.2. Federal

Several federal agencies provide funding for tribal solid waste programs. The primary sources are the Environmental Protection Agency (EPA), the Department of Agriculture (USDA), the Department of Health and Human Services (HHS), the Bureau of Indian Affairs (BIA), and the Department of Housing and Urban Development (HUD). Most of the grants and loans available provide money for planning, outreach and education, construction, or equipment purchases. Limited grant programs allow funds to be used for program or facility operation and maintenance.

There are many ways to learn about additional funding opportunities that are available for solid waste management. Most federal agencies announce grant and loan availability in the Federal Register and provide information on their websites. The federal government has established a central storehouse for information on 1,000 federal grant programs and provides access to approximately \$500 billion in annual awards. Detailed information on solid waste management federal funding opportunities can be found at <http://www07.grants.gov/index.jsp>.

Tribes can also speak directly with regional federal agency representatives from the EPA, IHS, BIA, USDA, and HUD. Internet searches can be an effective way to learn about grant and loan programs. Another way to learn about grant availability is by communicating with other tribes, either through conversations or networking at conferences and meetings. Some tribes exchange successful grant applications to help improve future applications. In the Pacific Northwest, the Tribal Solid Waste Advisory Network (TSWAN) facilitates opportunities for tribes to consult and exchange grant information with each other. Finally, the Grants and Contracts Office of the LIBC monitors grant opportunities and will alert the appropriate department of opportunities.

The grants and funding portion of the online EPA American Tribal Portal provides information about tribal grants and is intended to help tribes and individuals find all topics in one location. The Tribal Portal can be found at: <http://www.epa.gov/tribal/grantsandfunding/index.htm>.

EPA American Indian Environmental Office Grants

The EPA Hazardous Waste Management Grant Program for Tribes supports projects designed to develop and implement hazardous waste management programs. This grant is typically awarded annually.

The Tribal Solid Waste Management Assistance Project (TSWMAP) is a multi-agency effort to help tribes with closing open dumps and developing safe solid waste management

practices. The TSWMAP is intended to help tribes develop and implement comprehensive programs for managing solid waste and developing alternatives to disposal. Assistance may include funding to: characterize and assess open dumps; develop integrated solid waste management plans; establish alternative solid waste management options (e.g., waste reduction and recycling programs, financing transfer stations); and close, clean-up, or upgrade open dumps.

The Indian General Assistance Program (IGAP) supports solid waste management planning and implementation activities. This grant is typically awarded annually and can be combined with other EPA grant programs into a Performance Partnership Grant.

USDA

The USDA's Rural Development Solid Waste Management Grants help applicants to reduce or eliminate pollution of water resources and improve planning and management of their solid waste sites (<http://www.rurdev.usda.gov>). Interested tribes may submit a pre-application form to the USDA Office of Washington State or the USDA Rural Development National Office in Washington, D.C.

Department of Defense

The Department of Defense (DoD) Native American Lands Environmental Mitigation Program provides funding for the complete mitigation of all environmental impacts on Indian lands resulting from past DoD activities. Funded activities include training and technical assistance to tribes, related administrative support, research, documentation of environmental damage, prioritizing mitigation sites, and developing mitigation cost estimates.

Department of Health and Human Services, Indian Health Service

The Department of Health and Human Services (HHS) Sanitation Facilities Construction Program provides technical and financial support to tribes to promote a healthy environment through the cooperative development and continuing operation of safe drinking water, wastewater, and solid waste systems and related infrastructure support facilities. Projects are funded based on priority in the Indian Health Service Sanitation Deficiency System (<http://www.dsfc.ihs.gov/staff.cfm>).

Department of the Interior, Bureau of Indian Affairs

The Bureau of Indian Affairs (BIA) Indian Loan Guaranty program was established by the Indian Financing Act of 1974 to stimulate and increase Indian entrepreneurship and employment through establishment, acquisition, and expansion of Indian-owned economic enterprises. Loans may be made to finance Indian-owned businesses organized for profit provided that eligible Indian ownership constitutes not less than 51 percent of the business (<http://www.doi.gov/bia>).

9.2.3. Lummi Nation

Local potential funding sources for solid waste management activities on the Reservation are limited. Currently, the only significant sources are the LIBC, which receives annual appropriations from Congress and primarily generates revenue through business ventures

such as the Silver Reef Hotel, Casino & Spa. The LIBC has a very limited tax base – mainly employment/income taxes, permit fees, and license fees as no property taxes are collected on trust properties and taxes on fee land are collected and retained by Whatcom County. Profits from the Silver Reef Hotel, Casino & Spa are generally distributed through a prioritized system to various community programs. This distribution is based on initial casino profits being used to repay loans secured to build the casino and the remainder allocated pursuant to a formula, described as a “waterfall” approach, approved by the LIBC. If available profits exceed the specified amount for the first priority program, funding is provided to the second priority to its specified limit. If profits exceed this amount, the third prioritized program is funded to its limit and the method is repeated until the profits are fully allocated. Currently, solid waste management is not specifically identified as a target for the casino waterfall profits. Therefore, financial support for solid waste management projects will largely continue to come from grant funding or as a result of a shift in priorities by the LIBC.

9.3. Implementation Plan

This section provides a plan for implementing the recommended solid waste management alternatives for the Lummi Nation. The following actions are recommended to meet the Lummi Nation’s goals and objectives for solid waste management:

1. Adopt this plan by a Lummi Indian Business Council (LIBC) resolution that includes approval to join the Tribal Solid Waste Advisory Network (TSWAN). The TSWAN should be joined as soon as practicable to provide technical support from other tribal and solid waste management professionals during plan implementation and later plan updates.
2. Re-establish a Solid Waste Management Division within the Lummi Nation Planning and Public Works Department including:
 - a. Hiring a full time Solid Waste Management Specialist,
 - b. Hiring a part-time office assistant or re-allocating a portion of existing staff time to the re-established Solid Waste Management Division.
3. Fully subsidize weekly curbside solid waste and every other week recyclable collection or its equivalent (Solid Waste Collection Alternative A-3) in combination with an annual Community Clean-up Event (Transfer and Disposal Alternative 1).
4. Implement all of the Special Waste Recommendations presented in Table 6.3 and both encourage use of the existing Disposal of Toxics facility near the Bellingham Airport (Moderate Risk Waste Alternative B) and conduct an annual Community Clean-Up event (Transfer and Disposal Alternative 1) that includes collection and disposal of moderate risk wastes (Moderate Risk Waste Alternative C).
5. Implement a public education and outreach program that will inform the community on solid waste management and recycling on the Reservation following the recommendations presented in Section 8.2 and listed in Table 8.1.
6. Coordinate solid waste management with other jurisdictions as appropriate.

7. Pursue funding to implement the solid waste management alternatives described in the approved Integrated Solid Waste Management Plan.

9.3.1. 10-Year Solid Waste Management Plan

This 10-Year Solid Waste Management Plan is intended to provide an overall direction for solid waste management on the Lummi Indian Reservation over the 2014 to 2024 period and is the framework for the 5-Year Implementation Plan. The 10 year goal of this ISWMP is to design and implement a Reservation solid waste management system that effectively protects public health and the environment. The objectives to achieve this goal are:

1. Ensure convenient and reliable services for managing solid waste including providing convenient and cost-effective recycling opportunities to maximize participation.
2. Decrease illegal dumping on the Reservation.
3. Educate and involve citizens in solid waste management activities including waste reduction and recycling efforts.
4. Obtain funding for solid waste management services and facilities including enforcement actions against violators of established solid waste management laws.

General activities for achieving these objectives are listed in Table 9.1.

Table 9.1 Overview of the 10-Year Solid Waste Management Plan

ISWMP Objective	Ten Year Activities
1. Ensure convenient and reliable services for managing solid waste, including providing convenient and cost-effective recycling opportunities to maximize participation.	Encourage convenient and reliable curbside garbage and recyclable collection for all parts of the Reservation.
	Ensure convenient recycling opportunities to maximize participation.
	Design and implement planning processes when modification to existing facilities or development of new facilities occurs.
	Assess existing and projected waste generation patterns, including the generation of special wastes and waste prevention and recycling trends, to determine future transfer, processing, and transport needs.
	Assess present and future recyclable collection, transport, processing, and remanufacturing needs and opportunities and encourage such capability through coordinated action with private enterprise.
	Develop and implement a program to encourage, gather, analyze, and use public input into proposed and ongoing system operations as well as special on-time projects.
	Maintain effective working relationships with private haulers and off-Reservation transfer stations.
	Monitor relevant developments in the Congress, federal and state courts, and administrative law panels and as appropriate interact with these groups to help adjust system policies and procedures to better meet the needs of the Lummi Nation.
	Maintain effective communications and working relationships between the LSWM Division and the Lummi Planning Commission, the Lummi Natural Resource Commission, and the LIBC.

Table 9.1 Overview of the 10-Year Solid Waste Management Plan

ISWMP Objective	Ten Year Activities
	Maintain effective communications and working relationships with relevant private parties, departments of LIBC, special purpose districts, Whatcom County, and relevant state and federal agencies.
2. Decrease illegal dumping on the Reservation	Develop and implement educational programs aimed at those who illegally dump solid and moderate risk wastes as well as landowners who suffer illegal dumping and could secure their land to reduce the problem. Develop and implement a program to provide financial assistance to citizens and citizen groups who voluntarily clean up land they do not own. Enforce the solid waste management code which ensures that any identified illegal dumper will be assessed the cost of cleanup plus a penalty sufficient to discourage future illegal dumping. Develop and implement a comprehensive program to ensure that illegal dumpsites are identified and cleaned up in a timely manner. Assess needs and educate children, the general public, and businesses and institutions, including governmental entities, concerning solid and moderate risk waste prevention and recycling
3. Educate and involve citizens in solid waste management activities including waste reduction and recycling efforts.	Develop and implement educational programs aimed at those who illegally dump solid and moderate risk wastes as well as landowners who suffer illegal dumping and could secure their land to reduce the problem. Develop and implement educational programs that target Lummi Youth, including the use of social media. Ensure the long-term financial ability of the solid waste management program to accomplish mandated and desired activities.
4. Obtain funding for solid waste management services and facilities including enforcement actions against violators of established solid waste management laws.	Seek grant funding and tribal general fund allocations to implement the identified action plan. Effectively implement work plans and document program effectiveness to support continued funding of activities.

9.3.2. 5-Year Implementation Plan

As summarized in Table 9.2, the estimated annual cost to implement the recommended 5-Year implementation plan is \$300,000. The recommended action plan for the first five year implementation period of this Integrated Solid Waste Management Plan is summarized in Table 9.3. The ISWMP should be reviewed in Year 5 and the programs listed in the five year action plan evaluated to determine if they should continue, be modified, or be discontinued in order to meet the goals and objectives of the 10-Year action plan.

Table 9.2 Estimated Annual Budget for Five Year Implementation Plan

Budget Category	Total
PERSONNEL	
Solid Waste Management Specialist (1 FTE [2080 hours x \$21.82/hr])	\$45,386
Administrative Support Staff Member (0.5 FTE [1040 hours x \$14.35/hr])	\$14,924
Total	\$60,310
FRINGE BENEFIT ¹	
Solid Waste Management Specialist (36.88% of salary)	\$16,738
Administrative Support Staff Member (49.40% of salary)	\$7,373
Total	\$24,111
TRAVEL	\$0
EQUIPMENT	\$0
SUPPLIES (Miscellaneous supplies, educational material, mailings, photocopies)	\$7,025
CONTRACTS (contracts greater than \$5,000 are not subject to indirect charges)	
Annual Community Clean-Up Event With Lummi Housing Authority	\$62,198
Waste Disposal Costs - SSC curbside collection and/or Contract with RDS for dumping fees	\$129,182
Total	\$191,380
OTHER (Training and continuing education for Solid Waste Management Division staff)	\$2,500
TOTAL DIRECT COSTS SUBJECT TO INDIRECT	\$93,946
INDIRECT @ 15.62%	\$14,674
TOTAL DIRECT COSTS NOT SUBJECT TO INDIRECT	\$191,380
TOTAL	\$300,000

¹ Fringe Benefit costs are for employee health benefit, social security, Medicare tax, state unemployment, Life/AD&D insurance, LTD insurance, STD insurance, Employee Assistance Program, Workers Compensation, Retirement (401K), and fitness center. The fringe benefit costs per employee are essentially the same; the difference in percentage in fringe costs reflects the differences in hourly rates between employees and/or minor differences due to different Workers Compensation categories assigned to the various job titles.

Table 9.3 Recommended 5-Year Implementation Plan

	Recommendations	Responsible Department	Time Frame	Annual Budget and Staff Estimate
Administration and Planning	1. Adopt this ISWMP by a resolution which will include council approval to join TSWAN.	LNR, Planning, and LIBC	Year 1	No additional funding or staff necessary – LIBC Resolution
	2. Establish a Solid Waste Management Division (SWMD) within the Lummi Nation Planning and Public Works Department.	LNR, Planning, and LIBC	Year 1 and on-going	No additional funding or staff necessary – LIBC Resolution
	3. Hire a full-time Solid Waste Management Specialist (1 FTE) and a part-time (0.5 FTE) to coordinate solid waste management on the Reservation and the implementation and revisions of this plan.	LNR, Planning, and LHA	Year 1 and on-going	One FTE employee hired at the LIBC Salary and Wage Scale Grade 8 = \$72,000 (including fringe benefits and indirect charges); one 0.5 FTE hired at the LIBC Salary and Wage Scale Grade 5 = \$26,000 (including fringe benefits and indirect charges) or a total cost of \$98,000.
	4. Conduct a Lummi Reservation Solid Waste Characterization and Community Survey.	SWMD	Year 3 and on-going	No additional funding or staff necessary – part of work plan for the Solid Waste Management Specialist
	5. Solid Waste Management Staff training in solid waste management and recycling.	SWMD	On-going	\$2,500 annually
Regulations	1. Evaluate the existing Solid Waste Control and Disposal Code (LCL Title 18) and make changes to support the chosen alternatives from this plan if necessary.	SWMD, Lummi Planning Commission, Lummi Natural Resources Commission, and LIBC	Year 1	No additional funding or staff necessary
	2. Evaluate increased enforcement and fines for solid waste violations specifically illegal dumping and abandoned vehicles and mobile homes.	Planning, LWRD, Law and Order, and LIBC	Year 1 and ongoing	No additional funding or staff necessary

Table 9.3 Recommended 5-Year Implementation Plan

	Recommendations	Responsible Department	Time Frame	Annual Budget and Staff Estimate
Waste Collection	Implement Collection Alternative A3, voluntary curbside collection with a full LIBC subsidy.	SWMD	Year 1 and ongoing	\$129,181 per year
Waste Transfer and Disposal	Annual Community Clean-Up Event (Transfer and Disposal Alternative 1).	SWMD and LIBC	Year 1 and ongoing	\$62,198 per event
Illegal Dump Sites	1. Continue cleaning up illegal dumpsites, placing signs, and gating off heavily used dump locations.	SWMD	Ongoing	No additional funding or staff necessary. Conducted as part of Community Clean-Up Event; Coordination with Jail Alternatives program and Work Force Re-Entry Program.
	2. Organize annual beach cleanup and litter pickup events.	SWMD, LWRD, and Planning	Year 1 and ongoing	Cost covered by SWMD annual supplies budget of \$7,025.
	3. Provide community education and outreach on the potential environmental and health consequences of illegal dumping.	SWMD, LWRD, and Planning	Year 1 and ongoing	Cost covered by SWMD annual supplies budget of \$7,025.
Reduction, Reuse, and Recycling	1. Implement Recycling Alternative B-2 or B-3, Voluntary Curbside Collection by Contractor with LIBC subsidy.	SWMD	Year 2	Recycling service is included with MSW collection service: See estimates above.
	2. Conduct a waste audit for the Lummi Indian Business Council's facilities. Create and implement waste reduction and recycling policies for LIBC facilities.	SWMD	Year 1	No additional funding or staff necessary (coordination with SSC)
	3. Research possible solid waste prevention and reuse opportunities such as periodic "swap days".	SWMD	Year 2	No additional funding or staff necessary

Table 9.3 Recommended 5-Year Implementation Plan

	Recommendations	Responsible Department	Time Frame	Annual Budget and Staff Estimate
	4. Investigate local markets for recyclable materials.	SWMD	Year 4	No additional funding or staff necessary
Composting	1. Continue current self-haul system and voluntary subscription to collection service (Alternative A).	Individual home owners and businesses.	Ongoing	No additional funding or staff necessary
	2. Conduct community outreach about food waste reduction and composting and promote available yard waste collections sites.	SWMD	Year 2	No additional funding or staff necessary
	3. Provide FoodPlus! Recycling for all community events. Event organizers should be encouraged to use compostable plates and utensils for food service and ensure that compostables, recyclables, and trash are sorted properly	SWMD, event hosts	Year 1	No additional funding or staff necessary
	4. Provide information about the impacts of burning, mulching and composting alternatives and wastes inappropriate for burning (including trash).	SWMD, LHA, and LNR	Ongoing	No additional funding or staff necessary
	5. Offer Master Composter, Recycling, and worm bin design classes.	SWMD together with the Washington State University Whatcom County Extension, and NWIC	Year 5	Cost covered by SWMD annual supplies budget of \$7,025.
	6. Include yard waste collection as part of community clean-up events.	SWMD, LHA, and LNR	Year 1	No additional funding of staff necessary

Table 9.3 Recommended 5-Year Implementation Plan

	Recommendations	Responsible Department	Time Frame	Annual Budget and Staff Estimate
Special Waste Recommendations				
Agricultural Waste	LNR partners with the Whatcom Conservation District to assist on - Reservation farms and animal operations to create farm plans.	SWMD, LWRD, and Whatcom Conservation District	Year 5	No additional funding or staff necessary.
Biomedical Waste	Provide educational programs to promote safe handling and disposal of sharps and institute a collection program or provide containers at the clinic and all LIBC facilities.	SWMD, Lummi Clinic	Year 1	No additional funding or staff necessary.
Construction and Demolition Waste	1. Incorporate C&D waste recycling clauses into LIBC, NWIC, LHA, LCC, and LTSWD contracts to recycle or reuse as much C&D waste as possible (Alternative C).	SWMD, All LIBC Departments	Year 2 and ongoing	No additional funding or staff necessary.
	2. Conduct a public education campaign to promote C&D disposal and recycling opportunities in Whatcom County.	SWMD	Year 1	No additional funding or staff necessary
Biosolids	1. Reevaluate the biosolid land application site as connections to the sewer system continue to increase.	LTSWD	Year 5 and ongoing	May need contracted technical support
	2. Provide community education on the risks to human health and water quality from fecal waste.	SWMD, LTSWD	Year 1	No additional funding or staff necessary.
Vehicles and Boats	Improve the enforcement of LCL Title 18.05.030, conduct public education to raise awareness of the problems of storing non-operational vehicles, and publicize removal options.	SWMD, Law and Order	Year 1 and ongoing	No additional funding or staff necessary.
Scrap Tires	Promote ongoing, off-Reservation, tire collection and tire amnesty events and conduct public education on tire maintenance for source reduction.	SWMD	Ongoing	No additional funding or staff necessary

Table 9.3 Recommended 5-Year Implementation Plan

	Recommendations	Responsible Department	Time Frame	Annual Budget and Staff Estimate
Electronic Waste	Support the Washington State E-Cycle program including raising public awareness of disposal opportunities and holding an e-waste disposal event.	SWMD	Ongoing	No additional funding or staff necessary
Household Hazardous Waste	1. Encourage the community to use the Whatcom County Disposal of Toxics Facility (Alternative B).	SWMD	Ongoing	No additional funding or staff necessary
	2. Conduct periodic on-Reservation collection events in association with Community Clean-Up Events (Alternative C).	SWMD	Year 1 and ongoing	Negotiated with DoT and no additional staff necessary
Public Education and Outreach				
Community Education and Outreach	1. Publish an article in the <i>Squol Quol</i> each month and provide a quarterly solid waste management newsletter as a <i>Squol Quol</i> insert.	SWMD	Ongoing	No additional funding or staff necessary
	2. Create a Solid Waste Management Website	SWMD	Year 1 and ongoing	No additional funding or staff necessary
	3. Implement Zero Waste goals at community meal events and the First Salmon Ceremony and provide displays on solid waste management.	SWMD, SSC, Disposal of Toxics, E-Cycle	Year 2 and ongoing	No additional funding or staff necessary
	4. Provide community workshops and training sessions (e.g., a training session for community solid waste volunteers that would supervise litter or beach cleanup events or programs).	SWMD	Year 3 and ongoing	No additional funding or staff necessary Cost covered by SWMD annual supplies budget of \$7,025.
	5. Organize a Clean-yard and/or vehicle redemption contest.	SWMD	Year 5	No additional funding or staff necessary Cost covered by SWMD annual supplies budget of \$7,025.

Table 9.3 Recommended 5-Year Implementation Plan

	Recommendations	Responsible Department	Time Frame	Annual Budget and Staff Estimate
	6. Create an Assisted Solid Waste Clean-up Program to help elders and disabled tribal members with solid waste management.	SWMD	Year 4 and ongoing	No additional funding or staff necessary. Conduct as part of Community Clean-Up Event; Coordination with Jail Alternatives program or Work Force Re-Entry Program.
Youth Education and Outreach	1. Hold a Lummi Solid Waste Management Logo Contest.	SWMD and LNS	Year 1	No additional funding or staff necessary
	2. Hold two informal presentations during the school year based on the EPA K-6 curriculum.	SWMD and LNS	Year 2	No additional funding or staff necessary
	3. Lummi Waste Management Staff partners with RE-Sources for a Solid Waste Education Program targeted at specific solid waste concerns on the Reservation.	SWMD and LNS	Years 2-5	No additional funding or staff necessary
	4. Sponsor a recycled materials drive at the Lummi Nation School.	SWMD and LNS	Year 3	No additional funding or staff necessary
Government and Business Education and Outreach	Provide information on Sustainable Connections' Toward Zero Waste Program and the EnviroStars program to Reservation government and education institutions and businesses.	SWMD	Year 1	No additional funding or staff necessary
Funding Recommendations				
Grants	Identify opportunities, eligibility requirements, and funding cycles, and prepare applications for special projects as time and resources allow.	SWMD, Lummi Water Resources Manager	Ongoing	N/A
General Fund	Request allocations from the general fund to assist in establishing effective solid waste management on the Reservation.	Lummi Natural Resources Commission, Lummi Planning Commission, and LIBC	Ongoing	N/A

10. CONCLUSION

This Integrated Solid Waste Management Plan builds on the 1979 Lummi Solid Waste Management Plan (Harper-Owes 1979), the Lummi Solid Waste Control and Disposal Ordinance (LCL Title 18), Project Clean-Up, and past work by the Lummi Housing Authority, the Lummi Water Resources Division, and the Lummi Solid Waste Management Team. Solid waste management activities, including the status quo, were identified and evaluated against the goal and objectives of this plan. Alternatives were evaluated, and recommendations developed for municipal solid waste collection, transfer, and disposal; recycling; special and hazardous wastes; composting; and community education and outreach. The identified solid waste management problems, goals and objectives, and preferred alternatives were used to develop both a broad-scope 10-year action plan and a more detailed 5-year implementation plan for the Reservation.

As a result of this process, the key recommendations for designing and implementing a solid waste management system on the Lummi Indian Reservation that will protect public health and the environment are:

1. Adopt this plan by a Lummi Indian Business Council (LIBC) resolution that includes approval to join the Tribal Solid Waste Advisory Network (TSWAN). The TSWAN should be joined as soon as practicable to provide technical support from other tribal and solid waste management professionals during plan implementation and later plan updates.
2. Re-establish a Solid Waste Management Division within the Lummi Nation Planning and Public Works Department including:
 - a. Hiring a full time Solid Waste Management Specialist,
 - b. Hiring a part-time office assistant or re-allocating a portion of existing staff time to the re-established Solid Waste Management Division.
3. Fully subsidize weekly curbside solid waste and every other week recyclable collection or its equivalent (Solid Waste Collection Alternative A-3) in combination with an annual Community Clean-up Event (Transfer and Disposal Alternative 1).
4. Implement all of the Special Waste Recommendations presented in Table 6.3 and both encourage use of the existing Disposal of Toxics facility near the Bellingham Airport (Moderate Risk Waste Alternative B) and conduct an annual Community Clean-Up event (Transfer and Disposal Alternative 1) that includes collection and disposal of moderate risk wastes (Moderate Risk Waste Alternative C).
5. Implement a public education and outreach program that will inform the community on solid waste management and recycling on the Reservation following the recommendations presented in Section 8.2 and listed in Table 8.1.
6. Coordinate solid waste management with other jurisdictions as appropriate.

7. Pursue funding to implement the solid waste management alternatives described in the approved Integrated Solid Waste Management Plan.

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12. GLOSSARY

Animal Waste: solid and semi-solid animal excrement and animal carcasses.

Agriculture: activity related to the production of horticultural, silvicultural, viticultural, floricultural, dairy, apiary, vegetable, or animal products; or of berries, grain, hay, straw, turf, seed, Christmas trees, hybrid poplar trees, or livestock.

Asbestos Waste: material containing more than one percent asbestos by weight and that can be crumbled, pulverized, or reduced to powder by hand pressure when dry.

Baler: this technology compresses waste into high density, self-contained units (bales) of either waste or recyclables.

Beyond Waste Plan: the main message behind the State of Washington Solid Waste Management Plan. The Plan focuses on achieving a State where waste is viewed as inefficient and toxic substances have been eliminated. The Beyond Waste Plan lays out key initiatives to address as the state moves in the direction of Beyond Waste. These initiatives are:

1. Moving toward Beyond Waste with industries.
2. Reducing small-volume hazardous materials and wastes.
3. Increasing recycling for organic materials.
4. Make green building practices mainstream.
5. Measuring progress toward Beyond Waste.

Biomedical Waste: infectious and injurious waste originating from a medical, veterinary, or intermediate care facility, or from home use.

Biosolids: includes sludge from the treatment of sewage at a wastewater treatment plant and semisolid waste pumped from a septic system, which has been treated to meet standards for beneficial use.

Bulk Waste: includes, but is not limited to, construction and demolition debris; discarded residential, commercial and industrial appliances, equipment and furniture; trees and stumps; vehicle parts and tires; and other oversized wastes whose large size precludes or complicates their handling by normal solid waste collection and disposal methods.

Buy-Back Recycling Center: a facility that pays people for recyclable materials.

Commercial: activities of, in, or relating to commerce and/or activities related to a business, profession, or other endeavor having financial gain as an object.

Commercial Solid Waste: solid waste generated by non-industrial businesses. This includes waste from business activities such as construction; transportation, communications

and utilities; wholesale trades; retail trades; finance, insurance and real estate; other services; and government. This term is also used to refer to all waste except residential or all waste that is collected using dumpsters.

Co-Mingled: recyclable materials that have been collected separately from garbage by the generator, but the recyclable materials have been mixed together in the same container.

Composting: the controlled biological decomposition of organic wastes to produce a humus-like final product that can be used as a soil amendment. In this ISWMP, backyard composting means a small-scale activity performed by homeowners on their own property, using yard debris that they generate. Centralized composting refers to either drop-off or processing locations operated by a municipality or a business.

Construction and Demolition Debris (C&D): the waste material that results from construction, demolition and land clearing, largely comprised of inert and organic material. Consists of, but is not limited to the following materials: wood waste, concrete, asphalt, gypsum wallboard, glass and scrap metal.

Corrugated Cardboard: recyclable kraft liner cartons with corrugated inner liners, as typically used to ship materials. This generally does not include waxed cardboard or paperboard (cereal boxes, microwave, and similar food boxes, etc.), but kraft grocery bags are included.

Curbside Recycling: the act of collecting recyclable materials directly from residential generators, usually after the recyclable materials have been placed at the curb (or at the side of the street if no curb exists in the area) by the residents.

Disease Vector (Vector): a carrier that is capable of transmitting a pathogen from one organism to another.

Drop Box Facility or Convenience Center: small transfer facilities used in low-volume or rural settings. These low –technology options often use roll off boxes with an inclined ramp for cars and pickups. Bins can be included for recyclables that are source-separated.

Electronic Waste (E-Waste): waste products produced as a result of spent, unusable or unwanted electronics. Examples of these products include computer monitors, televisions, cell phones, and desktop or laptop computers.

Ferrous Metals: materials that are predominantly (over 75% by weight) made of iron. Includes cans and various iron and steel alloys that contain enough iron such that magnets adhere to them. For recycling purposes this generally does not include paint cans or other containers that may contain hazardous residues.

Food Waste: the organic residue generated by the handling, storage, sale, preparation, cooking, and serving of foods; commonly called garbage.

Franchise: a franchise to operate a waste or solid waste disposal site or resource recovery facility or collection service, including collection, transfer and transport issued by the Lummi Indian Business Council pursuant to LCL Title 18.

Grasscycling: a lawn maintenance practice of a homeowner mowing the lawn and leaving the grass clippings where they fall and allowing the clippings to decompose.

Ground Water: water that exists beneath the earth surface or beneath any surface water body, regardless of geological formation or structure in which such water stands, flows, percolates, or otherwise moves.

Hazardous Waste: a waste or combination of wastes as identified in 40 CFR 261.3.

Health Officer: the Lummi Nation Tribal Health Officer or his authorized representative.

Household Hazardous Waste (HHW): wastes that are classified as hazardous due to their nature or characteristics, generated in small amounts in households. Includes aerosol cans, solvents, some paints, cleaners, pesticides, herbicides, compressed gases, oil, other petroleum products, car batteries and other materials.

Incineration: reducing the volume of solid wastes by use of an enclosed device using controlled flame combustion.

Industrial Waste: waste or solid waste resulting from any process of industry or manufacturing or from the development or recovery of any natural resources.

Inert Wastes: includes wastes that are inert in nature, such as glass, concrete, rocks, gravel, and bricks.

Infectious Waste: includes cultures and stocks of infectious agents and any discarded materials those agents come into contact with; contaminated sharps (i.e., equipment that may cause punctures or cuts); pathological waste, human blood, and blood products; surgical wastes; and other waste identified by the Health Officer as infectious waste.

Landfill: a disposal site operated by means of compacting and covering waste or solid waste at specifically designated intervals.

Leachate: water or other liquid within a solid waste handling unit that has been contaminated by dissolved or suspended materials due to contact with solid waste or gases.

Lummi Indian Reservation (Reservation): means all lands within the boundaries of the Lummi Indian Reservation, including, but not limited to: (1) all lands within the territorial boundaries of the Lummi Indian Reservation as established by the Treaty of Point Elliott of January 22, 1855 and by the Executive Order of November 11, 1873, and such other lands as may thereafter be added thereto or made a part thereof; (2) all other trust, restricted or tribally-owned lands, regardless of whether they have been formally added to or made part of the Reservation; and (3) all tidelands landward of the extreme lower low water line.

Moderate Risk Wastes (MRW): household hazardous waste and wastes produced by businesses that meet the definition of a hazardous wastes but the amount of waste produced falls below regulatory limits. To be a small quantity generator of MRW, the business or facility may not generate more than the following amount of waste per month or batch:

- 220 pounds (100 kilogram; equal to approximately 25 gallons of liquid) of most dangerous wastes (used products such as paint, fuels, inks and toners, certain solvents and photographic chemicals), or
- 2.2 pounds (1 kilogram; equal to approximately 1 quart of liquid) of extremely hazardous waste (certain original unused products such as mercury, cyanides, certain pesticides and chlorinated solvents with greater than 1 percent chloride).

Or store more than:

- 2,200 pounds (1,000 kilograms; equal to approximately 250 gallons of liquid) of most dangerous wastes (used products), or
- 2.2 pounds (1 kilogram; equal to approximately 1 quart of liquid) of extremely hazardous wastes.

Municipal Solid Waste (MSW): any garbage, rubbish, and other discarded solid material from residential area. This does not include industrial, hazardous, or construction waste.

Mulching: leaving grass clippings on the lawn when mowing; and placing yard debris, compost, wood chips or other materials on the ground in gardens or around trees and shrubs to discourage weeds and retain moisture.

Non-Ferrous Metals: materials predominantly made of copper, lead, brass, tin, aluminum, and other metals except iron.

Paper Waste: solid wastes including newspaper, cardboard, and other paper products.

Person: An individual, firm, corporation, association, partnership, government agency, industry, or any other entity whatsoever.

Public Education: a broad effort to present and distribute public information materials.

Public Information: the development and distribution of educational materials for the public, including brochures, videos, and public service announcements.

Recycling: the act of collecting and/or processing source-separated materials in order to return them to a usage similar in nature to their previous use.

Recycling Bins: small household containers used to set out materials for curbside collection.

Residential Solid Waste: wastes generated by the normal activities of households, including but not limited to, food wastes, rubbish, ashes, and bulk waste.

Reusable Items: items that may be reused (or easily repaired), including things such as small electronic goods, household items such as dishes, and furniture.

Rubbish: a general term for solid waste excluding food wastes and ashes, taken from residences, commercial establishments and institutions.

Self-Haul Waste: waste that is brought to a landfill or transfer station by the person (residential self-haul) or company (non-residential or commercial self-haul) that created the waste.

Solid Waste: any garbage, rubbish, and other discarded solid material, including material resulting from industrial, commercial, construction, demolition, and agricultural operations; does not include solid or dissolved materials in domestic sewage.

Source Reduction: see “waste reduction”

Special Wastes: wastes that have particular characteristics such that they present special handling and/or disposal problems.

Surface Water: means any or all water originating from precipitation or ground water discharge that is found at the surface of the earth primarily in rivers, stream, springs, seeps, ponds, wetlands, lakes, and storm water drainage facilities.

Transfer Station: a permanent, fixed, supplemental collection and transportation facility used by persons and route collection vehicles to deposit collected solid waste from offsite into a larger transfer vehicle for transport to a solid waste handling facility.

Toter®: a wheeled, rollout cart (20-96 gallons) used for curbside automated waste and recycling collection by cities and private waste haulers

Waste Audit: a formal, structured process used to quantify the amount and types of waste being generated by an organization.

Waste Reduction or Waste Prevention: reducing the amount or type of solid waste that is generated.

Waste Characterization: the composition and ratio of materials in the total waste stream. Also sometimes referred to as a “waste audit”.

Wood Waste: Solid waste consisting of wood pieces or particles generated as a byproduct or waste from the manufacturing of wood products, construction, demolition, handling and storage of raw materials, trees and stumps. This includes, but is not limited to sawdust, chips, shavings, bark, pulp, hogged fuel and log sort yard waste, but does not include wood pieces or particles containing paint, laminates, bonding agents or chemical preservatives such as creosote, pentachlorophenol or copper-chrome-arsenate.

Vehicle: any car, truck, motorcycle, other wheeled machine, or boat that was designed to be, or which at one time was, self propelled or towed or in the case of boats, propelled by mechanical, natural, or human force and which was capable of being operated over land, a roadway, or water.

Yard debris: plant material commonly created in the course of maintaining yards and gardens and through horticulture, gardening, landscaping, or similar activities. Yard debris includes, but is not limited to, grass clippings, leaves, branches, brush, weeds, flowers, roots, windfall fruit, and vegetable garden debris.

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13. ACRONYMS AND ABBREVIATIONS

Programs, Terms, Agencies, and Organizations:	
BIA	Bureau of Indian Affairs
C&D	Construction and Demolition
CERCLA	Comprehensive Environmental Response, Compensation and Liability Act
CFC	Chlorofluorocarbon
CFR	Code of Federal Regulations
Corps	U.S. Army Corps of Engineers
County	Whatcom County
CWA	Clean Water Act
DoD	Department of Defense
DOH	Washington State Department of Health
DoT	Whatcom County Disposal of Toxics Facility
Ecology	Washington State Department of Ecology
EPA	Environmental Protection Agency
FEMA	Federal Emergency Management Agency
GIS	Geographic Information System
HHW	Household Hazardous Waste
IHS	Indian Health Service
ISWMP	Integrated Solid Waste Management Plan
LCC	Lummi Commercial Company
LCL	Lummi Code of Laws
LIBC	Lummi Indian Business Council
LNS	Lummi Nation School
LNR	Lummi Natural Resources
LSWMT	Lummi Solid Waste Management Team
LTSWD	Lummi Tribal Sewer and Water District
LWRD	Lummi Water Resources Division
MBR	Membrane Bioreactor
MRW	Moderate-Risk Waste
MSL	Mean Sea Level
MSW	Municipal Solid Waste
NEI	Northwest Economics, Inc.
NWIC	Northwest Indian College
PAYT	Pay-as-you-throw
PCB	Polychlorinated Biphenyl
Planning	Lummi Planning Department
RCRA	Resource Conservation and Recovery Act
RCW	Revised Code of Washington
RDS	Regional Disposal Services, Inc.
Reservation	Lummi Indian Reservation
SQG	Small-Quantity Generator
<i>Squol Quol</i>	Lummi Nation Newspaper
SWMP	Storm Water Management Plan
TAS	Treatment as a State
TRC	Technical Review Committee
TSWAN	Tribal Solid Waste Advisory Network
USDA	United State Department of Agriculture
USGS	United States Geologic Survey
WAC	Washington Administrative Code
WCD	Whatcom Conservation District
WWU	Western Washington University

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APPENDIX A

FEDERAL GUIDANCE DOCUMENTS RELATING TO SOLID WASTE MANAGEMENT ISSUES FOR TRIBAL RESERVATIONS

Table A-1. Federal Laws Relating to Solid Waste Management Issues on Tribal Reservations.

Guidance Document	Description of Document	Affects on Tribes
Federal Laws	Federal Laws can be found on the following website: http://www.epa.gov ; click on Laws and Regulation; and click on Major Environmental Laws	
Resource Conservation and Recovery Act (RCRA) 42 U.S.C. §6901 et seq.	<p>Enacted in 1976, RCRA is the primary federal law governing solid waste management.</p> <ul style="list-style-type: none"> • RCRA addresses the issue of managing and disposing of municipal and industrial waste nationwide. • RCRA establishes federal programs to regulate and manage treatment, storage, transport, and disposal of non-hazardous waste • Municipal solid waste (MSW) is regulated under RCRA Subtitle D, which authorizes the EPA to provide technical standards and requirements for solid waste management facilities. • Hazardous Waste is regulated under RCRA Subtitle C, which authorizes the EPA to regulate hazardous waste generation, transportation, treatment, storage, and disposal and the requirements and procedures to authorize states to administer the RCRA program <p>Under Sections 2002, 4004, and 4010 of RCRA, the EPA has the authority to promulgate site-specific rules concerning municipal solid waste landfill (MSWLF) criteria, including small landfill exemptions</p>	<p>RCRA applies to all tribal reservations, including ones with established landfills on-site. Tribes may also be held liable for RCRA violations for hazardous waste sites on reservation lands.</p> <p>Owners/operators of landfills on tribal reservations can request design and operating flexibility in states with EPA-approved MSWLF permitting programs.</p>
Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) 42 U.S.C. §9601 et seq.	<p>Congress enacted CERCLA, also known as the Superfund, in 1980. CERCLA provides a broad federal authority to respond directly to releases or threatened releases of hazardous substances that may endanger public health or the environment.</p> <ul style="list-style-type: none"> • CERCLA establishes a ban on, and select requirements concerning, closed and abandoned hazardous waste sites, provides for liability of persons responsible for releases of hazardous waste at these sites, and establishes a trust fund to provide for cleanup when no responsible party can be identified. 	<p>Tribal lands that have illegal dumping and hazardous materials disposed of in their municipal solid waste stream can be subject to potential CERCLA risks.</p>

Table A-1. Federal Laws Relating to Solid Waste Management Issues on Tribal Reservations.

Guidance Document	Description of Document	Affects on Tribes
<p>Solid Waste Management practices that directly or indirectly impact groundwater, surface water, and air resources on Tribal lands also can be subject to federal regulatory requirements. In addition to a tribe's inherent regulatory authority, certain federal regulatory programs, including the Clean Water Act, the Clean Air Act, and the Safe Drinking Water Act are also applicable to tribes.</p>		
<p>Clean Water Act (CWA) 33 U.S.C. §1251 et seq.</p>	<p>Initially, the CWA was enacted in 1948 and was called the Federal Water Pollution Control Act, but the Act was significantly reorganized and expanded in 1972. The Clean Water Act (CWA) establishes the basic structure for regulating discharges of pollutants into the waters of the United States and regulating quality standards for surface waters.</p> <ul style="list-style-type: none"> • The CWA gives the EPA the authority to implement pollution control programs such as setting wastewater standards for industry, and has requirements to set water quality standards for all contaminants in surface waters. • The CWA makes it unlawful for any person to discharge any pollutant from a point source into navigable waters, unless a permit was obtained under its provisions. 	<p>Tribes may obtain "treatment as a state" (TAS) status under the CWA; a tribe must meet criteria reflecting its ability to effectively implement the program.</p>
<p>Clean Air Act (CAA) 42 U.S.C. §7401 et seq.</p>	<p>The CAA is the comprehensive federal law that regulates air emissions from stationary and mobile sources.</p> <ul style="list-style-type: none"> • The CAA gives authority to the EPA for setting limits on how much of a pollutant can be in the air anywhere in the United States. This ensures that all Americans have the same basic health and environmental protections. • The law allows individual states to have stronger pollution controls, and to take the lead in carrying out the CAA, because pollution control problems often require special understanding of local industries, geography, housing patterns, etc. 	<p>Tribes have limited powers under the CAA. The EPA allows tribes to regulate indirect emissions from sources near the reservation. Tribes having landfills should be concerned with methane emissions. Reservations in the Pacific Northwest (Idaho, Oregon, and Washington) as of June 7, 2007 are subject to the Federal Air Rules for Indian Reservations in Idaho, Oregon, and Washington (FARR). FARR is a set of basic air quality regulations established under the CAA to protect health and welfare on Indian reservations in the Pacific Northwest.</p>

<p>Safe Drinking Water Act (SDWA) 42 U.S.C. §300f et seq.</p>	<p>Congress originally passed the SDWA in 1974 to protect public health by regulating the quality of the public drinking water supply in the United States.</p> <ul style="list-style-type: none">• Amended in 1986 and 1996; requires many procedures to protect drinking water and its sources: rivers, lakes, reservoirs, springs, and ground water wells.• The SDWA authorizes the EPA to set national health-based standards for drinking water to protect against both naturally occurring and man-made contaminants that may impact drinking water quality.	<p>Tribes may obtain “treatment as a state” (TAS) status under the SDWA, a tribe must meet criteria reflecting its ability to effectively implement the program.</p>
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Table A-2. Federal Regulations and Legislation Relating to Solid Waste Management Issues on Tribal Reservations.

Guidance Document	Description of Document	Affects on Tribes
Federal Regulations	Federal regulations can be found at: http://www.epa.gov ; select “Laws, Regulations & Dockets” and then select “Code of Federal Regulations”. CFR Title 40 Protection of the Environment.	
40 CFR 243: Guidelines for the Storage & Collection of Residential, Commercial, & Institutional Solid Waste	Applicable to the collection of residential, commercial, and institutional solid wastes and street wastes. <ul style="list-style-type: none"> • Recommended for state, interstate, regional, and local governments for use in their activities. • Outlines minimum levels of performance required of solid waste collection operations, including solid waste collection containers, types of collection vehicles and associated safety precautions, and frequency of collection, and frequency of collection to inhibit the propagation or attraction of disease vectors and the creation of nuisances. 	Tribes should follow guidelines for the storage of solid wastes to avoid health concerns created by animals and unsanitary conditions.
40 CFR 257: Criteria for Classification of Solid Waste Disposal Facilities and Practices	Establishes regulatory standards to satisfy the minimum national performance criteria for sanitary landfills. <ul style="list-style-type: none"> • Establishes standards for determining whether solid waste disposal facilities and practices may pose adverse effects on human health and the environment. • Governs only those solid waste disposal facilities that do not meet the definition of a MSWLF. 	Tribal facilities failing to satisfy the criteria in CFR 257 are considered “open dumps”, which are prohibited under Section 4005 of the RCRA.
40 CFR 258: Criteria for Municipal Solid Waste Landfills	Establishes minimum national criteria under RCRA for protecting human health and the environment, while allowing states/tribes to develop more flexible MSWLF. <ul style="list-style-type: none"> • Applies to owners and operators of new MSWLF units, existing MSWLF units, and lateral expansions, except otherwise noted. Subparts D and E exempt certain landfills (Exemptions for Small Landfills) if they meet the following criteria. To qualify for this exemption, a private or municipal landfill must: <ul style="list-style-type: none"> • Receive less than 20 tons of waste per day (averaged yearly), receive less than 25 inches of rainfall per year, and have no other practical waste disposal alternative; • Have no evidence of ground-water contamination from the landfill; • Be considered an extremely remote community that has no ready access to other disposal sites for an extended period of time. 	Indian tribes can maintain lead roles in implementing and enforcing the revised MSWLF criteria through approved state/Tribal permit programs.

Table A-2. Federal Regulations and Legislation Relating to Solid Waste Management Issues on Tribal Reservations.

Guidance Document	Description of Document	Affects on Tribes
<p>40 CFR Parts 260 –271 Hazardous Waste Management Guidelines</p>	<p>Sets rules and identifies solid wastes which are subject to regulation as hazardous wastes and which are subject to the notification requirements in RCRA. Parts 260-271 includes:</p> <ul style="list-style-type: none"> • Criteria for identifying the characteristics of hazardous waste. • A list of hazardous wastes. • Standards for generators and persons transporting hazardous wastes. • Minimum national standards for acceptable management practices for owners and operators of all facilities that treat, store, or dispose of hazardous waste. 	<p>In addition to RCRA violations, tribes may also be held liable for 40 CFR Parts 260-271 violations for hazardous waste sites and storage on reservation lands.</p>
<p>40 CFR Part 273: Standards for Universal Waste Management</p>	<p>Establishes standards for the management of universal wastes (batteries, pesticides, thermostats, and lamps).</p> <ul style="list-style-type: none"> • Reduces the regulatory management requirements • Fosters environmentally sound recycling 	<p>Tribes generating universal wastes should comply with storage requirements, but may recycle the material instead of disposing.</p>
<p>40 CFR Part 279: Standards for the Management of Used Oil</p>	<p>Establishes standards for the generation, transportation, reuse, recycling and disposal of used oil.</p>	<p>Tribes generating used oil should comply with storage requirements, but may recycle the material instead of disposing it.</p>
<p>Other Legislation</p>		
<p>Public Law 103-399</p>	<p>Identifies the location of open dumps on Indian lands.</p> <ul style="list-style-type: none"> • Assesses the relative health and environment hazards posed by those sites • Provides financial and technical assistance to Indian Tribal governments to close open dumps in compliance with federal standards and regulations or standards promulgated by the Indian Tribal governments or Alaska Native entities. <p>For further information, go to: http://www.ihs.gov</p>	
<p>Executive Order 13175 Consultation and Coordination with Indian Tribal Governments November 9, 2000.</p>	<p>Executive Order (EO) 13175 establishes a working relationship with Indian Tribal governments for the development of regulatory practices on Federal matters that have great impact on their communities.</p> <ul style="list-style-type: none"> • Reduces the burden of unfunded mandates upon Indian tribal governments and simplifies the process of waivers to Indian Tribal governments. <p>For further information, go to: http://www.epa.gov/fedrgstr/eo/eo13175.htm.</p>	

APPENDIX B

WASHINGTON STATE GUIDANCE DOCUMENTS RELATING TO SOLID WASTE MANAGEMENT

Table B-1. Washington State Laws Relating to Solid Waste Management.

Guidance Document	Description of Document
Washington Administrative Code (WAC)	To access the State of Washington's Rules administered by the Department of Ecology, go to: http://www.ecy.wa.gov/laws-rules/ecywac.html .
Chapter 173–300 WAC: Certification of Operators of Solid Waste Incinerators and Landfill Facilities	Guidelines for certification of solid waste landfill operators and for the operation and maintenance of the facility.
Chapter 173–304 WAC: Minimum Functional Standard for Solid Waste Handling	Regulations to protect public health, to prevent land, air, and water pollution, and to conserve the state's natural, economic, and energy resources <ul style="list-style-type: none"> • Sets minimum functional performance standards for the proper handling of all solid waste materials originating from residences, commercial, agricultural and industrial operations and other sources.
Chapters 173–312, 313, 321, and 322 WAC: Solid Waste Grants and Funding	Provide grants and funding to local governments for hazardous waste and solid waste management.
Chapter 173–331 WAC: Vehicle Battery Recycling	Establishes procedures for implementation and enforcement of the waste reduction law. <ul style="list-style-type: none"> • Addresses recycling of used vehicle batteries through a system of exchanging batteries at the point of sale.
Chapter 173-340 WAC: Model Toxics Control Act	Assigns responsibilities and provides funding for cleaning up hazardous waste disposal sites in Washington.
Chapter 173–345 WAC: Recyclable Materials – Transporter and Facility Requirements	Establishes minimum standards for the transportation of recyclable materials and reporting standards for recycling facilities and material recovery facilities (MRFs) <ul style="list-style-type: none"> • Ensures that recyclable materials are not delivered for disposal • Establishes penalties for violations of this code.
Chapter 173–350 WAC: Solid Waste Handling Standards	Sets minimum functional performance standards for the proper handling, on-site storage, collection and transportation, and disposal of solid waste originating from residences, commercial, agricultural and industrial operations and other sources. <ul style="list-style-type: none"> • Includes operational standards for composting and moderate risk waste facilities.
Chapter 173–351 WAC: Criteria for Municipal Solid Waste Landfills	Establishes minimum statewide standards for all municipal solid waste landfill (MSWLF) units.
Chapter 173–900 WAC: Electronic Product Recycling Program	Implements the Electronic Product Recycling Act, chapter 70.95N RCW <ul style="list-style-type: none"> • Requires the state to establish a convenient, safe, and environmentally sound system for the collection, transportation, and recycling of covered electronic products (CEPs).

Table B-2. Washington State Regulations Relating to Solid Waste Management.

Guidance Document	Description of Document
Revised Code of Washington (RCW)	To access the State of Washington's Revised Code administered by the Department of Ecology, go to: http://www.ecy.wa.gov/laws-rules/ecyrcw.html .
Chapter 36.58 RCW: Solid Waste Disposal	Establishment of regulations for obtaining authorization to locate solid waste disposal sites (including transfer stations), funding mechanisms on solid waste disposal fees, and the establishment of solid waste disposal districts
Chapter 70.93 RCW: Waste Reduction, Recycling and Model Litter Control Act	<p>Establishment of the Department of Ecology as the authority to regulate litter control, increasing waste reduction, and motivation of all recycling components throughout the state.</p> <ul style="list-style-type: none"> • It is a violation of this section to abandon a junk vehicle upon any property. • It is a violation of this section for anyone to throw, drop, deposit, discard, or otherwise dispose of litter upon any public/private property and in the waters of the state. • Requires the operator of a vehicle transporting solid waste to a staffed transfer station or landfill to secure or cover the vehicle's waste in a manner that will prevent spillage.
Chapter 70.95C RCW: Waste Reduction	Implementation of the highest waste management priority for the most cost-effective and environmentally sound manner of reducing the generation of waste.
Chapter 70.95M RCW: Mercury Education and Reduction Act	As of January 1, 2006, made the sale of most items that contain mercury, including thermometers, manometers, toys, games, and jewelry in Washington State illegal.
Chapter 70.95N RCW: Electronic Product Recycling	<p>Establishment of a convenient, safe, and environmentally sound system for the collection, transportation, and recycling of covered electronic products.</p> <ul style="list-style-type: none"> • Encourages the design of electronic products that are less toxic and more recyclable. • Requires electronic manufactures to finance the collection, transportation and recycling system of covered electronic products
Chapter 70.95I RCW: Used Oil Recycling	<p>Establishment of used oil recycling regulations and guidelines, including:</p> <ul style="list-style-type: none"> • Goals for household used oil recycling • Violations against anyone disposing of used oil improperly
Chapter 70.105 RCW: Hazardous Waste Management Act	<p>Establishment of requirements for state and local hazardous waste management.</p> <ul style="list-style-type: none"> • Rules for hazardous waste generation and handling • Criteria for citing hazardous waste management facilities and local zoning designations that permit hazardous waste management facilities • Criteria required in state and local hazardous waste management plans

APPENDIX C

WHATCOM COUNTY CODE – PERTINENT SOLID WASTE MANGEMENT SECTIONS

Solid Waste Advisory Committee	WCC 2.78
Solid Waste and Residential Recycling Collection	WCC 8.10
Solid Waste Recycling and Collection District	WCC 8.11
Solid Waste Disposal	WCC 8.12
Solid Waste Disposal District	WCC 8.13
Garbage Pass-through Fee	WCC 8.14
Solid Waste Disposal Sites	WCC 8.15

APPENDIX D

SOLID WASTE CONTROL AND DISPOSAL CODE LUMMI CODE OF LAWS TITLE 18



Digitally signed by Code Reviser
DN: cn=Code Reviser, o=Lummi
Nation, ou=Office of the
Reservation Attorney,
email=davidn@lummi-nsn.gov,
c=US
Reason: I attest to the accuracy
and integrity of this document
Date: 2008.06.26 14:40:39 -07'00'

TITLE 18
LUMMI NATION CODE OF LAWS
SOLID WASTE CONTROL AND DISPOSAL CODE

Enacted: Resolution 2004-013 (1/19/04)

**TITLE 18
LUMMI NATION CODE OF LAWS
SOLID WASTE CONTROL AND DISPOSAL CODE**

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TITLE 18
LUMMI NATION CODE OF LAWS
SOLID WASTE CONTROL AND DISPOSAL CODE

Chapter 18.01 Purpose and Scope

18.01.010 Purpose

This Title is adopted to protect the health, safety, and welfare of all the residents of the Lummi Indian Reservation (“Reservation”) and to respond to the need for proper control and disposal of solid wastes on the Reservation. This Title provides the policy framework and delegation of administrative authority for a coordinated program to address the accumulation, collection, and disposal of solid waste; the resource recovery, recycling, and utilization of recyclable materials; and the creation and operation of disposal sites and transfer stations.

18.01.020 Scope

Solid wastes covered under this Title include bulk wastes, industrial wastes, infectious wastes, hazardous wastes, food wastes, animal wastes, yard wastes, paper wastes, recyclables, and asbestos. Sewage and septic systems are not included in the scope of this Title.

Chapter 18.02 Definitions

18.02.010 General Interpretive Rules

For the purpose of this Title, words used in the present tense include the future; the singular number includes the plural; the masculine form includes the feminine; the word “shall” is mandatory and not permissive; and the term “this Title” shall be deemed to include all amendments hereafter made to this Title. Unless specifically defined below, words or phrases used in this Title shall be interpreted so as to give them the meaning they have in common usage and to give this Title its most reasonable application.

18.02.020 Definitions

As used in this Title, each of the following terms shall have its corresponding meaning:

Animal waste: solid and semi-solid animal excrement and animal carcasses.

Asbestos waste: material containing more than 1 percent asbestos by weight and that, by hand pressure, can be crumbled, pulverized, or reduced to powder when dry.

Bulk waste: includes, but is not limited to, construction and demolition debris; discarded residential, commercial and industrial appliances, equipment and furniture; trees and stumps; vehicle parts and tires; and other oversized wastes whose large size precludes or complicates their handling by normal solid waste collection and disposal methods.

Commercial: activities of, in, or, relating to commerce and/or activities related to a business, profession, or other endeavor having financial gain as an object.

Composting: the controlled degradation of organic solid waste, yielding a product for use as a soil conditioner,

Food waste: the organic residue generated by the handling, storage, sale, preparation, cooking and serving of foods, commonly called garbage.

Franchise: A franchise to operate a waste or solid waste disposal site or resource recovery facility or collection service, including collection, transfer and transport, issued by the Lummi Indian Business Council pursuant to this Title.

Hazardous waste: A waste or combination of wastes as identified in 40 CFR 261.3.

Health officer: the Lummi Nation Tribal Health Officer or his authorized representative.

Industrial waste: waste or solid waste resulting from any process of industry or manufacturing or from the development or recovery of any natural resources.

Infectious waste: includes cultures and stocks of infectious agents and any discarded materials those agents come into contact with;

contaminated sharps (i.e., equipment that may cause punctures or cuts); pathological waste; human blood and blood products; surgical wastes; and other waste identified by the Health Officer as infectious waste.

Landfill: A disposal site operated by means of compacting and covering waste or solid waste at specifically designated intervals.

Paper waste: solid wastes including newspaper, cardboard, and other paper products.

Person: An individual, firm, corporation, association, partnership, government agency, industry, or any other entity whatsoever.

Residential solid waste: wastes generated by the normal activities of households, including, but not limited to, food wastes, rubbish, ashes and bulk wastes.

Rubbish: a general term for solid waste, excluding food wastes and ashes, taken from residences, commercial establishments and institutions.

Solid waste: any garbage, rubbish, and other discarded solid materials, including materials resulting from industrial, commercial, construction, demolition and agricultural operations, but does not include solid or dissolved materials in domestic sewage.

Transfer station: a site at which solid wastes are concentrated for transport to a processing facility or land disposal site. A transfer station may be fixed or mobile.

Vector: a carrier that is capable of transmitting a pathogen from one organism to another.

Chapter 18.03 Administration and Authority

18.03.010 Health Officer

The Health Officer has authority to conduct inspections to determine whether the requirements of this ordinance are being fulfilled, to declare an area a health and safety hazard, and to remove or abate nuisances as defined herein. The Health officer may bring

actions in Lummi Tribal Court to enforce the provisions of this Title. The Lummi Indian Business Council shall designate the Health Officer by resolution.

Chapter 18.04 Prohibited Acts

18.04.010 Unlawful Dumping

Except as permitted by this Title, it shall be unlawful for any person to dump, or deposit, or permit the dumping or depositing of any solid waste onto or under the surface of the ground or into the water. Nothing herein shall prohibit a person from dumping or depositing agricultural waste resulting from his own activities onto or under the surface of ground owned or leased by him when such action does not violate any section of the Lummi Nation Code of Laws, regulations adopted there under, or applicable Federal regulation, or create a nuisance.

(a) Whenever solid waste, disposed in violation of this ordinance, contains three or more items bearing the name or address or other identifying information of one person or members of one household, it shall be presumed that the person or household whose identifying information appears on such items generated and unlawfully disposed of the waste.

(b) When the Health Officer investigates a case of unlawful dumping on lands owned by the Tribe and finds inadequate identifying evidence in the solid waste, the Tribe shall bear responsibility for removal and proper disposal of the solid waste. For cases involving all other lands, the Health Officer may order the property owner or person in possession of the property to remove said solid waste and dispose of it at an appropriate permitted facility. Failure of the property owner or person in possession of the property to remove the waste is a violation of this Title subject to enforcement under Chapter 18.07 of this Title.

18.04.020 Accumulation of Solid Waste Prohibited

Except as provided in this Title, no person shall accumulate, store, collect, maintain, or display on private property, waste or solid

waste that is offensive or hazardous to the health and safety of Reservation residents or that creates offensive odors, a condition of unsightliness, or is likely to attract or harbor vectors. Storage, collection, maintenance or display of wastes or solid wastes in violation of this section shall be considered to be a public nuisance and shall be subject to enforcement under Chapter 18.06 of this Title. Bulk waste including, but not limited to; appliances, vehicle parts, building demolition wastes, industrial wood wastes, land clearing debris, discarded furniture and bedding or scrap metals shall not be accumulated or stored in a visible location for more than 30 days. Bulk waste shall not be accumulated or stored in a manner that creates offensive odors or is likely to attract or harbor vectors. Residential solid waste, debris or garbage shall not be accumulated or stored more than fourteen days.

18.04.030 Burning

Open burning of solid or liquid waste is prohibited with the following exceptions:

- (a) ceremonial burnings, which may occur at any time without a permit; and
- (b) burning of household paper and cardboard garbage only in a burn barrel with a wire mesh cover; and
- (c) after a burning permit has been issued, the infrequent burning of agricultural wastes, uncontaminated combustible construction waste and slash from forest clearing or harvest operations. Property owners intending to burn such wastes must first obtain a permit to do so from the Health Officer. The permit shall identify the date and location for the permitted burn, as well as the type and approximate volume of waste to be burned.

18.04.040 Landfills Prohibited

Operation or construction of a landfill within the reservation shall be prohibited unless licensed pursuant to standards adopted by the Lummi Indian Business Council and consistent with applicable federal law.

Chapter 18.05 Collection, Storage, Transportation, and Disposal of Waste

18.05.010 Application of Federal Guidelines

Where not in conflict with specific provisions of this Title, the guidelines of 40 CFR 243, as amended from time to time, shall apply to the collection, storage, transportation and disposal of solid waste.

18.05.020 Infectious Waste

Public or private health facilities or other persons generating infectious waste shall have contractual arrangements for its proper collection, storage, transportation and disposal. Any bags used shall be appropriately labeled as containing infectious waste. Any bags used for infectious waste shall be secured and made leakproof. Sharps must be contained in leakproof rigid, puncture resistant, break resistant, labeled containers with lids. The collection and disposal service provider shall conform to federal standards and guidelines in the transportation and disposal of infectious waste.

18.05.030 Unregistered, Non-operational Vehicles

(a) Owners of vehicles that are unregistered, or which are not operational for a period of six months, shall arrange for sale of the vehicle, or placement of the vehicle in a closed garage, or transportation of the vehicle to a junkyard licensed to accept vehicles.

(b) The Health Officer shall have authority to impound pursuant to the procedures of Title 7 of this Code any unregistered vehicle, any vehicle which is not operational for a period of six months or more, or which is harboring or attracting rodents or other vectors. The Health Officer may also seek an award of damages from the vehicle's owner equal to the costs of removing the vehicle from the reservation and disposing of it.

(c) Residents who can demonstrate financial hardship may petition the Health Officer for relief from the requirements of this section by surrendering the title to one or more vehicles subject to this section to the Lummi Nation. The Health Officer shall arrange for removal

and sale of such vehicles.

(d) Persons holding a valid tribal business license for the repair or sale of vehicles must operate in compliance with Title 15 of this Code, and must operate in a manner so as not to pollute the ground, water or air. If not so operated, any and all vehicles shall be presumed to be non-operational and subject to removal under this Title or under Title 7 of this Code.

18.05.040 Construction and Demolition Wastes

(a) Construction-related materials that do not contain asbestos shall be separated into uncontaminated combustible materials and other waste for collection or hauling to an approved disposal site.

(b) Uncontaminated combustibles may be burned in compliance with 18.04.030 of this Title.

(c) Asbestos wastes shall be collected and disposed of in accordance with 40 CFR 61.156 as amended from time to time, and the National Emission Standards for Hazardous Air pollution (NESHAP) regulations, as amended from time to time. Any person who generates asbestos wastes must properly dispose of it, or arrange for its proper disposal.

18.05.050 Animal Wastes

Carcasses of animals shall be buried within 24 hours of death. All such burials shall take place on property of the animal's owner and in a manner that avoids attracting or harboring vectors and prevents offensive odors. If such burial is not possible, the animal's owner shall otherwise dispose of, or arrange for the disposal of the carcass in a lawful manner within 48 hours of the animal's death.

18.05.060 Composting

Where possible, residents shall make efforts to compost yard wastes and other organic materials on their property. Composting activities shall be maintained in a manner that does not create a nuisance, or attract rodents and/or other vectors.

Chapter 18.06 Collection and Disposal Franchises

18.06.010 Award of Franchises

Such person, firm or corporation as the Tribe may license, hereinafter referred to as a collection service, may be granted the exclusive right, privilege, and franchise of collecting, hauling, storing, and transferring solid waste for compensation on the Reservation, under terms and conditions established by the Lummi Indian Business Council and guidelines established in 40 CFR 243, as amended from time to time.

18.06.020 Types of Franchises

(a) When the Tribe finds that the applicant is able to provide complete and adequate service of all types within the Reservation it may issue an exclusive franchise for the Reservation to the applicant.

(b) If the Tribe finds that the need for service justifies action before a complete investigation and final determination can be made, the Tribe may issue a temporary franchise, valid for a stated period not to exceed six months, entitling a person to serve a defined service area or customers for that period.

(c) If the Tribe finds that the applicant for a collection franchise cannot provide complete service to a single customer, a group or type of customers, or for a particular type or unusually large quantity of recyclable material or solid waste, it may issue a franchise for joint service with another person who can provide supplemental service.

Chapter 18.07 Enforcement

18.07.010 Complaints

A complaint alleging the presence of a nuisance or other violation of this title may be filed with the Health Officer by any resident of the Reservation at least eighteen years of age.

18.07.020 Investigation

The Health Officer may, and upon the written complaint of any person shall, make an investigation to determine whether or not a violation of this title has occurred. For the

purpose of such investigation, the Health Officer or appointed representative may enter on private property at reasonable times to determine compliance.

18.07.030 Health Officer's Authority

After investigation, if the Health Officer finds that there is reasonable cause to believe that a violation of this Title has occurred, he shall

(a) Order immediate abatement if he finds that the existence of the violation poses an extreme hazard to the health, safety and welfare of Reservation residents. If the person in charge of the property is unwilling or unable to carry out the necessary action in a reasonable period of time under the circumstances, or cannot be located after diligent inquiry, then the Health Officer and his designees may enter the premises and perform actions necessary to immediately abate the violation; or

(b) If no extreme hazard to health, safety and welfare exists, the Health Officer may file an action in Tribal Court, requesting that the Court order that a notice be issued and served upon the owner, tenant, occupant, and/or person in possession of the premises where the nuisance is alleged or violation of this Title is claimed to exist, requiring such person or persons to appear before the Tribal Court at the time and place stated in the notice to show cause why a violation of this Title should not be declared to exist on the premises. If an owner, tenant, or person in possession of the premises cannot be found within the Reservation for service of notice, the notice can be served by certified mail, return receipt requested, addressed to the owner of the property. The notice shall state that if a violation is found to exist, costs of abatement shall be collected from the person or persons served, and that such costs may be collected as a lien against the property, unless prohibited by tribal or federal law.

18.07.040 Tribal Court Hearing

At the time and place described in the notice, the Tribal Court shall conduct a hearing on the existence of the alleged violation, and if the Tribal Court finds that a violation has occurred, it shall declare the existence of a nuisance and order the abatement of the

nuisance. The Health Officer or his designee shall appear, and the person or persons served with notice of the hearing may appear, and such person or persons may be represented by counsel at their own expense.

18.07.050 Nuisance Abatement

Where an order of abatement is issued by the Health Officer or the Tribal Court under this Chapter, the Health Officer or his designee may remove from the subject premises the waste or solid waste found to be the cause of such nuisance. Where such removal is performed by the Health Officer, or the Officer's agent or designee, the Tribe shall not be liable for any trespass or conversion as to any real or personal property and the Tribal Court shall order the abatement costs shall be collected from the generator of the waste, the property owner and/or the person who violated this Title, or the costs may be collected as a lien against such property, unless prohibited by tribal or federal law.

Chapter 18.08 General Provisions

18.08.010 Severability

If any section, clause, or provision of this code, or its application to any person or circumstance, is declared invalid for any reason by a court of competent jurisdiction, the remaining provisions of the code and its application to any other person or circumstance shall still be valid and in effect.

18.08.020 Effective Date

This title shall take effect thirty days after the date of its enactment by resolution of the Lummi Indian Business Council.

Title18pub08

APPENDIX E

LIBC RESOLUTION 2004-114: APPOINTMENT OF THE LUMMI NATION TRIBAL HEALTH OFFICER



LUMMI INDIAN BUSINESS COUNCIL

2616 KWINA ROAD • BELLINGHAM, WASHINGTON 98226 • (360) 384-1489

RESOLUTION 2004-114 OF THE LUMMI INDIAN BUSINESS COUNCIL

TITLE: Appointment of the Lummi Nation Tribal Health Officer

WHEREAS, the Lummi Indian Business Council is the duly constituted governing body of the Lummi Indian Reservation, by the authority of the Constitution and By-laws of the Lummi Tribe, of the Lummi reservation, Washington.

WHEREAS, pursuant to provisions of Title 18 of the Lummi Nation Code of Laws, the Solid Waste and Disposal Code, the responsibility and authority for administration of the Code and the Solid Waste Management division lies with a designated Health Officer; and,

WHEREAS, according to Title 18.03.010, the Lummi Indian Business Council shall designate the health officer by resolution; and

WHEREAS, oversight and budgetary responsibility for the Solid Waste Management division has been incorporated into the Planning Department.

NOW THEREFORE, BE IT RESOLVED, that the Lummi Indian Business Council designates the Planning Director, Richard Jefferson, or his designee, to be the Lummi Nation Tribal Health Officer; and

BE IT FURTHER RESOLVED, that the Tribal Health Officer shall be responsible for coordinating Title 18 enforcement activities with appropriate staff in the Lummi Police Department, Natural Resources Department, and the Life Center, with regard to solid waste management and public health and safety; and

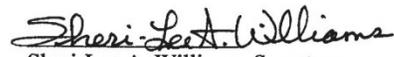
BE IT FINALLY RESOLVED, that the Chairman (or Vice-chairman, in his absence) is hereby authorized and directed to execute this resolution and any documents connected therewith, and the Secretary (or the Recording Secretary, in his absence) is authorized and directed to execute the following certification.

LUMMI NATION


Darrell Hillaire, Chairman
Lummi Indian Business Council

CERTIFICATION

AS Secretary of the Lummi Indian Business Council, I hereby certify the above Resolution #2004-114 was adopted at a **Special** Meeting of the Council, held on the 24th day of **August** 2004, at which time a quorum of **9** was present by a vote of **8** FOR, **0** AGAINST, and **0** Abstention(s).


Sheri-Lee A. Williams, Secretary
Lummi Indian Business Council



APPENDIX F

LUMMI NATION OUTDOOR BURNING REGULATIONS AND PERMIT INFORMATION PAMPHLET



Digitally signed by Code Reviser
DN: cn=Code Reviser, o=Lummi
Nation, ou=Office of the
Reservation Attorney,
email=davidn@lummi-nsn.gov,
c=US
Reason: I attest to the accuracy
and integrity of this document
Date: 2008.07.01 11:39:40 -07'00'

TITLE 10
LUMMI NATION CODE OF LAWS
NATURAL RESOURCES CODE

- Enacted: Ordinance L-64 (3/6/64)
- Amended: Ordinance L-7 (4/25/68)
Ordinance L-36 (8/22/72)
Ordinance L-38 (9/4/73)
Resolution OU-77 (12/6/76)
Resolution 81-16 (2/13/81)
Resolution 81-79 (7/29/81)
Resolution 81-114 (12/2/81)
Resolution 81-116 (12/4/81)
Resolution 95-92 (8/8/95)
Resolution 96-66 (4/8/96)
Resolution 82-23 (3/16/82)
Resolution 83-068 (8/5/83)
Resolution 83-069 (8/5/83)
Resolution 83-091 (9/29/83)
Resolution 86-77 (7/9/86)
Resolution 87-35 (3/13/87)
Resolution 88-110 (9/16/88)
Resolution 89-09 (1/7/89)
Resolution 89-107 (7/11/89)
Resolution 90-87 (7/6/90)
Resolution 95-20 (6/27/95)
Resolution 2001-067 (6/21/01)
Resolution 2001-078 (7/17/01)
Resolution 2001-122 (9/24/01)

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Lummi Citizens who meet the following terms and conditions:

(a) Produces signed permission for the proposed activity from all of the owners of record of the land where it is to be conducted.

(b) Produces a plan for the activity which details, among other things, the use of the products harvested, the period in which the harvest is to occur, site clean up activities, and plans for reforestation, and any other condition deemed appropriate by the Lummi Natural Resources Department in consultation with the Commission.

(c) Any other terms and conditions for the conservation and enhancement of the reservation forestry resources deemed necessary by the Lummi Natural Resources Department in consultation with the Commission.

Failure to observe any condition of this section or permit issued pursuant to this section shall be a violation punishable by civil penalties as follows:

First violation
\$ 50.00 to \$500.00

Second violation
\$100.00 to \$2,000.00 and loss of permit forfeiture of wood and loss of permit privileges until the violator, after a period of one year, meets with the Council and the Commission and receives permission to receive permits again.

10.18.100 Fire Suppression Authority

The Lummi Natural Resources Department on approval of the Commission in the interest of protection of the forest resources on the reservation may issue regulations governing burning within the exterior boundaries of the Lummi Reservation during periods of extreme danger due to dry weather and/or scarce water reserves. These regulations may include but shall not be limited to:

- (a) An open burning ban.
- (b) The requirement for a permit for open

burning with terms and conditions required for fire protection.

(c) Provide requirements for safe burning.

Notice of the implementation of regulations under this section shall be posted conspicuously at the Natural Resources Office and around the Reservation.

Failure to observe any regulation or term or condition of a permit issued pursuant to this section shall be a violation punishable by civil penalties as follows:

First violation
\$ 50.00 to \$500.00

Second violation
\$100.00 to \$2,000.00, forfeiture of wood and loss of permit privileges until the violator, after a period of one year, meets with the Council and the Commission and receives permission to receive permits again.

Chapter 10.19 Enforcement

10.19.010 Enforcement

This title and all regulations issued pursuant to it shall be enforced by the Lummi Natural Resources Enforcement Patrol, Lummi Tribal Law Enforcement personnel, and by any other person authorized by the LIBC.

[Editor's Note: Chief of Police authorized to supervise Natural Resources Enforcement Officers. Resolution 96-60 (3/26/95)]

10.19.020 Lummi Natural Resources Enforcement Patrol

The Lummi Natural Resources Enforcement Patrol shall consist of an administrator, a sergeant, and several enforcement officers with the general duties and responsibilities as set forth in the following sections. These positions are subject to the Personnel Policies of the LIBC, including, but not limited to, hiring, supervision, pay, discipline and grievances. The Chief of Lummi Law and Order shall be responsible to the Council and the Commission for the effective execution of the objectives of the Natural Resources Enforcement Patrol.

Forestry Permits Continued

4. **Firewood Permits:** Obtainable upon request at forestry office only when the tribe has designated open cutting areas or when a landowner has downed wood on their property. Fines for cutting firewood without a permit range between \$50 and \$2,000 and a loss of all firewood permit privileges for 1 year. The Washington Department of Natural Resources also issues firewood permits to tribal members when sites are available. Inquire at the Sedro-Woolley office or call 360-856-3500.

Timber Cutting Permit Steps

Landowners are often surprised at the amount of time it can take to obtain a valid Timber Cutting Permit. To provide you with an understanding of all the field and office work involved, the checklist used by the Forestry Division to ensure compliance with all tribal and federal rules is provided below. Once all of these steps are completed and all requirements are met, we are then able to issue a valid BIA approved Timber Cutting Permit.

1. Obtain Land Use Application
2. Verify Ownership
3. Preliminary Reconnaissance
4. Property Line Survey
5. Environmental & Biological Assessment
6. Timber Cruise, Road Layout & Harvest Design
7. Timber Appraisal & Marketing
8. Forest Officer's Report or Narrative
9. Sale Advertisement & Prospectus
10. Timber Cutting Permit or Timber Sale Contract
11. Pre-logging Conference
12. Contract Execution and Compliance
13. Site Preparation
14. Statement of Completion
15. Reforestation

1. STANDING TIMBER



2. PERMITTING



3. TIMBER HARVEST



4. REFORESTATION



If you have any questions or concerns about Lummi Nation timberlands, please contact Zach Dewees, Forest Manager at 360-384-2228 or via email at zacharyd@lummi-nsn.gov

LUMMI NATION Natural Resources Department Forestry Division



Mission Statement: To enhance, utilize, and protect forest resources within the exterior boundaries of the Reservation, Madrona Point, Portage Island, and the Arlecho Watershed into perpetuity for the benefit of the Lummi People.



Forestry Division

Zach Dewees, Forest Manager
Phone: 360-384-2228
E-mail: zacharyd@lummi-nsn.gov
Charlie Jefferson, Forest Technician
Phone: 360-384-2277
E-mail: charliej@lummi-nsn.gov

Purpose

The intent of this brochure is to familiarize Lummi tribal members and residents of the Lummi reservation with the role of the Forestry Division, its policies, procedures, and the timelines involved in applying for and receiving Forestry Permits. Additionally, we hope that this brochure provides you with a basic understanding of Forest Management and the benefits of actively managing this valuable resource.

Background

The Lummi Nation holds approximately 6,379 acres of timberlands within the exterior boundaries of the reservation, 2,126 acres of timberlands in the Arlecho Creek Watershed, and 26 acres at Madrona Point. These timberlands hold great cultural, environmental, and economic value to the Lummi people. Accordingly, the Forestry Division takes great care to manage these resources in a responsible and professional manner to ensure that they will be available for generations to come.

Although the Lummi Nation is a self-governing tribe, we still must comply with federal regulations. This means that the tribe must manage their forest lands according to the principles and regulations established in the National Indian Forest Management Act. As stated in this Act, the Bureau of Indian Affairs has final approval authority on all timber harvest permits for trust and allotted lands of the Lummi Indian Reservation

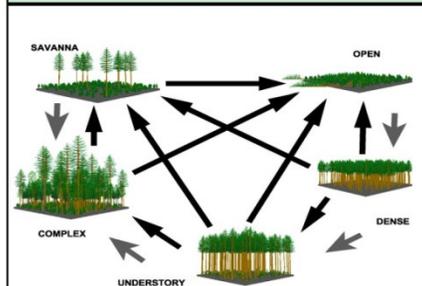
Forestry Division Responsibilities

- Provide Forest Management knowledge and expertise to landowners and other departments.
- Ensure proper management and protection of Forest Resources.
- Provide responsible and timely forest permitting.
- Maximize forest revenue and economics.
- Manage tribal conservation areas.
- Recruit wood for the Elder's firewood program.

What is Forest Management?

Forest Management is the art and science of manipulating trees to produce a desired condition or product that benefits the landowner while protecting wildlife and aquatic resources and ensuring a viable timber resource in the future. It is the Forestry Division's goal to manage Lummi forests according to the above definition. To achieve this goal, some essential forest management techniques need to be done throughout the life of a stand. For example, following reforestation, it is essential to conduct at least one "release treatment" to ensure planted seedlings are not out-competed and killed by invading brush species. A release treatment involves eliminating all grass and brush species growing within a 5-10 foot radius of each seedling and may be done manually or with herbicides. This ensures that the seedling will get all the water and light it needs to grow. As these seedlings continue to grow into larger trees, they will begin to compete with each other for light and water. To reduce this competition and maintain maximum growth rates, a pre-commercial thinning (PCT) will be required around age 10-15. A PCT involves cutting out all the smaller, less competitive trees so that growing space is given only to the best, fastest growing trees. At around age 65, these trees will be big enough to produce commercial forest products which can provide significant income. Below, you will find a helpful diagram that shows the various stages of forest development. As you can see, there are 5 distinct stages with many different development pathways. Which one do you have on your property?

Stages of Forest Development



Forestry Permits

The Forestry Division issues 4 types of permits: Timber Cutting Permits, Burning Permits, Beachwood Permits, and Firewood Permits. Below you will find an expected timeframe for obtaining each type of permit along with the fines and penalties for operating without a valid Forestry permit. As mentioned earlier, the Lummi nation is required to comply with the federal regulations outlined in the National Indian Forest Management Act. Because of this, Title 10 of the Lummi Nation Code of Laws states that "it shall be unlawful for any person to harvest or assist in the harvest of any standing green timber, including Christmas trees, or any downed firewood or other forestry product on any lands or beaches within the exterior boundaries of the Lummi Reservation without a permit from Lummi Natural Resources Department."

1. **Timber Cutting Permits:** Can take as little as 2 weeks (clearing for a homesite) or up to 1 year (Large-scale timber harvest). **Harvesting timber on trust or allotted lands without a BIA Timber Cutting Permit can result in severe penalties. The landowner not only forgoes the money he or she would have received for the harvested timber but also is liable for a fine from the BIA of triple the value of the harvested timber. In addition, the Lummi Nation may issue a fine ranging between \$500 and \$10,000.**
2. **Burning Permits:** Obtainable upon request at forestry office. Seasonal constraints are placed on these permits and absolutely no burning is allowed when a county-wide burn ban is in effect. Fines for burning without a permit range between \$50 and \$2,000. Also if the fire escapes, the landowner is financially responsible for all suppression and containment costs.
3. **Beachwood Permits:** Obtainable upon request at forestry office. Fines for cutting beachwood without a permit can range between \$50 and \$2,000 and a loss of all beachwood permit privileges for 1 year.

APPENDIX G

WHATCOM COUNTY'S 2001 WASTE STREAM ANALYSIS

APPENDIX A: ANALYSIS OF THE WASTE STREAM

An understanding of the nature and amount of disposed waste provides important context for the planning of appropriate diversion and recovery programs. This chapter presents estimates of the composition and quantity of disposed solid waste in Whatcom County according to specific waste *sectors*. The estimates were based on data from several sources, including direct observation of disposed waste, interviews with waste haulers and landfill personnel, disposal tonnage figures reported by disposal facilities to the Whatcom County Public Works Department, and waste composition studies conducted in nearby Washington counties.

Overview of Disposal Quantities and Sectors

According to reports submitted by transfer stations and disposal facilities, approximately 126,800 tons of solid waste were disposed by Whatcom County during the 2002 calendar year.

Approximately 118,800 tons of this waste was actually transported *out of* Whatcom County for disposal in landfills elsewhere. The remaining 8,000 tons is disposed in the CCR Landfill, which is dedicated to receiving construction & demolition waste.

For purposes of tracking and analysis, the County's entire disposed solid waste stream is considered to encompass four sectors, each with a different composition character and disposal method.

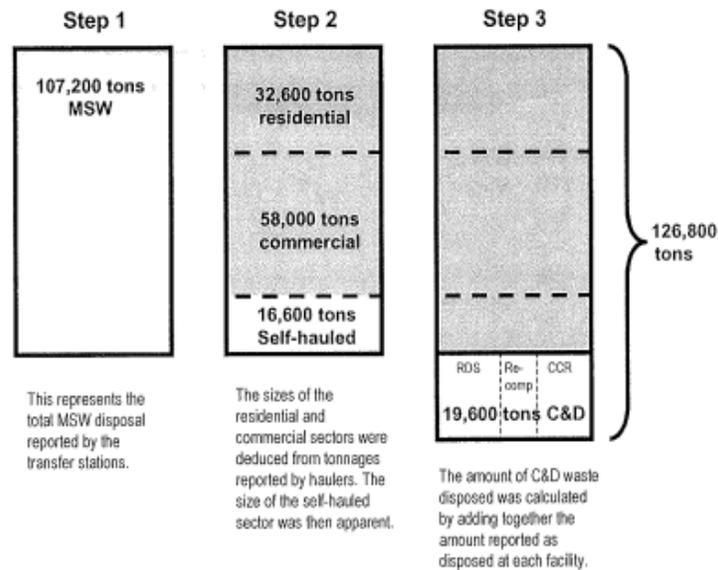
- *Residential* waste is generated by households and transported by commercially contracted haulers for disposal. An estimated 32,600 tons of residential waste were disposed at the RDS and Recomp transfer stations in 2001.
- *Commercial* waste is generated by businesses or institutions and, like residential waste, is transported by commercial haulers to the RDS and Recomp transfer stations. Commercial disposal in 2001 is estimated at 58,000 tons.
- *Self-hauled* waste is generated by either households or businesses/institutions and is transported to the disposal facility by the same households or businesses/institutions. Approximately 16,600 tons of self-hauled waste was taken to the RDS and Recomp transfer stations for disposal in 2001.
- *Construction & demolition (C&D)* waste is a product of specific commercial or residential building activities (typically new construction, remodeling, demolition, or roofing), and it produces waste of sufficiently unique composition to be treated as its own substream. The reported quantity of C&D waste disposed in 2001 was 19,600 tons. Of this quantity, approximately 8,000 tons were disposed at the CCR Landfill, which is dedicated to receiving C&D waste. An additional 2,300 tons were disposed at the Recomp transfer station and 8,400 tons at the RDS transfer station. A reported 800 tons of C&D waste was shipped out of the county directly via intermodal transport, without passing through either of the transfer stations.

The quantities of disposed waste corresponding to each sector were calculated as follows.

Step 1: The disposal tonnage figures for each sector were derived through the following method. The total amount of municipal solid waste (residential, commercial, and self-hauled waste) reported as being disposed in 2001 at the two transfer stations in Whatcom County was 38,000 tons for the RDS transfer station and 69,200 tons for the Reomp transfer station. These figures were added together to produce a total of 107,200 tons. (See *Step 1* in the diagram below.)

Step 2: Then, the commercial waste haulers that deliver residential and commercial waste to the transfer stations were asked to report the total amounts of MSW (residential and commercial) that they took to each transfer station, as well as breakdowns of those figures to distinguish residential from commercial waste. The amount of residential waste reported by all haulers as being taken to both transfer stations was added together to produce the figure of 32,600 tons that appears in the table above. Likewise the amount of commercial waste reported by haulers as being taken to both transfer stations was added together to produce the figure of 58,000 tons. The remaining portion of MSW, or 16,600 tons, was assumed to be self-hauled waste. (See *Step 2* in the diagram below.)

Step 3: The amount of C&D waste disposed at each transfer station was reported by the facility operators as being 8,400 tons for the RDS transfer station and 2,400 tons at the Reomp transfer station. In addition, C&D waste amounting to approximately 800 tons was sent to disposal through intermodal means (i.e. transported out of the County via truck or rail car). Finally, the CCR landfill, a dedicated C&D disposal landfill in Whatcom County, estimated that 8,000 tons of C&D waste were disposed there in 2001. Together, these reported and estimated figures for the three facilities amount to 19,600 tons. (See *Step 3* in the diagram below.)



APPENDIX H

OFF-RESERVATION RECYCLING LOCATIONS

Table H-1. Recycling Drop-off Locations in Whatcom County

	Aluminum (scrap, cans, foil)	Antifreeze	Appliances	Vehicle Batteries	Cardboard	Electronics	Fluorescent Lights	Glass Containers	Lead (foil, fish weights)	Motor oil (up to 5 gallons)	Newspaper	Paper	All Plastics Bottles	Plastic Containers (all colors & numbers)	#1 & #2 Plastic bottles	Scrap Metal	Tin Cans	Branches (up to 7 inches diameter)	Clean Wood Scraps	Stumps	Yard Debris
SKAGIT RIVER STEEL & RECYCLING 1265 S. Anacortes Street, Burlington, 8-4:30 Mon-Fri; 8-noon Sat, 800-869-7097	X		X		X			X	X		X	X	X		X	X	X				
Z RECYCLERS 6129 Guide Meridian, 8-5 Mon-Fri, 398-2161, 734-5986	X		X	X				X	X							X	X				

Table H-2. Construction Recycling and Reuse Options for Whatcom County

	ASPHALT/ CONCRETE (PAVEMENT)	CARDBOARD/OCC	PLATE GLASS	LAND CLEARING DEBRIS/BRANCHES	METAL	PALLETS	PAPER	PLASTIC SHEETING/ FILM	POLYURTHANE FOAM	UNPAINTED ROOFING MATERIALS	SHEETROCK/ DRYWALL	TILE/PORCELAIN	CLEAN TREATED WOOD	WOOD SCRAP
AGGREGATES WEST 360-966-3641 Van Buren Road, Everson	R													
BARKER'S WOODCHIPPING 360-734-7814 Call for appointment				R										
BLAINE BAY REFUSE (operated by SSC) 360-332-5443, 360-734-3490 Pick-up services in NW Whatcom County	R	R	D	R	R	R	R	R	D	D	R	D	D	R
CITY ORGANICS 360-671-YARD Pick-up Service				R										
NOOKSACK VALLEY DISPOSAL 360-354-3400 250 Birch Bay-Lynden Road Pick-up available	D	R	D	R	R	R	R	D	D	D	D	D	D	R
NORTHWEST CHIP & GRIND 360-676-9569 4243 Hannegan Rd, Bellingham On-site & pick-up available				R										F
NORTHWEST RECYCLING 360-733-0100 1419 C Street, Bellingham Pick-up NOT available		R			R		R							

APPENDIX I

COST ESTIMATES OF SOLID WASTE MANAGEMENT ALTERNATIVES

Alternative A and B - Voluntary or Mandatory Curbside Collection				
Assumes full participation (i.e., maximum cost to LIBC; minimum cost to household) under the voluntary alternatives				
Households Served		427		
Staffing Cost		\$12,889		
Supplies and Training		\$3,000		
100% Subsidized SSC Collection		\$113,292		
50% Subsidized SSC Collection		\$56,671		
Total Annual LIBC Cost (100% Subsidy)		\$129,181		
Total Annual LIBC Cost (50% Subsidy)		\$72,560		
Total Annual Cost Per Household (100% Subsidy)		\$303		
Total Annual Cost Per Household (50% Subsidy)		\$170		
NOTES:				
1) Staffing Costs computed using LIBC Spreadsheet and the following variables:				
	Hourly Rate = \$14.35/hour (Administrative Assistant [Salary Grade 5])			
	0.25 FTE = 520 hours/year			
	Fringe Rate = 49.40%			
	Indirect Charges = 15.62%			
2) Monthly Costs for Weekly SSC Curbside Collection and Disposal Costs and EOW Recycling				
	Full Cost (100% subsidy)	\$22.11		
	Half Cost (50% subsidy)	\$11.06		

Alternative 3: Tribally Operated Temporary Drop Box Site							
Four Month (June - September) Operational Period							
Item/Service	Service Cost	Number Rental Days or Months	Number of Hauls Per Container	Number Containers	Cost	Indirect Rate	Total Cost
Delivery (one-time cost per container)	\$29.05			8	\$232	15.62%	\$269
Container Rental (daily charge per container)	\$5.35	122		8	\$5,222	15.62%	\$6,037
Haul (Cost per container of recyclables)	\$103.00		18	4	\$7,416	15.62%	\$8,574
Disposal Costs for Recyclables	\$0.00		18	4	\$0	15.62%	\$0
Haul (Cost per container)	\$103.00		36	4	\$14,832	15.62%	\$17,149
Disposal Costs (\$70/ton solid waste)	\$490.00		36	4	\$70,560	NA	\$70,560
Solid Waste Technician	\$22,899				\$22,899	Included	\$22,899
Solid Waste Technician	\$22,899				\$22,899	Included	\$22,899
Site Improvement (280 feet fence rental x 4 months)	\$760				\$760	15.62%	\$879
Portable Toilet Rental (\$166/month)	\$166	4			\$664	15.62%	\$768
Miscellaneous Supplies and Training	\$2,500				\$2,500	15.62%	\$2,891
Total Cost Estimate							\$152,924
Cost per Ton							\$152
NOTES:							
1) Staffing Costs computed using LIBC Spreadsheet and the following variables:							
Solid Waste Technician [Salary Grade 6]		Hourly Rate = \$16.50/hour					
Part-Time, Temporary Employee		0.5 FTE = 1,040 hours/year					
		Fringe Rate = 15.41%					
		Indirect Charges = 15.62%					
2) 40-Yard containers hold approximately 7 tons of household solid waste							
3) Assume that each container for municipal solid waste is filled twice per week (56 tons per week); Total Waste Removed over 18 week period is 1,008 tons.							
4) Assume that each container of recyclables is filled once per week and no dumping fee for recyclables							
5) Fencing cost is to rent fencing from Scrap It (Slater Road) for four months, total of 280 feet of fencing (74 ft by 66 ft enclosure) Enclosure allows for four drop boxes (8 ft x 22 ft) with 10 ft separation from fenced enclosure; 30 ft between rows comprised of two drop boxes per row and 10 ft separation between drop boxes in a row. Drop boxes for recyclable located between two rows.							
6) Assumes disposal costs for recyclables recovered by metal recycling revenue.							

Alternative 4: Tribally Operated Permanent Drop Box Site							
Year-Round Operational Period - Rented Drop Boxes							
Item/Service	Service Cost	Number Rental Days or Months	Number of Hauls Per Container	Number Containers	Cost	Indirect Rate	Total Cost
Delivery (one-time cost per container)	\$29.05			8	\$232	15.62%	\$269
Container Rental (daily charge per container)	\$5.35	365		8	\$15,622	15.62%	\$18,062
Haul (Cost per container of recyclables)	\$103.00		52	4	\$21,424	15.62%	\$24,770
Disposal Costs for Recyclables	\$0.00		52	4	\$0	15.62%	\$0
Haul (Cost per container of solid waste)	\$103.00		104	4	\$42,848	15.62%	\$49,541
Disposal Costs (\$70/ton of solid wastes)	\$490.00		104	4	\$203,840	NA	\$203,840
Solid Waste Technician	\$58,418				\$58,418	Included	\$58,418
Office/Storage Building (Tuff Shed 8' x 8')	\$58,418				\$58,418	Included	\$58,418
Portable Toilet Rental (\$166/month)	\$10,000				\$10,000	NA	\$10,000
Portable Toilet Rental (\$166/month)	\$166	12			\$1,992	15.62%	\$2,303
Fencing (280 feet fence, 2 gates, installed)	\$4,990				\$4,990	15.62%	\$5,769
Used Backhoe with Compactor	\$30,000				\$30,000	NA	\$30,000
Miscellaneous Supplies and Training	\$2,500				\$2,500	15.62%	\$2,891
Total Cost Estimate							\$464,281
Cost per Ton							\$461
NOTES:							
1) Staffing Costs computed using LIBC Spreadsheet and the following variables:							
Solid Waste Technician [Salary Grade 6]	Hourly Rate = \$16.50/hour						
Full-Time, Permanent Employee	1 FTE = 2,080 hours/year						
	Fringe Rate = 47.22%						
	Indirect Charges = 15.62%						
2) 40-Yard containers hold approximately 7 tons of household solid waste							
3) Assume that each container for municipal solid waste is filled twice per week (56 tons per week); Total Waste Removed over 52 week period is 2,920 tons.							
4) Assume that each container of recyclables is filled once per week and no dumping fee for recyclables							
5) Fencing cost is installed fencing by Northwest Fence, total of 280 feet of fencing (74 ft by 66 ft enclosure) with two 12 ft gates Fencing is six feet tall plus three strands of barbed wire on top. Enclosure allows for four solid waste drop boxes (8 ft x 22 ft) with 10 ft separation from fenced enclosure; 30 ft between rows comprised of two drop boxes per row and 10 ft separation between drop boxes in a row. Drop boxes for recyclable located between two rows.							
6) Assumes disposal costs for recyclables recovered by metal recycling revenue.							