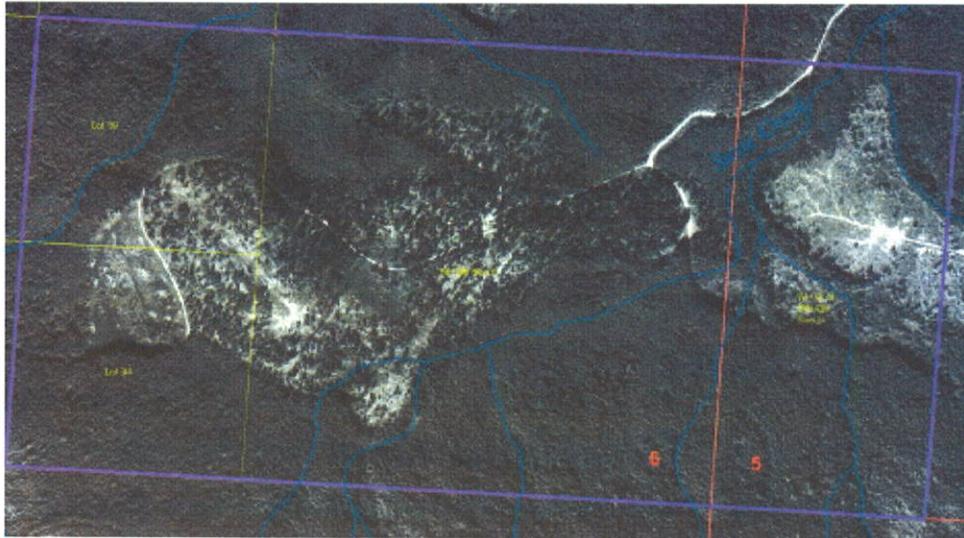


WESTECH COMPANY

Environmental Consulting ~ Site Permitting

PRELIMINARY ENVIRONMENTAL ANALYSIS PROPOSED SADIE CREEK SHOOTING RANGE SECTION 6, TOWNSHIP 30 NORTH, RANGE 9 WEST, WM



July 2009

G. Bradford Shea, Ph.D., REA, ABI
Xandra Kopp

SITE ANALYSIS, BMPs AND POTENTIAL LEAD TOXICITY

Submitted to:

CLALLAM COUNTY PARKS, FAIR AND FACILITIES DIVISION
223 East Fourth Street
Port Angeles, Washington 98362

Submitted by:

WESTECH COMPANY
P.O. Box 2876
Port Angeles, Washington 98362

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1.0 INTRODUCTION

1.1 SITE AND RANGE PROPOSAL HISTORY

The proposed Sadie Creek Shooting Range Site is located approximately seven miles west of Joyce, nearly two miles south of Highway 112 along a subsidiary road off of the 1000 Road in that area. The Site lies at an elevation of approximately 700 feet, lying on a broad plateau area between the drainages of Sadie and Susie Creeks.

Clallam County has had a number of shooting ranges over the years. The history is summarized in Table 1. A military range at Camp Hayden became a recreational range during the late 1950s and 1960s. When this was gradually closed due to conflicts with expansion of the park, a shooting range was established in the Airport Industrial Park during the 1980s. A private range is still active on Dryke Road (Sunnydale Range), and activities include trap and skeet, pistol and 0.22 rifle ranges (underground) at that site. The Port Angeles Gun Club has a shotgun range located on Highway 101 across from Deer Park Road for trap and skeet shooting.

Other shooting occurs informally throughout the County including hunting activities and target shooting at private and informal (mostly unsanctioned) ranges on public or private land. In particular, previous gravel pits are often used for this purpose. Hunting activities are pursued throughout the county generally with the exception of designated no-shoot zones and developed areas.

Throughout the last several decades, the County has proposed numerous alternative sites for a shooting range, culminating in the mid-1990s with a proposed site on Blue Mountain Road which attracted some public opposition, due in part to residential growth in the area between the initial date the site was proposed and the first public hearing. More recently several sites have been proposed in the area west of Joyce. The major advantages of these sites are the low residential density in the area and increased safety of some sites through use of natural topography to act as secondary backdrops to the target ranges.

1.2 SITE LOCATION AND CHARACTERISTICS

The Sadie Creek Shooting Range Site is located as shown in Figures 1-3. It lies in Section 6 of Township 30 North, Range 9 West, and Willamette Meridian. The Site is relatively level with minor topographic features, including some previous grading resulting from previous forestry activities (including a small gravel pit). Plans for the Site include three rifle ranges (300, 200 and 100 yards in length), two pistol ranges for the general public (including a black powder range) and one for law enforcement, a club house and an archery range. Previous plans for a longer rifle range (1,000 yard) and a shotgun range have been removed from the proposal (Figures 4 and 5).

TABLE 1. NORTH OLYMPIC PENINSULA SHOOTING RANGE HISTORY

Clallam County

Camp Hayden-Salt Creek Range (Public) 1959 – 1968

Peninsula Rifle and Pistol Club (police and private shooters) Airport Park - early 1980s

Sunnydell Shooting Grounds (Public) 1950 to present – Shotgun (skeet, trap, sporting clays), pistol, rifle (50 yard underground range)

Port Angeles Gun Club (Highway 101 near Deer Park Rd.) 1970s to present

Cassidy Creek: - The selected site out of 11 sites proposed by Pacific Northwest Shooting Park Association (PNSPA), but rejected by Clallam County following rejection of the Blue Mountain Site. Some informal shooting apparently occurs on this site.

Peninsula Rifle and Pistol Club – offshoot of Camp Hayden range, now indoors only (pistols and small bore) on 18th Street in Port Angeles (run by Sportsman's Association).

Peninsula Long Rifles, Inc. on Lost Mountain Road (private)

West End Sportsman's Club (private). Referred to by PNSPA, located in Forks. Fires rifle (small bore), pistol, shotgun and archery.

Jefferson County

Jefferson Co. Sportsman's Assn. near Port Townsend (Clallam used this range since early 1980s when Airport Park closed). Increasing residential encroachment occurred. Current status not determined.

Security Services Northwest (SSNW) (police and government agencies only) This is a privately run range for training government and law enforcement security personnel located on Discovery Bay near Gardiner. It has been active since 1988. While it has had complaints from neighbors and investigations and sanctions by Jefferson County, these seem focused around noise issues, hours of operation and land use issues. The Site has been investigated by DOE which noted data indicating the on-site well and stream (Contractor's Creek) did not have excessive concentrations of lead. The report also noted that few if any mitigation measures or stormwater controls were in place (TechLaw 2008a). Ranges were backed by earthen berms and no recycling was noted.

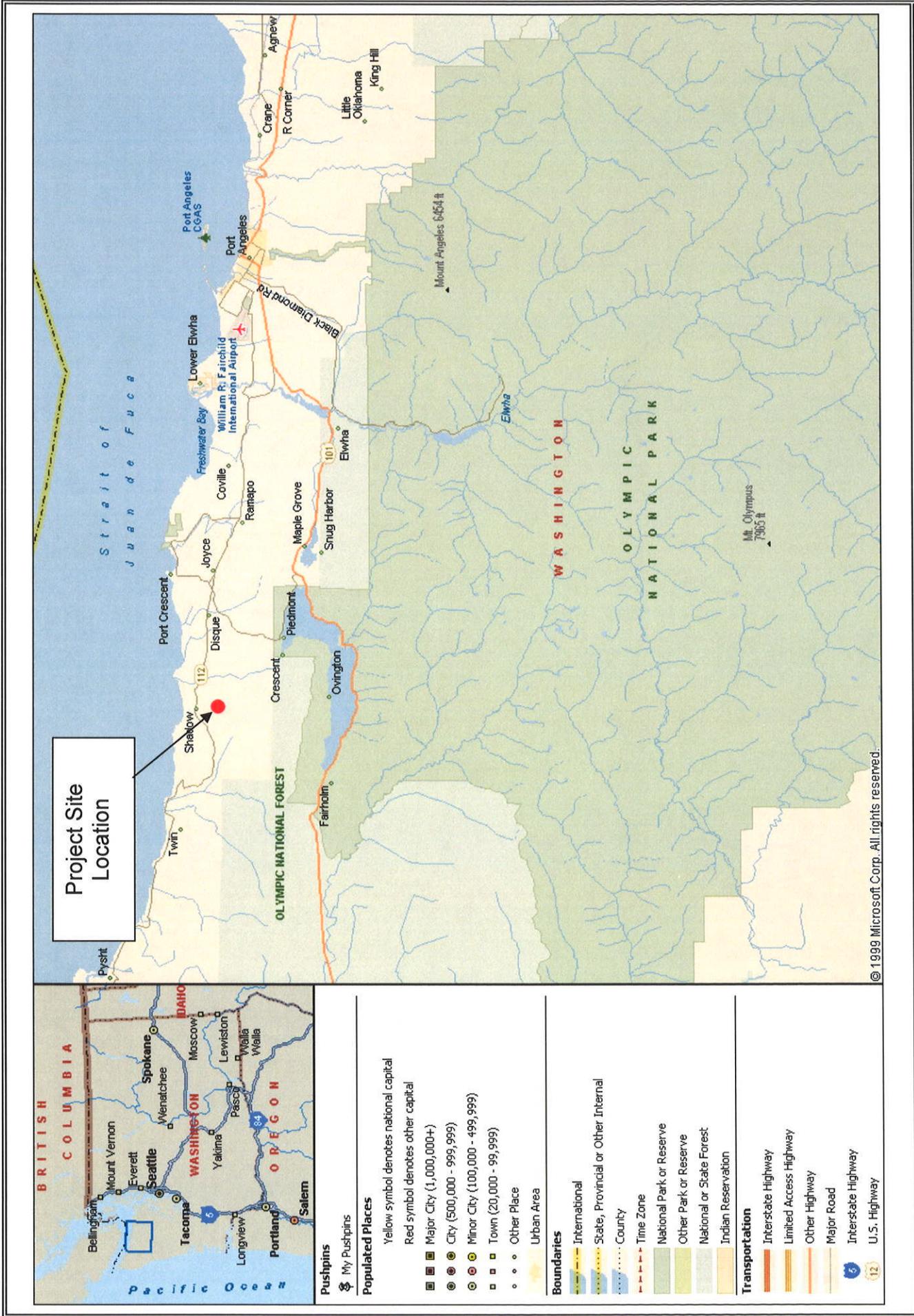


Figure 1. Location Map

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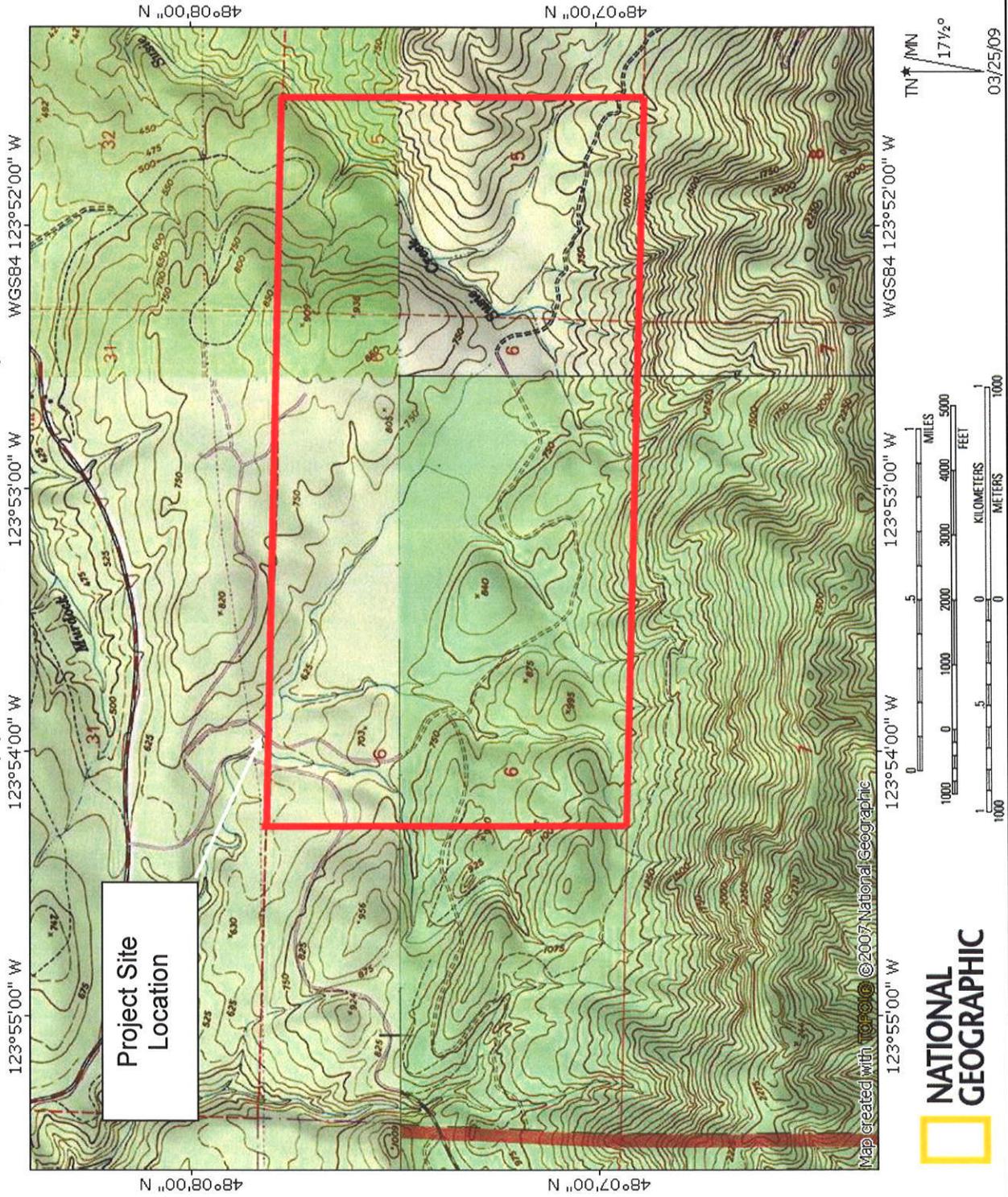


Figure 2. Vicinity Map

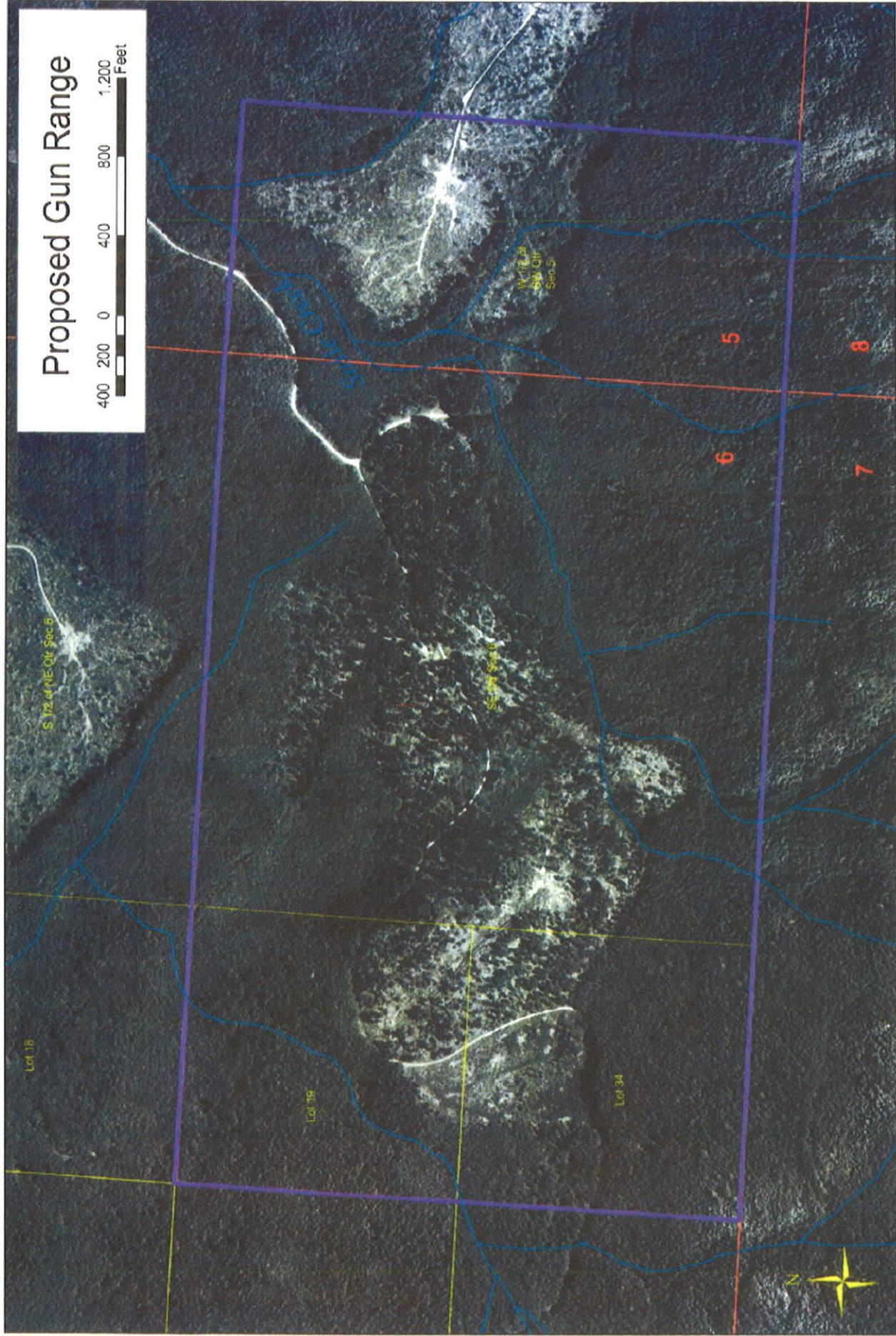


Figure 3. Proposed Gun Range Map

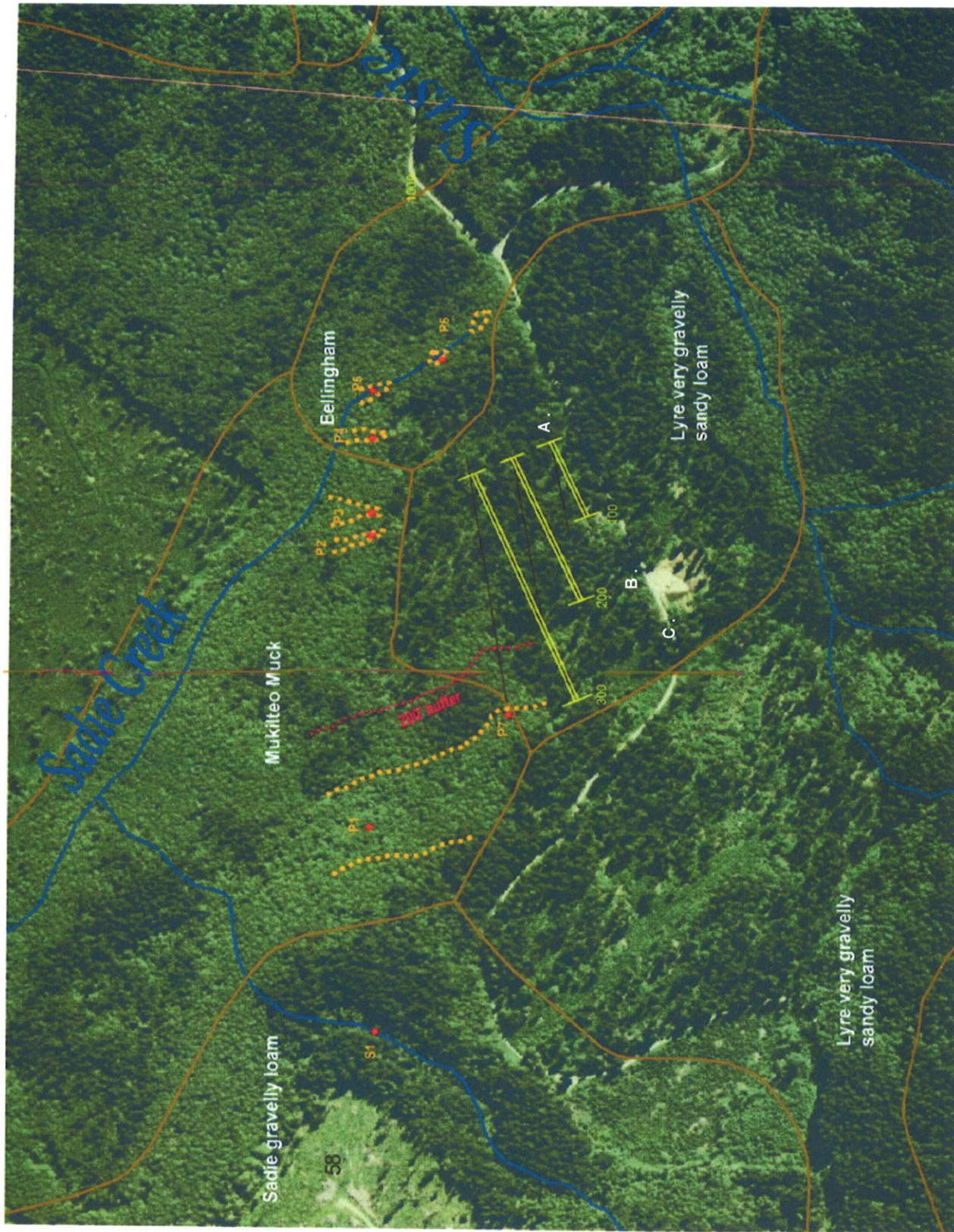


Figure 4. Approximate Locations of Wetlands and Proposed Firing Lines

A,B,C – Soil Sampling Location (see Appendix B)

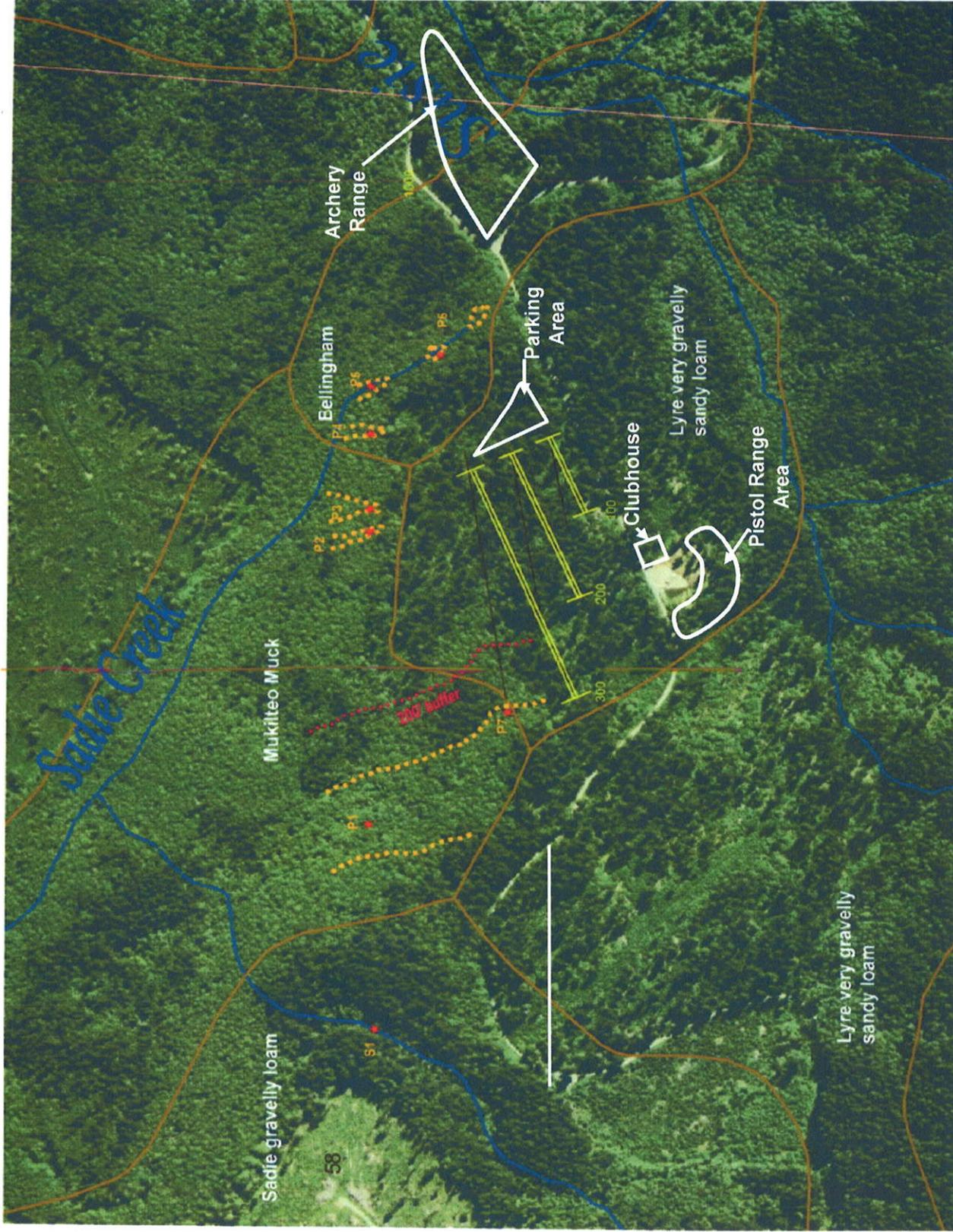


Figure 5. Current Site Plan Components

The Sadie Creek Range is proposed by the Pacific Northwest Shooting Park Association (PNSPA). The PNSPA proposes to construct a 56.4 acre range with amenities (including a club house, parking, etc.) on a site consisting of 320 acres including buffers. Figure 4 shows locations of the major features (see also Cummins and Associates 2003 and updates).

1.3 REGULATORY PROCESS

The Sadie Creek Site has not been approved for construction. The Site will need to be more precisely designed, based on safety and engineering requirements. The Proponents should select BMPs which will be used to reduce lead toxicity as well as reducing other potential environmental impacts.

The Site and Project Description will need to demonstrate compliance with federal and state laws pertaining to toxic materials prior to permits being issued. This includes compliance with the Resource Conservation and Recovery Act (RCRA) and the Comprehensive Environmental Response, Compensation and Liability Act (CERCLA) at the federal level and the Model Toxics Control Act (MTCA) at the State Level. The State's Lead Chemical Action Plan (CAP) should also be reviewed for compliance criteria.

A detailed regulatory process to obtain permits will begin with re-conveyance of the Site to the County, by the Department of Natural Resources (DNR). This process will be followed by SEPA review (which may trigger or not trigger an Environmental Impact Statement (EIS)), and issuance of local, state and federal permits which are required. The applicability of the various permit processes depend somewhat on the actual design and location of components of the facility. Many of these will be discussed in this preliminary document in the following chapters.

2.0 ENVIRONMENTAL SITE CHARACTERISTICS

2.1 TOPOGRAPHY AND GEOLOGY

The Site lies in an area characterized by low hills and terraces cut by ravines from stream drainages. The local area around the Site is a nearly flat plateau at an elevation of about 700 feet above mean sea level (msl) (USGS, 1950). Steep ridgelines up to 2,500 feet in height lie to the south, separating the Site from the Lake Crescent area. Low hills 800-1,000 feet in elevation lie to the west. The Sadie Creek drainage lies west of the Site and the Susie Creek drainage lies to the east.

The site has been mapped as having quaternary (Pleistocene) Vashon till underlying the surface soils. This is an undifferentiated lodgement till composed of poorly sorted sand, silt clay, gravels and boulders, laid down and compressed by direct glacial action. These formations are surrounded to the southeast, southwest and north by other formations of sandstone, siltstone and mudstone of Eocene age (Schasse 2003).

2.2 SOILS

Surface soils at the Site consist of Lyre, Sadie, and Bellingham soils with Mukilteo soils lying to the west in the Sadie Creek basin. These soils all lie within the Schnorbush-Sadie map unit. These are shallow and moderately deep, moderately well drained and well drained soils which are on hills. The individual soil types are discussed below for general physical characteristics as well as chemical and engineering characteristics when known. South of the site on the higher hills, Terbies soils are found:

Lyre very gravelly sandy loam: 0-15 percent, 15-30 percent slopes – These are very deep, somewhat excessively drained soils formed on terraces in glacial outwash. The surface layer is typically 5 inches of dark brown very gravelly sandy loam below a one inch mat of organic duff. The subsoils are brown and dark yellowish brown very gravelly sandy loam 25 inches thick underlain by 60 inches or more of gravelly sand. Small areas of Palix and Sadie soils are found associated with this unit. Lyre soils are somewhat acidic, with the surface layer at 4.5–6.0 pH, subsoils at 5.1–6.0 and underlying soils at 5.6–6.0. Permeability is moderately rapid with low water capacity. Runoff is medium and erosion hazard is slight.

Sadie gravelly loam, 0-35 percent slopes – This moderately deep, moderately well drained soil occurs on hills. It formed on glacial till and is underlain by dense compact glacial till. Below the duff layer is 4 inches of dark brown gravelly loam 4 inches thick, underlain by a subsoil of 26 inches of dark yellowish brown gravelly loam 26 inches deep. Glacial till occurs from a depth of 30 inches, extending an additional 25-40 inches. Bellingham, Lyre, Schnorbush and Palix soils may be included in this soil type. Permeability of this Sadie soil is moderate to the compact glacial till and very slow through it. Runoff is medium as is available water capacity. Erosion potential is slight. This soil is somewhat acid with a 4.5- 5.5 pH in the top 4 inches and 5.1–6.0 below that.

Bellingham silty clay loam – This very deep, poorly drained soil is in basins and on low terraces. It formed in alluvium. Typically the surface layer is very dark gray silty clay loam, 9 inches thick, underlain by dark gray silty clay. Permeability of this soil is slow, available water capacity is high, runoff is slow and hazard of water erosion is slight. Rooting depth can be limited by a seasonally high water table one foot below the surface. The surface pH varies from 5.6–6.5 and the subsoil pH varies from 6.1–7.3 according to SCS 1987.

Mukilteo muck - This is a very deep very poorly drained soil in basins, terraces and valleys. The mapped unit lies west of the Site, within the Sadie Creek drainage. The soil is highly organic with a black 10 inch deep surface layer and a reddish brown organic sub-layer, up to 60 inches deep. Permeability of this soil is moderate, with high available water capacity. Effective rooting depth is limited by high water table near the surface from October through May. Runoff is ponded and erosion hazard is slight. pH ranges from 4.5–5.0 in the surface 10 inches, and 4.5–5.5 below that depth.

Terbies very gravelly sandy loam: 30–65, 65–85 percent slopes. This deep, well drained soil occurs on mountainsides. These soils formed in residuum and colluvium derived from sandstone, siltstone and conglomerate. These soils have moderate permeability and medium runoff, with severe erosion hazard. pH ranges from 5.1–6.5 in these soils. These soils are found on the steep hillsides to the south of the proposed Shooting Range.

On-site investigation using a number of soil test pits indicates that these soils are present on the Site roughly as mapped by SCS (1987). A gravel pit is present south of the entry road which reveals a general soil profile at the Site similar to Sadie soils. Forest soils north of the road are indicative of Sadie or Lyre soils depending on location. Some areas of Bellingham soils are located near the fringes of the range where wetlands have been previously mapped. Soils were tested for acidity at three locations as shown in Figure 4 and Appendix B.

2.3 VEGETATION

Vegetation at the Site is mainly a second growth forest dominated by Douglas fir (*Pseudotsuga menziesii*). Lesser amounts of Western hemlock (*Tsuga heterophylla*), Western red cedar (*Thuja plicata*) and Sitka spruce (*Picea sitchensis*) are present. Understory shrubs include Red elderberry (*Sambucus racemosa*) salal (*Gaultheria shallon*), sword fern (*Polystichum munitum*) and bracken fern (*Pteridium aquilinum*) in relatively dry areas. Western red cedar (*Thuja plicata*) or Red alder (*Alnus rubra*), with an understory of salmonberry (*Rubus spectabilis*) can be found in some of the wetter areas.

Critical Areas on the Site (wetlands and streams) have been mapped in a preliminary fashion by Mr. Dave Lasorsa of Clallam County Public Works Department. He found a number of small stream channels and several wetlands which impinged upon the previously proposed 1,000 yard range and one wetland near the end of the 300 yard range. Now that the 1,000 yard range has been dropped from consideration and the 300 yard range has been realigned and slid eastward and turned about 20 degrees parallel to the road (approximately 200 feet east and rotated to avoid wetlands (PNSPA 2009)), along with the 100 and 200 yard ranges, these wetlands do not appear to be adjacent to the ranges based on an on-site walkover of the area. Whether the range features lie completely outside of the wetland/stream buffer zones has not yet been determined. Such determination will require a more detailed design and field flagging by the applicants prior to the permitting process so that accurate measurements to critical areas can be made.

2.4 HYDROLOGY

Soils at the range location are generally deep and moderately well drained (or better). Only the Sadie soils over-lie glacial till, creating potential horizontal groundwater movement at the sub-soil/till interface for these soils. In the Lyre soils, groundwater will tend to percolate deeply into the soil. In the Bellingham and Mukilteo soils, water will tend to remain near the soil surface, suspended in the organic-silt-clay mix, thus forming very high seasonal water tables.

In general, the soils present appear to be more acidic near the surface. Surface soil acidities are as follows, according to SCS (1987):

Lyre	pH = 4.5–6.0
Sadie	pH = 4.5–5.5

Where the neutral range is normally identified as 6.0–8.0. These are the two main soil types at the present range location. This acidity may have a varied effect on the solubility and transport of metals in the range area (see Chapter 3.0). Actual acidity has been measured at three points near the road (surface (4-6 inch) and depth (18-24 inch) measurements with resulting pH ranges between 5.0 and 5.6 (see Figure 4 and Appendix B).

The existing gravel pit on the Site is apparently within the Sadie soil area, as it has impounded an amount of water which appears to drain slowly over a several day period, while also decreasing through evaporation. Soil acidity has been tested in areas near the road as described above and in Chapter 3.0.

The US Environmental Protection Agency (USEPA) suggests that optimal pH for a shooting range is 6.5–8.5 (USEPA 2005). Clearly the soils on the Site are all more acidic than that range and use of this site will therefore require initial soil treatment as well as a continuing periodic treatment program.

Depth to groundwater probably varies considerably between the different soil types. In the main area of the gun-range, summer groundwater levels appear to be in the 20-50 foot range (relatively shallow) in the less well drained soils. Groundwater depth (perched water table) during winter months is probably near the surface since much of the forested surface area is honeycombed with near-surface channels (6-12 inches in depth) which in their natural state will drain slowly to nearby wetlands. Grading for installation of the gun-range would eliminate these channels in the range areas, requiring that surface water be re-routed to engineered groundwater infiltration areas.

3.0 CONTAMINATION ISSUES

3.1 POTENTIAL FOR LEAD CONTAMINATION

Lead shot has long been known as a potential environmental contaminant. In the U.S., lead has been removed from many other substances including gasoline, break pads, glassware, paints, etc. However, while non-lead shot has been required in waterfowl areas since the 1990s, required changes in upland hunting and pistol and rifle shot have not been mandated in most jurisdictions. While alternatives to lead shot exist for most firearms, these are generally more expensive, can cause safety or maintenance problems, and may still consist of some toxic components.

Lead is not considered a hazardous waste under federal RCRA regulations. Lead can be recycled and is considered a scrap metal which can be reused. If it is not recycled, however, court cases have found lead to be a hazardous material under CERCLA, requiring cleanup. State MTCA regulations can also be invoked to clean up lead which is not recycled or which is higher than certain levels in soil or groundwater.

Lead bullets are generally composed of lead with small amounts of arsenic and nickel. Other types of shot are bismuth-tin, steel, tungsten-iron, tungsten-steel, tungsten-polymer and tin. Lead and non-toxic alternatives are also often available in plated or jacketed forms (generally copper jackets). Some of these alternatives do not perform ballistically as well as lead. Others are of limited availability or very expensive (see Table 2).

Lead is toxic to humans. The exposure routes are ingestion, dermal contact and inhalation. Lead can be ingested through small particles attached to soil or dissolved in water. Soluble lead can be adsorbed through the skin and very small particles and fumes can be inhaled. Inhalation can occur at the firing positions on a range, however, adequate ventilation generally mitigates this to well below normal risk exposure. Dermal contact with adults is usually also very low, although those involved with reprocessing or reloading activities should try to minimize contact, through use of gloves, etc. Ingestion generally does not occur in adults at shooting ranges, provided there is no contamination of drinking water sources and proper hygiene procedures are followed (e.g., proper hand washing after firing and before eating) (USEPA 2005).

Lead is also toxic to wildlife, mainly when ingested. Exposure of waterfowl to lead shotgun shot has caused substantial deaths of ducks, geese and swans, leading the federal government to ban lead shot in waterfowl hunting areas in 1991 (USGS 1999). Some states and organizations are now looking into effects of lead shot on upland birds (grouse, pheasant, bald eagles and other raptors, shorebirds etc.) and some research is occurring on mammals.

Little is known about effects of lead on reptiles, amphibians, or fish (Rattner et al 2008, Goddard et al 2008), although alligators have been studied and were found to be susceptible if they ingested shot fed to them (Goddard 2008). The major risk to fish and

wildlife is through direct ingestion. While fish are known to ingest sinkers, jigs and hooks made of lead, ingestion of lead shot has not been demonstrated (Goddard 2008), and mortality in fish appears to be more related to injury, blood loss, exposure to air and exhaustion rather than the lead toxicity that affects warm blooded animals (USGS National Wildlife Health Center 2009).

3.2 MOBILITY FACTORS FOR LEAD

Lead as a metal can be bound in a rather inert form within a crystalline metallic form or it can oxidize or otherwise react with a wide variety of other elements and compounds (the CRC Handbook of Chemistry and Physics lists over 200 lead compounds (Lide 1994)). Metallic lead can reach the environment through contact with air (oxidation), or acidic water or soil (USEPA 2005). Decreases in acidity in water or soil can result in lead precipitating out of solution or simply not dissolving. Increases in contact time with water and soil tend to cause increases in lead concentration, particularly under acidic conditions. USEPA indicates the following factors affect the degree which lead can become soluble and move through the environment:

Annual Rainfall and Intensity: Higher annual rainfall can increase the contact time of water with lead. Higher intensity tends to increase runoff velocity and adds to the chance that lead or soluble lead compounds will be carried off-site.

Topographic Slope: While very flat areas may result in ponding and subsequent contact of lead with water, low slopes are preferable, because they result in slow runoff of soluble lead and increased chance of retaining stormwater on the site and of lead being deposited in slow-flowing areas. Increased slopes increase the velocity of stormwater and make it more difficult to control.

Clay vs. Sandy Soils: Lead adheres well to most clay soils which have a high ionic bonding capacity for metals. While lead will move large distances through quartz sand (in solution), the presence of other organic materials (such as calcium fragments from shellfish) can limit the migration distances of dissolved lead to a few feet (USEPA 2005).

pH of Surface Water and Groundwater: Lead will become more soluble under acidic conditions (below pH 7.0. It is very non soluble under alkaline conditions above pH 7.5). pH can be adjusted by approximately 1.0 unit per 10,000 pounds of dolomite lime per acre (Clallam Conservation District 2009).

Vegetative Cover and Man-made Structures: Increases in organic matter in soils limits the ability of lead to disperse by decreasing solubility and increasing binding and uptake of lead. Grass and other low-lying vegetation reduce runoff velocity and act a filter to remove suspended solids from water and soil.

The chemical characteristics of lead, coupled with the physical characteristics listed above, form the basis for a series of “Best Management Practices” (BMPs) for shooting ranges which have been promulgated by the USEPA (USEPA 2005). These measures, applied to the proposed Sadie Creek Site are further discussed in Section 3.5 of this report.

3.3 ALTERNATE TYPES OF SHOT

Lead is used for shot because of its characteristics for high density, ballistics and deformation upon hitting targets. It is also mined in large quantities in the United States and is relatively inexpensive. Other types of shot have been developed as shown in Table 2, adapted from the USEPA Report on Best Management Practices (USEPA 2005). More recent publications indicate that bismuth appears to be a type of non-toxic shot preferred by shooters, however, the use of bismuth shot will still depend heavily on relative price, since it tends to be 3-4 times as expensive as lead shot.

Lead shot also usually contains trace amounts of arsenic (Durborow 1998). Both compounds are toxic. In an effort to reduce toxicity, many government agencies have banned lead shot from aquatic areas and some are considering bans from upland areas due to the presence of game-birds or predator/scavengers such as bald eagles.

Bismuth shells are similar to lead in terms of ballistic performance, but much higher in cost and less available. Steel is the main suggested replacement shot for lead since it is less than twice as expensive and is comparable in ballistic performance at short distances with minor corrections at longer distances.

Tungsten may be alloyed with Iron and is as hard as steel shot. It can be substituted for lead shot, often with equal effectiveness. New polymers are also being developed for use with tungsten. Molybdenum and zinc are also being researched as possible new substances to utilize in shot (USEPA 2005).

3.4 OVERVIEW OF POTENTIAL BMPs

USEPA recommends consideration of a large array of BMPs in the design of a shooting range. Specific physical, chemical and biological conditions can then be used to select the most effective BMPs. In this section, we will discuss the range of BMPs from the USEPA Manual (USEPA 2005). The following section will narrow that group to those BMPs which may be effective at the Sadie Creek Site.

BMPs should first be selected and analyzed during the consideration of engineering feasibility. Physical, chemical and biological characteristics for the site (see Table 3) determine the degree of impact and the feasibility for mitigation (including BMPs).

TABLE 2. SUMMARY OF LEAD SHOT ALTERNATIVES* (Adapted from USEPA 2005, Appendix B)

Shot Material	Approximate Cost per 25 Round Box (EPA 2005)	Ballistic Performance	Availability	Comments
Lead	<p>\$5.00/ box</p> <p>\$3.00 - \$4.00 per box of reloaded shells</p>	<p>Standard to which all alternatives are compared</p>	<p>Readily available</p>	<p>Lead is heavy and malleable</p>
Bismuth*	<p>Bismuth shells are packed in 10 round boxes at \$15.00 - \$25.00 per 10 round box</p>	<p>Similar to lead</p>	<p>Limited world supply of bismuth</p>	<p>Bismuth is a byproduct of lead and gold mining used in shotgun shot.</p> <p>The addition of tin makes bismuth more malleable and reduces frangibility.</p> <p>Bismuth shot is safe to use in older firearms</p>
Steel	<p>\$8.00 - \$12.95 per box</p> <p>\$6.00 per box of reloaded shells</p> <p>\$15.00 per box (copper-plated)</p>	<p>In test performance by the Cooperative North American Shotgun Education Program (CONSEP) in hunting situation, no significant differences were found between lead and steel shot at reasonable distances. Lead is more effective at longer ranges</p>	<p>Readily available from both domestic and imported sources</p>	<p>Steel shot is about 33 percent lighter than lead. Therefore, the initial velocity must be increased so that downrange pellet energy remains similar. In hunting situations, larger heavier steel shot is used.</p> <p>Shooter perception that steel will adversely affect guns and scoring is the limiting factor in acceptance of steel shot for target shooting. It may damage older guns. It may also ricochet more and can embed in trees.</p>

TABLE 2. SUMMARY OF LEAD SHOT ALTERNATIVES* (Adapted from USEPA 2005, Appendix B) (continued)

Shot Material	Approximate Cost per 25 Round Box (EPA 2005)	Ballistic Performance	Availability	Comments
Tungsten/iron* 40% tungsten/60% iron	\$62.50 per box (tungsten/iron shots are packed in 10 round boxes at \$25.00 per 10 round box)	Tungsten/iron is as effective as lead shot. However, the amount of shot in each cartridge is significantly less than in typical lead or steel cartridges. The density of tungsten/iron is 94% that of lead	Readily available	The tungsten/iron shot currently available is harder than steel. It would therefore, cause similar damage to older guns
Tungsten/polymer* Various manufacturers have received final approval from the USFWS to market this type of shot	Not available yet (2005)	Comparable to tungsten/iron	Currently not available (2005)	This shot is more malleable than the tungsten/iron alloy and would therefore, be less damaging to shotguns. A R&D company has developed a tungsten/polymer material as a substitute for lead. This material has been tested by the US Army in projectiles, but has not been used to manufacture shot
Tungsten/steel Same as tungsten/iron	See above	See above	See above	See above

TABLE 2. SUMMARY OF LEAD SHOT ALTERNATIVES* (Adapted from USEPA 2005, Appendix B) (continued)

Shot Material	Approximate Cost per 25 Round Box (EPA 2005)	Ballistic Performance	Availability	Comments
Tin USFWS granted temporary approval for 1999-2000 hunting season	Not available yet (2005)	Since tin is just being developed as an alternative to lead, performance information is not yet available. However, since the density of tin is less than steel, performance may be less effective than steel	Currently not available (2005)	This material is just being developed as a lead shot alternative. However it has similar problems as steel in that it is lighter than lead. The International Tin Research Institute in England is developing this product

*Approved by USFWS for migratory waterfowl hunting.

TABLE 3. COMMON PHYSICAL CHARACTERISTICS AT RANGES – POTENTIAL RISKS AND BENEFITS ASSOCIATED WITH RANGE OPERATIONS (Adapted from USEPA 2005)

Physical Characteristics	Potential Risk to Environment	Potential Benefits in Preventing/Managing Contamination
Clay, acidic soils	<p>Acidic soils contribute to lead dissolution increasing the potential for lead contamination</p> <p>May increase runoff</p> <p>Difficult to reclaim lead via sifting/raking</p>	<p>May impede percolation of water through contaminated soil</p> <p>Binds “free” lead ions</p> <p>May benefit growth of vegetative covers</p>
Sandy, alkaline soils	<p>Contaminated rainwater can easily percolate through soil and groundwater</p> <p>Extremely alkaline soil will not support vegetation</p>	<p>Alkaline soils may inhibit lead dissolution</p> <p>Easier to reclaim lead via sifting/raking</p>
Sandy, acidic soils	<p>Acidic soils contribute to lead dissolution, increasing the potential for lead contamination</p> <p>Contaminated rainwater percolates quickly through sand soils</p>	<p>Easier to reclaim lead via sifting/raking</p>
Steep rolling terrain	<p>May promote off-site drainage or drainage to on-site surface water bodies</p> <p>Can impede reclamation of expended shot via raking</p>	<p>None</p>
Flat terrain	<p>Rainwater may “pond” in areas, promoting lead dissolution and contamination</p>	<p>Expended shot easily recovered</p> <p>Off-site drainage minimized</p>

**TABLE 3. COMMON PHYSICAL CHARACTERISTICS AT RANGES – POTENTIAL RISKS AND BENEFITS
ASSOCIATED WITH RANGE OPERATIONS (Continued)
(Adapted from USEPA 2005)**

Physical Characteristics	Potential Risk to Environment	Potential Benefits in Preventing/Managing Contamination
Wooded areas	May impede lead reclamation activities making equipment difficult to maneuver	None
On-site or contiguous surface water bodies	VERY high potential for contamination when shot fall zone is located over or adjacent to water; increased wildlife exposure; increased lead dissolution.	None
Vegetation	Lead may be absorbed into grasses, other wildlife food sources	Ground covers slow down surface water run-on and run-off Some vegetation can extract lead ions from the soils

BMPs are more than a list of practices. They should form a system of control, containment, removal and cleanup which minimizes pollution and other related potential impacts on the environment. This can be thought of as a five step process:

Step 1 – Control and Contain (bullets and shot)

Step 2 – Prevent Migration (chemically immobilize lead, control runoff)

Step 3 – Remove and Recycle (separating, recycling)

Step 4 – Periodic Cleanups and Final Cleanup

Step 5 – Document Activities and Record Keeping

Each of these activities is discussed in more detail below and key BMPs are summarized in Table 4. These BMP steps are based on the premise that some lead shot will be used at the facility. If other types of shot are used, alternate approaches to BMPs may be appropriate, however, almost all metals have some toxicity threshold, so the main approaches still may be useful.

Step 1 – Control and Contain

Bullet containment is generally oriented toward various absorbing surfaces or traps located behind the targets. Earthen backstops and shock absorbing concrete are often used for bullet containment. Traps include sand traps, steel traps, lamella or rubber granule traps. Other, more complex bullet traps are available or can be designed for specific purposes, including recycling, depending on site conditions. Shot containment strategy is generally to limit firing angles (sometimes through use of awnings or other control devices near the firing positions) and to thereby limit the size of shotfall zones.

All BMPs which limit shooting angles should be designed to minimize the risk of ricochet. Impermeable surfaces are sometimes recommended near firing positions to catch lead dust that may result from primers.

Step 2 – Prevent Migration

The strategy in this step is mainly to keep lead from moving to or leaching into surface or groundwater. Lead can be prevented from dissolving into water through monitoring pH and adjusting acidity through addition of lime, phosphate and/or organic materials. Runoff can be controlled through engineered structures (such as pipes, infiltration trenches, filters, detention ponds, etc.). During detention or controlled flow, chemicals can be added to water to form lead precipitates which can then be physically removed. Alternatively, plantings of grass and/or shrubs can be used to slow stormwater flow and provide the basis for binding lead to soils or vegetation.

TABLE 4. SUMMARY OF KEY BMPs
(Adapted from USEPA 2005)

Monitoring and Adjusting pH		
BMP Option	Advantage	Disadvantage
Lime spreading	<ol style="list-style-type: none"> 1. Easy 2. Inexpensive 3. Effective 	<ol style="list-style-type: none"> 1. Does not offer a permanent solution 2. Will not work in extremely acidic conditions
Immobilizing Lead		
BMP Option	Advantage	Disadvantage
Phosphate spreading	<ol style="list-style-type: none"> 1. Easy 2. Inexpensive 3. Effective 	<ol style="list-style-type: none"> 1. Does not offer a permanent solution
Controlling Runoff		
BMP Option	Advantage	Disadvantage
Vegetative groundcover (e.g., grass, etc.)	<ol style="list-style-type: none"> 1. Easy 2. Aesthetically pleasing 3. Relatively inexpensive 4. Effectively slows and can redirect runoff 5. Some may "bioabsorb" lead 	<ol style="list-style-type: none"> 1. Requires periodic maintenance 2. Must be removed or reduced prior to reclamation 3. Excessive vegetation will interfere with reclamation
Organic surface cover (e.g., mulch and compost)	<ol style="list-style-type: none"> 1. Easy 2. Aesthetically pleasing 3. Relatively inexpensive 4. Effectively slows and can redirect runoff 	<ol style="list-style-type: none"> 1. Requires periodic maintenance 2. Must be removed or reduced prior to reclamation 3. Excessive vegetation will interfere with reclamation

**TABLE 4. SUMMARY OF KEY BMPs
(Adapted from USEPA 2005) (continued)**

Controlling Runoff (continued)

BMP Option	Advantage	Disadvantage
Filter beds	<ol style="list-style-type: none"> 1. Diverts and treats lead contaminated runoff 2. Low maintenance 3. Assists with range drainage 	<ol style="list-style-type: none"> 1. May require hiring a licensed engineer 2. Higher initial setup cost
Water/sediment traps	<ol style="list-style-type: none"> 1. Low maintenance 2. Assists with range drainage 	<ol style="list-style-type: none"> 1. May require hiring a licensed engineer 2. Higher initial setup cost
Dams and dikes	<ol style="list-style-type: none"> 1. Low maintenance 2. Assists with range drainage 	<ol style="list-style-type: none"> 1. Higher initial setup cost
Ground contouring	<ol style="list-style-type: none"> 1. Lower initial setup cost 2. Assists with range drainage 	<ol style="list-style-type: none"> 1. May require hiring a licensed engineer

Controlling and Containing Bullets

Bullet Containment Devices

BMP Option	Advantage	Disadvantage
Earthen backstop	<ol style="list-style-type: none"> 1. Minimal (if any) initial setup cost 2. Accepts firing from various guns and directions 	<ol style="list-style-type: none"> 1. Build up of bullets increases chances of ricochet and fragmentation problems 2. Lead removal requires mining' 3. Potential decreased value of lead because it is less clean than lead reclaimed from other trap systems 4. Does not eliminate lead's introduction into the environment

TABLE 4. SUMMARY OF KEY BMPs
(Adapted from USEPA 2005) (continued)

Bullet Containment Devices (continued)

BMP Option	Advantage	Disadvantage
Sand trap	<ol style="list-style-type: none"> 1. Low initial setup cost 2. Ease of maintenance 3. Accept firing from various guns and directions 	<ol style="list-style-type: none"> 1. Build up of bullets increases chances of ricochet and fragmentation 2. Lead removal requires mining
Pit and plate trap (sand)	<ol style="list-style-type: none"> 1. Low initial setup cost 2. Simple installation 3. Lead removal and recycling requires less extensive mining 	<ol style="list-style-type: none"> 1. Lead builds up on top layer of sand causing ricochet problems 2. Increased bullet fragmentation 3. Higher level of maintenance than sand traps
Escalator trap (steel)	<ol style="list-style-type: none"> 1. Can be used indoors and outdoors 	<ol style="list-style-type: none"> 1. Deflection plates require regular oiling. The oil is hazardous and can easily migrate at outdoor ranges 2. Relatively high maintenance 3. Poor lead collection because the bullets may become clogged at the spiral collection area at the top of the deflection plate 4. Increased bullet fragmentation 5. May require rubber curtains to be placed in front of the trap to slow bullets 6. More noise 7. Possible creation of lead dust
Vertical swirl (steel)	<ol style="list-style-type: none"> 1. Can be used indoors or outdoors 2. Bullets are captured in pure form in containers, thus removal and recycling is easy 	<ol style="list-style-type: none"> 1. Does not accept shooting from all directions 2. Corners where each unit meet can cause ricochet and fragmentation problems 3. More noise 4. May create lead dust

TABLE 4. SUMMARY OF KEY BMPs
(Adapted from USEPA 2005) (continued)

Bullet Containment Devices (continued)

BMP Option	Advantage	Disadvantage
Wet passive bullet trap (steel)	<ol style="list-style-type: none"> 1. Can be used indoors and outdoors 2. Excellent results (i.e., low ricochet, low fragmentation, ease of removal) 3. Bullets are captured in containers, thus removal and recycling is easy 	<ol style="list-style-type: none"> 1. Expensive 2. Oil and water mixture is hazardous 3. More noise
Lameilla trap	<ol style="list-style-type: none"> 1. Can be used indoors or outdoors 2. Reduction of lead dust 	<ol style="list-style-type: none"> 1. Rubber strips quickly become destroyed and must be replaced 2. Potential fire hazard 3. High maintenance 4. Scattered lead fragments mixed with rubber can migrate; lead contaminated granules are hazardous and require special handling
Rubber granule	<ol style="list-style-type: none"> 1. Can be used indoors or outdoors 2. Reduction of lead dust 3. minimizes fragmentation, compares with some backstops 	<ol style="list-style-type: none"> 1. Rubber strips can quickly become destroyed and must be replaced. 2. Some pose potential fire hazard, although fire-retardant/resistant materials are available in some designs 3. High maintenance 4. Scattered lead fragments mixed with rubber can migrate; lead contaminated granules are hazardous and require special handling
Shock absorbing concrete	<ol style="list-style-type: none"> 1. Adaptable/ can be formed in any shape 2. Can be used to reduce erosion in soil berms/target emplacements 3. Crushed concrete can potentially be recast after fragments removed 	<ol style="list-style-type: none"> 1. Mechanical lifting and handling equipment must be used during installation and maintenance 2. High maintenance (replacement) costs

**TABLE 4. SUMMARY OF KEY BMPs
(Adapted from USEPA 2005) (continued)**

Removal and Recycling of Lead

BMP Option	Advantage	Disadvantage
Hand raking and sifting	<ol style="list-style-type: none"> 1. Easily done by club members 2. Inexpensive 3. Can be done outside operating hours 4. Relatively effective 	<ol style="list-style-type: none"> 1. May be more time consuming at large ranges 2. Weather sensitive (i.e., works best under dry conditions) 3. Exposure to lead and lead dust possible
Screening	<ol style="list-style-type: none"> 1. Effective 2. Potential economic returns 	<ol style="list-style-type: none"> 1. Vegetation must be removed 2. Weather sensitive (i.e., works best under dry conditions)
Vacuuming	<ol style="list-style-type: none"> 1. Effective 2. Can be used at least accessible ranges 3. Less vegetation needs to be removed 	<ol style="list-style-type: none"> 1. Weather sensitive (i.e., works best under dry conditions)
Soil washing	<ol style="list-style-type: none"> 1. Effective at cleaning the soil to remove the lead particles 	<ol style="list-style-type: none"> 1. Vegetation must be removed

The simplest and most effective method of changing soil pH appears to be the addition of dolomite lime. About 10,000 pounds per acre is recommended by the Clallam Conservation Service to raise the pH by 1.0. Proportional amounts can raise lime levels up to near the neutral range (6.3–6.8) and possibly beyond, however, amounts are not well established to raising pH above about 7.0. Lime re-applications are generally necessary annually or bi-annually, however, lesser amounts are necessary to keep the pH stabilized than the initial treatment to change the pH.

Step 3 – Remove and Recycle

Lead shot can be removed from sand traps or loose earthen berms by hand raking and sifting, mechanical screening, vacuuming, soil washing and similar methods of extraction. Lead Reclaimer's may be available to come to the Site for periodic recycling. If lead is separated and stored for recycling, laws regarding scrap metal storage and potentially hazardous materials regulations come into play at both the state and federal levels. Court cases have found, however, that lead that is intended for recycling is a scrap metal and not a hazardous waste under the federal Resource Conservation and Recovery Act.

Recovery Act (RCRA), although there may be notification requirements for workers and the public under CERCLA regulations.

Step 4 – Periodic and Final Cleanup

If a Range Site is well designed, lead shot can be collected as part of an on-going program associated with range operations. It can be stored for a period of time (depending on quantity) and then taken off-site for recycling, either by the Site Managers (to an approved recycling facility) or by a hired reclamation or recycling firm. If this is done regularly and thoroughly, soil which serves as traps, berms, etc., will only build up lead concentrations very slowly. Periodically, however, this material should be changed out and taken for off-site recycling and/or disposal as mandated by state and federal regulations. Upon range closure, all soils exposed to significant lead contamination should be cleaned or properly disposed of.

Step 5 - Document Activities and Record Keeping

A wide variety of records will need to be kept in order to comply with state and federal regulations for metals, potentially hazardous materials, worker and public safety and the effectiveness of the BMPs used. Ideally a range should first prepare an Environmental Stewardship Plan or similar plan which outlines which BMPs will be used and how the range intends to control potential pollution sources. Operational data should include numbers or estimates of rounds expended at the various ranges, weight or volume of recycled metals stored for pick-up, and dates lead is picked up by recyclers. Periodically (probably annually), the effectiveness of the BMPs should be evaluated based on this data. In the event that BMPs appear ineffective, monitoring of soil and/or water on or near the Site may be necessary.

The specific BMPs listed in Table 4 are representative of BMPs that could be used at the Sadie Creek Site, but are not site specific designs. This five step process should be used at the Sadie Creek Site to select the optimal BMPs for the Site, including the engineering and design of recycling programs and stormwater control systems specific to the Site.

3.5 POTENTIAL FOR CONTAINMENT OR MITIGATION NEAR CRITICAL AREAS

The proposed Sadie Creek Site (320 acres) contains critical areas including wetlands and stream headwaters. The shooting range infrastructure, however, has been redesigned to avoid these critical areas and to some extent their buffer zones. A previously proposed 1,000 yard rifle range has been removed from the project proposal. The locations for that range did impact several wetlands and stream channels as identified by Dave Lasorsa of the County's Public Works Department in a preliminary critical areas field assessment (Lasorsa 2005). Westech field-verified the main features of the Lasorsa report and agree with its findings. Changes in the proposal, however, have occurred since the time the Lasorsa report was issued (1,000 yard range and shotgun range have been dropped, rifle ranges realigned), thus changing mitigation measures required to off-set impacts.

It appears that the wetlands are at least 150 feet from the end of the 300 yard range, and within about 200 feet of a stream channel (this may or may not correspond to the required wetland buffer), that the realignment of the ranges has resulted in reduced potential impact on the wetlands and streams. Possibly reversal of the 200 and 300 yard ranges would result in an even larger setback from the critical areas. This would allow additional area for containment features or infiltration/detention features if these are recommended mitigation.

3.6 LEAD CONCENTRATIONS AT OTHER RANGES AND POTENTIAL MITIGATION

Mitigation measures and their effect on lead concentrations are not well documented in a variety of recent studies in western Washington. Other areas have seen some documentation. One study has indicated that while lead bullets corrode, the lead binds with the corrosion products and is essentially immobilized, however, the physical conditions for this effect are not completely clear (as per a Virginia Tech study by Professors Donald Rimstidt and James Craig – as reported in Science Daily (2003) <http://www.sciencedaily.com/releases/2000/11/001129074745.htm>).

Some shooting ranges (such as the Frailey Mountain/Coyote Ridge site in Skagit County) have not been permitted, while the existing Plantation Rifle Range in Whatcom County was established in 1971 and has continued to expand up through the 1990's. Other ranges are in final permitting stages (e.g., Clark County) and appear likely to be successfully permitted.

Opponents of the Sadie Creek Site have observed that recent tests for lead by DOE at one historical range at Salt Creek found extreme concentrations of lead (over 37,000 mg/kg or ppm) according to Clallam County Health Department, however, this was the highest of eight readings, five of which were below detection limits and only one other of which exceeds lead cleanup limits (615 mg/kg compared to the 250 mg/kg unrestricted cleanup limit). These high readings were probably taken near the target areas.

Another operational range, the Sunnydell Range at Dryke Road has lead concentrations in the tens of thousands (two samples out of four were 77,800 mg/kg (ppm) and 46,000 ppm, all well above the residential cleanup level of 250 ppm. Polycyclic Aromatic Hydrocarbons (PAHs), carcinogenic compounds were also found at concentrations higher than state cleanup standards under the Model Toxic Control Act (MTCA). This range includes both shotgun and pistol ranges. The targets for the shotgun range are the probable source for PAHs. There is an underground rifle range, which presumably was not sampled. DOE reports do not document use of BMPs at this range.

Soil analysis has also been performed at the Index Sportsman's Club in Index (Snohomish County), Washington. These tests were fairly thorough and included total and leachable lead. Concentrations ranged from below 250 mg/kg (generally from 6-60 mg/kg) for 18 out of 23 samples, to five samples over 2,000 mg/kg with a high of 58,100. Leachable lead levels ranged from 0.00336 mg/L to 1.15 mg/L, with the highest corresponding to a total lead concentration of 7,140 mg/kg. It should be noted that this range is primarily a shotgun range with no recycling or BMPs used historically. The range proponents are attempting to implement BMPs and Stewardship and have produced an Environmental Stewardship Plan (ISC 2006).

Sampling of the SSNW Range on the Miller Peninsula indicated high levels of lead near the targets, with six out of seventeen samples being above the unrestricted land use (MTCA) level of 250 mg/kg for lead cleanup. The highest concentration was 52,900 mg/kg. In that report, USEPA's contractor concluded that the SSNW Site "is not a significant source of soil contamination and has not impacted groundwater" (TechLaw 2008b).

As stated above, the sampling performed by DOE on two ranges in Clallam County and an USEPA contractor on a nearby range in Jefferson County indicates that certain areas on ranges can become substantially contaminated with lead shot and bullets. BMPs and recycling were not known to be used at the Salt Creek range.

Determination of the effectiveness of mitigation measures would require monitoring of background levels, measurements of concentrations prior to range opening at a number of locations (including several subsurface depths), and continued measurements at areas well protected by mitigation measures and other areas with different (less effective) mitigation measures. Such monitoring programs can be costly, however, finding the most effective BMPs can save the range operators considerable funds over time.

4.0 ENDANGERED SPECIES

Priority species within 2.0 miles of the Site include; marbled murrelets (*Brachyramphus marmoratus*), spotted owls (*Strix occidentalis*), the Northern goshawk (*Accipiter gentilis*) and several species of salmonid fish. Of these species, marbled murrelets and spotted owls are listed as threatened species.

4.1 MARBLED MURRELET HABITAT

Marbled murrelets are a federally threatened species under the Endangered Species Act. The birds nest in old growth forest habitat, but spend considerable time during their life cycle feeding in coastal marine waters. During nesting periods, the birds “commute” between old growth nest sites and the coast. The Sadie Creek Site is shown to be about 1.2 miles from known active nest sites according to a DNR map, but well outside the 0.25 mile nesting buffers shown on that map. WDFW Priority Habitat and Species maps show the nearest murrelet occupancy site to be at the same location, however this map has larger buffers (1.5 miles) which overlap the Site. On these maps, the entire Site area is listed as a marbled murrelet buffer habitat area – WDFW status 1-3 and buffer status 1-4.

4.2 SPOTTED OWL AND OTHER BIRD, MAMMAL, REPTILE, AMPHIBIAN HABITAT

The nearest spotted owl site is located approximately 1.5 miles south of the Site (on the south slope of relatively high ridge, along Boundary Creek) The Site lies within a Spotted Owl Management Circle Established Territory. The Site is second growth forest, with many adjacent logged areas. It is not likely to provide spotted owl habitat which is old growth forests.

Northern goshawk (*Accipiter gentilis*) is listed as having a nest and breeding site approximately 1.5 miles south of Site. This bird species is a State Candidate Species and Federal Species of Concern. The nest and breeding site are south of the ridge on the south side of the project.

4.3 SALMONID HABITAT

WRIA 19 comprises the Water Resource Inventory Area (WRIA) from the Lyre River, west to the Sail River. The major study for limiting factors (Smith 2001) lists major coho spawning areas on the East and West Twin Systems (below RM 3.4 on the East Twin). The study indicates that steelhead utilize creeks west of these systems but does not specifically mention them in the East Twin (or Sadie Creek system).

The NOPLE (2001) report lists a depressed and declining population of fall coho salmon, a critical and declining population of fall chum, a depressed and declining population of winter steelhead and an unknown population of cutthroat trout for the East and West Twin systems.

The East Twin River is listed by WDFW as having fall chum salmon, coho salmon, winter and summer steelhead. These are also found in the Sadie Creek System.

Clallam County (2004) in their State of the Waters 2004 Report listed water quality conditions in the East and West Twin Rivers as "Compromised/Impaired". Although water quality conditions were rated as "healthy" at sampled stations, little biological data existed at that time (for invertebrates and fish). Habitat concerns included impacts from past and present watershed alterations, road construction (sediment input to streams), lack of sufficient large woody debris (LWD) and impacts of estuarine habitat alterations.

Recently, a variety of salmonid restoration projects have been carried out in the East Twin, Sadie and Susie Creek drainages. These have included substitution of bridges for culverts and culvert improvement projects as well as large woody debris project. The success of some of these projects will be evaluated by studies of the East Twin (restored) and the West Twin (not restored) by monitoring by the Elwha Tribe, a variety of state and local agencies and volunteer groups (the Twin System has been designated an Intensely Monitored Watershed for this purpose by these groups).

The proposed project Site does not cross any known tributary of Sadie Creek. The rifle range is within the Sadie Creek drainage basin, but above the headwater stream channels and wetlands which feed the creek. Storm-water from the Site now drains toward the basin as surface and groundwater. Site development would clearly require control of stormwater on the Site. The pistol range drains mainly to Sadie Creek, although a portion may reach Susie Creek. The archery range area will also drain to Susie Creek.

5.0 CRITICAL AREAS

5.1 WETLAND LOCATIONS

Wetland locations near the Site were determined by Mr. Dave Lasorsa during July 2005. While this was a "Wetland Assessment" and not a full Wetland Delineation, Mr. Lasorsa appears to have taken quite a detailed look at wetland locations in the area. He describes wetland soils and plants and indicates that the Sadie Creek tributary known as "S1" in his report (see Figure 4) had salmonids present at the point near the (now discontinued) 1,000 yard range.

Mr. Lasorsa notes two possible stream headwaters (P1 and P7) near the west end of the shooting range proposal, but over 100 yards from the reconfigured rifle ranges. These were not encountered during Westech's field investigation of the range vicinity. A wetland area, located about 150 feet from the end of the new 300 yard rifle range location was found about 300 feet (100 yards) southwest of mapped wetlands P2 and P3. Wetland P5 and non-regulatory wetland locations designated as P6 were confirmed in the field as mapped by Lasorsa. Field conditions were also assessed south of P2 and P3 and found to be upland areas.

Lasorsa found a high groundwater table in the wetland areas which included standing water in dug pits during July. We found standing water in several areas of skunk cabbage during late May. Skunk cabbage, an obligate wetland plant which is found 99 percent in wetlands, was found to be a good indicator of wetlands. Due to relatively high annual rainfall (about 65 inches), other facultative plants (FAC) which can be found in upland or wetland situations such as alder and salmonberry proved to be poor indicators and should not be used to designate wetlands in this area without a significant percentage of species which require more water than a moist woodland environment (FACW plants) such as piggyback (*Tolmiea minziesii*) and obligate plants such as water-parley (*Oenanthe sarmentosa*).

5.2 STREAM LOCATIONS

The Lasorsa report found the stream labeled "S1" to be an important stream channel which is a Type 3 or "F" stream which contained salmonid fry during his July 2005 field investigations. This channel crosses the road and was observed in the field by Westech during a site reconnaissance. The shooting range has been realigned and the 1,000 yard proposal has been dropped so that the nearest portion of the rifle range is about 500 yards away. Two other potential small channels were marked, P1 and P7. P7, the closest to the range as currently planned is a least 300 feet (100 yards) from the end of the 300 yard range.

Lasorsa also noted that wetlands designated P4 and P5 appear to be the main headwaters of Sadie Creek, although he saw no distinct channels, but only small wetland drainages at these points. It appears that these increase in size and merge as they continue north, eventually developing a stream channel.

5.3 CRITICAL AREAS

Westech confirmed the wetlands close to the newly aligned 300 yard range. There were no wetlands found within 150 feet of this new range configuration, as flagged in the field. Altering the placement of the 200 yard and 300 yard ranges might allow increasing the distance from the wetland if necessary.

Lasorsa indicated that the wetlands may be Category I wetlands, however, no formal rating was conducted and no boundary Delineation was done. Both of these should be completed once the Range has been adequately flagged to determine distances from wetlands and streams and to determine if wetlands are within the buffer zones. Buffer zones for wetlands are likely to be 150 feet (for Category II wetlands) to 200 feet (for Category 1 wetlands).

Stream buffers can range from 100 feet for Type 3 streams to 150 feet for Class 1 and 2 streams. Perennial and seasonal non-fish bearing streams (Type NFP and NFS) would require a 50 foot buffer zone, however, the presence of fish in high tributaries near the range would argue that any well channelized stream in the vicinity should likely be considered as potentially fish-bearing.

6.0 SEPA ISSUES

6.1 PROJECT DESCRIPTION AND ALTERNATIVES

6.1.1 Background (Scoping Summary, Relevant Issues)

This proposed project is a public rifle, pistol and archery range located between the Sadie and Susie Creek watersheds on Forest Road 1050 in Clallam County, Washington. Relevant issues are described below.

6.1.2 Project Description-Proposed Action

The Site is intended as a public shooting range for rifle, pistol and archery. The Site will accommodate local law enforcement training as well as public use.

6.2 ALTERNATIVES

6.2.1 No Action Alternative

The No Action Alternative will result in no construction on this Site. Under this alternative the shooting range will not be constructed. Hunting and random shooting will continue to occur at this Site as well as throughout the County or citizens wishing target practice will utilize existing private ranges or public ranges in nearby counties. Local law enforcement training will continue to be constrained by existing range conditions.

6.2.2 Proposed Action Alternative

The proposed action will be to build the proposed shooting range as proposed. Use of Best Management Practices, an Environmental Stewardship Plan and a Lead Recycling and Reuse Plan will be among the requirements for obtaining permits for use of the Site.

6.2.3 Other Alternatives

There have been many alternatives proposed for a public shooting range in Clallam County. These alternatives should be documented and a SEPA analysis of some of these (the most feasible) or other reasonable alternatives must be made in order to comply with SEPA.

6.3 ISSUE STATUS FOR ELEMENTS OF THE ENVIRONMENT (Existing Conditions, Impacts and Mitigation)

PHYSICAL ENVIRONMENT

EARTH RESOURCES

Topography – Topographic modification will be minor, generally 3-5 feet, with 5-15 feet of modification in areas near the pistol range. This is a very minor issue.

Geology – Geologic formations will not be affected. This is a very minor issue.

Geologic Hazards – No significant geologic hazards are known. Steep slopes lie to the south but the Site itself is relatively flat. This is a very minor issue.

Soils – Soils will be affected by grading to a minor extent. Control of runoff and erosion will be major issues due to the potential for lead toxicity. Soil acidity and lead binding capacity will be major complex issues that must be addressed by BMPs used and Lead Recycling Systems to be developed prior to range permitting.

AIR RESOURCES

Climate – Climate will not be affected by the project. Site rainfall will be important in that it results in necessary control of surface and groundwater runoff. This is an issue which will be handled in the Water Resources sections.

Air Quality – Air Quality will be a minor issue on most of the Site. Lead contamination in air near the firing positions may be a moderate issue which requires some use of BMPs as well as planning and mitigation.

WATER RESOURCES

Water Quality – Water Quality will be a major issue in terms of lead, arsenic and other potential contaminants. Control of surface and groundwater runoff will key into this issue.

Water Resources – Water resources including streams and wetlands will be a moderate issue. While there do not appear to be critical areas adjacent to the range, setbacks appear to be near the standard buffer distances for the closest wetlands. This proximity will lead to questions as to the effectiveness of water control structures and release of water (even after mitigation measures and BMPs) to the streams and wetlands. This will be a major issue.

BIOLOGICAL RESOURCES

Sensitive, Threatened and Endangered (T&E) Species

This will be a moderate to major issue, mainly for marbled murrelets (threatened) and for priority salmon and steelhead, although formally endangered stocks of these species may not occur in this area. The area is being restored for certain salmon species and these stocks will be regarded as important for that reason.

Vegetation – This will be a relatively minor issue, as the area is second growth timber which may be harvested soon. However, vegetation in critical areas (wetlands and riparian areas near streams) will be an important issue in terms of Critical Areas and habitat for fish and wildlife.

Wildlife – Marbled murrelet will be dealt with under T&E species above. Other species may be moderately important in the area, however, the range will occupy a relatively small area within local DNR land and nearby National Forest.

Fisheries – Effects on fish, particularly salmonids, will be a major issue due to interest and recent restoration efforts by local groups (WRIA 19) and the Lower Elwha Tribe.

ENERGY AND NATURAL RESOURCES

Energy Resources – This will be a relatively minor issue. Electricity will be supplied by generator. Energy for construction will be moderate for the size of the project.

Conservation and Renewable Resources

Conservation of forest resources will be a minor but somewhat important issue. It will be important to coordinate with DNR on forest management.

NOISE, LIGHT AND GLARE

Noise – This is usually the most major issue with shooting ranges. In this case it will be minor, associated with noise effects on marbled murrelets and other wildlife, and noise effects on range users and staff (noise safety and range regulations).

Light and Glare – This will be a very minor issue. The range will probably not be used at night.

VISUAL RESOURCES

This will be a very minor issue. The range will not affect views since there are no nearby residents or other users with a view shed of the parcel.

HUMAN ENVIRONMENT

LAND USE

Land Uses in Project Area – The Project will require a Conditional Use Permit from Clallam County since shooting ranges are a Conditional Use of Commercial Forest zones. This will be a fairly major issue in terms of other recreational uses of the area and compatibility and safety of those uses to the shooting range.

Conformance with Existing Plans – This will be a moderate issue. Conformance to state and local plans will need to be carefully analyzed and documented.

POPULATION AND HOUSING

Population – This will be a very minor issue. The site is remote and will not create any changes in population.

Demographic Trends – This will be a minor issue, mainly dealing with the demographics of users of the facility (including law enforcement), their locations and therefore availability of the facility.

Housing – No housing will be built. This will not be an issue. The Site is remote from other potential housing.

ECONOMICS

Employment and Income – This will be a very minor issue. The facility will provide some income and a few jobs, some part-time.

Revenue Base – The facility will generate very minor changes in the revenue base. This is a very minor issue.

SOCIAL RESOURCES

Education – Very minor issue. Firearms training for law enforcement will occur and firearms safety for public will be important. Hunter safety training will also be available. DNR will harvest the forest resources, which may provide some money to schools.

Family – Very minor issue. The Site will encourage activities in families who consider shooting a family sport. It will cause some limitations on other recreation in the area.

Religious – There will be no religious affiliation. The Elwha Tribe did not mention any religious significance in their comment letter. Very minor issue.

Recreation/Leisure – The facility will provide recreation to shooters, but will somewhat curtail recreation in some part of the area. This includes potential conflicts with ATV users, equestrians and hikers. This is a minor to moderate issue.

CULTURAL RESOURCES

Archaeological - No known cultural artifacts have been located at the Site. The Site development will require an on-site archaeological study. This is a minor to potentially moderate issue.

Historical – There are no known historical resources at the Site. This is a very minor issue.

Compliance with Section 103 of the National Historical Preservation Act – Permits and construction will be dependent on absence of significant artifacts. In the event of such a discovery, the State Historic Preservation Office (SHPO) will be notified and construction will cease.

TRANSPORTATION

Vehicle Traffic – This is a minor issue, however, there will be potential problems while the site or nearby areas are being logged. There may be some necessity for added turnouts depending on the amount of traffic to the Site.

Parking – Parking is a minor issue. Adequate space should be provided during planning stages of the project.

Movement/Circulation of People or Goods – This is a minor issue, dependent on project planning and design.

ENVIRONMENTAL HEALTH

Public Health and Safety – This is a major issue. Shooting safety will be very important. Safety of trail users in potential ricochet zones has been raised as an issue. Lead contamination will be a key issue (see also below).

Toxic or Hazardous Materials – This will be a major issue. Lead, arsenic or other contaminants will be a key issue. Recycling and removal/control of contaminants is probably the most significant issue for this location.

PUBLIC SERVICES

Fire – Fire protection will be a minor, but important issue. Good firefighting access exists and nearby sites have been logged. The Site itself may be logged soon.

Police – The Site will have law enforcement presence much of the time and will provide training areas for law enforcement.

Schools – No schools will be affected. This is a very minor issue.

Medical Services – This will be a minor but important issue. In the event of accident or medical emergency, the Site is moderately remote.

Maintenance – This is a moderate issue. The success of the recycling program will depend on periodic maintenance. Minimizing contamination may result in substantial on-site maintenance.

UTILITIES

Communications – This is a moderate issue. Communications at the site is limited and the Site is outside of cell range in most areas. Reliable communication will be important in the event of an emergency.

Power – Power will be provided by generators. This is a minor issue.

Water/Stormwater – Control of stormwater is a major issue in this moderately high rainfall area.

Waste Disposal/ Sewage – This is a minor issue. The Site will develop an acceptable septic system.

7.0 CONCLUSIONS AND RECOMMENDATIONS

7.1 SADIE CREEK SITE CHARACTERISTICS

The Sadie Creek site was found to have generally positive characteristics for a shooting range:

- 1A) The Site is remote, about two miles from the nearest residence. This location minimizes concerns about both noise and safety for non-range users, although there are periods when hikers, ATV users or equestrians may utilize the trails.
- 2A) The Site has ridges to the south, which limit the distance off-target shots can go. This also improves general safety given proper control and signage on the graveled roads near the Site.
- 3A) The Site is relatively flat and lies between the headwaters of two stream basins. Runoff control should be straightforward, however, during intense events, large amounts of storm-water will need to be handled.
- 4A) Site soils are well drained, making infiltration possible in most areas (this may be difficult in areas underlain by glacial till).

Negative characteristics are also present:

- 1B) The Site is in a relatively high rainfall regime, lying about 20 miles west of Port Angeles. Opponents of the project have cited 80 inches of rainfall, however, that is likely high given the elevation and location, 40-60 inches is more likely. It would be simple and prudent to put an automatic rain gauge on the site to better answer this question.
- 2B) Site soils, particularly the Lyre and Sadie soils are acidic. Various amendments are available to counteract such acidity, including lime, phosphates and organic matter.
- 3B) Critical areas and endangered species are near the site, requiring an aggressive program for recycling and management of toxic compounds. This is further discussed below.

7.2 POTENTIAL TOXICITY AND BMPs

The shooting range location has been chosen after consideration by the County and the Proponents of about a dozen possible locations including two other locations near the Sadie Creek Site. Initial locations between Sequim and Port Angeles were possibly feasible 20-30 years ago, but ran into severe proximity problems due to residential

growth in that area. After several unsuccessful attempts including one on Blue Mountain Road, the search for potential sites shifted to the area west of Port Angeles. Since rainfall increases west of Port Angeles, the rainfall at the Sadie Creek Site is near or comparable to that likely to be found at any remote site, particularly west of Joyce or west of Lake Crescent. Acid soils are also commonplace in Clallam County, particularly in soils in the western portion of the County. This means that any site chosen will likely have similar problems with runoff control, and control of contamination.

Any site will require an aggressive lead recycling program, as well as strong BMPs for management of lead shot in order to minimize the amount of contamination reaching the environment. BMPs should include entrapment of bullets in sand traps or equivalent features, periodic sifting and removal of bullets, treating of soils surrounding the ranges with lime, phosphates and possibly organic material to lessen solubility of lead, detention, and percolation facilities designed to precipitate lead and bind it in place, and periodic testing and removal of soils with high lead content (5-10 years). Engineered controls for shotfall zones should also be designed into the project.

During the environmental process, the Proponents or the County should prepare an Environmental Stewardship Plan which will include the issues discussed in this report including recycling, target traps, shotfall minimization, stormwater controls, soil treatments and other BMPs which will be used to minimize contamination. The key items can then be included as terms and conditions for permits issued by the County.

7.3 CONCLUSIONS

Two operating shooting range Sites in western Washington were contacted to determine the degree of soil or water sampling required by agencies, the types of BMPs directed at lead cleanup and the method of lead recycling used. The Plantation Range in Whatcom County used lead recycling at their indoor pistol range, but no lead cleanup or recycling at the outdoor rifle range. Targets were sand and tires filled with sand. Although no sampling was done or required by agencies, it was felt that the lead was trapped within the sand backstops and was not a problem (Rasmussen 2009).

At the Kenmore Range, steel bullet traps with deceleration devices were used on the pistol range and were very effective. Lead drops into buckets and is recycled regularly. For the rifle range and shotgun ranges, a California recycler comes annually and scrapes and separates the sand and earth from the shells. Lead is processed during the cleaning effort and is resold to gun range participants for reuse (Wells 2009). Both of these ranges are in areas which receive over 40 inches of rainfall per year, although soil acidity is not known.

It appears, based on comparisons with local ranges and others contacted and the information reviewed in this report, that the Sadie Creek Site provides a reasonable area for pistol and rifle ranges as planned. Prior to re-conveyance project documentation should demonstrate compliance with SCORP requirements.

7.4 RECOMMENDATIONS

As indicated in our conclusions, we have found that the Site has some drawbacks, however, that it appears to be feasible if designed, constructed and managed in a well-controlled manner with respect to environmental contaminants and other environmental issues. Our recommendations, to be carried out prior to permitting, are as follows:

- 1) We recommend that PNSPA complete documentation and analysis of the top feasible alternatives for compliance with SEPA. If another alternative is strongly more feasible, we recommend that further study of that alternative be made.
- 2) We recommend that more complete design be accomplished, focusing on locations and size of facilities, type and specifications for limiting lead contamination and type and frequency of recycling program.
- 3) We recommend that an Environmental Stewardship Plan for the Site be prepared. The Plan should be compliant with current DOE and USEPA requirements and in-line with Plans for other operating sites in Western Washington.
- 4) We recommend that additional background surveys be carried out including background levels of contaminants at the Site. Other technical studies that will be carried out in support of environmental analysis should be outlined and time-frames for those studies determined.
- 5) The County and PNSPA should provide DNR with necessary documentation for re-conveyance of the Site. This will include compatibility with state plans and policies that affect the area.
- 6) Once re-conveyance has occurred, a detailed environmental Initial Study (or Environmental Report or Assessment) should be prepared. This will help Scope the EIS which will be prepared prior to final permitting and construction

These recommendations for the Sadie Creek Site conclude this preliminary report.

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APPENDICES

APPENDIX A
SITE PHOTOGRAPHS



1) Entrance to main shooting range.



2) Archery range area on right.



3) Rifle range area.



4) Gravel pit and pistol range area.

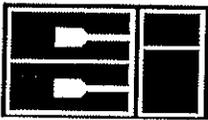


5) Proposed clubhouse area on left.



6) Proposed parking area near clubhouse.

APPENDIX B
SAMPLE RESULTS – ACIDITY OF SITE SOILS



CCI
ANALYTICAL
LABORATORIES
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CERTIFICATE OF ANALYSIS

CLIENT: WESTECH COMPANY
P.O. BOX 2876
PORT ANGELES, WA 98362,

DATE: 5/11/2009
CCIL JOB #: 0905018
CCIL SAMPLE #: SEE BELOW
DATE RECEIVED: 5/6/2009
WDOE ACCREDITATION #: C1336

CLIENT CONTACT: DR. BRAD SHEA

CLIENT PROJECT ID: SADIS CREEK
CLIENT SAMPLE ID: SEE BELOW

DATA RESULTS

CLIENT SAMPLE ID	ANALYTE	CCIAL SAMPLE ID	METHOD	RESULTS*	UNITS**	ANALYSIS DATE	ANALYSIS BY
A-1	pH	-01	EPA-9045	5.0	pH UNITS	5/7/2009	SMR
A-2	pH	-02	EPA-9045	5.4	pH UNITS	5/7/2009	SMR
B-1	pH	-03	EPA-9045	5.2	pH UNITS	5/7/2009	SMR
B-2	pH	-04	EPA-9045	5.5	pH UNITS	5/7/2009	SMR
C-1	pH	-05	EPA-9045	5.6	pH UNITS	5/7/2009	SMR
C-2	pH	-06	EPA-9045	5.5	pH UNITS	5/7/2009	SMR

* "ND" INDICATES ANALYTE ANALYZED FOR BUT NOT DETECTED AT LEVEL ABOVE REPORTING LIMIT. REPORTING LIMIT IS GIVEN IN PARENTHESES.
** UNITS FOR ALL NON LIQUID SAMPLES ARE REPORTED ON A DRY WEIGHT BASIS

APPROVED BY: