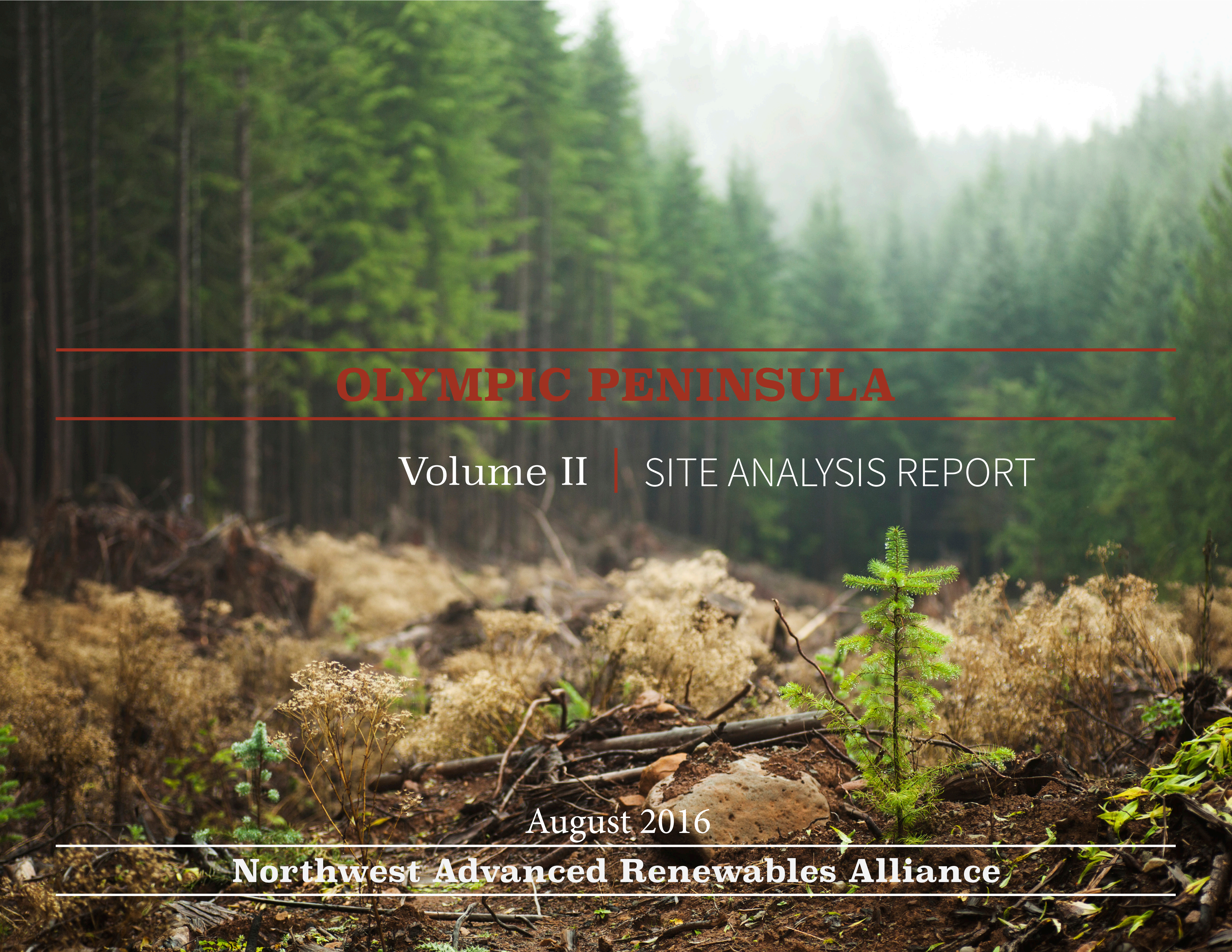

OLYMPIC PENINSULA

Volume II | SITE ANALYSIS REPORT

August 2016

Northwest Advanced Renewables Alliance

TABLE OF CONTENTS

This project is part of the Northwest Advanced Renewables Alliance (NARA), supported by the Agriculture and Food Research Initiative Competitive Grant no. 2011-68005-304 from the USDA National Institute of Food and Agriculture.

Thank you to our project partners throughout the Olympic Peninsula and the entire NARA Study Region. We look forward to working with you this coming year!

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NARA is led by Washington State University and supported by the Agriculture and Food Research Initiative Competitive Grant no. 2011-68005-30416 from the USDA National Institute of Food and Agriculture.

Abbreviations

BDT	Bone Dry Tons
Brownfield	Abandoned or underutilized site with real or perceived contamination
C&D	Construction and Demolition Debris
CIA	Community Impact Analysis
Greyfield	Vacant or underutilized industrial site with no known contamination
IBR	Integrated Biorefinery
LCA	Life Cycle Analysis
MC2P	Mid Cascades to Pacific Supply Chain Region
MRF	Material Recycling Facility
NARA	Northwest Advanced Renewables Alliance
PNW	Pacific Northwest
PTPC	Port Townsend Paper Corporation
RWW	Recycled Wood Waste
UI	University of Idaho
USFS	United States Forest Service
WMC	Western Montana Corridor
WSU	Washington State University

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Olympic Peninsula

2.1.0 NARA OVERVIEW

The Northwest Advanced Renewables Alliance (NARA) examined the wood-based biofuels supply chain on Washington's Olympic Peninsula (OP) during 2015/2016. This is Volume II - OP Site Analysis. The first report, Volume I - OP Preliminary Scoping, is on the website: www.nararenewables.org. The study region is shown in **Figure 2.1.1**.

NARA was initiated in 2011 with funding from the United States Department of Agriculture (USDA). It is one of six regional bioenergy Coordinated Agricultural Projects (CAPs) within the Sustainable Bioenergy challenge area funded by the USDA National Institute of Food and Agriculture (NIFA) in its Agriculture and Food Research Initiative (AFRI) program. NARA is focused on developing feasibility studies and a supporting environment for the sustainable production of biobased products derived from woody biomass feedstock, specifically softwood forest residuals, in Washington, Oregon, Idaho and Montana. The USDA defines woody biomass as the trees and woody plants, including limbs, tops, needles, leaves, and other woody parts, grown in a forest, woodland, or rangeland environment, that are the by-products of forest management (USDA 2008). In addition to post-harvest forest residuals, NARA is also examining construction and demolition (C&D) wood waste (indifferent to species) as a potential feedstock. In this document the term woody biomass is used to cover softwood forest residuals and C&D wood waste.

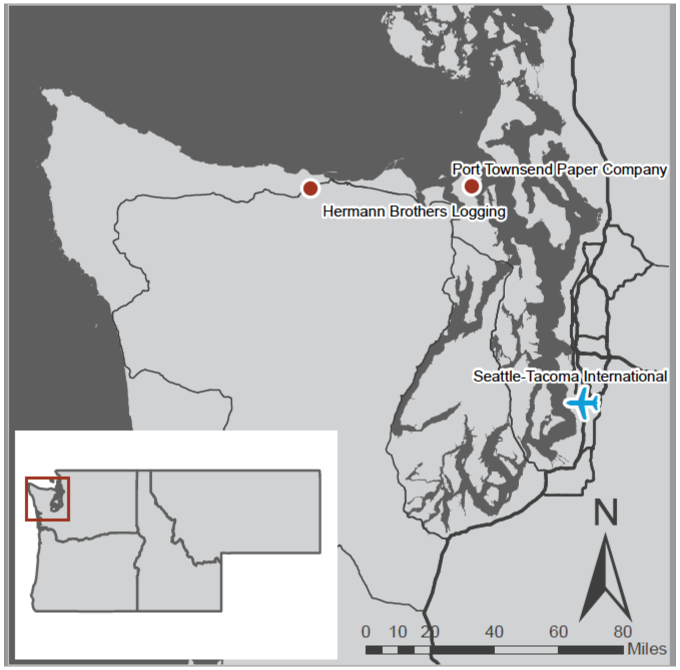


Figure 2.1.1 NARA Olympic Peninsula Study Region, 2015/2016

2.1.1 GOALS AND OBJECTIVES

This document has been prepared by members of the Integrated Design Experience (IDX) studio at Washington State University. IDX faculty and students are part of the NARA Education Team. IDX examines wood-based biofuels supply chains, identifying facility siting locations based on assets such as biomass availability, transportation options, and proximity to markets. IDX has examined both centralized and distributed supply chain models. In a centralized model, post-harvest forest residuals and C&D waste are shipped to an integrated biorefinery (IBR) where the biomass is converted to liquid biofuels all in the same location. In a distributed model, feedstock is mechanically processed into chips at

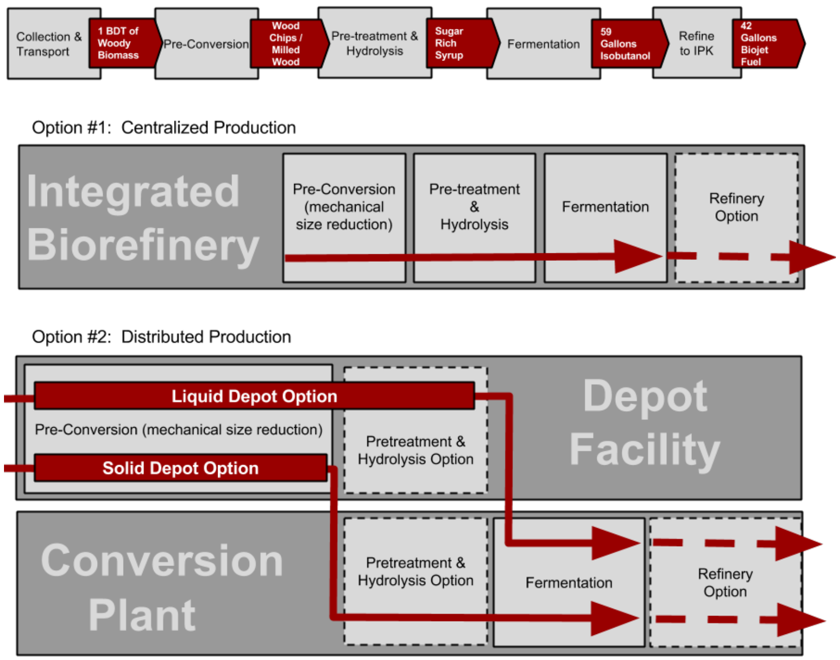


Figure 2.1.2 NARA Biofuels Supply Chain Pathway Options

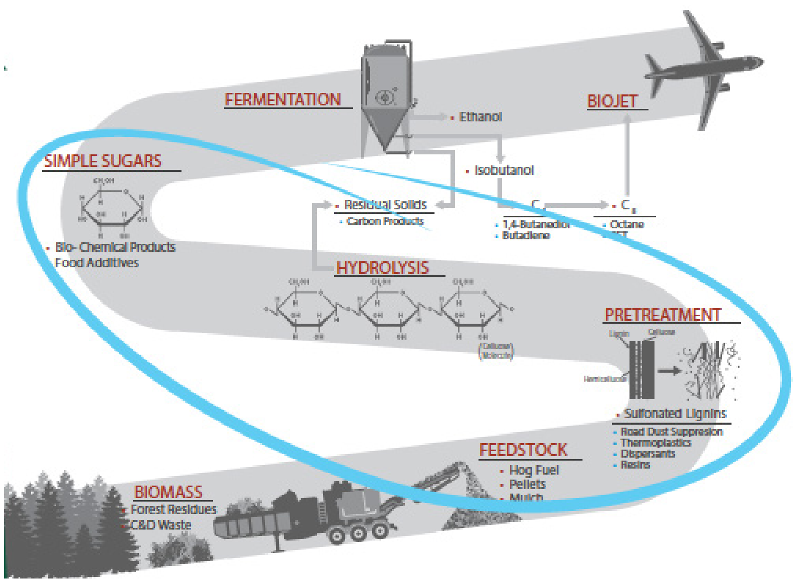


Figure 2.1.3 NARA Supply Chain Products

either a solids depot; chips are then pretreated followed by enzymatic hydrolysis at a liquids depot; the liquid sugars are fermented into to alcohol at a conversion plant; and finally, the alcohol is shipped to a refinery for final processing before distribution. **Figure 2.1.2** shows the different supply chain pathway options and facilities. **Figure 2.1.3** depicts the NARA wood-to-biofuels supply chain and products from each step in the process.

In 2015, NARA began testing a new pretreatment technology, wood milling, which produces micronized wood flour. By finely grinding the woody biomass feedstock, the pretreatment stage at a liquids depot is eliminated. The wood flour can be brought directly to a conversion facility, where clean sugars are extracted for alcohol production. During the 2015/2016 academic year, IDX examined the potential for co-locating supply chain components with existing industries on the OP. In particular, IDX analyzed the feasibility of building a micronized wood depot at the Hermann Brothers Logging and Construction, in Port Angeles, WA. to produce wood flour, and a liquids depot at the Port Townsend Paper Corporation (PTPC) facility. Both depots, which require less than 10 acres of land, would process up to 100,000 green tons/year of woody biomass.

This document, Volume II - OP Site Analysis, presents our final analysis of OP supply chain estimates and case studies for the Herman Brothers operation in Port Angeles, WA, and the Port Townsend Paper Corporation in Port Townsend, WA. The material in the document was also presented at webinars by the IDX students and can be viewed online.

The presentation for the Hermann Brothers site can be viewed here: https://www.youtube.com/watch?v=xBCtfTXjgoQ

The presentation for PTPC can be viewed here: https://www.youtube.com/watch?v=ENzrn_3LBic

For more information about the NARA project, OP's assets, and our analysis approach, please review Volume I - OP Preliminary Scoping, which is available at: https://nararenewables.org/olympic-peninsula/

NARA fully recognizes that the quality of the reports depends on the quality of the input data. IDX is grateful to the active participation of representatives from both the Herman Brothers and Port Townsend Paper Corporation. Both companies provided site tours, answered questions, and have given feedback on proposals.

To find out more about NARA and other regional supply chain analyses in the Clearwater Basin, Western Montana Corridor, Mid-Cascade to Pacific, and the Pacific Northwest please visit: https://research.libraries.wsu.edu/xmlui/handle/2376/5661

2.2.0 Olympic Peninsula Supply Chain Feedstock Estimates

A 2013 statewide study in Washington found that only about 14% of post-timber harvest biomass was marketed, suggesting an underdeveloped market in the state (University of Washington). However, Cross, Turnblom and Ettl (2013), studying 5 counties on the Olympic Peninsula, found that “42% of total biomass generated from harvest or treatment operations was potentially recoverable” (University of Washington, 98). Harvest operations impact the amount of biomass available. If biomass is piled, rather than scattered throughout the harvesting unit, the more recoverable it is (University of Washington). It is likely that the OP could support either a micronized wood depot at the Hermann Brother’s site, or a liquids depot at the Port Townsend Paper Corporation mill, especially if there were increased efforts to recover a greater percentage of the slash produced from harvest and treatment operations.

To determine quantities of feedstock available, IDX used the cost-based network analyst tool in ArcGIS. The total fixed cost estimate used was $39.50/bone dry tons (BDT) (assuming $15/BDT to collect residuals and move to a landing, $21/BDT for grinding/loading chips onto truck at landing, and $3.50/BDT truck wait time). A micronized wood depot in Port Angeles would take in about 100,000 green tons/feedstock a year. **Figure 2.2.1** shows the feedstock supply curve for Port Angeles. **Figures 2.2.2, 2.2.3,** and **2.2.4** show biomass availability at $63, $68, and $73/BDT, with estimates ranging from 122,000 to 242,000 BDT/annually.

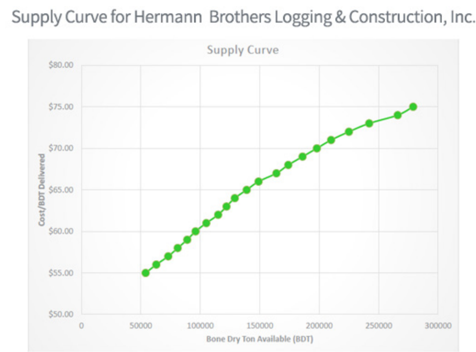


Figure 2.2.1 Woody Biomass Feedstock Supply Chain, Port Angeles, WA

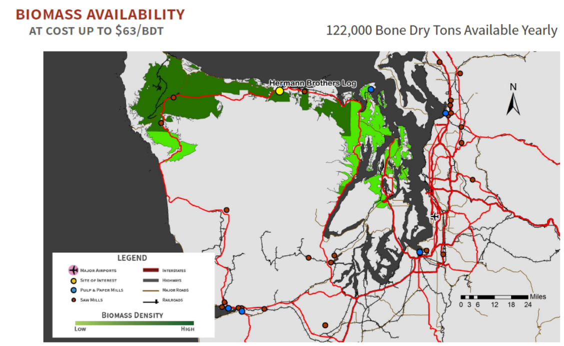


Figure 2.2.2 Woody Biomass Availability for Port Angeles, WA at $63/

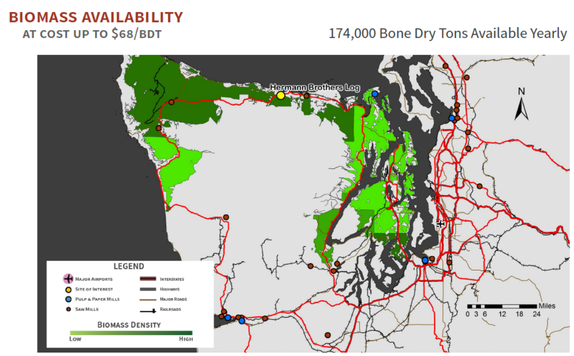


Figure 2.2.3 Woody Biomass Availability for Port Angeles, WA at $68/

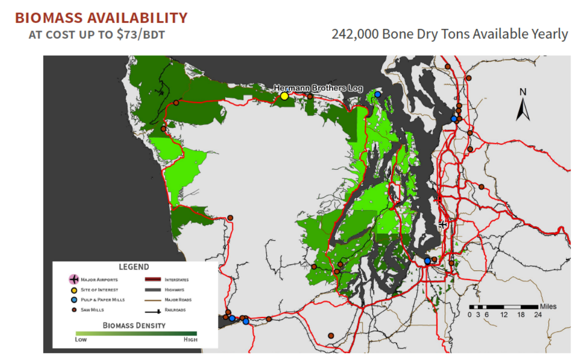


Figure 2.2.4 Woody Biomass Availability for Port Angeles, WA at $73/

A liquids depot in Port Townsend would take in about 100,000 BDT/feedstock a year. **Figure 2.2.5** shows the feedstock supply curve for Port Townsend. **Figures 2.2.6, 2.2.7**, and **2.2.8** show the biomass availability at $63, $68, and $73/BDT, with estimates ranging from 81,000 to 246,000 BDT/annually.

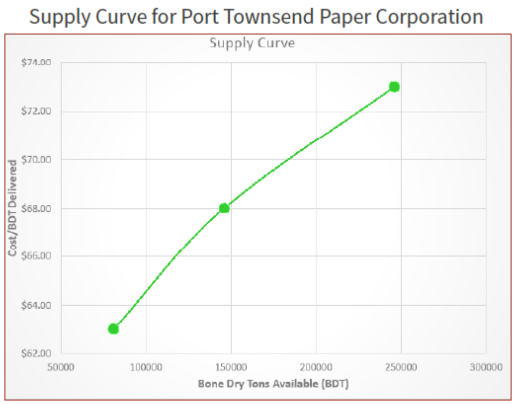


Figure 2.2.5 Woody Biomass Feedstock Supply Chain, Port Townsend, WA

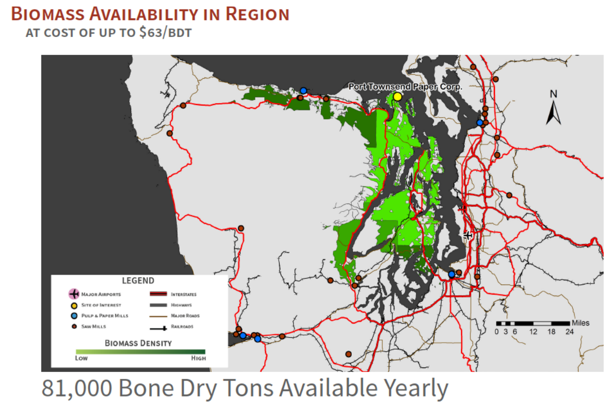


Figure 2.2.6 Woody Biomass Availability for Port Townsend, WA at $63/BDT

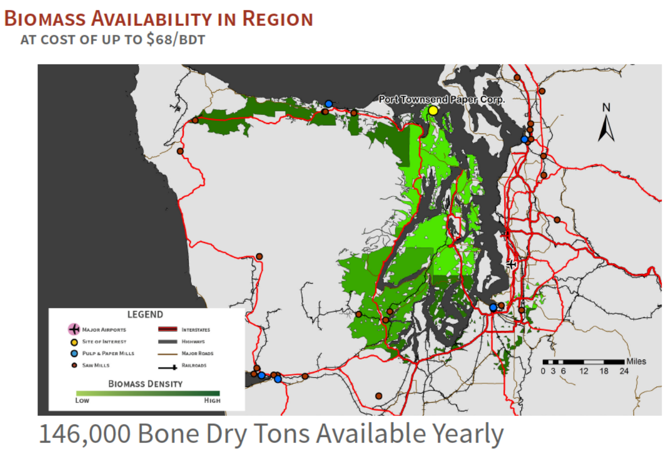


Figure 2.2.7 Woody Biomass Availability for Port Townsend, WA at $68/BDT

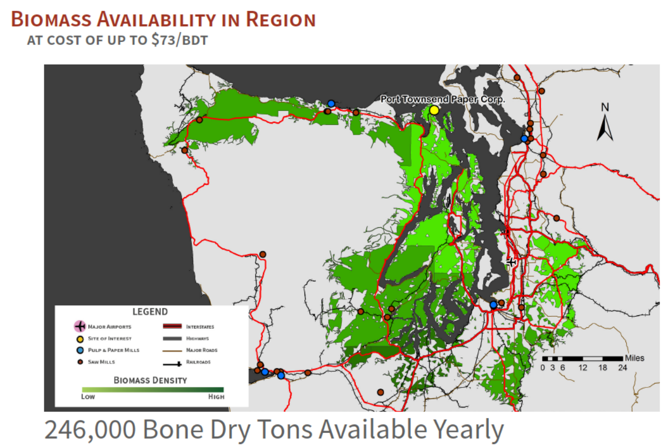


Figure 2.2.8 Woody Biomass Availability for Port Townsend, WA at $73/BDT

2.3.0 Micronized Wood Depot

A micronized wood depot is the least complex of operations, in scale and in its range of onsite processes, compared to other biofuels facilities (e.g., liquids depot, conversion plant, IBR), in the biofuels supply chain. A micronized wood depot is estimated to process approximately 100,000 green tons of post-harvest forest residuals and C&D waste debris a year. At a micronized wood depot, the biomass feedstock is mechanically reduced through chipping and grinding to produce a fine wood flour (Figure 2.3.1). Chips, 4 inches (101.6 mm) in diameter, enter the depot and wood flour, 0.01 mm, leaves the facility. Micronized wood depots are typically located in close proximity to the feedstock source and to truck or rail lines. A micronized wood depot supplies feedstock to a liquids depot or a conversion facility for further processing into chemical products. Key assets that impact the site selection for a micronized wood depot are:

- Available feedstock
- Highway access
- Railway access
- Electricity rates

For a pilot plant taking in 100,000 green tons/year, it is expected to require 15 BDT/ hour running for 10 hours/day to produce about 50,000 - 75,000 BDT/year of marketable product.

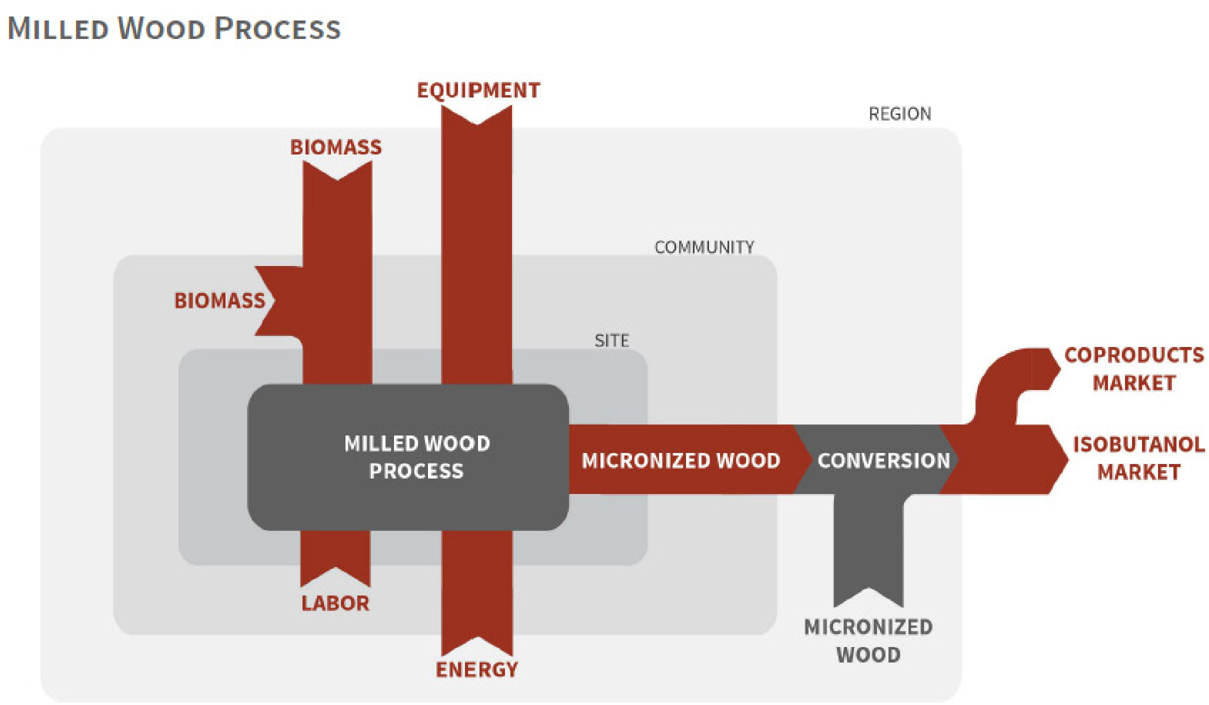


Figure 2.3.1 Micronized Wood Depot Site Resource Flow Diagram

2.3.1 Hermann Brothers Logging & Construction, Inc.

The Hermann Brothers Logging and Construction Company is located on tip of the Olympic Peninsula, less than 20 miles from the Olympic National Park in Clallam County, WA. The business office is located at 2095 Blue Mountain Road Port Angeles, WA, while the log yard is located southwest of the city of Port Angeles at 404 Eclipse W Drive, Port Angeles, WA. Directly adjacent to the log yard is Highway 101, giving Hermann Brothers an excellent location for raw material import and product distribution.

Bill and Fred Hermann grew up between Sequim and Port Angeles. They started the Hermann Brothers business more than 43 years ago. While most of the 44.74 acre (~1.9 million square feet) log yard site is currently developed, a 5.27 acre (~200,000 square feet) parcel of land was recently acquired for future development. The property is accessed from Highway 101 and is located 76 miles from Seattle, WA (**Figure 2.3.2**).

Hermann Brothers is currently a successful logging company that has an established business for obtaining, processing, and shipping logging materials and slash. The company also has an active commitment to environmental projects, making it an ideal potential location for a pilot micronized wood depot. Additional information about the Hermann Brothers' company is available on their website: http://www.hermannbros.com/.

At a micronized wood depot, forest residuals are mechanically broken down into a product for conversion facilities and IBRs. **Figure 2.3.3** illustrates the transitions of the feedstock from the working forest through all stages of the micronized wood depot. If not collected and processed, post-harvest forest residuals are usually burned after logging operations are wrapped up. The proposed micronized wood process would mechanically break those materials down into a feedstock that could be treated to produce alcohol for production of sustainable biojet fuel.

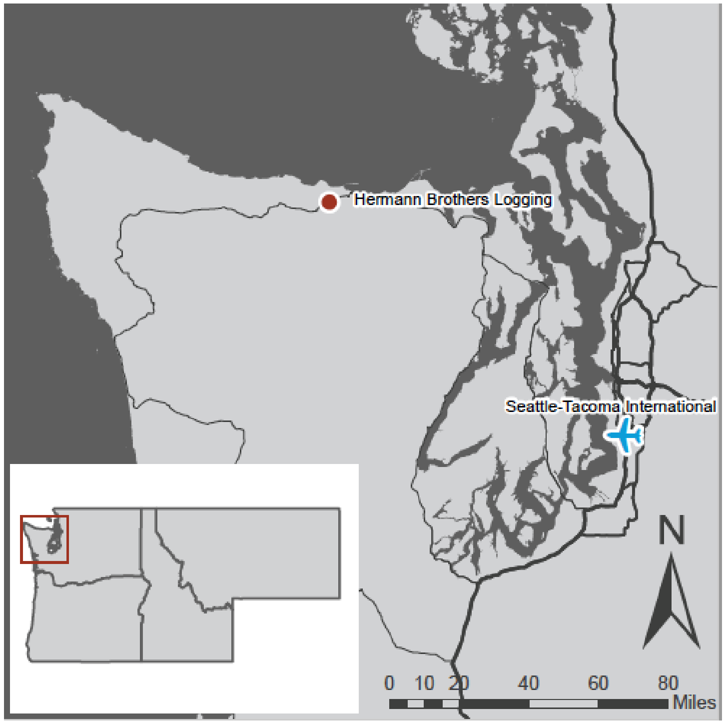


Figure 2.3.2 Location of Hermann Brothers in Port Angeles, WA

2.3.2 Micronized Wood Depot Equipment

A number of steps are required to process wood chips into a micronized wood flour. These steps are described and illustrated in Figures 2.3.4 through 2.3.9.

Figure 2.3.3 Transition of Forest Residuals from Chips to Flour

Steps to Process Wood Chips into Wood Flour

Step 1. Trucks dump feedstock, usually wood chips, at the depot

Figure 2.3.4 Truck Dump

Step 2. The wood chips are fed into a greenwood hammermill, which begins the breakdown of the feedstock.

Figure 2.3.5 Greenwood Hammermill

Step 3. The ground wood chips are dried in a rotary dryer, which brings down the moisture content of the broken down wood chips.

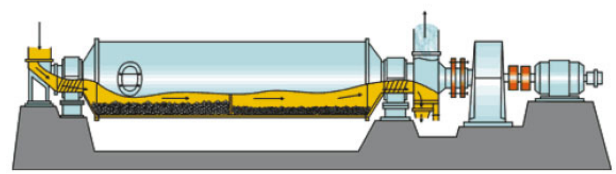


Figure 2.3.6 Rotary Dryer

Step 4. The dried wood chips are fed into a drywood hammermill for further reduction (similar to **Figure 2.3.5**)

(no illustration)

Steps to Process Wood Chips into Wood Flour

Step 5. The broken down wood chips are sent through an air classifier, where they are finely graded; the feedstock begins to look more like a powder than a chip.

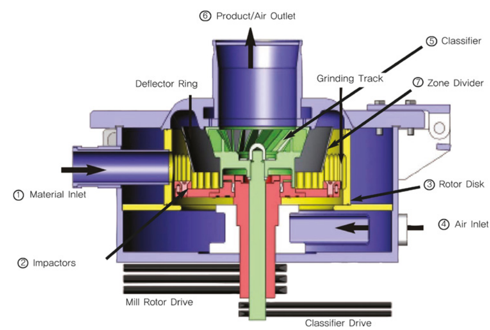


Figure 2.3.7 Air Classifier

Step 6. The wood powder is sent through a ball miller. The wood particles undergo amorphization, where the cell walls of the wood are broken down. When the wood leaves this part of the process it exits as a very fine wood flour.

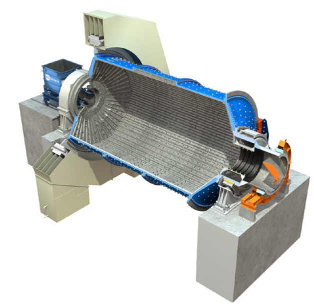


Figure 2.3.8 Ball Mill

Step 7. The wood flour is sent to dry storage.

Figure 2.3.9 Dry Silo Storage

2.3.3 Micronized Wood Depot Site Location Options at Hermann Brothers Log Yard

Three potential locations for a micronized wood depot at the Hermann Brothers Logging and Construction log yard property in Port Angeles, WA were identified and examined. **Figure 2.3.10** shows the three potential sites.

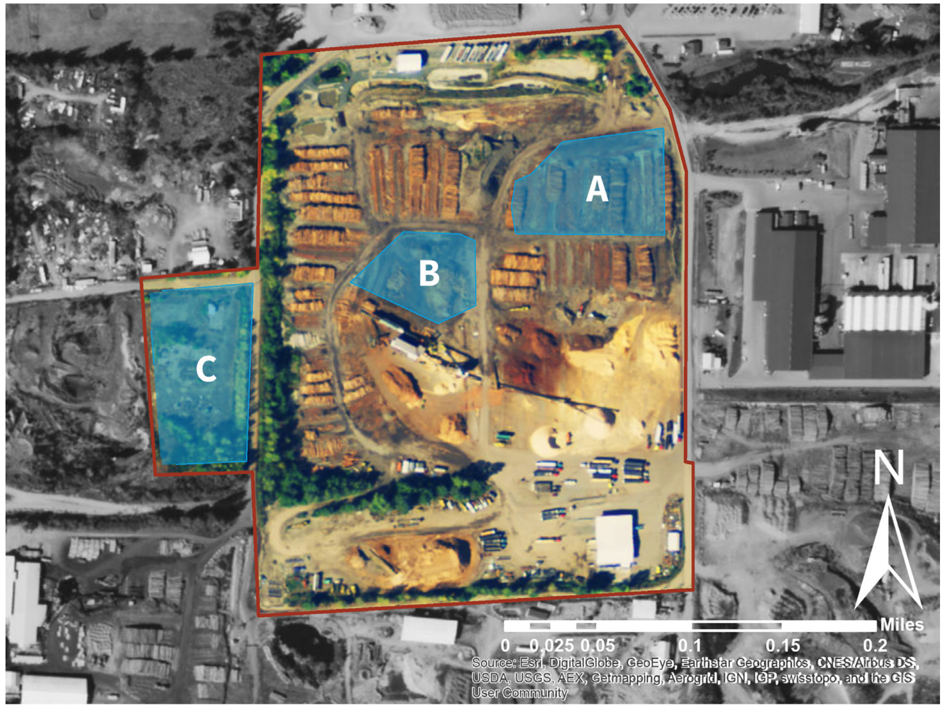


Figure 2.3.10 Potential Site Location Map at the Hermann Brothers operation in Port Angeles, WA

The three sites were evaluated based on the following criteria:

Reasoning: current usage of the area

Topography: constructability/site work

Utilities: ease of installation and proximity

Flow: accessibility and conflict detection with existing operations.

Site A Analysis

Site A is located in the northeast corner of the Hermann Brothers site. This site has a good access to the adjacent road, it is relatively out of the way of current Hermann Brothers production, and the ground is relatively level, reducing issues with constructibility and excessive earthwork. However, this site is currently used for log storage, so a new location would have to found to make room for the added biomass dedicated to the solids-depot pilot plant. The proposed site is very close to the current water line and storm water pond; it is relatively far from the current electrical line which could result in an increase of costs. An overall site flow of material in and out of the pilot plant is displayed in **Figure 2.3.11**. The potential conflict point shown represents a tight intersection of current Hermann Brothers production flow with the proposed production flow. **Figure 2.3.12** shows the equipment layout for Site A.

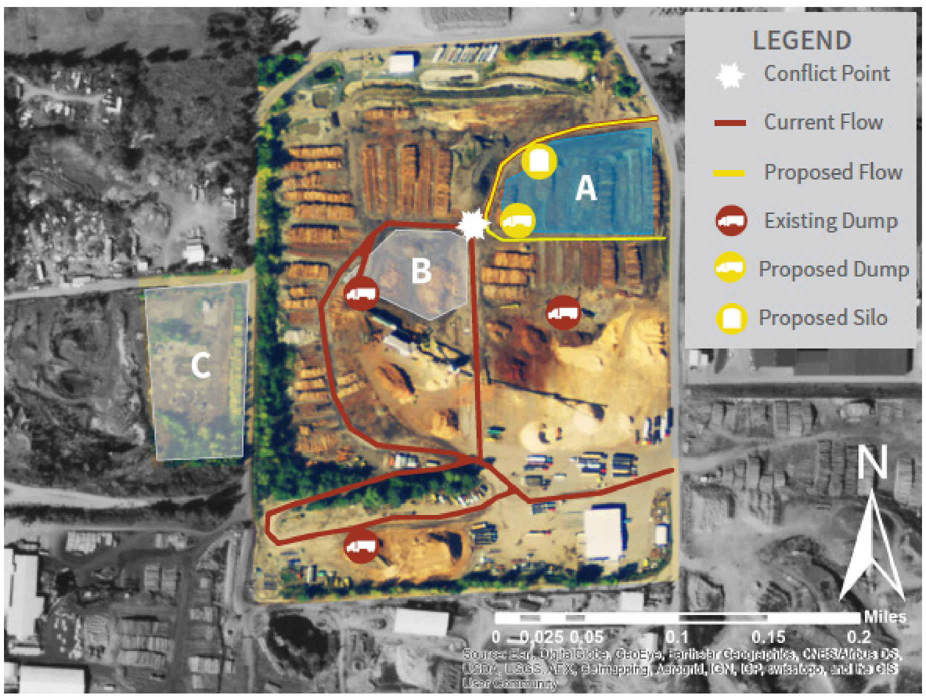


Figure 2.3.11 Hermann Brothers Site A Materials Flows

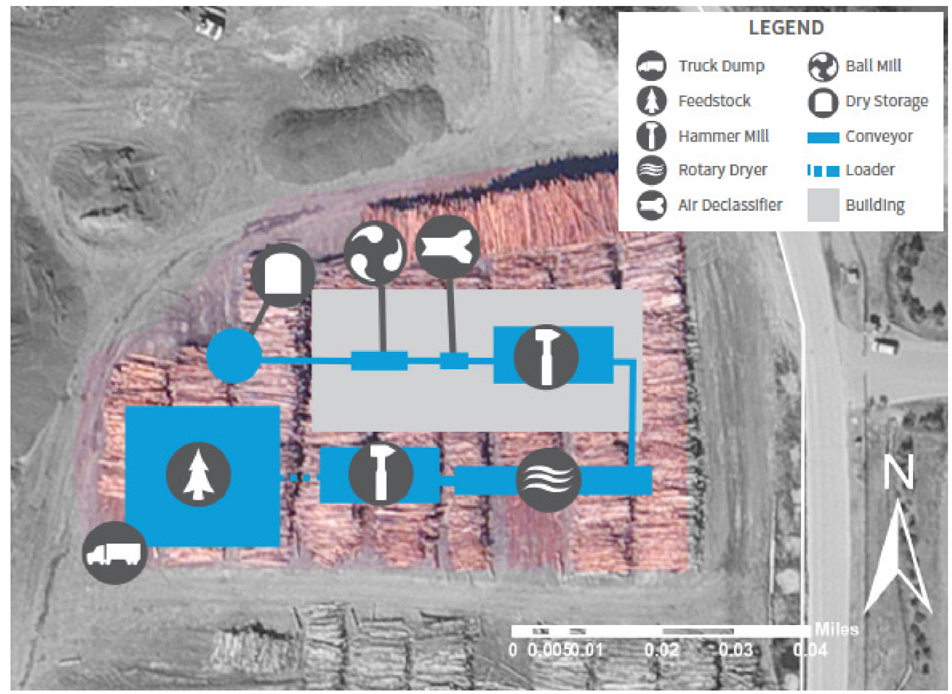


Figure 2.3.12 Hermann Brothers Site A Equipment Layout

Site B Analysis

Site B is located in the middle of the current Hermann Brothers property. The proposed location for the pilot plant is relatively flat with only a 10 foot drop over the entire area, which would increase the ease of constructability. The site is adjacent to Hermann Brothers' wood chipper and debarker, so there is a possibility to tap into the existing infrastructure to power and supply the pilot facility. Stormwater at this site could also be sent to the existing stormwater pond. **Figure 2.3.14** shows the suggested process flow for Site B. This design was made with an effort to use existing lanes and work efficiently with the current Hermann Brothers production flow. For this reason, the truck dump and dry storage silo are located adjacent to the current truck dump. The equipment layout for Site B is displayed in **Figure 2.3.13**. As shown, the dry storage silo and truck dump are located close to each other so that there could only be one place where traffic might be held up.

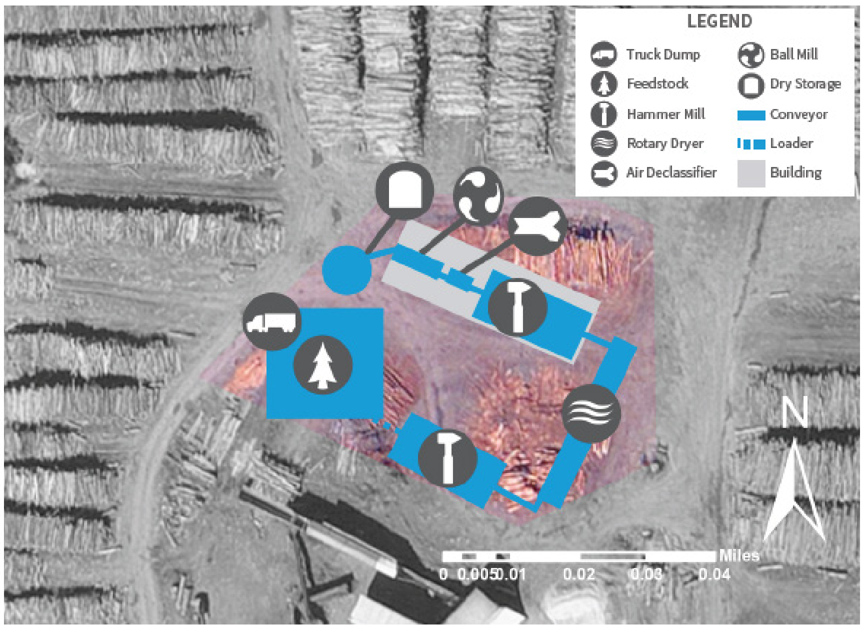


Figure 2.3.13 Hermann Brothers Site B Equipment Layout

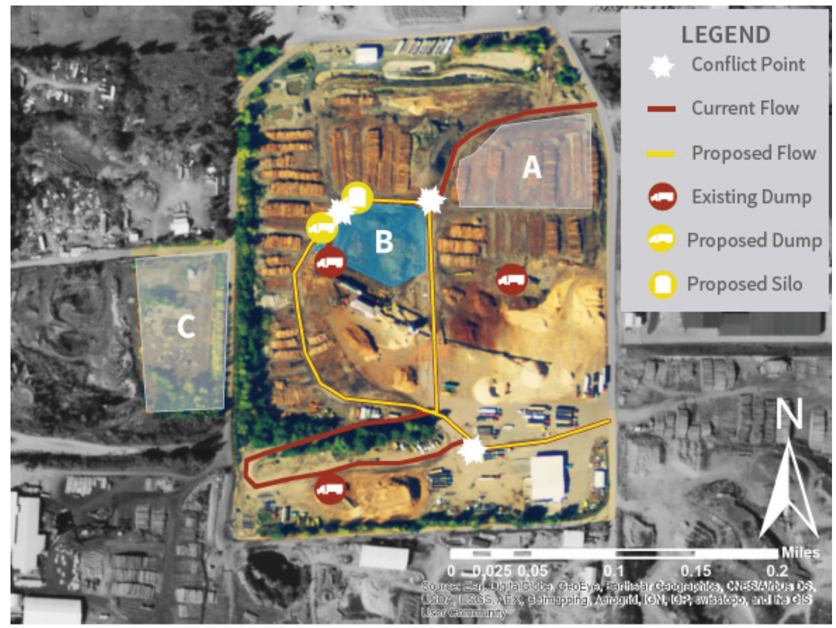


Figure 2.3.14 Hermann Brothers Site B Materials Flows

Site C Analysis

Site C is situated on recently acquired land and is not currently used by Hermann Brothers. The south end of the site poses a slight potential earthwork challenge because of its relatively steep topography, however the north end of the property is very flat and would be easy to develop. While this site has great access to existing electricity lines, there is a potential issue with having to connect to the existing water lines as they are far away from the proposed site. For this reason, existing water systems would have to be expanded to handle the additional stormwater from the depot facility. **Figure 2.3.15** shows the process flow for Site C. Because this site is relatively detached from the current site, flow is not expected to be an issue. The equipment flow of the depot is shown in **Figure 2.3.16**. While a road would have to be constructed in order to deliver and export materials, no other traffic issues or expenditures are expected.

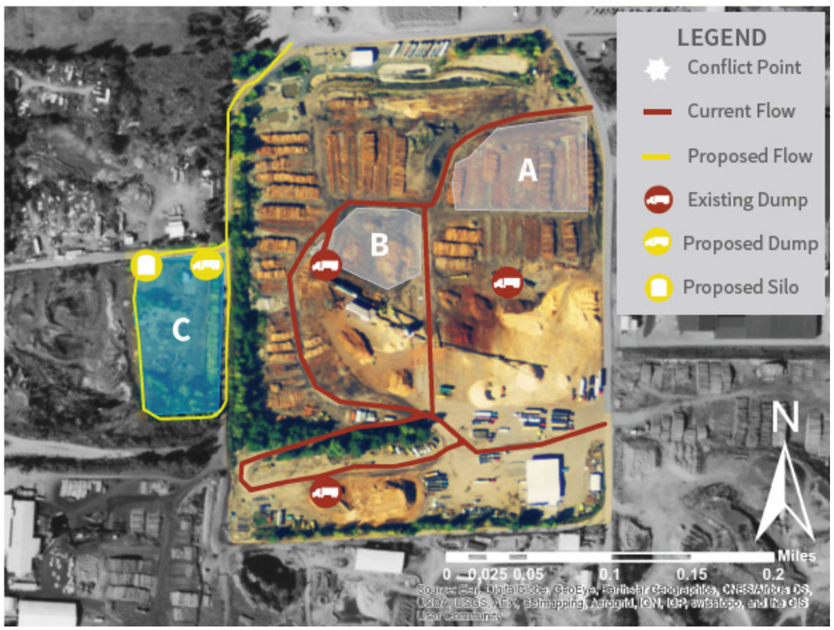


Figure 2.3.15 Hermann Brothers Site C Materials Flows

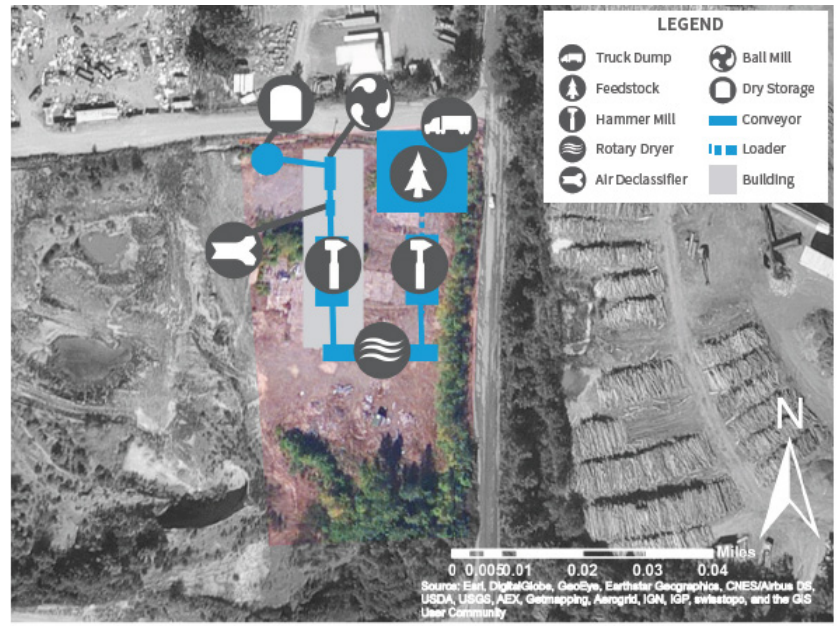


Figure 2.3.16 Hermann Brothers Site C Equipment Layout

Hermann Brothers Site Summary

All three potential sites were analyzed using the same criteria for easy comparison. **Figure 2.3.17** displays the pros and cons in reference to the reasoning, topography, utilities, and flow for each potential site discussed. Purple represents a disadvantage and crimson represents an advantage (Go Cougs!). Overall, Site C has the most advantages and is therefore, the most preferred site for a pilot micronized depot.

	Site A	Site B	Site C
Reasoning	Being used for log storage	Used for storing waste from log chipper	Not Being Used
Topography	No apparent issues	No apparent issues	No apparent issues
Utilities	Some utilities adjacent	Utilities directly adjacent	Some utilities adjacent
Flow	Interferes with existing flow	Greatly interferes with existing flow	Isolated flow

2.4.0 Liquids Depot

A liquids depot processes wood chips into a sugar rich slurry. The analysis and design for a liquids depot at Port Townsend Paper Corporation assumed 100,000 green tons of post-harvest forest residues and C&D waste delivered to the site annually. The feedstock materials could be chipped on site, or they could be delivered from a solids or micronized wood depot. Additional activities at the liquids depot include chemical and thermal pretreatment using a mild bisulfite process and enzymatic hydrolysis. Pretreatment breaks the bonds that bind cellulose, hemicellulose, and lignin together and exposes the polysaccharides for enzymatic hydrolysis, which generates simple sugars from the cellulose and hemicellulose. **Figure 2.4.1** shows a materials flow chart for a liquids depot. A liquids depot could supply a conversion facility or IBR with syrup by truck, rail tank car, or a dedicated pipeline. The output from a liquids depot might serve other consumers as well, such as ethanol plants or bio-plastic producers. Lignin-based co-products might also be marketed from this type of depot. Key assets for a potential liquids depot site include:

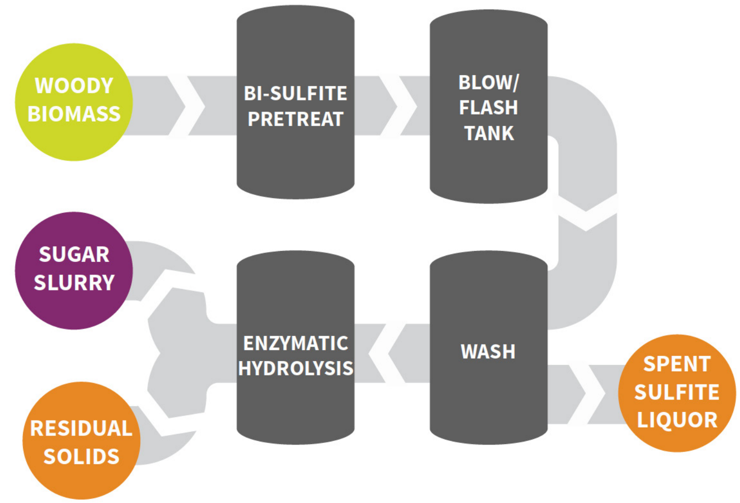


Figure 2.4.1 Liquids Depot Flowchart

Former Sulfite or Kraft pulp/paper facility (digesters)

- On-site boiler and wastewater treatment plants (WWTP)
- Feedstock availability
- Utilities
- Water
- Rail and highway access

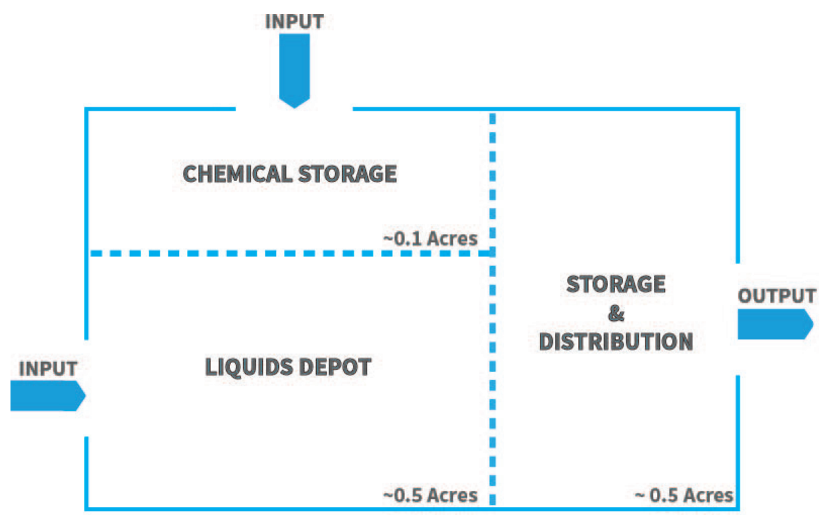


Figure 2.4.2 Building Footprints for Liquids Depot Pilot Plant

Each component necessary to make the liquids depot run can be divided into three separate operational footprints, as shown in the **Figure 2.4.2**. The three main building footprints are: 1) Chemical Storage Facility, 2) Liquids Depot, and 3) Storage and Distribution areas. Each are projected to need approximately 0.1, 0.5, and 0.5 acres of land, respectively.

The chemicals needed for this process, such as calcium bisulfite, various enzymes, and lime will be stored in the Chemical Storage facility which will need about 0.1 acres of space (~4,000 square feet). After the woody biomass goes through the mild bisulfite pretreatment process, it exits as a pretreatment liquor, then it goes through enzymatic hydrolysis, where residual solids and a sugar slurry are produced. These end products will be stored in the Packaging and Distribution center, which needs about 0.5 acres of space. The majority of the heat and steam generated in the process is recycled back into the system as an energy source, and the majority of chemicals and water (which is about 2 MGD) used will also be recycled through the system. It is estimated that about 60 new jobs could be created to operate the liquids depot.

It is projected that the liquid depot pilot plant would require about 50 truck loads of chips per day and 1.5 acres of land for chip storage for one week of production. Currently, the PTPC see 100 chips trucks a day.

2.4.1 Port Townsend Paper Corporation

Port Townsend Paper Corporation (PTPC) is located at 100 Mill Road, Port Townsend, WA, in Jefferson County. Figure 2.4.3 shows PTPC's location and regional biomass availability. The mill's strategic location at the mouth of the Puget Sound in Northwest Washington State is part of what has kept the company in business for over 85 years. Originally constructed by Crown Zellerbach, the mill is currently owned by Crown Paper Group Inc, of Atlanta, GA. The kraft paper mill has earned a reputation of being one of the safest and most environmentally friendly paper mills in the nation.

The PTPC mill has 448.2 acres (20 million square feet) with 228.4 acres (10 million square feet) zoned heavy industrial and 219.8 acres (9.5 million square feet) zoned rural residential. Furthermore, the mill owns about 150 acres (6.5 million square feet) of greenfield adjacent to the existing infrastructure. The property can be accessed either by barge or Highway 101. It is within an hour of the major shipping ports of Seattle and Tacoma, WA and is less than 100 miles to Sea-Tac Airport by road.

The company is currently the largest private employer in Jefferson County, WA, and also, according the mill's Director of Sustainability, the largest recycler on the Olympic Peninsula, recycling ½ billion tons of old corrugated cardboard annually. Over the last decade, PTPC has cut its fossil fuel use by 60%, largely by installing a boiler that runs on hog fuel.

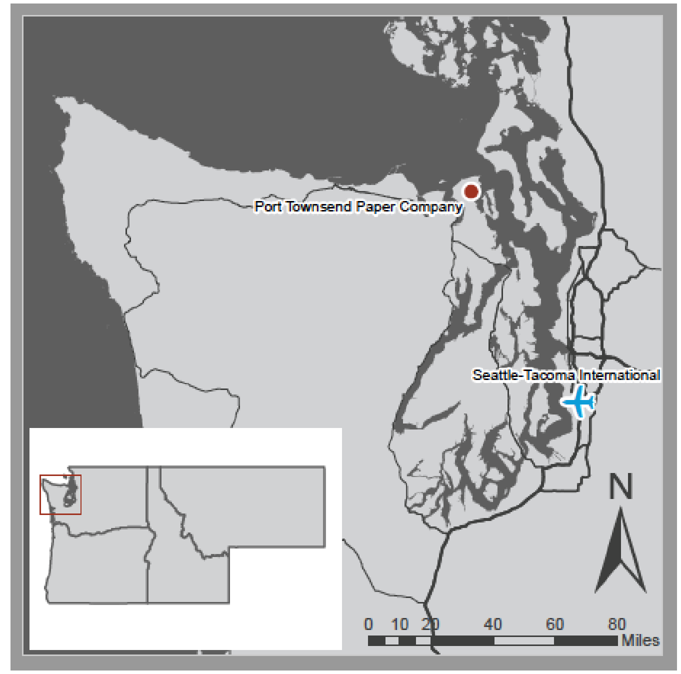


Figure 2.4.3 Port Townsend Paper Corporation, Port Townsend, WA

2.4.2 Liquids Depot Site Location Options at Port Townsend Paper Corporation

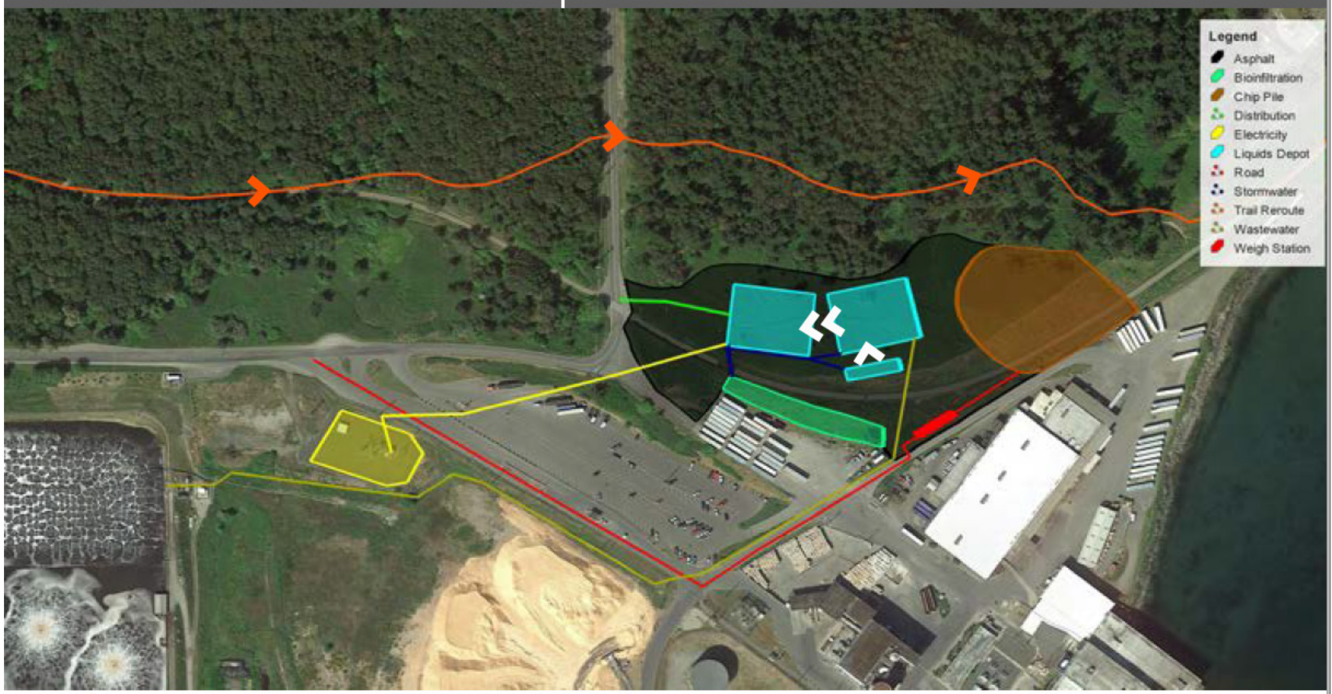
Three potential locations for a liquids depot pilot plant were identified for the PTPC property in Port Townsend, WA. Figure 2.4.4 shows the three sites. The sites were analyzed and compared across four criteria: site preparation, utility infrastructure, chip storage, and equipment placement and flow.

Figure 2.4.4 Site Location Map for Potential Liquids Depot Placement, showing Topography Lines, PTPC mill in Port Townsend, WA

Northeast Site Analysis

The Northeastern site is roughly seven acres and contains some elevation change with the lower region standing at about 60 feet above sea level and the upper region at about 80 feet above sea level. The proposed process flow for this site is illustrated in **Figure 2.4.5**. The proposed paved area is 6.5 acres. There is a buffer and reroute area for the Larry Scott Trail which runs through the northern portion of the site. This site is well positioned for easy product export (shown in red and including a truck scale), however it presents a challenge in its distance from existing utilities (shown in yellow). The green biofiltration area shown depicts an engineered green space of native soils and plants that would filter the stormwater from impervious surfaces created on the site. A biofiltration area seems feasible because the soils in the region are rapidly draining, and Port Townsend only receives about 19 inches of precipitation per year due to the site's location in the Olympic Mountain Range's rainshadow.

NORTHEAST SITE | PORT TOWNSEND, JEFFERSON COUNTY, WA



SITE INFORMATION

Size:	7 acres
Grading:	20.0 %
Soil Type:	Sandy loam
Impervious Surface:	6.5 acres

STRENGTHS

- Opportunity for bioinfiltration of all onsite stormwater
- Land is currently unused
- Good location for exporting
- Adjacent to existing mill infrastructure

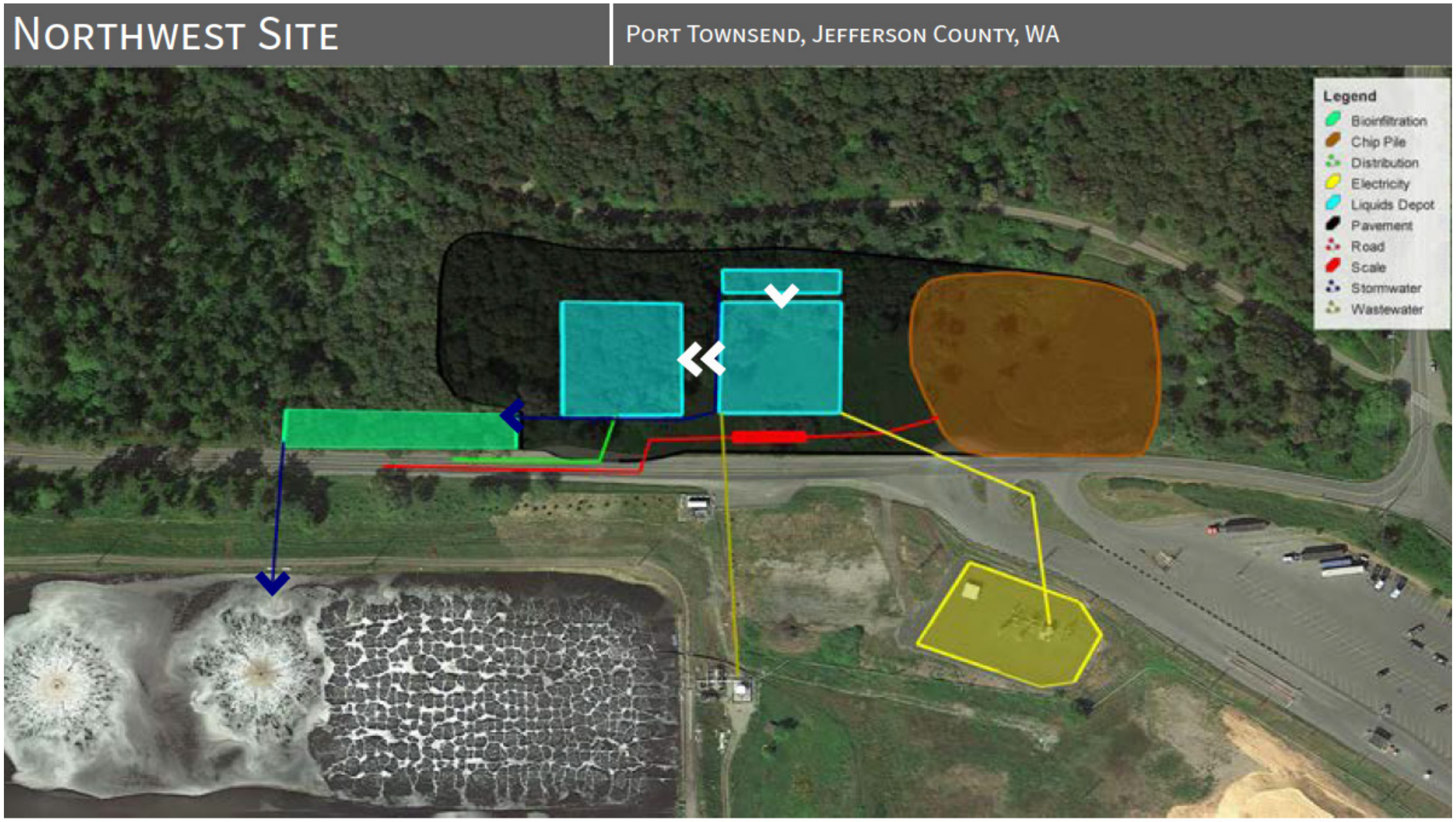
WEAKNESSES

- Land requires large amounts of developement
- May need a lot of utility work
- Little room for expansion
- Requires Larry Scott Trail reroute

Figure 2.4.5 PTPC Northeastern Site Materials Flows

Northwest Site Analysis

The Northwest site is located on the north side of Mill Road. The site is about 10 acres leaving a large amount of buffer space between the pilot plant and the Larry Scott Trail. The contour lines show only a slight elevation change of about 50 feet. The process flow for the northwestern site is shown in **Figure 2.4.6**. With this location right along Mill Road there is easy access for this site compared to the northeastern site. This site still uses the existing electrical substation and wastewater treatment facility of PTPC. While it is much closer than the northeastern site, there is still the obstacle of crossing Mill Road to connect to existing utilities.



SITE INFORMATION

Size:	9.8 acres
Grading:	12.7 %
Soil Type:	Sandy loam
Impervious Surface:	5.1 Acres

STRENGTHS

- Opportunity for bioinfiltration of all onsite stormwater
- Land is currently unused
- Good access to Mill Road
- Abundant space for expansion

WEAKNESSES

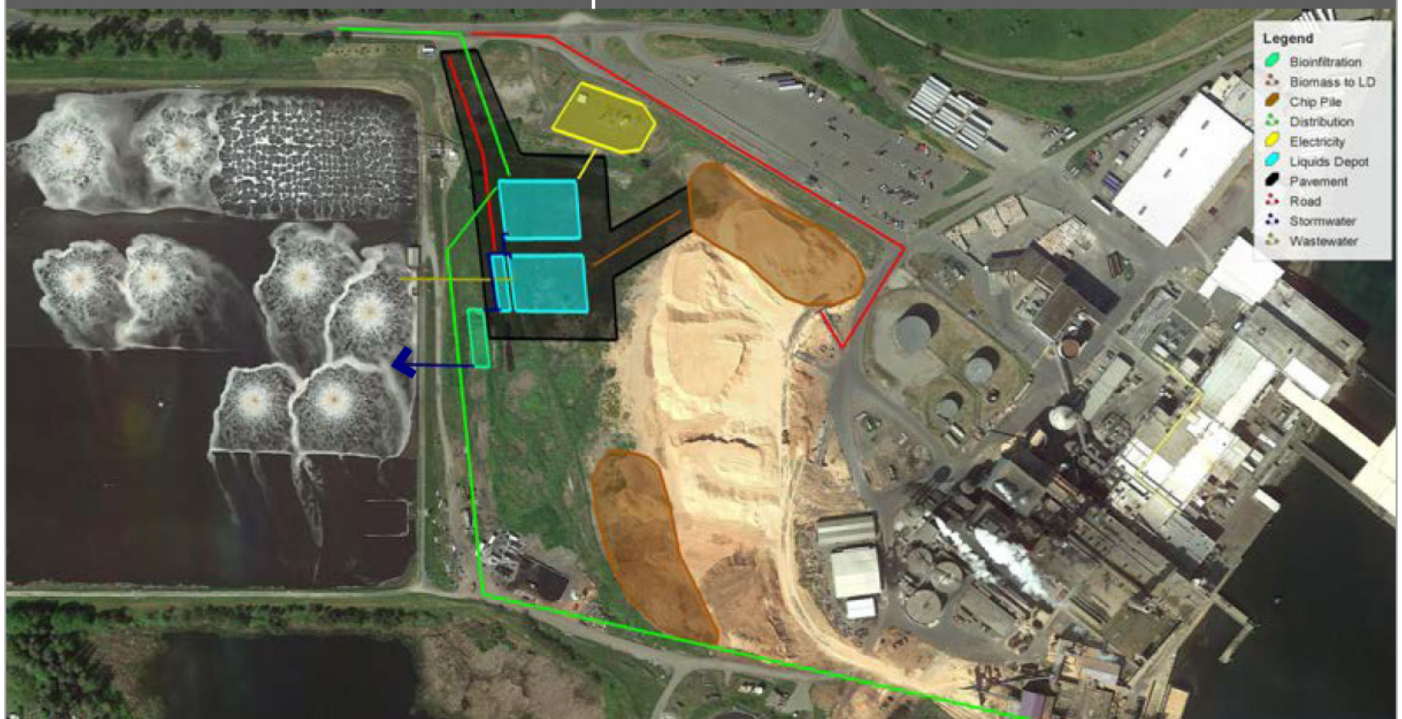
- Land requires large amounts of development
- May need a lot utility work
- Needs new infrastucture; scale and chip pile/conveyor belt

Figure 2.4.6 PTPC Northwestern Site Materials Flows

Central Site Analysis

The Central site is a greenfield located between the existing wastewater treatment facility and chip yard, and is about 10 acres. There is virtually no elevation change at this site. The process flow for the central site, shown in **Figure 2.4.7**, has the best proximity to existing utilities, wastewater facilities, and delivery and shipping methods. This siting option uses the current truck scale and ramps. The green delivery line that runs to the southeast corner of **Figure 2.4.7** is the proposed shipping route through the Strait of Juan de Fuca by barge, which is the most cost effective mode of transport, when compared with truck or rail. This final design concept proposes storing feedstock chips for the liquids depot pilot plant in the existing chip yard, shown in brown-shaded area at the northern portion of the property. The southernmost brown-shaded area is the proposed relocation site for current chips being stored.

CENTRAL SITE | PORT TOWNSEND, JEFFERSON COUNTY, WA



SITE INFORMATION

Size:	10 acres
Grading:	0.5 %
Soil Type:	Sandy loam
Impervious Surface:	4 acres

STRENGTHS

- Adjacent to both existing chip pile and waste/storm water treatment plant
- Could use existing truck scale, chip yard, and dump ramps
- Land is flat and appears easily developable
- Next to substation

WEAKNESSES

- Mill may want to utilize area in the future due to central location
- Additional biomass deliveries may interfere with mill operations
- Bioinfiltration techniques for stormwater may be undesirable due to location

Figure 2.4.7 PTPC Central Site Materials Flows

PTPC Site Summary

The three sites are compared in **Figure 2.4.8**, with the color of the text relating to expected cost expenditures. Red text represents high capital expenditure, green low expenditure, and yellow moderate expenditure. The central site appears to be the most promising location largely due to its close proximity to existing utilities and ease of product import and export.

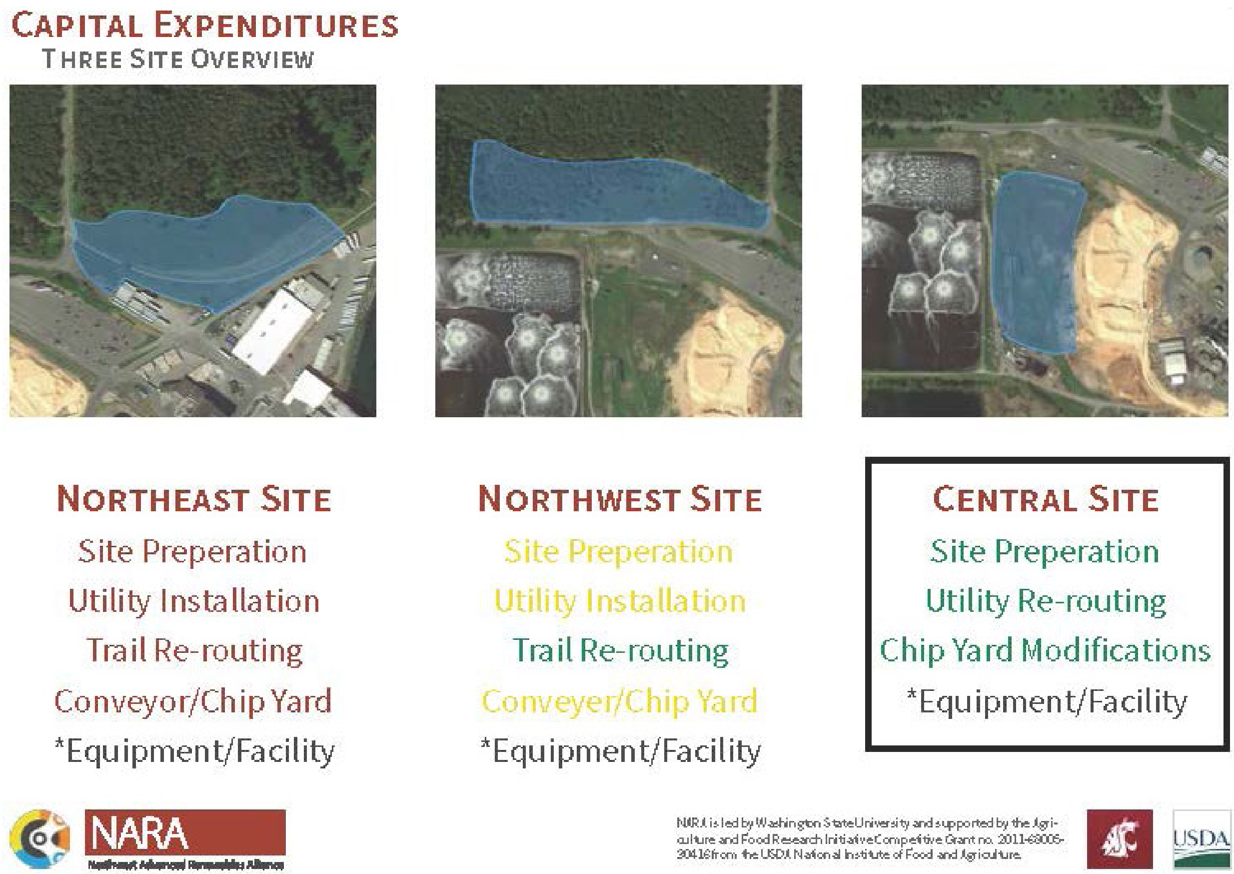


Figure 2.4.8 Comparison of Each Potential Liquids Depot Site at PTPC

2.5.0 Summary

IDX examined the feasibility of co-locating a micronized wood depot at the Hermann Brothers Logging and Construction company site in Port Angeles, WA, and a liquids depot at the Port Townsend Paper Corporation in Port Townsend, WA. At both sites, IDX considered three potential locations for the proposed new facilities, and based on preliminary site attributes and costs, identified preferred facility siting options. For the Hermann Brothers site, site C was the preferred location; for the PTPC, the central site was the preferred location.

IDX is extremely grateful to the Hermann Brothers and the Port Townsend Paper Corporation for giving the team tours of their facilities, answering questions, and providing comments and feedback on their siting analysis.

The final step taken by IDX was to prepare master plans for the proposed facilities. This work is available in Volume III - OP Facility Design.

2.6.0 References

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