Fall 2015

Environmental impact assessment for Hermann Brothers Logging & Construction, INC wood-based solids depot

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Environmental Impact Assessment
Huxley College of the Environment

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Signature
Jacob Jones

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December 7, 2015
Dear Concerned Citizens,

The purpose of this Environmental Impact Assessment (EIA) is to evaluate the potential environmental risks involved with the installation of a wood-based solids depot plant at the Hermann Brothers lumber processing plant located in Port Angeles, WA. The assessment is in compliance with protocol from the Washington Administrative Code (WAC) 197-11-430 and is to be used solely as an educational exercise, not to be consulted by any individual or agency for legitimate environmental review purposes. This EIA has been constructed under the supervision of Dr. Tammi Laninga the instructor for the course Environmental Impact Assessment (EIA), ENVS 493.

The proposed action of this EIA concerns the development of a 4 acre solids depot to be co-located with the Hermann Brothers lumber processing plant. The depot’s primary function would be to convert woody biomass from post-harvest forest residuals, also referred to as “slash,” and construction and demolition (C&D) waste into wood flour, or alternatively pellets, which have multiple uses. Pellets have the potential to be used for both the production of industrial energy as well as for home heating. Wood flour alternatively has the ability to be used as a feedstock for enzymatic hydrolysis, a major step in the creation of a drop in biofuel for sustainable aviation. Slash is a waste product in timber harvesting, and includes smaller branches, twigs, and tops, and other portions of trees not easily converted into usable product. Advocates of the project state that it would be taking a waste product, which is currently disposed of by burning, and turning it into something that can be utilized by multiple end consumers.

Our EIA analyses the effects of the depot, as well as alternatives including reduced output, as well as the potential for no action. Evaluation of these alternatives have been primarily to reduce local impacts to the community surrounding the Hermann Brothers site. We appreciate concern for these issues and hope this EIA has adequately addressed all environmental concerns relevant to this project.

Sincerely,

Jacob Jones  Sam West  Danika Kraft  Noah Braley
Environmental Impact Assessment for Hermann Brothers Logging & Construction, INC Wood-Based Solids Depot

Prepared for:

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Environmental Impact Assessment (ENVS 493)
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Note: This report represents a class project that was carried out by students at Western Washington University's, Huxley College. It has not been undertaken at the request of any persons representing local government or private individuals. Nor does it necessarily represent the opinion or position of individuals from government or the private sector.
Fact Sheet

Project Title
Environmental Impact Assessment on the Hermann Brothers USA CO Wood-Based Solids Depot

Description
This EIA analyzes the potential environmental impacts of the proposed project with the Northwest Advanced Renewables Alliance (NARA) to develop an alternative jet fuel made from post-harvest forest residuals. This EIA will also evaluate the validity of installing a solids depot that will turn logging slash into wood flour that can be easily shipped to a facility to produce liquid fuel.

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List of Permits and Approvals
The project proposal is to co-locate a new industrial activity at an operating lumber yard. The current facility is operating under multiple permits and approvals. Because of this, permit requirements will not be as extensive as it would be if this project was done on an entirely new site. The SEPA EIS identifies the following permits and approvals as being required:

- **State Permits**
  - Air Operating Permit Modification
• National Pollutant Discharge Elimination System (NPDES) Waste Discharge Permit Modification
• Construction Storm water General Permit

• Local Permits
  • City of Port Angeles Conditional Use Permit
  • City of Port Angeles Building Permits

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Glossary

Technical Terms

**Arsenic:** A highly poisonous metalloid, which naturally occurs in many minerals, and is commonly used to preserve wood.

**Acute:** Conditions that are severe and sudden in onset, such as a broken bone or asthma attack.

**Arbuscular Mycorrhizal Fungus:** A type of mycorrhiza in which the fungus penetrates the cells of the roots of a vascular plant, which help plants to capture nutrients such as phosphorus, sulfur, nitrogen and micronutrients from the soil.

**Benzene:** A colorless, volatile liquid hydrocarbon present in coal tar and petroleum, used in chemical synthesis, and found to have carcinogenic properties.

**Biofuel:** A fuel that is produced through present-day biological processes, such as agricultural or anaerobic digestion.

**Biotic:** Associated with or derived from living organisms.

**Biomass:** The total mass in a given area or volume of organic matter derived from living, or recently living organisms.

**Carcinogen:** A substance capable of causing cancer in living tissue.

**Carbon Dioxide:** A naturally occurring chemical compound that is composed of one carbon and two oxygen atoms, that is the primary greenhouse gas emitted through human activities.

**Carbon Monoxide:** An element which consists of one carbon and one oxygen, that is toxic to hemoglobin animals and included in the formation of ground-level ozone.

**Chronic:** A condition that is associated with a long-developing syndrome, such as osteoporosis or asthma, which may also cause an acute condition.

**Diesel Oxidation Catalyst:** A device that uses a chemical process to break down pollutants from diesel engines in the exhaust stream, turning them into less harmful components.

**Dissolved Oxygen:** Bubbles of gaseous oxygen that are mixed in water and available to aquatic organisms for respiration. Primary sources of DO include the atmosphere and aquatic plants.

**Diesel Particulate Matter Filters:** Device designed to remove diesel particulate matter or soot from the exhaust gas of a diesel engine.

**Ecosystem:** A biological community of interacting organisms and their physical environment.

**Endocrine Disruptor:** Chemicals that can interfere with the endocrine (or hormone) system in mammals at certain levels, and can cause cancerous tumors, birth defects, and other developmental disorders.

**Formaldehyde:** A naturally-occurring organic compound with the formula CH$_2$O.

**Hammermill:** A machine whose purpose is to shred or crush woody material into smaller pieces by the repeated blows of little hammers.

**Hazardous Air Pollutants:** Pollutants that are known or suspected to cause cancer or other serious health effects, or adverse environmental effects. The EPA recognizes 187 hazardous air pollutants, including benzene, formaldehyde, and arsenic compounds.

**Hermann Brothers:** Proposed site, current lumber mill operating in Port Angeles, Washington
Landing: The place where logs are dragged for loading onto trucks.
Micronized Wood: Also referred to as wood flour. Wood that has been pulverized into a substance similar to sawdust that is a feedstock for sustainable aviation fuel.
Mononitrogen Oxides: Oxides of nitrogen, especially as atmospheric pollutants.
Nonpoint-Source Pollution: Pollution caused by rainfall or snowmelt moving over and through the ground.
Ozone: A colorless, unstable, toxic gas with strong oxidizing properties, formed from oxygen by electrical discharges or ultraviolet light.
Particulates: A very small particle, as of dust or soot, which can potentially remain suspended in the atmosphere for long periods of time.
Particulate Matter: the term used for a mixture of solid particles and liquid droplets suspended in the air.
Pelletizing: The process of compressing or molding a material into the shape of a pellet.
Propagules: A structure, such as a cutting, seed, or spore, which produces a new plant.
Sediment: Natural material that is broken down by weathering and erosion, and is transported by various mechanisms.
Selective Catalytic Reduction: An emissions control system that injects a liquid-reductant agent through a special catalyst into the exhaust stream of a diesel engine.
Slash: coarse and fine woody debris generated during logging operations.
Solids Depot: An industrial site that breaks down slash from forest residuals into a feedstock, being micronized wood or wood flour for export to a liquids depot.
Threatened Species: Any species of animals, plants or fungi which are vulnerable to endangerment in the near future.
Toxicant: Substances made by humans or introduced into the environment by human activity.
Turbidity: Measure of water clarity and the amount of light which can pass through the water.
Watershed: The area of land where all of the water that is under it or drains off of it goes into the same place.
Wet scrubbing: An air pollution control device used for removing particles and/or gases from industrial exhaust streams.
Wood Pellets: Commonly used fuel for biofuel generation plants as well as heating
Wood Flour: Finely ground wood that has a consistency similar to sand or sawdust.
Volatile Organic Compounds: Organic chemicals that have a high vapor pressure at ordinary room temperature, which results in a large numbers of molecules to evaporate or sublimate from the liquid or solid form of the compound and enter the surrounding air.
Acronyms and Abbreviations

AMF: Arbuscular Mycorrhizal Fungus
BDT: Bone Dry Tons
CO: Carbon Monoxide
CO2: Carbon Dioxide
DNR: Department of Natural Resources
DOC: Diesel Oxidation Catalyst
DO: Dissolved Oxygen
DPMF: Diesel Particulate Matter Filters
EIA: Environmental Impact Assessment
HAPs: Hazardous Air Pollutants
HB: Hermann Brothers
HDDV: Heavy duty diesel vehicle
HDGV: Heavy-duty gasoline fueled vehicle
LCOE: Leveleized Cost of Energy
NARA: Northwest Advanced Renewables Alliance
NPS Pollution: Nonpoint-Source Pollution
NOx: Mononitrogen oxides (includes nitrogen oxide and nitrogen dioxide)
OCC: Old Corrugated Cardboard
PM 2.5: Particulate matter under 2.5 nanometers in diameter
PM10: Particulate matter with a diameter under 10 nanometers
PTPC: Port Townsend Paper Corporation
SCR: Selective Catalytic Reduction
SOx: Sulfur Oxides
THC: Total Hydrocarbons (including methane)
VOCs: Volatile Organic Compounds
1. Executive Summary

1.1 Purpose

The purpose of this document is to explore the potential environmental impacts of adding a wood milling facility to an industrial lumber yard. The goal of the facility is to produce a finely milled wood flour that can be used in processes such as the production of wood pellets for fuel or chemical processes such as enzymatic hydrolysis, a process that turns wood sugars into a liquid fuel. The target for this projects is the Hermann Brothers log yard located southwest of the City of Port Angeles, at 404 Eclipse W Dr, Port Angeles, WA 98363. Hermann Brothers is a logging company that has an extensive established infrastructure for obtaining, shipping, and processing logging slash. Hermann Brothers is an ideal company because they have an active commitment to environmental projects, and are a fairly diverse company that deals not only in logging, but also in the production and selling of various wood chip products.

1.2 Site Description

The proposed project is located just southwest of the city of Port Angeles, Washington, on the northern tip of the Olympic Peninsula. The construction of a solids depot at the Hermann Brothers’ site will occur in Clallam County, but the resource base for the project will extend into neighboring counties. The Hermann Brothers’ site is an existing site that already has much of the infrastructure needed to facilitate the project. The site is located directly on Highway 101, one of the largest roads in the area, this will allow for easy access by trucks which will be the source of feedstock input for the project.

The location on the Olympic Peninsula allows for extremely close proximity to the ongoing large scale logging operations because the project is focused on logging by-products. The availability of feedstock changes depending on the acceptable cost with a range of about 122,000 bone dry tons (BDT) at $63 per ton to 242,000 BDTs at $73.1 The target production for this project will be working at a level of 50,000 BDTs; the available feedstock in the surrounding area will be able to easily accommodate the demand.

The site also has easy access to the power grid, which will be necessary for the project. A Bonneville Power Administration transmission line runs directly to the south of the site location.

Beside the close proximity to large scale logging, locating the project in Washington provides the closest practical location to the largest market in the region. The Seattle metropolitan area will be the main market for any output from the potential project either as pellets or a bio refined fuel. Seattle offers both a massive aerospace industry and international ports that can act the final resting place for the project outputs.

1 IDX Webinar
1.3 Problem Description

Under present conditions large piles of post logging waste, often stumps, tree limbs, and other woody biomass not used in conventional wood processing are burned on site of harvest as a form of waste management. These piles cannot be left because of the potential increase in fire hazard of leaving these flammable materials around. Currently timber land managers must dispose of these forest residuals, and often the cheapest method of doing so is through obtaining a burn permit through the Department of Natural Resources (DNR). Though the DNR and the Department of Ecology monitor conditions such as wind and weather when permitting these burns there are still emitting substantial amounts of airborne pollutants.²

Burning on site emits large quantities of particulate matter, as well as Co2, and releases smoke which decreases visibility. Table 1 provides estimates for emissions of PM10/pile based on size. However there are more complicated and accurate measures on calculating emissions of burning slash piles based on their biotic make up, physical size and structure.³ PM10 refers to the emission of particulates up to 10 nanometers in diameter. PM10s are significant because they have been found to be small enough to reach the lower respiratory system and are known to cause human health effects, such as difficulty breathing, premature death, damage to lung tissue and lung cancer.⁴

Furthermore, there are many other serious toxic compounds released from the incomplete combustion of woody biomass in these piles. The release of volatile organic compounds, or VOCs, from combustion can result in ozone, an inorganic molecule linked to respiratory issues and destruction of lung tissue. This is through VOCs being struck by sunlight and photochemically reacting with Nitrogen Oxides (NOx), which are also released from this incomplete combustion. NOx are also a prevalent contributor to the issue of acid rain.

² Washington State Department of Ecology
³ Piled Fuels Biomass and Emissions Calculator
⁴ U.S. Environmental Protection Agency
Table 5

Under current practices burning of these slash piles is simply for waste disposal, and has no yield in terms of productive activity. A solids depot at the Hermann Brothers site, however, could convert this biomass into a fuel source to be utilized by many end uses. Processing and more controlled combustion could allow for decrease in harmful chemical and particulate matter release, and therefore a decreased overall environmental impact. Furthermore, even if all of these emissions were still happening and not controlled, this project would at least mean the woody biomass would be burned for a productive end use, rather than simply waste disposal.

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Pile Tonnage calculated using paraboloid volume formula\(^a\) multiplied by 30 lbs/ft\(^3\), multiplied by 0.2 packing ratio\(^b\)

U.S. Forest Service's Conformity Handbook, Table 6 -- PM10 Emissions Factor of 19.0 pounds/ton of fuel burned - average pile and burn slash

Revised 2/13/2001

Table 1\(^5\)

<table>
<thead>
<tr>
<th>PILE SIZE (in feet)</th>
<th>TONS OF PM10/PILE</th>
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</tr>
<tr>
<td>5’ diameter x 4’ height</td>
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</tr>
<tr>
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</tr>
<tr>
<td>50’ diameter x 10’ height</td>
<td>0.3</td>
</tr>
</tbody>
</table>

\(^a\) Pile Tonnage calculated using paraboloid volume formula
\(^b\) Multiplied by 30 lbs/ft\(^3\)

\(^5\) USDA, Forest Service General Technical Report
1.4 Proposed Action | Milled Wood Facility

The production of jet fuel from wood chips requires that the raw material be stored somewhere with optimal connection to affordable transportation, energy efficiency, and environmental safety. In order to decrease cost and increase effectiveness of this plan, the project to produce milled wood at an existing wood industry facility is being proposed. The candidate, Hermann Brothers Logging & Construction, INC, in Port Angeles, WA serves as a potential location for raw materials storage and pre-processing.

Milled wood, or wood flour, is produced by a process which requires several steps through large wood grinding machines. Before any of this can be done, the materials must be sorted by size through a sieve. After the material is shaken and separated into their respective sizes they are then shipped off to different processing sites accordingly.

Wood sizes that are desirable will continue to be processed by machines on site. For this depot, the wood flour consistency will be required to be finely ground. This fine consistency will require the use of a hammermill machine to be involved in the process, which consists of rotating blades and a screen. When the chips pass through the screen and blades, the materials are ground to a fine dust. From here, the dust can either be stored, shipped, or converted into pellets.

1.5 Alternative Action | Pellet Mill

The pellet mill alternative adds an extra step in the processing procedure on the Hermann Brothers site. This process adds a preheating element to the formula, which would require slightly more energy, along with a pelletizing step. The process of pelletizing the wood flour requires a pelletizer machine, which consists of a perforated steel die and steel rollers that pushes the wood flour through the machine to form wood pellets. Once the wood dust is converted to pellets, it can then be stored or shipped elsewhere.

1.6 No Action

The no action alternative is the proposal to not change the environment in any way, shape, or form, which would not change any of the current conditions of the surrounding area.

1.7 Recommendation

It is believed after analyzing potential impacts of each proposed action, that the proposed action of a solids depot/micronized wood facility to be added to the Hermann Brothers site would have the highest net benefit after considering all factors listed in WAC 197-11-444. This includes all relevant impacts to specific sections of the Natural and Built environment. Overall the proposed action would likely have positive net
environmental impacts when compared to other alternatives, including leaving the site under current conditions as is.

**Decision Matrix**

**Effects on Natural Environment**

<table>
<thead>
<tr>
<th>Affected Area</th>
<th>Proposed Action</th>
<th>Alternative Action</th>
<th>No Action</th>
</tr>
</thead>
<tbody>
<tr>
<td>Soil</td>
<td>+</td>
<td>+</td>
<td>-</td>
</tr>
<tr>
<td>Air</td>
<td>0</td>
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</tr>
<tr>
<td>Water</td>
<td>-</td>
<td>-</td>
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<tr>
<td>Plants and Animals</td>
<td>0</td>
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</tr>
<tr>
<td>Energy and Natural Resources</td>
<td>-</td>
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</tr>
</tbody>
</table>

Legend:

+ Positive Impact
- Negative Impact
0 Neutral Impact

**Effects on Built Environment**

<table>
<thead>
<tr>
<th>Affected Area</th>
<th>Proposed Action</th>
<th>Alternative Action</th>
<th>No Action</th>
</tr>
</thead>
<tbody>
<tr>
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<td>-</td>
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<td>Land Use</td>
<td>+</td>
<td>+</td>
<td>0</td>
</tr>
<tr>
<td>Transportation</td>
<td>-</td>
<td>-</td>
<td>0</td>
</tr>
<tr>
<td>Public Services and Utilities</td>
<td>-</td>
<td>-</td>
<td>0</td>
</tr>
</tbody>
</table>

Legend:

+ Positive Impact
- Negative Impact
0 Neutral Impact
2. Elements of the Natural Environment

The following section describes effects from the proposed action, alternative action, and no action alternative on the Natural Environment, as well as potential mitigation techniques that can be undergone to address these potential impacts. Each section addresses a specific aspect in compliance with Washington Administrative Code Section 197-11-444. Based on our analysis of the potential impacts to the Natural Environment, we consider effects to Soil, Air, Water, Plants and Animals as well as effects on Energy Use and Natural Resources.

2.1 Soil

1.) Existing/current conditions

Impacts to soil on the proposed site would likely be minor, given the site is already zoned for industrial use and is already developed. Further soil compression due to development could have very small environmental impacts such as drainage issues.

According to the USDA soil survey, classification of this area is Elwha sandy loam, with 0 to 15 percent slopes. The area receives a mean annual precipitation of 38 inches, with a mean annual temperature of 48 degrees Fahrenheit. The surrounding geography consists of moderately well drained hill slopes. Elevation ranges from 200 to 2,000 feet in this region, with a frost free period of 160-200 days. With this much rainfall and a soil classification of till, the survey classified the area as prime farmland if irrigated.  

While impacts to soils at the HB site would be minimal, these impacts to soil elsewhere, specifically the logging sites that slash would be obtained from, is more significant. Under current conditions, due to logging regulations, slash piles must be disposed of, and often this is done by burning on the landing sites of current logging operations. Slash pile burning results in a multitude of negative effects to local soil conditions. Slash pile burning can result in moderate soil erosion issues, due to the fact that the fires are killing plant matter keeping the soil in place, as well as drying out the soil. However these issues only persist in the short term until more biotic material return to the soil.

Another effect on soil health from burning these piles would be changes in the nutrient and acidity of soil composition. These results are seen in Figure 1, and would cause decreased acidity, nitrogen and organic carbon levels, as well as an increase in phosphorus.

---

6 Web Soil Survey
7 Washington Department of Natural Resources
8 Effects of Pile Burning in the LTB on soil and Water Quality
Furthermore the scarred areas left after the burning of a pile often destroys most, if not all, propagules. This means that the soil is left to be recolonized and is more vulnerable for the invasion of exotic species. These scarred areas also negatively impact Arbuscular mycorrhizal fungi (AMF), which are important to the regrowth of an area. AMF’s play a key role in soil health and thus the health of the ecosystem that will grow from the scars of the burned slash pile.

2) Proposed Action

Potential impacts

The proposed action for a solids depot/micronized wood facility could increase soil compaction for the 10 acres required on the Hermann Brothers site due to this development. However this area is already zoned as heavy industrial and environmental impacts due to this would be negligible when considering positive impacts elsewhere. The resulting decrease in degradation from slash piles being burned on logging sites would result in a net increase in soil health.

Mitigation

No mitigation efforts would be possible or necessary for the issue of soil in our proposed action.

---

9 Restoration Ecology
3) Alternative Action

Potential impacts

The alternative action of installing a wood pellet producing facility would have similar if not identical impacts as the proposed action. Resulting in little to no negative impact and a large positive impact from building the facility.

Mitigation

No mitigation efforts would be possible or necessary for the issue of soil in our proposed action.

4) No action alternative

Impacts:

A no action alternative would result in the continuous harm to forest soils that is currently occurring because of the burning of slash piles at landing sites.

2.2 Air

1.) Existing/current conditions

Current air quality in the Port Angeles community surrounding the Hermann Brothers site is monitored and recorded by the Olympic Region Clean Air Agency (ORCCA) at E 5th St. Port Angeles, WA 98362, roughly 10 miles from the proposed site. As of 4:30 PM on 11/30/2015 the WAQA value of air quality was in the moderate range, meaning that “People with asthma, respiratory infection, diabetes, lung or heart disease, or have had a stroke may begin to have breathing problems.” and that “People with asthma, respiratory infection, diabetes, lung or heart disease, or have had a stroke should limit outdoor activities or do activities that take less effort, such as walking instead of running.”

As far as air quality beyond the local area, currently slash piles are being burned on the logging sites as a mitigation effort to decrease forest fire potential, resulting in the unregulated emission of particulate matter and volatile organic compounds (VOC’s) that result in the creation of ozone, CO2, CO, and NOx. This is not to mention the emission in smaller levels of over 100 other toxicants such as formaldehyde and benzene. This is done purely for waste disposal in an effort to decrease chances of larger forest fires due to potential ignition of these piles, meaning they currently have no productive use.

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10 ORCAA Current Air Quality
11 Boulder County Colorado
2.) Proposed Action

Potential impacts

Considering our potential feedstock is already being burned, our proposed action of using this underutilized resource for the manufacturing of wood flour would more than likely have a positive net environmental impact. The milling of the wood would be done in an indoor facility, so there will only be negligible impact of particulates coming from the facility.

The biggest potential impact on air quality in our case would be the increased emissions from burning diesel to run equipment used in this operation, primarily being trucks to ship the woody debris to the Hermann Brothers site, as well as the onsite use of front end loaders. These emissions would have both local effects as well as global effects in terms of the release of CO2 and its contribution to worldwide climate change issues. Local effects from the burning of diesel fuels include the emission of fine particulate matter, as well as the release of over 40 toxic air contaminants.¹²

A few of these toxic air contaminants would be benzene which has been proven to cause drowsiness, headaches, dizziness and nausea under acute exposure,¹³ however acute toxicity from inhalation exposure has been proven to be low when tests were done on lab animals. Chronic exposure from inhalation, include blood and bone marrow damage, as well increased cancer risk, given that benzene is a Group A human carcinogen. Another chemical of concern in regards to the burning of diesel fuel would be the release of arsenic, a known group 1 carcinogen and known endocrine disrupter. The former are both effects of chronic exposure, however acute exposure can result in skin irritation as well as damage to the respiratory system.¹⁴ These are just two major examples of toxic chemicals found in diesel fuel, there are an additional 38 that will not be discussed in this assessment, but are known to have similar effects. Some average operating emissions from a study done by the United States EPA are shown below in Figure 2.

Besides chemicals released from diesel fuel being burned there is also the issue of fine particulate matter. Ninety percent of particulates found in diesel exhaust are classified as fine particulates or PM 2.5, meaning they are less than 2.5 microns in diameter.¹⁵ This class of particulates are especially harmful to the human body because they are not filtered out by the human respiratory system and can cause both acute and chronic issues from their intrusion into the deeper respiratory system. They have the ability to aggravate existing issues such as asthma bronchitis and emphysema, as well as generally aggravate

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¹² Office of Environmental Health Hazard Assessment
¹³ United States Environmental Protection Agency Technology Transfer Network
¹⁴ Agency for Toxic Substances & Disease Registry
¹⁵ Agency for Toxic Substances and Disease Registry, ATSDR
the respiratory system and result in coughing, painful breathing, and general decreased lung function. (Note: Impacts from CO2 emissions found under energy section.)

As far as quantity goes it is hard to estimate the distance travelled by these trucks, due to the fact that logging operations are located vastly across the Olympic Peninsula. Trip distance would depend on the source of the slash piles. However estimates from Table 2 can give us an idea of emissions on a per mile basis for these chemicals.

<table>
<thead>
<tr>
<th>Pollutant</th>
<th>HDGV (gasoline)</th>
<th>HDDV (diesel)</th>
</tr>
</thead>
<tbody>
<tr>
<td>VOC</td>
<td>1.586</td>
<td>0.447</td>
</tr>
<tr>
<td>THC</td>
<td>1.635</td>
<td>0.453</td>
</tr>
<tr>
<td>CO</td>
<td>13.130</td>
<td>2.311</td>
</tr>
<tr>
<td>NOx</td>
<td>2.914</td>
<td>8.613</td>
</tr>
<tr>
<td>PM$_{2.5}$</td>
<td>0.044</td>
<td>0.202</td>
</tr>
<tr>
<td>PM$_{10}$</td>
<td>0.051</td>
<td>0.219</td>
</tr>
</tbody>
</table>

Table 2: Average In-Use Emission Rates for Heavy-Duty Vehicles (grams per mile) (Definitions for abbreviations can be found in the glossary section)

**b.) Mitigation**

The only issues requiring mitigation for our proposed action would be in relation to increased burning of diesel fuels. This can be done in a few ways, the most feasible way being through the cleaning of tailpipe emissions. Other alternatives would include a change in transportation altogether, or a change in fuel type. These two alternatives would be much less cost effective and less feasible than a simple cleaning of emissions. These could include a transfer to natural gas powered vehicles, which is not economically sensible for this operation at this time, or the movement to alternative methods of transportation, which would most likely be rail which is currently unavailable at the Hermann Brothers site.

Current technologies existing to clean emissions from diesel fuels would include retrofitting measures as well as idle reducing technologies. Three major retrofitting technologies exist including Diesel Oxidation Catalysts (DOC), diesel particulate matter filters (DPMF) and selective catalytic reduction (SCR). DOCs have the ability to reduce particulate emissions up to 40 to 50 percent. DPMFs require the use of a modified diesel fuel known as ultra-low sulfur diesel, but in conjunction with the new fuel has the ability

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16 Environmental Protection Agency
to reduce the emission of hydrocarbons carbon monoxide as well as particulate matter by 60 to up to 90 percent in some cases. The third option SCR is used primarily to reduce the emissions of NOx, through a chemical reaction separating it into oxygen and nitrogen. These technologies have huge potential to decrease NOx in the range from 75 to 90 percent, to reduce hydrocarbon emissions 50 to 90 percent, as well as reduce particulate matter from 30 to 50 percent.\textsuperscript{17}

Another mitigation technique could include further chipping and breaking down the woody biomass before loading to increase the amount of woody biomass that can be transported per trip, resulting in fewer trips and thus reduced emissions. However, this would require bringing mobile chipping equipment to the landing site, which would likely be less efficient.

However when considering the increases in emissions from burning diesel fuels we must consider the net effects of the proposal. Many emissions discussed in the impacts section overlap with emissions from the burning of slash piles themselves, which would continue in our no action alternative. Even considering the increased emissions from diesel fuels it is likely that without any mitigation efforts this project would likely have a net positive increase in terms of environmental degradation.

3.) Alternative Action
   a.) Potential Impacts
   The alternative action of a pellet making facility rather than a wood mill would create greater issues in terms of air quality. This is due to the fact that the pellets would be burned for energy production or space heating. However it is difficult to impossible to quantify these effects without knowledge on who would buy the product produced. Besides this the same issues exist as described above in the originally proposed action.

   b.) Mitigation
   Pellet mill emissions could be regulated through the incorporation of wet scrubbing technology. This could be particularly effective if the fuel was being burned at a large scale biofuel electricity production plant. The incorporation of wet scrubbing technology could lead to a potential 95\% capture and therefore reduction in the emission of particulate matter from the burning of these pellets in a biofuel generation plant.\textsuperscript{18} However this would come with an increase in water usage due to the fact that water is the primary input for the capture of these particulates. Wet scrubbing technologies also exist for the capture of NOx, and VOCs.
   Efforts to mitigate increased emissions from burning diesel fuel would be the same as the previous mitigation section addressing the proposed action.

\textsuperscript{17} West Coast Collaborative
\textsuperscript{18} Wet Scrubber for Particulate Matter
4.) No action alternative
a.) Potential Impacts

A no action alternative would result in the same current conditions, of these hazardous air pollutants (HAPs) being released unregulated into the atmosphere.

2.3 Water

1) Existing/current conditions

The Hermann Brothers site is located within the Elwha-Morse Watershed (Figure 2). This location is to the right of Tumwater Creek and to the left of Dry Creek, both of which flow into the Elwha-Morse Watershed.

Figure 2\(^\text{19}\). Black line shows border of the Elwha-Dungeness Watershed area. The black star marks the general location of the Hermann Brothers site.

\(^{19}\) USGS Washington Water Science Center
2) Proposed Action

a. Potential impacts

The proposed action will require mitigation to offset the impacts of new water uses on stream areas. Increasing transportation in this area may increase the sediment load input into the nearby streams, negatively impacting marine populations and degrading the quality of drinking water. Sediment increase in relation to logging is a well-documented threat to water quality as a nonpoint-source pollutant. Trucks grind up gravel road surfaces, which turns it into fine sediment that is transported by storm water to rivers and streams. Chronic sediment input into streams has negative effects on fish and other marine life. Increased sediment in streams smother fish eggs, increases temperature of the stream, and effectively chokes out life by decreasing the levels of dissolved oxygen (DO). The increase in sediment can also increase the turbidity of the stream, which not only increases the temperature of the water, but decreases the amount of available light. This decrease in light availability decreases the amount of photosynthesis occurring, which will decrease the amount of DO being produced. Low amounts of DO in the water, along with increased temperatures and decreased vegetation from lack of photosynthesis, disrupts feeding and reproduction in many marine species, especially salmon.

Using the slash piles in production rather than burning them automatically decreases the amounts of nitrates and sulfates that are able to leech into the soil and groundwater systems.

b. Mitigation

Road location planning and design can greatly reduce the sediment loads transported into nearby water bodies. Road systems should be designed to minimize the length and width of the roads. In addition, the transportation system should be planned in such a way that minimizes the number of water bodies being crossed by trucks. New construction of roadways in this area should avoid steep gradients, landslide-prone areas, or areas with poor drainage. Proper planning and maintenance of these roads will reduce the pollution and erosion impacts in the long run.

3) Alternative Action

a. Potential impacts

Our alternative action would have the same impacts to water quality as our proposed plan, in that stopping the burning of slash piles will decrease the amounts of nitrates and sulfates absorbed into the soil, but increased transportation could negatively impact the health of water bodies.

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20 US Environmental Protection Agency
21 US Environmental Protection Agency
b. **Mitigation**

Similarly to our proposed action, proper planning of roadways will greatly reduce the amount of sediment load in water bodies.

4) No action alternative
a. **Impacts**

The status quo of burning slash piles already negatively affects the environment, by increasing erosion and increasing the amount of sulfate and nitrate inputs into nearby streams through surface and subsurface water runoff.

b. **Mitigation**

McDonald and Siebert creeks drain directly into the Strait of Juan de Fuca. The upper portions of these creeks are adversely affected by forest practices, so habitat in these streams would benefit from restoration actions if the no action alternative is chosen.

**2.4 Plants and Animals**

1) **Existing/current conditions**

The Hermann Brothers facility is located in an area which is not within 200 feet of any state or federal protected areas (Figure 3). However, the surrounding area is a known habitat for the Spotted Owl, which is listed federally as a threatened species (Figure 4, Figure 5). Threats to the spotted owl are due to a loss of habitat quality and quantity as a result of human activities and disturbances, and ongoing and projected loss of habitat as a result of fire, logging and conversion of habitat to other uses. Any additional use of this land should consider the impacts on this nearby species.

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22 Clallam County Website
Figure 3. North Olympic Wildlife protected areas, marked with circles. Black star indicates general area of Hermann Brothers site.

Figure 4. Distribution of Spotted Owls in Washington State. This threatened species has known occurrences in Clallam County.

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23 North Olympic Wildlife Areas
24 Priority Species List, 2008
Clallam County also hosts some species of rare plants, although most that are threatened or a species of concern are located along coastlines. One possible local threat exists to *Actaea elata*, commonly known as tall bugbane, which grows in forest areas. This species of plant is not toxic to birds, although it is highly toxic to mammals, and is useful as a bug repellant. Logging, road maintenance, and other forest disturbances can cause and damage to populations.

2) Proposed Action
   
   c. Potential impacts
      
      The proposed action will increase the amount of industrial activity and transportation around the Hermann Brothers site. This could potentially affect the habitats of the Spotted Owl or any threatened plant species.

   d. Mitigation
      
      Any construction or forest clearing in this area should not impede on the habitat range of the spotted owl. In addition, while planning new transportation routes the habitat zone for the Spotted Owl should be considered. Impacts to the tall bugbane should also be considered.
3) Alternative Action  
   c. Potential impacts  
      The alternative action will pose similar threats to the proposed action, in 
      that the increased industrial activity and transportation could affect the habitat of 
      the Spotted Owl and threatened plant species. 
   d. Mitigation  
      As with our proposed action, the ranges of habitat for known plants and 
      animals should be given special consideration while drawing new transportation 
      routes or construction areas. 
4) No action alternative  
   c. Impacts  
      Currently the habitat range of the spotted owl is not affected by the 
      Hermann Brothers site. 
   d. Mitigation  
      No mitigated is required for the status quo since the habitat of the spotted 
      owl is not currently negatively impacted by logging practices in this area. 

2.5 Energy and Natural Resources 
1) Existing/current conditions  
   Energy use of the Hermann Brothers site is currently in the range of 150,591,880 - 
   353,800,200 Kwh/year, based on a wood processing load of 200,000 BDT per year. This 
   is just calculating the energy demands of processing the wood, not the lighting, heating, 
   and cooling of the entire facility. 
   Currently negligible energy is being used in burning slash piles at the landings. 
   Any proposed action would result in an increase in energy usage. However this could be 
   offset by a decrease in energy consumption at end use due to fact that we are producing a 
   source of usable energy. 
2) Proposed Action  
   Potential impacts  
   Potential impacts from our project would include an immediate increase in energy 
   use due to the manufacturing of wood flour. Assuming this wood flour is to be used as a 
   feedstock for the production of a drop in aviation jet fuel, we would see a decreased 
   demand for fossil fuel based jet fuels in the end, which does not reduce energy 
   consumption but does transition the energy creation to a more sustainable source. 
   However, since this is so much further down the line and we do not currently have 
   information on the efficiency of a biofuel facility it is difficult to estimate what kind of 
   net impacts this may have on energy usage.
The proposed action would be drawing electricity to run the micronized wood machinery. Looking at getting particles into the ideal range of under 50 nanometers would take between 1.5 and 2.5 KWh/kg. The solids depot/micronized wood facility proposal would bring in 50,000 BDT of feedstock, which equates to 45,359,235kg, this brings us to an increased energy demand on the Hermann Brothers site of 68,038,852.5 - 113398087.5 Kwh annually. This would result in about a 45% increase in energy demand (is we assume minimum energy use values).²⁷

Estimates that can be made in terms of energy usage for shipping are limited to the average fuel economy for trucks that would be used for this operation, which are in the range of 4-7 mpg²⁸ in terms of diesel fuel. This would emit somewhere in the range of 20 lbs of CO2 per gallon.²⁹ Estimates are limited to a per gallon or per mileage basis due to the nature of the operation, and that location of the feedstock changes based on where logging is taking place.

**Mitigation**

Mitigation efforts could include anything that would increase the facility’s efficiency or the use of renewables at the facility. There could be potential for the installation of a bio-generation plant that could produce needed electricity by burning hog fuel. The site itself has more than enough available room for a generation plant. Costs for a small scale biomass electric plant are somewhere in the range of $3,000-$4,000 per kW of capacity resulting in a levelized cost of energy (LCOE) of between 80-15 cents per kWh.³⁰

As far as shipping goes there is potential for drastic increases in efficiency of diesel fuel semi-trucks, however, these are nowhere close to being economically feasible. There has been research done and potential found for semi-trucks obtaining up to 12 mpg³¹, a close to doubling of average current efficiency.

**3) Alternative Action**

**Description**

The instillation of a pellet mill facility would increase energy consumption as well as energy use in shipping to the facility, likely in a very similar way to the proposed action.

**Potential impacts**

Our alternative action of a pellet mill would have similar increases in immediate energy usage. However the decrease of end use would be a bit more ambiguous due to

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²⁷IDK Hermann Brothers Webinar  
²⁹U.S. Energy Information Administration  
³⁰Whole Building Design Guide  
³¹Green Car Report
the fact that wood pellets can have a multitude of uses, from being burned as a renewable electricity generating resource to being used for home heating. Many high end boilers can achieve an efficiency of up to 85%, however we must consider this is simply in the combustion of the pellets, we also must consider their production.

An environmental impact assessment of exported wood products done by the Consortium for Research on Renewable Industrial Materials did a lifecycle analysis on the impacts from pellet production and export and came up with the results that 11%-18% of the energy contained in the pellets was used to produce them from forest residuals, to an end use product arriving at a specific location. Assuming these wood pellets have an energy content in the range of 16,000,000 BTU/ton this means an increased energy use of 17,60,000 BTU/ton of pellets if we use the low end. If we are assuming the production of 50,000 BDT of pellets that would result in an 88,000,000,000 BTU increase in energy demand equivalent to 25790 MWH. Since marginal demand in Washington state comes primarily from Peaker natural gas fired power plants this could result in a 31,205,900lb increase in CO2 emissions, assuming that 1210 lbs of CO2 are produced from 1 MWH of electricity produced from natural gas. The 11% range was used because we are primarily concerned with the production of these pellets, where they will be transported to is unknown, so we opted not to include transportation into our analysis.

As far as shipping effects go they would be very similar if not identical to the proposed action.

Mitigation

Mitigation efforts in this case would be the same as the originally proposed action.

4) No action alternative

Impacts

A no action alternative would result in no increase in energy production, and so in terms of energy use would have the least environmental impact.

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32 Biomass Center
33 Consortium for Research on Renewable Industrial Materials
34 University of Connecticut
35 U.S. Energy Information Administration
3 Elements of the Built Environment

3.1 Environmental Health

1) Existing/Current Conditions

The Herman Brothers site is currently developed, with existing structures adjacent to the site consisting of a variety of private business. They include: Port Angeles Hardwood (a hardware store), Green Creek Lumber, and Eclipse (a heliport) (Figure 6). The HB grounds are unpaved, but are cleared to provide space for lumber storage. The site has roughly 10 small water reservoirs. Storage of dry timber requires access to water for fire mitigation purposes. Access to Eclipse Industrial Parkway is through two lane paved streets that service all industrial activities in the area. The entire industrial parkway is surrounded with spotty forest vegetation, with levels of development increasing towards the center. There are no present known contaminations of water or soil resources in this area.

Figure 6: The existing structures (heliport, hardware store, lumber company) are highlighted in yellow. Outlined in blue is the Herman Brothers site.

36Google Maps- Hermann Brothers location
2) Proposed Action
Potential Impacts

The construction of the micronized wood facility would be taking place on a site that is already intended for industrial land uses, so the environmental modification to the existing environment would be minimal.

Construction and operations at the facility would involve noise pollution, however once the facility is completed, noise pollution will significantly decrease. Operation of the micronized wood facility will create noise that is similar to what is already occurring at the site.

To co-locate the facility, additional electrical capacity will need to be added, which should be minimal due to the close proximity of Bonneville Power Administration lines. The storage of the micronized wood and feedstock should take into consideration the potential for fire hazards. Should the region experience any seismic activity, the structure’s design could potentially pose a risk to human health and safety.

Mitigation

Mitigating potential damage to the proposed buildings from an earthquake involves engineering specifications that keep the walls continuous from floor to ceiling. State law WAC 365-190-120 defines the geological risks that should be taken into consideration when designing the site layout. Anchoring structures to the ground (i.e. large electrical poles) for the facility could mitigate further damage in the case of a hazard such as an earthquake. Earthquake bands, limiting the size and shape of structures, and reinforcing of critical structural features\(^{37}\) (such as framing connectivity and continuity) can reduce this hazard in compliance with RCW 70.86.03.\(^{38}\)

Fire resistance can be incorporated into the site development by avoiding situating structures on slopes. FEMA guidelines identify two types of fuel for fire hazards, the built and the natural environment. Keeping the area surrounding the facility well-irrigated, as well trimming and removing dry foliage within a 30 ft. radius of structures can significantly reduce the risk associated with fire.\(^{39}\)

3) Alternative Action
Potential Impacts

The impacts of a pellet mill on the health of the environment should not significantly differ from the impacts of a micronized wood facility. Like the previous alternative, a pellet mill’s built structure could potentially pose a risk to human and environmental health and safety in the instance of a natural hazard if mitigation is not planned accordingly.

\(^{37}\) Techniques of Seismic Rehabilitation of Existing Buildings
\(^{38}\) Washington State Legislature
\(^{39}\) FEMA Rebuilding After a Wildfire
Mitigation

Along with relevant mitigation techniques listed in the mitigation section of the proposed action, other safeguards may involve strict on-site storage and maintenance policy for processed goods that reduce the risk associated with fire hazard, such as frequent irrigation. Earthquake awareness and drills for evacuation can help reduce the loss of life in the case of a seismic hazard, which is a sound alternative to structural engineering.

4) No action alternative

Potential Impacts

The potential impacts of the no action alternative would bear no significant changes to the health of the natural environment.

3.2 Land Use

1) Existing/Current Conditions

The existing land use regulation for the proposed area of the Hermann Brothers property is zoned for industrial activity, according to the City of Port Angeles’ Comprehensive Plan. An example of the area is illustrated below in Figure 7. The proposed development of additional industrial activity should not run into difficulties with city planning or local residencies given there are none to be found within the immediate vicinity.
2) Proposed Action

Potential Impacts

The micronized wood facility would include the use and construction of a 30 million BTU dryer (approximately 60 feet in length) which dries sawdust on site. This is heated using wood fuel. Before it can be dried, the raw materials must be pulverized by greenwood and dry wood hammermills. Once run through this system, the wood can be processed by a ball mill, which can bring the particle size down to micronization level, which is ideal for fermentation into other forms of fuel. Figure 8 illustrates this process. This entire sequence of events would occur on site should the project take place.

Should the development take place, the area designated in Figure 6 would see an increase in industrial land use activity. Initially, increased activity would be due to the construction of the storage and processing facilities. Soon afterwards would be the continued use of those facilities to process post-harvest forest residues and export wood flour. The site is already zoned for industrial use and therefore may not see much increased diversity, but will see an increased intensity in levels of use.

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40 The City of Port Angeles Comprehensive Plan
Mitigation

The proposed action of installing a micronized wood facility on site should not change the use of the land to a degree which would require out of the ordinary mitigation, given its designated use by the city’s comprehensive plan. Installing industrial drainage, sewage, and electrical lines for industrial purposes are what the area is currently designated and used for. The permitting process to address the plumbing, road drainage, and septic systems can be found at www.clallam.net/Permits.\textsuperscript{42}

3) Alternative Action

Description

The pellet mill facility would incur similar, if not the same levels of changes to land use that the proposed action would, with similar amounts of construction during the pre-operation stage. The pellet facility would also include the use and construction of a 30 million BTU dryer (approximately 60 feet in length) to be used to dry sawdust on site, heated using wood fuel. Typical sites for processing sawdust into pellets employ 400 horse power pellet mills. Two of these can produce up to 10 tons of pellets per hour,

\textsuperscript{41} IDX Herman Brothers Webinar
\textsuperscript{42} Clallam County Building Department Commercial Building Permit Application Checklist
which are then cooled and screened to be stored in 270 ton pellet silos until they are bagged.\textsuperscript{43}

**Potential Impacts**

Impacts from the pellet mill facility do not significantly differ from the potential impacts of the proposed action micronized wood facility on land use. The few differences that are notable include minor variations in equipment requirements and power consumption levels, but not on land use. Neither of the alternatives will require the demolition of existing structures.

**Mitigation**

Mitigation measure would be the same for the pellet mill facility and the micronized wood facility. Potential risk from land use is not substantial enough to include mitigation as the site itself was chosen and designed to withstand the land uses employed by this facility.

4) No action alternative

**Potential Impacts**

The no action alternative provides no changes to the land use of the site.

### 3.3 Transportation

1) Existing/Current Conditions

The Hermann Brothers’ site is located on Eclipse W Drive, just off of Highway 101. The highway sees roughly 10,000-20,000 cars per day. Public transportation to the site is facilitated by a single bus stop off of Highway 101 (Figure 9). This bus terminal ends at the entrance of the industrial zone, which is serviced by two roads: the Eclipse Industrial Parkway and Eclipse W Drive. Both of the streets encompass the site location and its assets.

\textsuperscript{43} Pacific Coast Pellets, Our Plant
Figure 9: Highway 101, the main source of transportation is highlighted in yellow. The bus station is circled in blue.

2) Proposed Action

Potential Impacts

The micronized wood facility would increase the amount of shipping by trucks. The Hermann Brothers site location has no access by boat or by train, however a helipad is available nearby that could serve some industrial transportation uses. Highway 101 would receive greater activity on a daily basis, which would have an effect on the public transportation access to the site.

Based on NARA information, accounting for an 8-hour work day and assuming for 50,000 BDT per year, there would be an estimated additional 4,380 chip vans (input) on the road per year and an additional 1,460 additional sugar tanker trucks (export) per year. This would estimate an additional 6,000 truck trips per year to the site. Furthermore, NARA estimates 15 permanent employees. Washington's car ownership is 860 cars per 1,000 people. Using this statistic as a reference for calculations an estimated 12 employees would be driving in cars. Assuming 350 workdays a year, there would be an additional 4,200 car trips a year to the site.

Mitigation

Mitigating traffic and reducing the levels of congestion on Highway 101 can be approached by several methods outlined by the Federal Highway Administration. These include scheduling shipments and routes outside of peak traffic hours to reduce the strain on infrastructure or use of alternative routes. Keeping the majority of shipping vehicles

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44Google Maps, Highway 101
45 Federal Highway Administration
46Mitigating Traffic Congestion, The Role of Demand-side Strategies
involved out of the way of large flows of traffic may assist in keeping the need for mitigation at a minimum.

3) Alternative Action

**Potential Impacts**

The potential impacts on transportation from a pellet facility are the not significantly different from the potential impacts of a micronized wood facility.

**Mitigation**

Approaches to reduce the influence of a pellet facility on traffic levels are identical to mitigation measures proposed for the micronized wood facility.

4) No action alternative

**Potential Impacts**

The potential impacts of the no action alternative on the transportation of the region are negligible. The no action alternative would have no impact on current or future levels of transportation activity in and around the City of Port Angeles.

3.4 Public services and utilities

1) Existing/Current Conditions

Current conditions on the site pertaining to public services include one public transit stop as mentioned in the transportation section above. The nearest police protection, as well as emergency fire services and healthcare are located within the city approximately 3 miles away, which service the Hermann Brothers property. The Bonneville Power Administration power lines are located south of the site, which services existing facilities in the surrounding area (Figure 10).
Figure 10\textsuperscript{47}: Bonneville Power Administration Transmission Lines run south of the Hermann Brothers site location, highlighted in yellow. Circled in red is the water treatment facility, in blue is the wood chipper.

\section*{2) Proposed Action}

\textbf{Proposed Action}

The pressure this facility will have on the Bonneville power grid is directly proportional to the particle size and energy requirements of the micronization process. NARA’s IDX team analysis of energy requirements puts the processing power required for a micronized wood facility to be roughly 2.5 kwh/kg of for particles under 50 micrometers, which is the size required for the extraction of isobutanol.\textsuperscript{48} Total energy use, although unknown to us at this point, may be somewhere between 10,000-25,000 MWh/ton as mentioned in the Energy and Natural resources section.

The installation of a micronized wood facility would also incorporate the use of the site’s water treatment facility indicated in Figure 6. It is currently unknown as to how much water would be required to run the micronized wood facility, however it is certain that water consumption levels would increase. Establishing the project would require the installation of utility infrastructure from these resources.

\textbf{Mitigation}

Mitigating the effects of power and utility installation can be remedied by locating the actual site plan for the processing units close to existing infrastructure. By keeping

\textsuperscript{47}Google Maps - Hermann Brothers location
\textsuperscript{48}IDX Hermann Brothers Webinar
the distances between facilities smaller, the cost of installation can be mitigated by decreasing the amount of electrical and water/stormwater piping work.

3) Alternative Action

Potential Impacts

Impacts associated with a pellet facility would be the similar if not the same as the requirements for a micronized wood facility. Assuming the facility were to create 50,000 tons of pellets, the facility would require 25790 MWH of energy from Bonneville Power Administration, as mentioned in the Energy and Natural Resources section. Water usage would increase as well from the installation of a pellet mill on site. Levels of water usage are unknown, but would be similar to those of the micronized wood facility.

Mitigation:

Mitigating the strains on public services and utilities from the pellet facility could be achieved by the same means as the micronized wood facility. Decreasing distances between resources can drastically reduce resource installation requirements for both the two suggested projects.

4) No action alternative

Potential Impacts

No additional strain should be inflicted on current or future public services and utilities by the no action alternative.

Conclusion and Recommendation

Recommendation: Proposed Action

It is our collective decision, after due consideration of the effects of the proposed action on the natural and built environment, that the micronized wood facility be constructed and put into operation. The proposed location at the Hermann Brothers site, which is designated for industrial activity, is well set up for additional industrial activity. The soil condition, the surrounding buildings, infrastructure, water sources, utilities, and environmental health would not be affected detrimentally if the proposed action were to take place. This micronized wood facility would take post harvest forest residues, which are currently burned at the log landing and release air pollutants, and turn the wood biomass into useable goods such as liquid jet fuel that could reduce our dependence on fossil fuel-based aviation fuels.
References

1) IDX Webinar. November 16, 2015. [https://www.youtube.com/watch?v=xBCtfTXjgoQ]


12) United States Environmental Protection Agency Technology Transfer Network –


23) State of Washington Priority Habitats and Species List. Washington Department of Fish


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