Bureau of Planning and Sustainability
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MEMO

DATE: March 13, 2015

TO: Planning and Sustainability Commission

FROM: Tom Armstrong, Supervising Planner

CC: Susan Anderson, Director

SUBJECT: Terminal 6 Environmental Zoning Code and Map Amendments
PSC Questions and Answers

The following are answers to key issues and questions raised at the January 13, 2015 Planning and Sustainability Commission hearing on the proposed Terminal 6 Environmental Overlay Zone Code and Map Amendments. The questions and issues were raised by PSC commissioners and in written testimony. The answers have been provided by Pembina, the Port of Portland and staff of the Bureau of Planning and Sustainability.

Process:

1. *Why isn't there a National Environmental Policy Act (NEPA) process or EIS?*

   Answer provided by Pembina:

   Based on current design concepts, a NEPA process will be triggered by the U.S. Army Corps of Engineers (USACE) federal permitting requirements for the in-water components of the project. The scope of in-water components requiring approval is expected to be limited in nature and potential effects, as an existing dock is being utilized. The USACE will initiate their NEPA process after they determine Pembina's Joint Permit Application is complete. Pembina is currently targeting this application to be filed towards the end of March or early April.

   In addition to the NEPA process, the project will be subject to several municipal, state and federal permitting requirements. The e-zone amendment is the first step in the design and permitting process. Some of the reviewing agencies include:

   - U.S. Army Corp of Engineers (USACE)
   - U.S. Fish and Wildlife, National Marine Fisheries Services (NMFS)
   - U.S. Coast Guard (USCG)
   - Federal Aviation Administration (FAA)
   - Oregon Department of Environmental Quality (DEQ)
   - Oregon Department of Fish and Wildlife (ODFW)
   - Oregon Department of State Lands (DSL)

- Oregon State Fire Marshal (SFM)
- City of Portland Bureau of Development Services (BDS)
- City of Portland Bureau of Environmental Services (BES)
- City of Portland Fire and Rescue (PF&R)

While the City of Portland's ESEE analysis addresses some potential project impacts, these impacts and others will be evaluated in project-specific administrative proceedings. For example:

- potential impacts to in-water habitat, water quality, and endangered species will require mitigation by USACE, NFMS, DSL, DEQ, and ODFW
- potential impacts to air quality will be addressed by DEQ
- stormwater impacts will be addressed by DEQ and BES
- potential impacts to riparian habitat, wildlife habitat, and the floodplain will be addressed by BDS and BES
- safety will be reviewed by USCG, FAA, SFM, BDS, and PF&R

2. *Are the code and map amendments tied together as one package?*

   The code and map amendments are presented as two related components under a single ordinance. It is possible to delete one component, while moving forward to adopt the other component. The City/Port intergovernmental agreement (IGA) will be a separate ordinance.

3. *After 100-year floodplain maps are updated, when will the ezone maps be updated?*

   There is a federal process underway between FEMA and NOAA Fisheries/National Marine Fisheries Service to address litigation regarding the National Flood Insurance Program and compliance with the Endangered Species Act (ESA). BPS expects that a requirement to update the floodplain maps, along with other restrictions on development in the floodplain, will emerge from this process.

   The negotiation between the federal agencies has been underway for over a year and may continue for some months or even another year or two. When the federal agency process is resolved, BPS will initiate a process to update the City's floodplain maps and related regulations and the Natural Resource Inventory and associated overlay zones.

4. *What can the City do to control/monitor/enforce the promises Pembina and the Port make?*

   The City and the Port will have an intergovernmental agreement (IGA) to outline the implementation of this project, which will include an on-going Community Advisory Committee (CAC) to provide a forum for a public dialogue on the construction and operation of the terminal and to implement the commitments that the Port and Pembina make as part of this legislative process.

   In addition to the provisions in an IGA, the State Fire Marshal will conduct a safety inspection every year and the Portland Fire Marshal will conduct fire safety inspection every two years (ORS 480.375). There are also a number of federal, state and local regulations that allow for ongoing monitoring and enforcement by the USCG, Oregon OSHA, Oregon DEQ, and other public agencies.

Safety and Risk:

5. *What is the safety record of propane transport by rail?*

   Answer provided by Pembina:

   Pembina has only provided information regarding their safety record (January 12, 2015). Pembina has been safely transporting propane by rail for 40 years and to Oregon for over 15 years. Pembina leases its own fleet of rail cars specifically designed for liquid propane (DOT 112).

Ron Ebersole has submitted testimony (March 12, 2015) regarding an October 2013 Canadian National freight train derailment and fire involving DOT112 tanker cars carrying liquefied petroleum gas (LPG) in Gainford, Alberta. Thirteen cars, including 4 tank cars containing petroleum crude oil and 9 [DOT112] tank cars of LPG derailed. Of the derailed LPG tank cars, 2 were breached and caught fire. A third LPG tank car released product from the safety valve and ignited. About 600 feet of track was destroyed. There were no injuries. A total of 106 homes in the vicinity of the derailment were evacuated.

6. *What is the safety monitoring and reporting plan for the facility?*

Answer provided by Pembina:

Pembina is recognized as a safe, reliable operator. Pembina has provided substantial evidence to demonstrate its (1) exceptional safety record, (2) Safety, Environment, and Security Management System, (3) Emergency Response planning and preparedness, and (4) asset integrity management. See Pembina's submissions from January 12, 2015, December 5, 2014 and November 19, 2014.

In addition to Pembina's corporate requirements for safety monitoring and reporting, there are various regulators that will oversee and enforce the safety regulations during construction and operation.

The facility must comply with various applicable local, state and federal regulatory reporting and monitoring requirements. The USCG, US Environmental Protection Agency (EPA), federal and Oregon Occupational Health and Safety Administrations (OSHA), DEQ, the State Fire Marshal and the City Fire Marshal will all have the authority to inspect the facility during construction and operation. The State Fire Marshal will conduct a safety inspection every year and the Portland Fire Marshal will conduct fire safety inspection every two years (ORS 480.375). The results of these inspections are public records and available to the general public.

Some examples of the regulating authorities and responsibilities for safety considerations are identified below:

- 33 CFR 127.011 - The operation must allow USCG Captain of the Port ("COTP") or representative access for inspections.
- 33 CFR 127.013 – Allows COTP to suspend operations to prevent loss or damage to resources.
- 33 CFR 127.019 – Requires Pembina to submit an Operations Manual and Emergency Manual to the COTP for review prior to operations.
- 33 CFR 127.1321 - Requires Pembina to notify the COTP of any release (does not specify threshold) of propane and to not transfer propane again until authorized by COTP. It also requires immediate shut down of the transfer.
- 33 CFR 127.1325 – Requires Pembina to allow USCG and other local, state and federal agency access to the facility and vessels for inspection. Allows USCG access to the facility at any time to make any examination or board any vessel moored at the facility.
- Section 112(r) of the 1990 Clean Air Act (40 CFR 68) – Requires Pembina to conduct consequence analysis for the facility, complete a hazard assessment, report accident history, develop prevention programs and submit updated information on each of these subjects every 5 years to the EPA in the form of a Risk Management Plan (RMP)
- The SFM will provide public access to community right to know information and RMP information for the facility.
- DEQ Air Contaminant Discharge Permit – This permit will establish air emission limits and reporting requirements for Pembina that will be enforced by DEQ
- Oregon OSHA has responsibilities for Process Safety Management rules (29 CFR 1910.119)
- Various rules at the federal and state level establish requirements for release reporting of hazardous substances and response (CERCLA, Oregon Administrative Rules, etc.)
- The Oregon OSHA is responsible for enforcement of federal and state safety requirements at the terminal.

- The federal OSHA is responsible for enforcement of safety related to marine terminal operations under 29 CFR which has a number of requirements including how rail movements at a marine terminal are undertaken and emergency action plans
- Process Safety Management (29 CFR 1910.119) outlines requirements for preventing or minimizing the consequences of catastrophic release of hazardous chemicals and include such things as employee training, process equipment integrity, management of change process, emergency action plan, compliance audits, process hazard analysis. These requirements would be enforced by Oregon OSHA at the terminal.

7. *What is the role of the Port in ensuring that safety protocols are followed?*

   Answer provided by the Port of Portland:

   The Port assures the protection of safety, health and the environment through careful pre- transaction due diligence and the inclusion of appropriate obligations on the tenant through the property lease. Ongoing Port due diligence may result in additional protective requirements. The Port and Pembina contemplate that the Pembina lease will address the following areas:

   - Requires compliance with all applicable laws and regulations, with a particular focus on safety, health and environmental laws.
   - Requires review and approval of facility design plans before facility construction can begin. The Port intends to use a third party expert to conduct this review.
   - Requires the development of an operations management plan, subject to Port review and approval, before facility operation can begin.
   - Requires that improvements be maintained in good working order, with a particular focus on fire suppression and safety equipment.
   - Requires the development and implementation of a safety management plan.
   - Requires the development of an emergency management plan.
   - Requires the development of a Spill Prevention and Response (SPAR) Plan.
   - Requires the development of a stormwater management plan.
   - Requires the prevention and correction of any damage from any hazardous substance release.
   - Requires prompt reporting of violations of any safety, health and environmental law and appropriate government agency oversight of corrective action.
   - Requires periodic preventative auditing of safety, health and environmental, health, safety, legal and regulatory compliance.
   - Provides self-help and other contractual remedies for any threatened or actual breach of lease obligations.
   - Requires a financial guaranty to assure performance with all lease terms.
   - Requires multiple types of insurance coverage to address significant risks be carried throughout the term of the lease.

8. *What will happen in a catastrophic event?*

   Answer provided by Pembina:

   This facility will be a state-of-the-art facility. Safety measures and equipment design considerations will include:

   - Double-walled steel refrigerated storage tanks with full-time pressure monitoring between the inner and outer tanks
   - Site-wide fire water tank and pump system for emergencies
   - Automated monitoring and control systems
   - All equipment connected to flare system
   - “Fire eyes” automatic shutdown system and gas detection system
   - Over-pressure automatic relief valves and automatic shutoff and isolation valves
   - Backup power onsite for control systems and emergency equipment

- 24 hours/day, 7 days per week, skilled and trained control room operators and operations staff
- Site located in a Port secure area under Homeland Security supervision
- Segregated safety software systems
- Site-specific emergency response plan, systems and training
- US DOT 112 railcars designed for propane
- Six year average age of leased railcar fleet
- Quick disconnecting capability for railcars and ship loading equipment
- Site engines always hooked to loaded cars

The facility will be designed to meet the most recent seismic standards of the 2012 International Building Code and the 2014 Oregon Structural Specialty Code. Consequently, the facility will be designed to withstand the effects of a magnitude-7 earthquake in the city of Portland or a magnitude-9 earthquake on the Oregon coast. Some of the design features that will achieve this standard include driving piles 160 feet in depth and 36 inches in diameter, like a bridge, as well as installing ground improvements, a long underground wall, along the site that may be as deep as 100 feet and as long as 3,000 feet. Post-earthquake, the structures would still support gravity load, damage that does occur will not prevent egress for occupants, and the tanks will retain containment capability.

It should be noted that there has been no recorded failure of a large double-walled refrigerated storage tank. Further, with the design features described above, including significant seismic design components, it is expected that the refrigerated storage tanks would remain intact with their contents during an earthquake. Security plans including barriers to prevent access to the tanks will be in place to minimize potential intentional release. Consequently, a release of all 23 million gallons of propane from a tank is highly improbable.

Pembina has hired DNV GL, an internationally known consulting company, to complete a quantitative risk assessment (QRA) for the facility as well as a QRA for the ship route and dock. QRAs are a formal and systematic approach of identifying potentially hazardous events, estimating the likelihood and consequence of those events, and expressing the results as risk to people (onsite and public), the environment or the business. The QRA results will be used to:

- enhance facility and equipment system design as necessary,
- confirm safety and emergency relief systems are adequate, and revise as necessary,
- optimize operating procedures, and
- form the basis of emergency response planning work.

DNV GL has developed a number of scenarios for the facility QRA, and has input key data into the model such as facility design details, comprehensive weather data, ignition sources and population data. The QRA includes frequency assessment for each scenario, input of facility design safety features, risk assessment for each scenario. The QRA will result in the definition of final risk zones for the facility. The results of the QRA and the resulting mitigation strategies including emergency response plans will be reviewed through the project's permitting processes by various regulators.

9. *What is the blast radius?*

Answer provided by Pembina:

"Blast radius" is not a term that is used in any applicable regulations for the project's construction or operation. Pembina's QRA will provide results in relation to zones or areas defined by the USCG and EPA. These zones are summarized below.

The USCG's Navigation and Vessel Inspection Circular (NVIC) 01-2011 Guidance Related to Waterfront Liquefied Natural Gas (LNG) Facilities outlines their expectations for QRAs and defines three zones of concern. Although NVIC 01-2011 has been developed for LNG, the USCG has advised Pembina to follow these requirements for the propane facility. The USCG's zones of concern consider fire hazard and vapor dispersion risk as well as potential consequences. The distance identified for each zone is affected by the scenario assessed, local topography and conditions, facility and equipment design and mitigation, and receptors.

The USCG has identified 3 zones of concern:

- Zone 1 has the most severe consequences with potential fatality and damage or significant disruption to critical infrastructure.
- Zone 2 has less severe consequences where severe injury could occur without shelter.
- Zone 3 poses minimal risks or consequences to public and property and is related to maximum flammable cloud.

EPA's Risk Management Program Guidance for Propane Storage Facilities (40 CFR Part 68) consequence assessment from a worst-case release must consider distance to a 1 psi overpressure for a worst-case release (at 1 psi, windows will break), receptors, potential consequences and mitigation strategies. This rule also provides guidance on how scenarios must be selected for the consequence analysis.

The facility QRA results will identify these zones for the assessed scenarios.

10. *Does the Fire Bureau have the equipment and training to respond to a catastrophic event?*

Answer provided by Pembina:

PF&R is currently responsible for responses to emergencies in the Willamette River energy cluster and is well acquainted with how to address hazardous fuels. PF&R will be hiring a third party reviewer for the development permit in addition to obtaining advice from the State Fire Marshal.

Pembina will be able to join the Maritime Fire and Safety Administration (MFSA) as a member of the Columbia River maritime community. MFSA is a bi-state, member-based non-profit organization funded by vessel fees. MFSA has two programs.

- MFSA provides an Oil Spill Vessel Response Plan for vessels transiting the river that is regulated and approved by Washington Department of Ecology and Oregon DEQ. MFSA coordinates a system of prevention, preparedness, and response, which includes significant training, drilling and equipment strategically located through the Columbia River to ensure immediate response and clean up.
- MFSA also supports training and acquisition of specialized firefighting equipment for 13 fire agencies along the Columbia to respond to marine fires through the Fire Protection Agencies Advisory Council (F-PAAC). Coordinated drills, education, training and planning are conducted by F-PAAC members which provides all of the member fire agencies an increase response capability to respond to vessel emergencies.

The Port of Portland Fire Department has a mutual aid agreement with PF&R that would likely also be available in a catastrophic event.

Before operations, a facility-specific Emergency Response Plan ("ERP") will be developed for the facility that addresses Pembina's corporate emergency response planning requirements and accounts for facility-specific incidents, potential impacts and response resources. This emergency response plan will be reviewed by the USCG, SFM, PF&R as well as the Port of Portland.

Notwithstanding Pembina's reliance on its own employees, third-party contractors, and industry cooperatives such as the MFSA, Pembina will work with PF&R to ensure that local responders are adequately educated on facility-specific issues including having local responders participate in Pembina's regular emergency response exercises. If it is determined that local first responders lacked equipment critical to handling a potential incident at the facility, Pembina has committed to support the purchase of such equipment. Provision of this equipment is one of the elements of the City-Port IGA.

11. *Who is liable for damages in a catastrophic event? Does Pembina or the Port have the financial capacity to cover the losses?*

    Answer provided by Pembina and the Port of Portland:

    Allocation of liability for damages from a catastrophic event depends on a number of factors. It is impossible to specify responsible parties in this context, but regardless of liability, there will be measures in place to respond immediately to a catastrophic event. Ultimately, liability for damages resulting from a catastrophic event will be determined by the courts, which are responsible for allocating liability and damages.

    Under its lease with the Port, Pembina would be required to carry multiple types of insurance to cover losses associated with a variety of risks including a catastrophic event. Evidence of such insurance would be provided to the Port at time of contract inception and regularly thereafter.

    To supplement this coverage, the Port carries its own insurance to cover losses associated with a catastrophic event not covered by the lessee. The Port has a comprehensive, professionally administered risk management program that uses a combination of self-insurance and commercial insurance to provide protection from losses involving property, liability, personnel and financial/net income. The Port purchases various types of insurance coverages and regularly evaluates the limits of coverage as well as any self-insured retention/deductibles. Insurance coverage options available in the market can vary and the Port adds, modifies or cancels insurance coverages based upon Port risks, business operations and market conditions.

Regional Economy:

12. *Does the regional rail network have the capacity to accommodate these propane trains?*
    Will the trains displace or delay regional goods trying to get to market via rail?
    Will the trains displace or delay passenger rail service?

    Answer provided by the Port:

    As discussed in the Port's January 9, 2015 submittal, trains serving the facility will not be frequent enough to pose a rail capacity problem for other commodities or passenger rail. The 2013 Port of Portland Rail Plan shows that by 2030, the Union Pacific system on the Oregon side of the Columbia River will approach but not exceed capacity and the BNSF system on the Washington side will have potential capacity problems. The proposed project will increase the volume by one train per day, which is a 6% increase for the Union Pacific system or a 2% increase for the BNSF system.

    Although no capacity problems exist today, and this project alone will not create a capacity problem, it should be acknowledged that continued investment in the rail system from both private and public sectors is a continuing need to address growing demand for both passenger and freight rail service.

13. *Will the operations at the propane terminal impact operations at other Port terminals (container at T6 or other facilities at T4)?*

    Testimony provided by Captain Steve Woods of the Columbia River on January 13, 2015 provides an overview of river navigation generally and how propane gas carriers would be accommodated.

    - Specifically, the Pilots' testimony notes that river traffic calling at ports in the Columbia and Willamette Rivers peaked in 1988 with 2,185 ship calls and has dropped to 1,576 ship calls in 2014, primarily due to larger vessel sizes allowed by the Columbia River Navigation Channel deepening project completed in 2010.
    - Pembina has indicated there will be 2-3 vessel calls per month or 24-36 vessel calls per year once their facility is operational. Based on the 2014 vessel count, vessels serving the Pembina terminal would be up to 2.3% of all vessel calls. Even with the addition of vessels serving Pembina, the total number of vessels serving ports in the Columbia and Willamette Rivers would still be more than 25% below historic levels of

vessel traffic. As noted in the Pilots' letter from 1/13/15, "There is plenty of capacity to safely absorb the extra ships that would call at the Pembina facility."

- While not mentioned specifically in the Pilots' letter, over 200 of the 1,576 vessel calls in the Columbia/Willamette River systems in 2014 involved tankers handling chemical, petrochemical or petroleum products. The Columbia River Pilots have decades of experience in safely handling these types of cargos.
- Finally, Pembina has submitted a letter of intent (LOI) with the U.S. Coast Guard to submit for a Waterways Suitability Assessment (WSA). The WSA is the federal process to ensure that propane and similar cargos can be transported safely by ships and other vessels in the Columbia/Willamette River systems.

14. *Will this facility negatively affect property values in the neighborhood nearby?*

    This impact is difficult to determine. The propane facility is located in the middle of an industrial area and is at least 1 mile from the nearest floating home community and about 2 miles from the Hayden Island and St. Johns neighborhoods.

Facility Operations:

15. *Is this the biggest project that Pembina has ever invested in?*

    Answer provided by Pembina:

    No, typically, Pembina's major projects can range from $100 million to over a $1 billion in size.

16. *What will happen if unit trains are not able access the facility due to delays in transloading, or delays because of weather?*

    Answer provided by Pembina:

    Pembina's proposed terminal rail yard is designed with three tracks:

    - one track to receive a loaded propane train
    - a second track one to accommodate an empty train ready to depart
    - a third "run around" track to allow the mainline locomotives to disconnect from one end of the loaded train after arrival on site, run around to connect to the empty train and then depart the site with the empty train

    The time for the mainline locomotives to be on site to deliver the loaded train and depart with the empty train is estimated to be 2-2.5 hrs.

    A loaded train will arrive every two days or every 48 hours. The terminal is designed to offload liquid propane from one unit train in 32 hours. There are 16 hours to allow for the mainline locomotive to disconnect from the arriving train and depart with the empty train before a second train arrives into the Portland area.

    The facility is being designed to have spare pumps and compressors that allow the facility to operate at full capacity even in the event some equipment is off-line for maintenance. Consequently, the on-line time is very high for the propane unloading and refrigeration systems. In the instance trains do not arrive as planned, the facility can operate back-up systems to reduce the propane unloading time from 32 hours to 24 hrs.

    Pembina is also discussing with PGE a secondary power supply to the site, that if installed would minimize any electrical outages that might reduce online operation time. Both design considerations (spare equipment and secondary power supply) would minimize delays unloading the liquid propane from the unit train.

    Notwithstanding these described design and operational features for trans-loading, if the service disruption is significant, Pembina has the ability to delay train departures from its Redwater, Alberta loading facility and require that the mainline rail carrier accommodate some trains in transit within its rail system.

17. *What is the maximum capacity of the site based on future expansion?*

Answer provided by Pembina:

The site restricts the size of a facility that may be constructed and operated.

As designed, the project has the capacity to handle approximately 1.6 million gallons of propane per day. Expansion beyond the 1.6 million gallons of propane per day is not being contemplated at this time.

The proposed site has sufficient space to accommodate up to twice the throughput of the current design but Pembina would need to make significant infrastructure improvements at the site including the installation of a second rail unloading rack, associated unload equipment and unload storage, additional refrigeration equipment, and required utilities. There would be no need to increase the number of large refrigerated storage tanks.

These changes would trigger permitting requirements including potentially:

- City environment review for any changes or new infrastructure within the e-zone
- City site development permit for ground disturbance and changes to the infrastructure on the site
- DEQ air permit amendment if the changes would result in a different air emission profile
- DEQ NPDES 1200-C Construction Stormwater General Permit if the additional infrastructure installation would disturb more than one acre
- DEQ NPDES 1200-Z Industrial General Stormwater Permit modification or amendment to address changes to the site stormwater management plan
- Potential permit modifications or review from USACE, DSL and USCG for increased vessel traffic operations

Climate Action Plan (CAP):

18. *Is the export facility consistent with the Climate Action Plan?*

The 2009 CAP does not address fossil fuel exports. Locally, a propane terminal can be an energy intensive operation. The refrigeration and compression necessary to liquefy the propane for transportation requires large amounts of electricity. Exporting approximately 46-69 million gallons of propane per month will require an estimated 8,000 MWh of electricity per month, which would put the facility among the largest electricity users in Portland, though not atypical for a major industrial facility. The proposal raises questions regarding the ability of Portland to reach our GHG reduction targets

The draft 2015 CAP, currently out for public comment through April 10, includes the following proposed policy to address fossil fuel exports:

> **3G Fossil Fuel Exports** — Establish a local fossil fuel export policy; at the state level, oppose exports of coal and oil through Oregon.

The draft action reflects the need to establish policy on exports of natural gas and propane, which have lower carbon emissions than coal and oil but do not result in the scale of emission reduction needed to meet Portland's 2050 goal of reducing carbon emissions 80 percent from 1990 levels. Adopting a formal policy on fossil fuel exports could eventually lead to a more specific city policy on exports other than coal and oil, such as natural gas and propane.

Pembina's January 12, 2015 submittal to the PSC argued that the project is consistent with the 2009 Climate Action Plan (CAP) for the following reasons:

- The code amendment is specifically tailored to only allow the transportation of propane, not other fossil fuels.
- The project will not process any propane, so air emissions from the facility will be minimal and subject to DEQ air contaminant discharge permit.
- Pembina has committed to purchase some form of green energy or carbon credits to offset the facility's energy consumption.

- Pembina is exploring operations to help reduce carbon emissions, including a "green" on-site train engine and on-shore electricity for ships when at the berth.

19. *Does the propane come from "fracking" or from tar sands?*

    Answer provided by Pembina:

    The propane exported through the facility is expected to be sourced primarily from hydraulic fracturing, or "fracking," but not from tar sands. The propane is derived from natural gas production in the Western Canadian Sedimentary Basin (WCSB), which is located in northeast British Columbia and northwest and central Alberta. The producing natural gas fields are located in areas that are separate from the Alberta oil sands resources. Pembina has pipelines in these areas that transport the natural gas liquids, once they've been separated from the natural gas, to Pembina's Redwater Facility in Fort Saskatchewan where the propane component of the natural gas liquids is separated.

    Pembina provides a service to customers to ship product to market and Pembina's business does not involve extraction or production of oil and gas. The propane is derived from natural gas produced in Canada and, like more than 95% of new North American natural gas production, the propane is likely extracted through hydraulic fracturing in deep reservoirs. Hydraulic fracturing, or "fracking," is not new; it has been in existence for more than 70 years.

Climate Impacts (Local):

20. *Could local emissions be offset with renewable energy?*

    Pembina has made a commitment to purchase some form of green energy or carbon credits to offset the facility's energy consumption. Pembina is exploring operational measures to help reduce emissions, including a "green" on-site train engine and on-shore electricity for ships when at the berth. Ensuring that the terminal operator meets 100% of its energy needs for on-site operations from renewable energy sources is one of the key elements of the City-Port IGA.

21. *What about diesel emissions from trains and ships?*

    Significant energy is consumed in rail transport from the wellhead to Portland, and by ship from Portland outward bound. BPS has not estimated these emissions, but testimony has been submitted from Mike Burnett, founding Executive Director of The Climate Trust (March 12, 2015).

Inbound rail-related:	108,000 MTCO2e per year
Outbound shipping-related:	34,000 MTCO2e per year (36 vessel shipments per year)
On-site electricity:	20,000 MTCO2e

    MTCO2e = metric tons of CO2-equivalent

22. *What is the global impact on carbon emissions from these exports?*
    Does propane actually displace use of other fuels or does it add to overall fuel use?
    Does propane used in manufacturing processes have a lower carbon footprint?

    Globally, a propane terminal can have positive or negative consequences on greenhouse gas (GHG) emissions. Depending on the end use, the fuel or feedstock that it is replacing, and the time horizon the impacts are evaluated over, it could result in a net increase or decrease in carbon emissions. Propane typically has lower lifecycle carbon emissions than coal or oil, though when burned it releases 19% more carbon per unit of energy than natural gas.

    In the near term, bringing additional propane to market will likely result in a net reduction in global GHG emissions, to the extent that propane displaces more carbon-intensive fuels like fuel oil. At the same time, making fossil fuels less expensive tends to increase consumption, all else being equal. In the long term,

increasing the availability of relatively affordable propane will likely delay the transition to near-zero GHG energy resources, increasing net global emissions.

Exporting large quantities of fossil fuels will result in CO2 released into the atmosphere when those fuels are burned, contributing to climate change. Burning all of the approximately 46-69 million gallons of propane per month represents 3 to 5 million metric tons of CO2 released into the atmosphere annually, which is about 0.01% of global CO2 emissions.

Natural gas and propane can be viewed as important transitional fuels that could wean the world from coal and oil until adequate supplies and storage of wind, solar and other forms of clean, renewable energy are in place. Natural gas, when burned, produces about half the carbon emissions as coal, without most of the air pollutants. However, to the extent natural gas leaks into the atmosphere, that advantage can be reduced or lost, because it's largely composed of methane, a far more potent greenhouse gas than carbon dioxide. As noted above, if natural gas and propane are institutionalized as fuel sources, instead of serving as transitional fuels, then it will slow the transition to solar, wind and other clean energy sources.

Because the end uses of the propane that would be exported are not known—and, even if known, would likely change over time—it is not practical to estimate the carbon impacts with specificity.

23. *What is the CO2 emission profile for the extraction of natural gas? Can methane emissions during extraction cause propane to be just as, or nearly as, polluting as coal?*

Propane is usually produced as a byproduct of other fossil fuel extraction efforts, and when it is captured it is either flared or transported as fuel.

Propane itself is relatively stable and does not add measurable GHG emissions except in the event of combustion. In a gaseous state, propane is heavier than air; and if released naturally or inadvertently will tend to sink, pool and not migrate into the atmosphere (although it can contribute to low-level ozone impacts). Natural gas (primarily methane, CH4) exists as a lighter-than-air gas that, if released naturally (e.g., coal-bed methane emissions) or inadvertently (fugitive methane emissions from wellheads, pipelines and at point of use) will migrate to the atmosphere, imposing a GHG impact that is about 25 times greater than CO2.

Habitat:

24. *What about impacts to unprotected natural resources?*

Answer provided by Pembina:

Most of the natural resources that have been identified on parts of the proposed site or that may be affected by the development are protected by various city, state and federal legislation. They include in-water habitat, riparian habitat, as well as all habitats within the City's environmental overlay zone. The permitting process will review potential impacts to these resources and appropriate mitigation will be developed for any impacts.

Pembina is working with the Bureau of Environmental Services to identify off-site, voluntary habitat enhancement measures to mitigate for upland grassland habitat identified in the 2012 Natural Resource Inventory on the east end of the site that has not been protected by the City's environmental overlay zone. This mitigation is one of the key elements of the City-Port IGA.

River Access and Boating:

25. *What will be the restrictions on recreational boating access to the Oregon Slough?*

The impact to recreational boating in the Oregon Slough during the time the ships are at berth is unknown at this time. The U.S. Coast Guard (USCG) will conduct a Waterway Suitability Assessment (WSA) for the project, which could establish a security zone around a vessel in transit and during loading at a facility. Specifically, the USCG may impose a security zone of 500 yards in all directions from the vessel but this zone is applied at the discretion of the USCG (not automatically). Entry into a security zone is allowed only with permission and at

the discretion of the USCG. In the event a security zone is established under these regulations, the USCG will issue a local broadcast notice to mariners. It is not the intent of the USCG to close all access to the waterway, but recreational boaters may have limited access while the ships are being loaded. Two to three ships per month are expected at the facility for up to two days each time, meaning in total, up to six days per month. Again, the USCG provides advance notice of any security zones to the marine community and most security zones allow for access through the zone if permission is requested.

Questions Related to Jobs:

26. Why is this site not good for jobs that could have a higher jobs/acre?

Answer provided by the Port of Portland:

The 61 acre Pembina site, adjacent to the Port's marine terminal, has excellent rail and deep-water dock access, and secondary access on N. Marine Drive to Interstate 5, and is ideally suited to marine industrial uses. Due to site constraints (100 year flood plain, BPA transmission towers) and the long, narrow configuration of the site, only 40 net acres are available for development. These constraints break the site into small, non-contiguous, development footprints. The design of the proposed Pembina propane export facility maximizes use of what is an otherwise constrained site.

At the Port's request, Mark Childs from Capacity Commercial (industrial broker) and Steve Wells from Trammel Crow (industrial developer) assessed whether other higher jobs/acre industrial uses could occur on the site. Key issues include:

- N. Suttle Road is the only access to and through the site which can best be described as unimproved. For development with any significant increase in traffic, road improvements would be required to make the site developable.
- Sewer/water/utility connections would need to be provided to the site from N. Marine Drive, under the Union Pacific railroad tracks, and extending down N. Suttle Road.
- The site has poor access, sight lines, and site coverage potential. The view from the property is largely rail cars and backs of large warehouses.
- Due to the poor entrance image and sight lines, manufacturing companies would not find this location to be attractive.
- For warehouse and distribution uses, the long configuration of the property would limit the development to only small buildings with a site coverage ratio of only 20%. Industrial development requires a 40% site coverage ratio to be economically viable.
- The shape of the site makes it impossible to build modern warehouse/distribution facilities, and smaller flex buildings would require good site visibility from the street and good roadway access.
- Uses that do not have frequent heavy vehicle traffic might find the site attractive for outside long-term storage, infrequent heavy equipment or auto auctions, contractor storage yards, or similar uses that typically have low job densities. Aggregate, concrete, or asphalt plants could fit on the site.
- The site is too small to handle a loop track required by grain terminals or other bulk commodities.
- The current Port auto handling facilities are each located on at least 80 acres. Aside from the size, the extremely long and narrow configuration of the site would pose a number of operational problems, starting with unloading 4,000-5,000 autos to a first point of rest prior to processing.

27. How do the projected jobs per acre for Pembina compare to other similar harbor bulk terminals?

Answer provided by the Port of Portland:

Different types of employment lands provide different functions, different job types and play different roles in the overall regional economy. This is especially true for marine terminal lands that have relatively low number of jobs per acre, but play an important role in terms of moving goods through the region.

The Port/Pembina revised employment calculations are:

92 direct, on-site Pembina jobs plus other off-site jobs (pilots, rail, linesmen, etc.)

55 indirect jobs

87 induced jobs

234 total jobs

The 600-800 constructions jobs over a two-year period driven by the high-value investment also are significant.

The Martin study of employment on all types of public terminals found an average of about 4 jobs/acre. The Pembina facility at about 2 jobs/acre is on the low end in terms of jobs per acre, but is a high-value investment on a constrained site.

Over the past 15 years, this site has been used by the Port as an auto overflow yard and dredge re-handling facility. Very few jobs were directly associated with either use. Nor was any property tax revenue being generated. Site constraints and market conditions affect the investment and employment at the Pembina site. The site is too small to handle a loop track required by grain terminals or other bulk commodities.

Some marine terminal sites, such as Canpotex, include acreage for rail infrastructure, which decreases their job density capacity. Other terminal sites, such as Columbia Grain, use adjacent rail yards to break trains and shuttle product to the terminal.

The forecasts for marine terminal land demand cover automobiles, containers, break bulk, grain, dry bulk and liquid bulk commodities. These are cargo based land uses that by their nature are river- dependent, require large sites and have low job densities (relative to urban commercial/office development or manufacturing). What varies is the capital investment by cargo/terminal type.

28. *What is the classification of the site in the BLI/EOA?*

The Buildable Land Inventory (BLI) and the Economic Opportunities Analysis (EOA) are primarily focused on future development capacity – land or building space that can accommodate future employment growth. The Pembina site is a mix of land types. The portion of the site that is the Honda auto facility is considered "developed" and does not factor into the BLI or the EOA because we are assuming that most (85%) of the new jobs will locate on vacant or underutilized buildable lands. The BPA transmission line is a different case. Even though it is vacant or undeveloped under the power lines, BPA owns the right-of-way and the BLI considers right-of-way as not available for development, and therefore it is not counted as future development capacity. In this case, most of the Pembina development would be rail lines, roads and utilities that cross the right-of-way (with BPA permission). It is the vacant portion of the site that is counted as about 37 acres of future development capacity.

Estimated Annual Tax Revenue:

29. *Why won't all six school districts with Portland receive tax revenue from the project?*

The fiscal analysis shows the property tax revenue from the project going to Portland Public Schools because the project is located in that school district. However, in Oregon, since Measure 5 passed in 1990, public education funding has shifted the primary burden of paying for K–12 education from local property tax to the General Fund. In short, every district gets about the same amount of funding per student, whether it comes from local property tax revenue or the State School Fund. Each district's total funding depends solely on the base funding (state and local revenues). If local property tax revenues go up (due to a large, capital-intensive development), then state aid is reduced to compensate. In effect, the state formula converts local school taxes into statewide resources. So, in a way, the increased property tax revenue from the Pembina project does get shared with other districts across Oregon because it would reduce the amount that Portland Public Schools receives from the State School Fund.