OREGON SHORES
CONSERVATION COALITION

June 10, 2019

Via Email to: planning@co.coos.or.us

Coos County Planning Department
c/o Planning Director Jill Rolfe
Coos County Courthouse
250 N. Baxter
Coquille, Oregon 97423

Re: County Remand File No. REM-19-001/LUBA Case No. 2016-095

Dear Hearings Officer Stamp:

Please accept these comments from the Oregon Shores Conservation Coalition and its members (collectively "Oregon Shores"), which was an original party to the LUBA appeal of the underlying applications, File Nos. HBCU-15-05/CD-15-152/FP-15-09 (collectively, "Omnibus I").

Oregon Shores Oregon Shores is a non-profit organization dedicated to protecting the natural communities, ecosystems, and landscapes of the Oregon coast while preserving the public's access to these priceless treasures in an ecologically responsible manner. Our mission includes assisting local residents in land use matters and other regulatory processes affecting their coastal communities, and engaging Oregonians and visitors alike in a wide range of stewardship activities that serve to protect our state's celebrated public coastal heritage. For nearly half a century, we have been a key public interest participant in legal and policy matters related to land use and shoreline management at the local and state level. Oregon Shores has been tracking and working to address the numerous adverse environmental and social impacts likely to arise from the proposed Jordan Cove LNG facility, the Pacific Connector Gas Pipeline, and the construction

activities associated with the two in the Coos Bay estuary and its surrounding communities for over a decade.

Please continue to notify us of any further decisions, reports, or notices issued in relation to this Application.

I. General comments on the Remand Application and its relationship to other pending applications

At the outset, Oregon Shores notes that although the County *may* limit the issues on remand, it does not have to. Coos County ("County") has the option to accept open the record and accept testimony on any issue relating to the application. Given the many circumstances that have changed since the application was first filed, the County should broaden the scope of issues that it considers. *Schatz v. Jacksonville*, 113 Or App 675, 680, 835 P2d 923 (1992) (On remand a local government may also choose to expand the scope of the evidentiary process to consider different questions or to adopt new findings or a new decision.) Further the county should expand the scope of the issues to include consideration of the entirety of the Jordan Cove development (including the NRIs, alignment of the pipeline, road expansion, etc) and the cumulative impacts of these proposed actions rather than looking at the pieces of the development in isolation.

Oregon Shores also notes that applicant has submitted a second set of land use applications (HBCU 19-003) for development to be located at Jordan Cove. The new set of applications ("Omnibus II") appears to request changes to the development proposed in the Omnibus I applications. Because Omnibus I is on remand and is not a valid land use approval, it cannot be modified. Further, uses that are accessory to a use that is not yet approved cannot be approved, nor can the county authorize alternative routes or locations for uses that are not yet approved. Perhaps more importantly however, the County should consider whether it should approve Omnibus I on remand when it appears to no longer be the intended plan of development for the Jordan Cove terminal. While applicant may be correct that it is entitled to seek permits, it is not in the best interest of the County to allow the applicant to essentially collect land use approvals for various components of energy infrastructure development that can be combined in different ways to yield different developments with different impacts. This is particularly the case in an area as geographically significant and biologically sensitive as Coos Bay and the Jordan Cove.

In addition, because the applicant is proposing multiple applications with multiple components that will impacts the same areas, the County should consider the cumulative impacts of the proposed uses together, rather than as separate and unrelated approvals.

Finally, as discussed in depth below, the applicant falls sorely short of addressing the criteria as required by LUBA in its remand order. The applicant put minimal supporting documentation into the record in its remand application and is primarily relying on documents that were in the record before LUBA before. LUBA has already determined that the County's prior decision, as supported by that record, was insufficient to justify approval. Given that the applicant offers almost nothing new to support its request, the County should deny the application.

II. First Remand Issue: The County should find that the proposed use cannot meet the public need standard in CBEMP Policy #5.I.b because the use will not provide public benefit as asserted by the applicant.

In order for the County to approve dredging in the 5-DA and 6-DA CBEMP zones, the County must adopt findings that, among other things, the dredging is:

(1) "required for navigation or other water-dependent use that requires an estuarine location," and

(2) a "need (i.e., a substantial public benefit) is demonstrated and the use or alteration does not unreasonably interfere with public trust rights." CBEMP Policy #5.I.

LUBA held that "the county must evaluate the substantiality of the public benefits provided by the use that the proposed dredging serves, in this case, the LNG terminal, or at least those components of the terminal that are properly-viewed as water-dependent uses." *Oregon Shores Conservation Coalition et al. v. Coos County,* 76 Or LUBA 346, 354 (2017).

For the following reasons, the County should find, as did the Federal Energy Regulatory Commission (FERC) and the Oregon Department of Environmental Quality (DEQ), that the applicant has not demonstrated that the proposed facility and associated infrastructure that relies on dredging will serve a public need.

First, in the FERC decision denying the approval, FERC stated:

- "Pacific Connector has presented little or no evidence of need for the Pacific Connector Pipeline."[1]
- "Pacific Connector states that the pipeline will benefit the public by delivering gas supply from the Rocky Mountains and Canada to the Jordan Cove LNG Terminal and by providing an additional source of gas supply to communities in southern Oregon though, again, *it has presented no evidence of demand for such service*."[2]
- A DOE finding that authorization of the commodity export is consistent with the public interest is not sufficient to support a finding that the project is required for public convenience and necessity.[3]
- "The generalized allegations of need proffered by Pacific Connector do not outweigh the potential for adverse impact on landowners and communities." [4]

FERC also found without a pipeline connecting it to a source of gas to be liquefied and exported, the proposed Jordan Cove LNG Terminal can provide no benefit to the public.[5]

[1] Docket Nos. CP13-483-00, CP13-492-000, Order Denying Applications for Certificate and Section 3 Authorization, FERC (March 11, 2016).
[2] *Id.*
[3] *Id.*
[4] *Id. at 18.*
[5] *Id. at 19.*

Second, the economic projections underlying the applicant's allegations as to the need and public benefit are JCEP relies on the ECONorthwest report entitled "Economic Impact Analysis of the Construction of an LNG Terminal and Natural Gas Pipeline in Oregon" and dated March 6, 2012 (Rec. 11753 - 11770). As is typical of economic impact studies, the analysis for the Project covers the four calendar years 2014 through 2017. The averages reported in this analysis are based on this four-year period. However, plans call for the construction of the JCEP terminal to start July 2014 and end July 2017. Pipeline construction would begin July 2014 and end December 2017.[6] ECONorthwest's economic projection is now expired and no updated economic study currently exists, except for the McCulloch study, which, as discussed below, finds that there is a minimal likelihood that the project will succeed economically.

Robert McCullough, of McCullough Research, has twenty-five years of experience advising government, utilities and aboriginal groups on energy, metals and chemical issues. His *curriculum vitae* is attached hereto as Exhibit A. Mr. McCullough's recently issued a memo entitled "The Questionable Economics of Jordan Cove LNG Terminal." A copy of the report is attached hereto as Exhibit B. The report makes the following conclusions:

- The terminal, if constructed, would be at a 600-mile disadvantage compared to other west coast projects in transportation costs, the announced costs are high by market standards, and the proposed technology to be used will make JCEP less efficient than competitors in British Columbia and the Gulf Coast.
- JCEP will have a 25% cost disadvantage as compared to its competitors
- Based on an economic model comparing all possible combinations of feed gas and Asian landed gas prices over the last decade, the chance of JCEP reaching operation is 33%.

In addition to the McCullough report's conclusions that the project is unlikely to succeed or be economically viable, there are several other factors that indicate the lack of public benefit from the project:

- As to the project's impacts on greenhouse gas emissions:
    - By enabling an increase in production and consumption of fossil gas, the Jordan Cove LNG terminal and Pacific Connector Gas pipeline will contribute significant amounts of greenhouse gas emissions that will exacerbate climate change.

    - The total lifecycle emissions caused by the project to be over 36.8 million metric tons (MMT) of carbon dioxide equivalent (CO2e) per year. This is equivalent to over 15.4 times the 2016 emissions from Oregon's only remaining coal plant, the Boardman coal plant, or equivalent to the annual emissions from 7.9 million

[6] ECONorthwest: An Economic Impact Analysis of the Construction of an LNG Terminal and Natural Gas Pipeline in Oregon (March 6, 2012).

passenger vehicles. The Boardman plant is scheduled to close in 2020 because of climate and air pollution concerns.[7]

- Natural gas is made up mostly of methane, a greenhouse gas far more potent than carbon dioxide at warming the Earth's atmosphere. Leaks erode any climate advantage methane has over coal.[8]
- Leaks in LNG tanks are common and are not always policed adequately by operators. See e.g. Cheniere Energy, the top US natural gas export company, which has recently had severe leaks in tanks at its Sabine Pass facility in Texas, given rise to methane emissions that are more potent than carbon dioxide emissions with respect to climate impacts.[9]

There are also substantial safety concerns relating to the facility that negate the public benefit of the project:

- The entire project would be sited in the region of the Cascadia Subduction Zone, deemed by foremost seismic experts to be the most likely area on the Pacific Northwest coast to experience a major (magnitude 8.7-9.2) earthquake and resultant tsunami during the lifetime of the project. The area is also subject to navigational challenges made more difficult by weather and coastal configuration.[10]
- The 229-mile pipeline could increase wildfire risks across a four-county region that already reels from wildfire costs and damage. The Draft Environmental Impact Statement (DEIS) for the new FERC application for the project (pp. 4-770-71) indicates that 95% of the pipeline would be built to Class 1 specifications--the lowest legally allowed in terms of design, materials, testing and operational standards.[11]
- Leakages from LNG tanks are common which then increases fire risk. According to a ref a LNG tank catches fire, according to a senior regulator with the Pipeline and Hazardous Materials Safety Administration (PHMSA) there would be no way to put it out in which case, the only course of action would be to let the fire die out.[12]

Finally, with respect to the alleged job creation associated with the project, much of the workforce will be both temporary and not local. A workforce associated with constructing an LNG terminal and pipeline is specialized and no such workforce exists in Coos County currently, let alone in Oregon which has no other such facilities. It is likely that this workforce will come

[7] *Id. at 5.*
[8] Exhibit C: Jenny Mandel et al., Leaks Threaten Safety – and Success – of America's Top Natural Gas Exporter, Houston Chronicle (May 30, 2019) https://www.houstonchronicle.com/business/energy/article/Leaks-threaten-safety-and-success-of-13904931.php#photo-17570798.
[9] Exhibit C:Jenny Mandel et al., Leaks Threaten Safety – and Success – of America's Top Natural Gas Exporter, Houston Chronicle (May 30, 2019) https://www.houstonchronicle.com/business/energy/article/Leaks-threaten-safety-and-success-of-13904931.php#photo-17570798.
[10] Exhibit D: Rogue Climate, Jordan Cove is Risky Business at 6.
[11] *Id.*
[12] Exhibit C: Jenny Mandel et al., Leaks Threaten Safety – and Success – of America's Top Natural Gas Exporter, Houston Chronicle (May 30, 2019) https://www.houstonchronicle.com/business/energy/article/Leaks-threaten-safety-and-success-of-13904931.php#photo-17570798.

from outside of the state, will reside temporarily in workforce housing constructed by the applicant onsite and then leave after construction is complete, providing minimal long-term economic benefit to the local community.

In conclusion, consistent with the FERC determination that the project which found there to be little or no public need for the project, the County should find that there is no substantial public benefit or need for the project as proposed and the permit should be denied.

III. The proposed use will unreasonably interfere with public trust rights and the County should deny the application.

As set forth above, CBEMP Policy #5 provides the local government shall support dredge and fill activities in the estuary only if the use or alteration does not unreasonably interfere with public trust rights.

1. Scope of the Public Trust Rights

Public trust rights with respect to submerged lands and navigable waters is rooted in the principle that "navigable waterways are a valuable and essential resource and as such all people have an interest in maintaining them for commerce, fishing, and recreation." *Brusco Towboat v. State Land Bd.*, 30 Or App 509, 526 (1977). *See also Chernaik v. Brown*, 295 Or App 584, 593 (2019). "The doctrine is founded upon the necessity of preserving to the public the use of navigable water from private interruption and encroachment." *Illinois Cent. R. Co. v. State of Illinois*, 146 U.S. 387, 436 (1892). LUBA found that there was insufficient evidence and findings to support a decision that the proposed use will not interfere with the public trust rights. As set forth below, the proposed activities will encroach upon the public's rights to use the navigable waters in Coos Bay and Jordan Cove.

2. Unreasonable Interference with Public Trust Rights

A. LNG vessel traffic in Coos Bay will unreasonably limit access to in-bay crab fishing areas.

Oregon Shores provides the following summary as to the impact of the proposed development activities on the public trust. Where not otherwise cited, the information is derived from comments prepared by Mike Graybill, former manager of the South Slough National Estuarine Research Reserve and marine biologist. Mr. Graybill's comments and CV are attached hereto as Exhibits E, F, G and H.

Coos Bay and Jordan Cove are utilized by a Dungeness crab fishery as well as other fishery interests. Dungeness crab fishing is an important part of the Oregon economy. In a good year, landings can yield $100 million to the Oregon economy.[13] There are in excess of 350 vessels

[13] *Statement of Dr. Silvia Yamada* at Oregon DSL Hearing on Jordan Cove at 2:17:36, *available at* https://www.youtube.com/watch?v=aRQATTbaE6k.

presently engaged in the crab fishery.[14] Although Oregon estuaries (including Coos Bay) provide year-round opportunities for crabbing, fall is typically recognized as the best time for harvesting.[15]

Most recreational and all commercial crab fishing in the estuary is undertaken using rings. Deploying a string of baited crab rings and then requiring fishers to vacate the deployment area leaving the rings unattended for 30 minutes around slack high tide while an LNG tanker and its associated safety zone passes will seriously diminish the effectiveness of one of the most important methods used to capture crabs in the Coos Estuary. For bay crabbing, as the tide approaches slack high water it is important to check rings on a more frequent basis as this is the time of greatest crab movement and feeding activity. Because crab rings do not retain crabs while the ring is at rest on the bottom, the only way to capture crabs using rings is to bring them rapidly to the surface while actively feeding crabs are present on the baited ring. In contrast to a recreational fishery using traps, the effectiveness of capture using crab rings is based on the frequency upon which the rings, once deployed, are recovered/brought rapidly to the surface. Requiring rings to "soak" for a period of 30 minutes or more will not improve their capture success rate. If transiting LNG carriers require recreational fishers to leave deployed rings unattended for 30 minutes, this requirement will likely render this type of harvest method infeasible/impractical.

Virtually all boat based recreational crab fishing takes place within a two-hour time period centered over slack high water (http://www.scod.com/cities/crabs/crabbing.html). Depending on the number of fishers aboard, it is not uncommon for boat based recreational fishers in Coos Bay to deploy a string of rings or traps consisting of 6, 9,or 12 rings or traps per vessel. It typically takes several minutes to recover, clear, and redeploy each crab ring or trap in a string. It is common practice for recreational fishers to deploy a string a rings or traps one hour before the slack tide, and check/tend individual rings and traps continuously during the ensuing leadup to slack high water and during the hour following the slack high water. A 30-minute interruption caused by a transiting LNG carrier at in the peak period of fishing activity having a 2 hour feasible time window centered over high tide can readily and reasonably be characterized as a *major* disruption of one of the most important (and valuable) recreational uses of the Coos Estuary.

Requiring recreational vessels to clear long established and preferred crab fishing areas for a half hour to accommodate the passage of an LNG tank vessel will greatly disrupt and interfere with both recreational and commercial crab fishing in the Coos Estuary. While the recor describes a moving 500-yard security/safety zone surrounding LNG vessels transiting the estuary, the application does not say where recreational vessels involved in recreational crabbing and fishing activities will be required to go. The description of areas of the estuary of importance to commercial and recreational crabbers in the Coos Estuary presented in the record is an incomplete list. Perhaps the most important area for commercial bay crabbers is a region of the estuary on the margin of the Federal Navigation channel which parallels the south edge of the North Jetty. (https://myodfw.com/articles/where-crab-clam-coos-bay) The Federal navigation

[14] Or. Dungeness Crab Comm'n, "Vessels," http://oregondungeness.org/fishery/ (last visited June. 3, 2019
[15] Or. Dep't. of Fish and Wildlife, "How to Crab," https://myodfw.com/articles/how-crab (last visited June. 3, 2019).

channel makes its closest approach to the North Jetty in this region of the bay. Crabbers working in the area between the North Jetty and the Federal navigation channel will be unable to vacate the moving 500-yard safety/security safety zone surrounding a transiting LNG vessel as there is not room to move away from the channel without grounding on the rock jetty. The applicant fails to identify important crab fishing locations in the lower bay where small vessel operators that may become "trapped" between the shore and the moving safety/security zone of an LNG vessel transiting the Federal navigation channel.

Recreational and commercial crabbers and boaters operating vessels to the North and West of the Federal navigation channel required to vacate the moving safety/security zone of a transiting LNG vessel may be faced with a choice of grounding their vessel in the natural shallows at the margin of the bay or on rock revetment structures at the margin of the bay. The other choice available to vessel operators working in areas to the north and west of the federal navigation channel that lack sufficient space to vacate the moving safety/security zone of a transiting LNG carrier is to cross the navigation channel in front of the path of the oncoming LNG vessel. The North Jetty and the shoreline of the North Spit are within the 500-yard safety/vessel exclusion zone of the Federal Navigation channel in numerous locations meaning that these locations are unsuitable for use as refuge/safety areas for recreational vessels to muster during the passage of an LNG vessel. As a result, it may be necessary for recreational vessels to cross the navigation channel in advance of an LNG tanker passage in order to find a suitable muster area that is outside the 500-yard LNG vessel safety/vessel exclusion zone.

Because LNG vessels will likely be in operation during all months of the year, the LNG vessel will necessarily interfere with Dungeness crab harvest during both off and peak seasons. Recreational harvesters will also be restricted in their harvesting activity during both off and peak seasons. This will ultimately result in the interference of public trust rights of Dungeness crab harvesters as well as the ultimate decline in economic stability and benefits to Coos County that Dungeness crab harvesters provide.

B. LNG vessel traffic in Coos Bay will unreasonably Impact ocean-based fisheries.

For a variety of reasons, including fishing seasons and ocean conditions, individual boats involved in commercial fisheries including but not limited to the crab, salmon and pink shrimp work as a fleet. This means that when the season is open and weather conditions are right, many of the boats in the fishery all head out to sea together. Particularly in winter, during commercial crab season, when weather imposes more limitations on the bar than any other time of year, boats at sea work their crab pots while watching the weather conditions decline. Members of the fleet are talking with one another and everyone is paying attention to bar conditions and the tides.

Particularly in declining and marginal weather conditions, the vessels at sea in the commercial fleet all begin to head home around the same time. The previous outbound parade of boats reverses direction and the whole fleet heads for the bar. It can take the entire window of suitable incoming high tide conditions on the bar for the fleet to get back into the harbor. When the tide reverses and begins to ebb, conditions on the bar degenerate rapidly and in a matter of minutes the bar conditions can change from marginal to impassable. Boats that miss this window are forced to ride out the storm at sea until the next high flood tide.

There is not sufficient time to add an LNG ship transit to this scenario without having negative impacts on the existing use of the navigation channel by fishers. If the bar is closed for a half an hour over the high flood tide, to accommodate passage of an LNG carrier and multiple tractor tugs, somebody is going to get stuck at sea in bad weather conditions. JCEP has stated the total time required for an LNG carrier to transit between the harbor entrance and the proposed berth is 90 minutes and that no individual location in the estuary will be impacted for more than 30 minutes. Roughly one third to one half of the LNG carrier's total transit time will occur when LNG vessels transit the lower portion of the bay that is also used by commercial and recreational vessels based in the Charleston harbor. Taking a half hour chunk out of the extremely limited time that the commercial fleet uses to cross the bar to enable an LNG tanker to transit the bar will only have negative impacts on fisheries. Those impacts are serious and potentially life threatening.

The Dungeness crab fishery in Oregon has been characterized as a "derby fishery". During the first days and weeks of the season, a substantial portion of the total annual commercial crab landings are caught in the first days and weeks of the season. Having gear in the water for "the first pull" is critically important. In the days just prior to the start of the commercial crabbing season, fisheries management agencies provide a very narrow window of time for commercial fishers to set out their gear before the first pull of the season. Smaller vessels in the fleet must make multiple trips to sea in order to get all their gear in the water. Thus, in the days leading up to the opening of the commercial crab season and in the days and weeks immediately following the season opening, there are hundreds of commercial vessel crossings over the Coos Bay Bar by boats loaded to capacity with crab pots and live crab. The restrictions imposed by LNG carriers transiting the lower portion of the Coos Bay federal navigation channel will result in significant, quantifiable, negative impacts on use of the channel by commercial fishing vessels. **The permit should be denied because the work proposed will result in unreasonable interference with use of state waters for fishing and recreation.**

C. The description of impacted resources fails to identify the lower bay as a location used by recreational boat operators, paddle sport enthusiast and commercial shellfish harvesters.

Recreational and commercial activities will also be impacted by the passage of LNG carriers transiting the bay. Specifically:

a.) The description of impacted resources fails to identify the lower bay on the inside of the North Jetty as a popular recreational surfing spot, particularly during high and near slack outgoing tides, commonly in the winter months or periods of high ocean surf conditions. Surfers access this location by off highway vehicles via the North Spit or by paddling across the estuary from shore points in Charleston. Surfing in the lower bay is typically associated with winter periods of large ocean swells and strong fresh water runoff. Transiting LNG tank vessels will impact surfing in this location.

b.) The description of impacted resources fails to identify the area of the lower bay, including the area between the Jetties at the entrance to the channel as an important location for recreational salmon fishing in the lower estuary. The practice of "mooching

the Bar" is widespread in the fall season and is centered almost exclusively around the hour before and the hour following slack high water. The Transiting LNG vessels will

c.) A commercial crab fishery exists in the lower portion of the bay including the area between the north and south Jetties. This fishery uses commercial crab "rings". Unlike commercial crab traps, deployed crab rings lie flat on the bottom permitting both legal and sub-legal sized crabs unimpaired freedom to enter and depart the ring while deployed. For rings to capture crabs, they must be regularly pulled swiftly to the surface requiring regular tending to fish effectively. The in-bay commercial crab fishery is currently limited to weekdays. In contrast, the recreational crab fishery is permitted year-round, all days of the week.

d.) Sub tidal clam populations in the lower bay have historically been subject to commercial and recreational harvest by fishers employing scuba. The lower bay is also a popular location for boat based recreational scuba divers. Both commercial and recreational scuba diving in the estuary are highly tide dependent activities centered on periods of slack water high and low tides. The safety exclusion zone surrounding LNG vessels transiting the federal navigation channel will impact the ongoing recreational and commercial use of the estuary by scuba divers.

e.) There is no description of oyster fisheries that exist in the bay. These could be cut off from the bay due to construction.

Hence, the applicant's proposal to construct an LNG facility in Coos Bay will unreasonably interfere with public trust rights and should be denied.

IV. Third Remand Issue: The County should find that the proposed use cannot meet the requirements in Policies #4 and 4a of the CBEMP.

The 5-DA and 6-DA of the CBEMP allow dredging "subject to finding that adverse impacts have been minimized (see Policy #5); and to Policy #8 (requiring mitigation)." CBEMP Policy #5 incorporates the requirements of Policy #4 – "Identification and minimization of adverse impacts as required in 'd' above shall follow the procedure set forth in Policy #4." CBEMP Policy #4 provides that a decision to permit uses and activities (including fill in a development management unit) shall be "based upon a clear presentation of the impacts of the proposed alteration, as implemented in Policy #4a."

In order to comply with Policies 4 and 4a and because the proposed uses will alter the estuarine ecosystem, the county must assess the impacts of the proposed alteration and making findings as to the consistency of the uses with the resource capabilities of the management unit.

The impacts assessment must determine the type and extent of the alterations expected, the resources affected, the extent of the impacts on water quality and other physical characteristics of the estuary, living resources, recreation and aesthetic uses, navigation and other existing and

potential uses of the estuary and the methods that could be employed to avoid or minimize adverse impacts. Policy #4.

In undertaking this impacts assessment, because it looks at the impacts to the estuary as a whole including other potential uses of the estuary, the county should consider impacts in the context of and cumulatively with all other JCEP proposed uses of the estuary, including but not limited to the alignment of the pipeline itself, the NRIs and the road widening. The applicant fails to address these cumulative impacts.

Notably, JCEP has not yet obtained its DSL/Clean Water Act permits for the dredging activities. It also recently received a denial from DEQ as to its Clean Water Act Section 401 permit. As part of the DSL permit, ODFW submitted a letter that is included herewith as Exhibit I. That letter describes how the applicant must make efforts to avoid habitat impacts, and that the applicant should work on a coordinated, interagency habitat mitigation plan for the entire project including both the terminal and the pipeline. No evidence regarding such a plan has been submitted by the applicant.

The ODFW letter also discusses the uniqueness of the habitats located at the project site. Coos Bay is the largest estuary located entirely in Oregon. The letter lists a variety of species for which habitat would be impacted by the dredging. Notably ODFW contends in the letter that the JCEP and the Port of Coos Bay navigation channel modification project are connected actions and should be evaluated as such by all permitting authorities. The letter goes on to list impacts of the two projects. Applicant, despite having access to this letter from ODFW since its submission in February, submits nothing responding to this list of impacts, which differs from those outlined in the DEA memo.

Other impacts that are not fully addressed are:

a.) Bioaccumulation of toxins from the sediment that will be released with dredging in the slip. The record does not contain evidence discussing testing of that particular area and what the toxic substance levels are below 8 ft or at all.
b.) The existing toxins at the Ingram Yard that are currently "dormant" but may be released with disruption from construction, including but not limited to a "yellow unknown substance" (Rec 11853); chromium and arsenic in wood waste (Rec 11858, 7538)
c.) Toxic and hazardous substances may be present below 8ft, which was the depth of testing. Rec 11861.
    a. Pursuant to the Clam Diggers Intervention Letter (R. 6384) there seems to be records of many toxic substances in the Jordan Cove area (Tributyltin, metals, PAHs, PCBs). These would all be released with dredging and have a negative and lasting effect on benthic communities, bivalves, oysters, other invertebrates and the people who utilize them
    b. Testing from 2013 showed: tributyltin, antimony, chromium, copper, mercury, nickel and zinc are still present in the sediments sampled (R. 6385). These will all persist in invertebrates, particularly oysters

c. Dredged soils will be relocated to a beach segment on the north strip. (R. 6151) These sediments have been proven to contain elevated levels of toxic materials, and would be risk exposure to human contact
d. The fact that DEQ has a partial "no action" for the site does not mean it will be non-hazardous when re-disturbed.

d.) Turbidity impacts to spawning salmon that can begin in winter months. Rec 2054. Even short-term turdbity can affect predation on juvenile salmonids.[16]

e.) The eelgrass mitigation plan is unsupported.
a. Colonizing a robust benthic community in under a year seems dubious without any research.
b. Mitigation has a negative effect on eel grass population[17]
c. Any expansion by airport runway 4-22 would destroy the eelgrass mitigation area. The airport is applying for ROAR funding in an attempt to reinstate daily flights to PDX and seemingly would like to expand.[18]
d. Monitoring plans only include the mitigation area, no plans to monitor existing eelgrass for detrimental effects (Rec 10035). Monitoring plans only account for 5-8 years (Rec 10035) but 10 years is required (Rec 11747

V. Fourth Remand Issue: Policy #30 and subsidence impacts from dewatering during construction of the tank/slip facilities.

The applicant's materials on this issue appear not to address subsidence risks at all. Thus the County should find that there is insufficient evidence to show that there will not be subsidence impacts from dewatering.

VI. Fifth Remand Issue: Mitigation for filling of wetlands in CBEMP 7-D management unit.

LUBA hold that the findings do not identify the proposed mitigation for fill in Wetland J in the southeast portion of the 7-D district, or relate it in any way to the prescribed mitigation for Shoreland District 5. *Oregon Shores* at 364.

Applicant admits that it is proposing to fill a wetland in the 7-D zone and as such it must comply with Special Condition 5 and, in turn, the Henderson Marsh Mitigation Plan (HMMP). Remand App at 22. Applicant states that Wetland J lies outside of Henderson Marsh and so there is no prescribed mitigation.

First the Henderson Marsh Mitigation Plan does not appear to be in the record. Further, the map exhibits to the HMMP do not appear to have survived and are therefore not available to consult. However the plan includes a Condition 16 which provides that "estuarine intertidal losses not

[16] See o Gregory, Robert S. (1993). Effect of Turbidity on the Predator Avoidance Behaviour of Juvenile Chinook Salmon (Oncorhynchus tshawytscha), Canadian Journal of Fisheries and Aquatic Sciences.
[17] Williams, S. (2001). Reduced Genetic Diversity in Eelgrass Transplantations Affects both Population Growth and Individual
[18] See Coos airport 2019 ROAR funding application https://www.oregon.gov/aviation/AVB/Documents/2019/06_06/RA/CCAD_Consolidated%20Application.pdf.

already provided for in this plan will be handled on a project basis through the appropriate permit processes." This statement indicates that mitigation for losses to wetlands in the estuary and intertidal areas should be determined consistent with the HMMP at the time a project is permitted. Thus, in order to comply with the HMMP and in turn the CCZLDO, any approval should include a condition that the mitigation will be consistent with the HMMP and all other federal and state permitting requirements.

VII. Sixth Remand Issue: Ability of JCEP to obtain other required permits.

LUBA requires that there be "substantial evidence in the record that the applicant is not precluded from obtaining [required] state [or federal] agency permits as a matter of law." *Bouman v. Jackson County*, 23 Or LUBA 626, 647 (1992). Although Oregon Shores agrees that there is a new FERC permit pending, Oregon Shores notes that applicant was recently denied a separate state permit, the DEQ Clean Water Act Section 401 permit. See Exhibit J: DEQ Decision Letter. Thus LUBA stated, as with the FERC denial, the County must make findings addressing whether the DEQ denial means that JCEP is precluded as a matter of law from obtaining the required Clean Water Act permits for the project.

II. Conclusion

On remand, JCEP has failed to demonstrate that the proposed uses meet the applicable criteria or that the County can make findings to satisfy the issues remanded by LUBA. the Hearings Officer should recommend denial of these applications. We further ask that the record be left open for fourteen days following today's hearing.

Sincerely,

Phillip Johnson
Executive Director
Oregon Shores Conservation Coalition
P.O. Box 33
Seal Rock, OR 97376
(503) 754-9303
phillip@oregonshores.org

Encl. Exhibits A through J.

Robert McCullough – *Curriculum Vitae*

Principal
McCullough Research, 3816 S.E. Woodstock Place, Portland, OR 97202 USA

Professional Experience

1985-present	Principal, McCullough Research: provide strategic planning assistance, litigation support, and planning for a variety of customers in energy, regulation, and primary metals
1996-present	Adjunct Professor, Economics, Portland State University
1990-1991	Director of Special Projects and Assistant to the Chairman of the Board, Portland General Corporation: conducted special assignments for the Chairman in the areas of power supply, regulation, and strategic planning
1988-1990	Vice President in Portland General Corporation's bulk power marketing utility subsidiary, Portland General Exchange: primary negotiator on the purchase of 550 MW transmission and capacity package from Bonneville Power Administration; primary negotiator of PGX/M, PGC's joint venture to establish a bulk power marketing entity in the Midwest; negotiated power contracts for both supply and sales; coordinated research function
1987-1988	Manager of Financial Analysis, Portland General Corporation: responsible for M&A analysis, restructuring planning, and research support for the financial function; reported directly to the CEO on the establishment of Portland General Exchange; team member of PGC's acquisitions task force; coordinated PGC's strategic planning process; transferred to the officer's merit program as a critical corporate manager
1981-1987	Manager of Regulatory Finance, Portland General Electric: responsible for a broad range of regulatory and planning areas, including preparation and presentation of PGE's financial testimony in rate cases in 1980, 1981, 1982, 1983, 1985, and 1987 before the Oregon Public Utilities Commission; responsible for preparation and presentation of PGE's wholesale rate case with Bonneville Power Administration in 1980, 1981, 1982, 1983, 1985, and 1987; coordinated activities at BPA and FERC on wholesale matters for the InterCompany Pool (the association of investor-owned utilities in the Pacific Northwest) since 1983; created BPA's innovative aluminum tariffs (adopted by BPA in 1986); led PGC activities, reporting directly to the CEO and CFO on a number of special activities,

	including litigation and negotiations concerning WPPSS, the Northwest Regional Planning Council, various electoral initiatives, and the development of specific tariffs for major industrial customers; member of the Washington Governor's Task Force on the Vancouver Smelter (1987) and the Washington Governor's Task Force on WPPSS Refinancing (1985); member of the Oregon Governor's Work Group On Extra-Regional Sales (1983); member of the Advisory Committee to the Northwest Regional Planning Council (1981)
1979-1980	Economist, Rates and Revenues Department, Portland General Electric: responsible for financial and economic testimony in the 1980 general case; coordinated testimony in support of the creation of the DRPA (Domestic and Rural Power Authority) and was a witness in opposition to the creation of the Columbia Public Utility District in state court; member of the Scientific and Advisory Committee to the Northwest Regional Power Planning Council

Economic Consulting

2016-present	Expert witness to the U.S. Department of Justice on nuclear rate case
2016-present	Advisor to the City of Logansport on utility project development and decision-making
2016	Expert testimony for Gratl and Company before the Supreme Court of British Columbia on costs of Site C project delay
2015-present	Advisor to Huu-ay-aht tribe on Sarita Bay LNG project in British Columbia
2015-present	Analysis and expert testimony for Illinois Attorney General in official FERC complaint against MISO
2015-present	Advisor to Calbag Metals on generation project
2015-2016	Advisor to Oregon Department of Justice in the investigation of taxes owed the state by Powerex Corp.
2015	Economic analysis of the proposed 1100 MW hydro project, Site C, for the Peace Valley Landowner Association
2014-2015	Market analysis of the NYISO for the New York State Assembly

2014	Advisor to the Grand Council of the Cree on uranium mining in Quebec
2014-present	Support for the investigation of Barclays Bank
2013-present	Retained to do a business case analysis of the Columbia Generating Station by the Physicians for Social Responsibility
2013	Advisor to Environmental Defense Fund on gasoline and oil issues in California
2013	Advisor to Energy Foundation on Ohio competitive issues
2013	Export market review in the Maritime Link proceeding
2011	Consultant to Citizens Action Coalition of Indiana on Indiana Gasification LLC project
2010	Analysis and expert witness testimony for Block Island Intervenors concerning Deepwater offshore wind project
2010	Analysis for Eastern Environmental Law Center of 25 closed cycle plants in New York State
2010	Advisor on BPA transmission line right of way issues
2009-2010	Advisor to Gamesa USA on a marketing plan to promote a wind farm in the Pacific Northwest
2009-2010	Expert witness in City of Alexandria vs. Cleco
2009	Expert witness in City of Beaumont v. Entergy
2008-2009	Consultant to AARP Connecticut and Texas chapters on the need for a state power authority (Connecticut) and balancing energy services (Texas)
2008	Expert witness on trading and derivative issues in Barrick Gold litigation
2008-2014	Advisor to Jackson family in Pelton/Round Butte dispute
2007-2014	Advisor to the American Public Power Association on administered markets
2006-present	Advisor to the Illinois Attorney General on electric restructuring issues

2006-2007	Advisor to the City of Portland in the investigation of Portland General Electric
2006	Expert witness for Lloyd's of London in SECLP insurance litigation
2005-2007	Expert witness for Federated Rural Electric Insurance Company and TIG Insurance in Cowlitz insurance litigation
2005-2007	Advisor to Grays Harbor PUD on market manipulation
2005-2007	Advisor to the Montana Attorney General on market manipulation
2005-2006	Expert witness for Antara Resources in Enron litigation
2005-2006	Advisor to Utility Choice Electric
2004-2005	Expert witness for Factory Mutual in Northwest Aluminum litigation
2004	Advisor to the Oregon Department of Justice on market manipulation
2003-2006	Expert witness for Texas Commercial Energy
2003-2004	Advisor to The Energy Authority
2002-2005	Advisor to the U.S. Department of Justice on market manipulation issues
2002-2004	Expert witness for Alcan in Powerex arbitration
2002-2003	Expert witness for Overton Power in IdaCorp Energy litigation
2002-2003	Expert witness for Stanislaus Food Products
2002	Advisor to VHA Pennsylvania on power purchasing
2002	Expert witness for Sierra Pacific in Enron litigation
2002-2004	Advisor to U.S. Department of Justice
2002-2007	Expert witness for Snohomish PUD in Enron litigation

2002-2010	Expert witness for Snohomish in Morgan Stanley investigation
2001-2008	Expert witness for City of Seattle, Seattle City Light and City of Tacoma in FERC's EL01-10 refund proceeding
2001-2008	Advisor to VHA Southwest on power purchasing
2001-2005	Advisor to Nordstrom
2001-2005	Advisor to Steelscape Steel on power issues in Washington and California
2001	Advisor to California Steel on power purchasing
2001	Advisor to the California Attorney General on market manipulations in the Western Systems Coordinating Council power markets
2000-2007	Expert witness for Wah Chang in PacifiCorp litigation
2000-2001	Expert witness for Southern California Edison in Bonneville Power Administration litigation
2000-2001	Advisor to Blue Heron Paper on West Coast price spikes
2000	Expert witness for Georgia Pacific and Bellingham Cold Storage in the Washington Utilities and Transportation Commission's proceeding on power costs
1999-2002	Advisor to Bayou Steel on alternative energy resources
1999-2000	Expert witness for the Large Customer Group in PacifiCorp's general rate case
1999-2000	Expert witness for Tacoma Utilities in WAPA litigation
1999-2000	Advisor for Nucor Steel and Geneva Steel on PacifiCorp's power costs
1999-2000	Advisor to Abitibi-Consolidated on energy supply issues
1999	Expert report for the Center Helios on Freedom of Information in Québec
1999	Advisor to GTE regarding Internet access in competitive telecommunication markets

1999	Advisor to Logansport Municipal Utilities
1998-2001	Advisor to Edmonton Power on utility plant divestiture in Alberta
1998-2001	Energy advisor for Boise Cascade
1998-2000	Advisor to California Steel on power purchasing
1998-2000	Advisor to Nucor Steel on power purchasing and transmission negotiations
1998-2000	Advisor to Cominco Metals on the sale of hydroelectric dams in British Columbia
1998-2000	Advisor to the Betsiamites on the purchase of hydroelectric dams in Québec
1998-1999	Advisor to the Illinois Chamber of Commerce concerning the affiliate electric and gas program
1998	Intervention in Québec's first regulatory proceeding on behalf of the Grand Council of the Cree
1998	Market forecasts for Montana Power's restructuring proceeding
1997-2004	Expert witness for Alcan in BC Hydro litigation
1997-2003	Advisor to the Manitoba Cree on energy issues in Manitoba, Minnesota and Québec; Advisor to the Grand Council of the Cree on hydroelectric development
1997-1999	Advisor to the Columbia River Intertribal Fish Commission on Columbia fish and wildlife issues
1997-1998	Advisor to Port of Morrow regarding power marketing with respect to existing gas turbine plant
1997-1998	Expert witness for Tenaska in BPA litigation
1997	Advisor to Kansai Electric on restructuring in the electric power industry (with emphasis on the California markets)
1996-1997	Bulk power purchasing for the Association of Bay Area Cities
1996-1997	Advisor to Texas Utilities on industrial issues

1996-1997	Expert witness for March Point Cogeneration in Puget Sound Power and Light litigation
1996	Advisor to Longview Fibre on contract issues
1995-2000	Bulk power supplier for several Pacific Northwest industrials
1995-1999	Advisor to Seattle City Light on industrial contract issues
1995-1997	Advisor to Tacoma Utilities on contract issues
1995-1996	Expert witness for Tacoma Utilities in WAPA litigation
1994-1995	Advisor to Idaho Power on Southwest Intertie Project marketing
1993-2001	Northwest representative for Edmonton Power
1993-1997	Expert witness for MagCorp in PacifiCorp litigation
1992-1995	Advisor to Citizens Energy Corporation
1992-1994	Negotiator on proposed Bonneville Power Administration aluminum contracts
1992	Bulk power marketing advisor to Public Service of Indiana
1991-2000	Strategic advisor to the Chairman of the Board, Portland General Corporation
1991-1993	Chairman of the Investor Owned Utilities' (ICP) committee on BPA financial reform
1991-1992	Financial advisor on the Trojan owners' negotiation team
1991	Advisor to Shasta Dam PUD on the California Oregon Transmission Project and related issues
1990-1991	Advised the Chairman of the Illinois Commerce Commission on issues pertaining to the 1990 General Commonwealth Rate Proceeding; prepared an extensive analysis of the bulk power marketing prospects for Commonwealth in ECAR and MAIN
1988	Facilitated the settlement of Commonwealth Edison's 1987 general rate case and restructuring proposal for the Illinois Commerce Commission; reported directly to the Executive Director of the Commission; responsibilities included financial

	advice to the Commission and negotiations with Commonwealth and interveners
1987-1988	Created the variable aluminum tariff for Big Rivers Electric Corporation: responsibilities included testimony before the Kentucky Public Service Commission and negotiations with BREC's customers (the innovative variable tariff was adopted by the Commission in August 1987); supported negotiations with the REA in support of BREC's bailout debt restructuring
1981-1989	Consulting projects including: financial advice for the Oregon AFL-CIO; statistical analysis of equal opportunity for Oregon Bank; cost of capital for the James River dioxin review; and economic analysis of qualifying facilities for Washington Hydro Associates
1980-1986	Taught classes in senior and graduate forecasting, micro-economics, and energy at Portland State University

Education

Unfinished Ph.D.	Economics, Cornell University; Teaching Assistant in micro- and macro-economics
M.A.	Economics, Portland State University, 1975; Research Assistant
B.A.	Economics, Reed College, 1972; undergraduate thesis, "Eurodollar Credit Creation"

Areas of specialization include micro-economics, statistics, and finance

Papers and Publications

June 22, 2017	"Trump plan to sell BPA lines misguided"
April 11, 2017	"Affordable power or Site C power: British Columbia must choose"
February 28, 2017	"My View: Trade tariffs would hurt Americans", *The Portland Tribune*
January 8, 2017	"Many lives of Jordan Cove may have come to an end", *The Oregonian*

July 22, 2016	"Balancing an aging Hanford nuke plant against cheaper firm market power purchases", *The Oregonian*
July 7, 2016	"More roads needed to handle growth", *The Portland Tribune*
July 7, 2016	"Close the expensive Columbia Generating Station", *The Oregonian*
June 29, 2016	"Our future is in green energy, not aging, costly nuclear plants", *The Seattle Times*
May 12, 2016	"Diesel tax on heavy trucks is the right move", *The Portland Tribune*
May 2016	"Aspirational Planning: A Statistical Model of Hawthorne Bridge and Tilikum Crossing Bicycle Ride Counts", *Hatfield Graduate Journal of Public Affairs 1(1).*
January 19, 2016	"A good time for a sensibly managed Portland gas tax", *The Oregonian*
October 15, 2015	"A plan to fix Portland's roads", *The Portland Oregonian*
June 2015	"Estimating the Longevity of Commercial Nuclear Reactors", *Public Utilities Fortnightly*
December 2014	"Nuclear Winter", *Electricity Policy*
July 2013	"Mid-Columbia Spot Markets and the Renewable Portfolio Standard", *Public Utilities Fortnightly*
April 14, 2013	"Selling Low and Buying High", *The Oregonian*
December 2012	"Are Electric Vehicles Actually Cost-Effective?", *Electricity Policy*
November 30, 2012	"Portland's Energy Credits: The trouble with buying 'green'", *The Oregonian*
July 2009	"Fingerprinting the Invisible Hand", *Public Utilities Fortnightly*
February 2008	Co-author, "The High Cost of Restructuring", *Public Utilities Fortnightly*
March 27, 2006	Co-author, "A Decisive Time for LNG", *The Daily Astorian*
February 9, 2006	"Opening the Books", *The Oregonian*

August 2005	"Squeezing Scarcity from Abundance", *Public Utilities Fortnightly*
April 1, 2002	"The California Crisis: One Year Later", *Public Utilities Fortnightly*
March 13, 2002	"A Sudden Squall", *The Seattle Times*
March 1, 2002	"What the ISO Data Says About the Energy Crisis", *Energy User News*
February 1, 2001	"What Oregon Should Know About the ISO", *Public Utilities Fortnightly*
January 1, 2001	"Price Spike Tsunami: How Market Power Soaked California", *Public Utilities Fortnightly*
March 1999	"Winners & Losers in California", *Public Utilities Fortnightly*
July 15, 1998	"Are Customers Necessary?", *Public Utilities Fortnightly*
March 15, 1998	"Can Electricity Markets Work Without Capacity Prices?", *Public Utilities Fortnightly*
February 1998	"Coping with Interruptibility", *Energy Buyer*
January 1998	"Pondering the Power Exchange", *Energy Buyer*
December 1997	"Getting There Is Half the Cost: How Much Is Transmission Service?", *Energy Buyer*
November 1997	"Is Capacity Dead?", *Energy Buyer*
October 1997	"Pacific Northwest: An Overview", *Energy Buyer*
August 1997	"A Primer on Price Volatility", *Energy Buyer*
June 1997	"A Revisionist's History of the Future", *Energy Buyer*
Winter 1996	"What Are We Waiting for?" *Megawatt Markets*
October 21, 1996	"Trading on the Index: Spot Markets and Price Spreads in the Western Interconnection", *Public Utilities Fortnightly*

McCullough Research Reports

June 13, 2017	"Privatization of Bonneville Power Administration's Transmission Assets"
May 8, 2017	"Response to Public Power Council staff comments on replacing the Columbia Generating Station with lower cost renewables"
April 3, 2017	"Who actually pays for the Columbia Generating Station?"
February 15, 2017	"Replacing the Columbia Generating Station with Renewable Energy"
November 14, 2016	"Review of 'Economic Analysis of Proposed Changes to the Single Dwelling Zone Development Standard'"
October 5, 2016	"The Falling Price of Renewable Energy Relative to Conventional Generation"
October 3, 2016	"Statistical Evidence on the Increase in Portland Home Values Correlated with Historic Districts"
September 5, 2016	"Why are House Prices so high in the Portland Metropolitan Area?"
July 8, 2016	"Historic District Econometric Literature Review"
June 21, 2016	"Columbia Generating Station (CGS) Market Update"
November 19, 2015	"Market Cost of the Columbia Generating Station During the FY 2014/2015 Refueling Cycle"
September 30, 2015	"Decrypting New York's "Secret" Electric Bids"
September 9, 2015	"Market Power in West Coast Gasoline Markets: September Update"
September 8, 2015	"August 10, 2015 PADD 2 Gasoline Spike at BP Whiting's Pipestill 12"
July 23, 2015	"Market Power in West Coast Gasoline Markets: July Update"
June 23, 2015	"Market Power in West Coast Gasoline Markets: June Update"
May 25, 2015	"Site C Business Case Assumptions Review"
April 7, 2015	"2015 Paducah Update"

April 6, 2015	"Market Power in West Coast Gasoline Markets: April Update"
March 23, 2015	"Market Power in West Coast Gasoline Markets"
March 20, 2015	"Daniel Poneman and the Paducah Transaction"
January 2, 2015	"Data and Methodological Errors in the Portland Commercial Street Fee"
December 15, 2014	Report to the Bureau d'audiences publiques sur l'environment (BAPE), "Uranium Mining in Quebec: Four Conclusions"
February 11, 2014	"Energy Northwest's Revised Analysis of the Paducah Fuels Transaction"
January 25, 2014	"Energy Northwest Losses in the 2013 Forward Purchase of Nuclear Fuel"
January 2, 2014	"Review of the November 2013 Energy Northwest Study"
December 11, 2013	"Economic Analysis of the Columbia Generating Station"
February 21, 2013	"McCullough Research Rebuttal to Western States Petroleum Association"
November 15, 2012	"May and October 2012 Gasoline Price Spikes on the West Coast"
June 5, 2012	"Analysis of West Coast Gasoline Prices"
October 3, 2011	"Lowering Florida's Electricity Prices"
July 14, 2011	"2011 ERCOT Blackouts and Emergencies"
March 1, 2010	"Translation" of the September 29, 2008 NY Risk Consultant's Hydraulics Report to Manitoba Hydro CEO Bob Brennan
December 2, 2009	"Review of the ICF Report on Manitoba Hydro Export Sales"
June 5, 2009	"New York State Electricity Plants' Profitability Results"
May 5, 2009	"Transparency in ERCOT: A No-cost Strategy to Reduce Electricity Prices in Texas"
April 7, 2009	"A Forensic Analysis of Pickens' Peak: Speculation, Fundamentals or Market Structure"

March 30, 2009	"New Yorkers Lost $2.2 Billion Because of NYISO Practices"
March 3, 2009	"The New York Independent System Operator's Market-Clearing Price Auction is Too Expensive for New York"
February 24, 2009	"The Need for a Connecticut Power Authority"
January 7, 2009	"Review of the ERCOT December 18, 2008 Nodal Cost Benefit Study"
August 6, 2008	"Seeking the Causes of the July 3rd Spike in World Oil Prices" (updated September 16, 2008)
April 7, 2008	"Kaye Scholer's Redacted 'Analysis of Possible Complaints Relating to Maryland's SOS Auctions'"
February 1, 2008	"Some Observations on Societe Generale's Risk Controls"
June 26, 2007	"Looking for the 'Voom': A Rebuttal to Dr. Hogan's 'Acting in Time: Regulating Wholesale Electricity Markets'"
September 26, 2006	"Did Amaranth Advisors, LLC Attempt to Corner the March 2007 NYMEX at Henry Hub?"
May 18, 2006	"Developing a Power Purchase/Fuel Supply Portfolio: Energy Strategies for Cities and Other Public Agencies"
April 12, 2005	"When Oil Prices Rise, Using More Ethanol Helps Save Money at the Gas Pump"
April 12, 2005	"When Farmers Outperform Sheiks: Why Adding Ethanol to the U.S. Fuel Mix Makes Sense in a $50-Plus/Barrel Oil Market"
April 12, 2005	"Enron's Per Se Anti-Trust Activities in New York"
February 15, 2005	"Employment Impacts of Shifting BPA to Market Pricing"
June 28, 2004	"Reading Enron's Scheme Accounting Materials"
June 5, 2004	"ERCOT BES Event"
August 14, 2003	"Fat Boy Report"
May 16, 2003	"CERA Decision Brief"
January 16, 2003	"California Electricity Price Spikes"

November 29, 2002	"C66 and Artificial Congestion Transmission in January 2001"
August 17, 2002	"Three Days of Crisis at the California ISO"
July 9, 2002	"Market Efficiencies"
June 26, 2002	"Senate Fact Sheet"
June 5, 2002	"Congestion Manipulation"
May 5, 2002	"Enron's Workout Plan"
March 31, 2002	"A History of LJM2"
February 2, 2002	"Understanding LJM"
January 22, 2002	"Understanding Whitewing"

Testimony and Comment

December 14, 2016	Testimony to the U.S. Court of Federal Claims on behalf of the U.S. Department of Justice regarding nuclear rate case
February 10, 2016	Testimony before the Supreme Court of British Columbia on the costs and benefits of delaying Site C dam
August 24, 2015	Testimony to the New York State Public Service Commission on behalf of the New York State Legislative Assembly
May 29, 2015	Testimony before the Federal Energy Regulatory Commission on behalf of Illinois Attorney General Lisa Madigan
December 15, 2014	Testimony before the Bureau d'audiences publiques sur l'environment (BAPE) in Quebec, "Uranium Mining in Quebec: Four Conclusions"
November 15, 2012	Testimony before the California State Senate Select Committee on Bay Area Transportation on West Coast gasoline price spikes in 2012
July 20, 2010	Testimony before the Rhode Island Public Utility Commission on the Deepwater offshore wind project
April 7, 2009	Testimony before the U.S. Senate Committee on Energy and Natural Resources on "Pickens' Peak"

March 5, 2009	Testimony before the New York Assembly Committee on Corporations, Authorities and Commissions, and the Assembly Committee on Energy, "New York Independent System Operators Market Clearing Price Auction is Too Expensive for New York"
February 24, 2009	Testimony before the Energy and Technology Committee, Connecticut General Assembly, "An Act Establishing a Public Power Authority" on behalf of AARP
September 16, 2008	Testimony before the U.S. Senate Committee on Energy and Natural Resources, "Depending On 19th Century Regulatory Institutions to Handle 21st Century Markets"
January 7, 2008	Supplemental Comment ("The Missing Benchmark in Electricity Deregulation") before the Federal Energy Regulatory Commission on behalf of American Public Power Association, Docket Nos. RM07-19-000 and AD07-7-000
August 7-8, 2007	Testimony before the Oregon Public Utility Commission on behalf of Wah Chang, Salem, Oregon, Docket No. UM 1002
February 23 and 26, 2007	Testimony before the Federal Energy Regulatory Commission on behalf of Public Utility District No. 1 of Snohomish County, Washington, Docket No. EL03-180
October 2, 2006	Direct Testimony before the Régie de l'énergie, Gouvernement du Québec on behalf of the Grand Council of the Cree
August 22, 2006	Rebuttal Expert Report on behalf of Public Utility District No. 1 of Snohomish County, Washington, Docket No. H-01-3624
June 1, 2006	Expert Report on behalf of Public Utility District No. 1 of Snohomish County, Washington, Docket No. H-01-3624
May 8, 2006	Testimony before the U.S. Senate Democratic Policy Committee, "Regulation and Forward Markets: Lessons from Enron and the Western Market Crisis of 2000-2001"
December 15, 2005	Direct Testimony before the Public Utility Commission of the State of Oregon on behalf of Wah Chang, Wah Chang v. PacifiCorp in Docket UM 1002
December 14, 2005	Deposition before the United States District Court Western District of Washington at Tacoma on behalf of Federated Rural Electric Insurance Exchange and TIG Insurance Company, Federated Rural Electric Insurance Exchange and

	TIG Insurance Company v. Public Utility District No. 1 of Cowlitz County, No. 04-5052RBL
December 4, 2005	Expert Report on behalf of Utility Choice Electric in Civil Action No. 4:05-CV-00573
July 27, 2005	Expert Report before the United States District Court Western District of Washington at Tacoma on behalf of Federated Rural Electric Insurance Exchange and TIG Insurance Company, Federated Rural Electric Insurance Exchange and TIG Insurance Company v. Public Utility District No. 1 of Cowlitz County, Docket No. CV04-5052RBL
May 6, 2005	Rebuttal Testimony before the Federal Energy Regulatory Commission on behalf of Public Utility District No. 1 of Snohomish County, Washington, Docket No.EL03-180, et al.
May 1, 2005	Rebuttal Expert Report on behalf of Factory Mutual, Factory Mutual v. Northwest Aluminum
March 24-25, 2005	Deposition by Enron Power Marketing, Inc. before the Federal Energy Regulatory Commission on behalf of Public Utility District No. 1 of Snohomish County, Washington, Docket No.EL03-180, et al.
February 14, 2005	Expert Report on behalf of Factory Mutual, Factory Mutual v. Northwest Aluminum
January 27, 2005	Supplemental Testimony before the Federal Energy Regulatory Commission on behalf of Public Utility District No. 1 of Snohomish County, Washington, Docket No. EL03-180, et al.
April 14, 2004	Deposition by Enron Power Marketing, Inc. and Enron Energy Services before the Federal Energy Regulatory Commission on behalf of Public Utility District No. 1 of Snohomish County, Washington, Docket No.EL03-180, et al.
April 10, 2004	Rebuttal Testimony on behalf of the Office of City and County Attorneys, San Francisco, California, City and County Attorneys, San Francisco, California v. Turlock Irrigation District, Non-Binding Arbitration
February 24, 2004	Direct Testimony before the Federal Energy Regulatory Commission on behalf of Public Utility District No. 1 of Snohomish County, Washington, Docket No.EL03-180, et al.

March 20, 2003	Rebuttal Testimony before the Federal Energy Regulatory Commission on behalf of the City of Seattle, Washington, Docket No. EL01-10, et al.
March 11-13, 2003	Deposition by IdaCorp Energy L.P. before the District Court of the Fourth Judicial District of the State of Idaho on behalf of Overton Power District No. 5, State of Nevada, IdaCorp Energy L.P. v. Overton Power District No. 5, Case No. OC 0107870D
March 3, 2003	Expert Report before the District Court of the Fourth Judicial District of the State of Idaho on behalf of Overton Power District No. 5, State of Nevada, IdaCorp Energy L.P. v. Overton Power District No. 5, Case No. OC 0107870D
February 27, 2003	Direct Testimony before the Federal Energy Regulatory Commission on behalf of the City of Tacoma, Washington and the Port of Seattle, Washington, Docket No. EL01-10-005
October 7, 2002	Rebuttal Testimony before the Federal Energy Regulatory Commission on behalf of Public Utility District No. 1 of Snohomish County, Washington, Docket No. EL02-26, et al.
October 2002	Expert Report before the Circuit Court of the State of Oregon for the County of Multnomah on behalf of Alcan, Inc., Alcan, Inc. v. Powerex Corp., Case No. 50 198 T161 02
September 27, 2002	Deposition by Morgan Stanley Capital Group, Inc. before the Federal Energy Regulatory Commission on behalf of Nevada Power Company and Sierra Pacific Power Company, Docket No. EL02-26, et al.
August 8-9, 2002	Deposition by Morgan Stanley Capital Group, Inc. before the Federal Energy Regulatory Commission on behalf of Nevada Power Company and Sierra Pacific Power Company, Docket No. EL02-26, et al.
August 8, 2002	Deposition by Morgan Stanley Capital Group, Inc. before the Federal Energy Regulatory Commission on behalf of Public Utility District No. 1 of Snohomish County, Washington, Docket No. EL02-26, et al.
June 28, 2002	Direct Testimony before the Federal Energy Regulatory Commission on behalf of the City of Tacoma, Washington, Docket No. EL02-26, et al.

June 25, 2002	Direct Testimony before the Federal Energy Regulatory Commission on behalf of Public Utility District No. 1 of Snohomish County, Washington, Docket No. EL02-26, et al.
June 25, 2002	Direct Testimony before the Federal Energy Regulatory Commission on behalf of Nevada Power Company and Sierra Pacific Power Company, Docket No. EL02-26, et al.
May 6, 2002	Rebuttal Testimony before the Public Service Commission of Utah on behalf of Magnesium Corporation of America in the Matter of the Petition of Magnesium Corporation of America to Require PacifiCorp to Purchase Power from MagCorp and to Establish Avoided Cost Rates, Docket No. 02-035-02
April 11, 2002	Testimony before the U.S. Senate Committee on Commerce, Science and Transportation, Washington DC
February 13, 2002	Testimony before the U.S. House of Representatives Subcommittee on Energy and Air Quality, Washington DC
January 29, 2002	Testimony before the U.S. Senate Committee on Energy and Natural Resources, Washington DC
August 30, 2001	Rebuttal Testimony before the Federal Energy Regulatory Commission on behalf of Seattle City Light, Docket No. EL01-10
August 16, 2001	Direct Testimony before the Federal Energy Regulatory Commission on behalf of Seattle City Light, Docket No. EL01-10
June 12, 2001	Rebuttal Testimony before the Public Utility Commission of the State of Oregon on behalf of Wah Chang, Wah Chang v. PacifiCorp in Docket UM 1002
April 17, 2001	Before the Public Utility Commission of the State of Oregon, Direct Testimony on behalf of Wah Chang, Wah Chang v. PacifiCorp in Docket UM 1002
March 17, 2000	Rebuttal Testimony before the Public Service Commission of Utah on behalf of the Large Customer Group in the Matter of the Application of PacifiCorp for Approval of Its Proposed Electric Rate Schedules and Electric Service Regulations, Docket No. 99-035-10
February 1, 2000	Direct Testimony before the Public Service Commission of Utah on behalf of the Large Customer Group in the Matter of the Application of PacifiCorp for Approval of Its Proposed

	Electric Rate Schedules and Electric Service Regulations, Docket No. 99-035-10

Presentations

January 23-24, 2017	"Are Electric Markets Obsolete?", Buying & Selling Electric Power Conference, Seattle, Washington
December 3, 2015	"Ozymandias: Seventeen years of administered markets, high costs, and poor eligibility", Utility Markets Today, Rockville, Maryland
May 6, 2014	"Economic Analysis of the Columbia Generating Station", Energy Northwest, Boise, Idaho
April 30, 2014	"Economic Analysis of the Columbia Generating Station", Portland State University, Portland, Oregon
April 22, 2014	"Economic Analysis of the Columbia Generating Station", Clark County, Vancouver, Washington
January 9, 2014	"Economic Analysis of the Columbia Generating Station", Northwest Power & Conservation Council, Portland, Oregon
January 1, 2014	"Economic Analysis of the Columbia Generating Station", Bonneville Power Administration, Portland, Oregon
December 2, 2013	"Economic Analysis of the Columbia Generating Station", Skamania, Carson, Washington
December 1, 2013	"Peak Peddling: Has Portland Bicycling Reached the Top of the Logistic Curve?" Oregon Transportation Research and Education Consortium, Portland, Oregon
July 12, 2013	"Economic Analysis of the Columbia Generating Station", Tacoma, Washington
June 21, 2013	"Economic Analysis of the Columbia Generating Station", Seattle City Light, Seattle, Washington
January 29, 2013	"J.D. Ross (Who)", Portland Rotary Club, Portland, Oregon.
January 13, 2011	"Estimating the Consumer's Burden from Administered Markets", American Public Power Association conference, Washington, DC
October 15, 2009	"The Mysterious New York Market", EPIS, Tucson, Arizona

October 14, 2009	"Do ISO Bidding Processes Result in Just and Reasonable Rates?", legal seminar, American Public Power Association, Savannah, Georgia
June 22, 2009	"Pickens' Peak Redux: Fundamentals, Speculation, or Market Structure", International Association for Energy Economics
June 5, 2009	"Transparency in ERCOT: A No-cost Strategy to Reduce Electricity Prices in Texas", Presentation at Texas Legislature
May 8, 2009	"Pickens' Peak", Economics Department, Portland State University
April 7, 2009	"Pickens' Peak: Speculators, Fundamentals, or Market Structure", 2009 EIA energy conference, Washington, DC
February 4, 2009	"Why We Need a Connecticut Power Authority", presentation to the Energy and Technology Committee, Connecticut General Assembly
October 28, 2008	"The Impact of a Volatile Economy on Energy Markets", NAESCO annual meeting, Santa Monica, California
April 1, 2008	"Connecticut Energy Policy: Critical Times…Critical Decisions", House Energy and Technology Committee, the Connecticut General Assembly
May 23, 2007	"Past Efforts and Future Prospects for Electricity Industry Restructuring: Why Is Competition So Expensive?", Portland State University
February 26, 2007	"Trust, But Verify", Take Back the Power Conference, National Press Club, Washington, DC
May 18, 2006	"Developing a Power Purchase/Fuel Supply Portfolio"
February 12, 2005	"Northwest Job Impacts of BPA Market Rates"
January 5, 2005	"Why Has the Enron Crisis Taken So Long To Solve?", Public Power Council, Portland, Oregon
September 20, 2004	"Project Stanley and the Texas Market", Gulf Coast Energy Association, Austin, Texas
September 9, 2004	"Back to the New Market Basics", EPIS, White Salmon, Washington

June 8, 2004	"Caveat Emptor", ELCON West Coast Meeting, Oakland, California
June 9, 2004	"Enron Discovery in EL03-137/180"
March 31, 2004	"Governance and Performance", Public Power Council, Portland, Oregon
January 23, 2004	"Resource Choice", Law Seminars International, Seattle, Washington
January 17, 2003	"California Energy Price Spikes: The Factual Evidence", Law Seminars International Seattle, Washington
January 16, 2003	"The Purloined Agenda: Pursuing Competition in an Era of Secrecy, Guile, and Incompetence"
September 17, 2002	"Three Crisis Days", California Senate Select Committee, Sacramento, California
June 10, 2002	"Enron Schemes", California Senate Select Committee Sacramento, California
May 2, 2002	"One Hundred Years of Solitude"
March 21, 2002	"Enron's International Ventures", Oregon Bar International Law Committee, Portland, Oregon
March 19, 2002	"Coordinating West Coast Power Markets", GasMart, Reno, Nevada
March 19, 2002	"Sauron's Ring", GasMart, Reno, Nevada
January 25, 2002	"Deconstructing Enron's Collapse: Buying and Selling Electricity on The West Coast", Seattle, Washington
January 18, 2002	"Deconstructing Enron's Collapse", Economics Seminar, Portland State University
November 12, 2001	"Artifice or Reality", EPIS Energy Forecast Symposium, Skamania, Washington
October 24, 2001	"The Case of the Missing Crisis" Kennewick Rotary Club, Kennewick, Washington
August 18, 2001	"Preparing for the Next Decade"
June 26, 2001	"Examining the Outlook on Deregulation"

June 25, 2001	Presentation, Energy Purchasing Institute for International Research (IIR), Dallas, Texas
June 6, 2001	"New Horizons: Solutions for the 21st Century", Federal Energy Management-U.S. Department of Energy, Kansas City, Kansas
May 24, 2001	"Five Years"
May 10, 2001	"A Year in Purgatory", Utah Industrial Customers Symposium-Utah Association of Energy Users, Salt Lake City, Utah
May 1, 2001	"What to Expect in the Western Power Markets this Summer", Western Power Market Seminar, Denver, Colorado
April 23, 2001	"Emerging Markets for Natural Gas", West Coast Gas Conference, Portland, Oregon
April 18, 2001	"Demystifying the Influence of Regulatory Mandates on the Energy Economy" Marcus Evans Seminar, Denver, Colorado
April 4, 2001	"Perfect Storm", Regulatory Accounting Conference, Las Vegas, Nevada
March 21, 2001	"After the Storm 2001", Public Utility Seminar, Reno, Nevada
February 21, 2001	"Future Imperfect", Pacific Northwest Steel Association, Portland, Oregon
February 12, 2001	"Power Prices in 2000 through 2005", Northwest Agricultural Chillers, Bellingham, Washington
February 6, 2001	Presentation, Boise Cascade Management, Boise, Idaho
January 19, 2001	"Wholesale Pricing and Location of New Generation Buying and Selling Power in the Pacific Northwest", Seattle, Washington
October 26, 2000	"Tsunami: Market Prices since May 22nd", International Association of Refrigerated Warehouses, Los Vegas, California
October 11, 2000	"Tsunami: Market Prices since May 22nd", Price Spikes Symposium, Portland, Oregon
August 14, 2000	"Anatomy of a Corrupted Market", Oregon Public Utility Commission and Oregon State Energy Office, Salem, Oregon

June 30, 2000	"Northwest Market Power", Governor Locke of Washington, Seattle, Washington
June 10, 2000	"Northwest Market Power", Oregon Public Utility Commission and Oregon State Energy Office, Salem, Oregon
June 5, 2000	"Northwest Market Power", Georgia Pacific Management
May 10, 2000	"Magnesium Corporation Developments", Utah Public Utilities Commission
May 5, 2000	"Northwest Power Developments", Georgia Pacific Management
January 12, 2000	"Northwest Reliability Issues", Oregon Public Utility Commission

Volunteer Positions

2015-Present	Board member, Portland State University Master in Public Policy Advisory Committee
2016-Present	Eastmoreland Neighborhood Association, Treasurer
2013-2016	Eastmoreland Neighborhood Association, President
2013-Present	Southeast Uplift Neighborhood Coalition, President
2013-Present	City of Portland Office of Management and Finance Advisory Committee
1990-Present	Chairman, Portland State University Economics Department Advisory Committee

Exhibit B

McCULLOUGH RESEARCH

ROBERT F. McCULLOUGH, JR.
PRINCIPAL

Date: June 5, 2019

To: McCullough Research Clients

From: Robert McCullough
Michael Weisdorf
Eric Shierman

Subject: The Questionable Economics of Jordan Cove LNG Terminal

A decade ago, one member of Oregon's congressional delegation asked us for a review of the Jordan Cove LNG import terminal proposed for Coos Bay.[1,2] The analysis was not difficult. The price of LNG exported to Japan from Alaska is reported in both Japan and Alaska. These prices were higher than the increasing amounts of natural gas appearing on the market from Alberta and Wyoming. Clearly, Jordan Cove was not a competitive solution for the import of LNG.

Jordan Cove's owners gradually realized that the new technologies of oil and natural gas made the import proposal uneconomic and changed the direction of LNG to a proposed export terminal in 2012.[3]

However, there are a number of good reasons to question whether this is a good location and a good project design. First, the supplies for Jordan Cove are taken from the Malin hub in southern Oregon. This puts the terminal at a six-hundred-mile disadvantage in transportation costs. Second, the announced costs of the terminal are high by market standards – significantly higher than its competitors. Third, the technology of Jordan Cove – using natural gas as opposed to electricity for compression – makes it less efficient than its competitors in British Columbia or the Gulf Coast.

Our analysis indicates that Jordan Cove will have a significant cost disadvantage compared to its competitors – approximately 25%. We also calculate the chance of Jordan Cove reaching operation is only one third.

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[1] McCullough Research. *Memo on LNG Pricing.* April 8, 2008.
[2] LNG refers to Liquified Natural Gas. LNG is a liquid when maintained at 260 degrees (F) below zero.
[3] Jonathan Thompson. "A pipeline built years ago may start to export Rocky Mountain gas to Asia." *High Country News*, April 14, 2014. https://www.hcn.org/blogs/goat/how-a-little-noticed-pipeline-might-make-natural-gas-exports-possible

Jordan Cove is currently at the pre-FID stage in its development. FID is an industry term standing for "Final Investment Decision". The FID is a critical decision that initiates actual financing and construction. The justification for proceeding to FID usually depends on two different analyses:

1. Is the location and facility likely to succeed given the past history of feed gas and ultimate markets?
2. How competitive is this specific facility compared to its peers?

The price differential between feed gas at the production site and delivered LNG at the destination market forms the economic basis for the decision to invest in LNG export projects. The chart in Figure 1 below shows the price history for Platts JKM (Japan/Korea Marker) price index, the global market with the highest price premium, as well as the price of Canadian feed gas at the AECO hub, which in recent years has traded at the lowest prices in North America.[4]

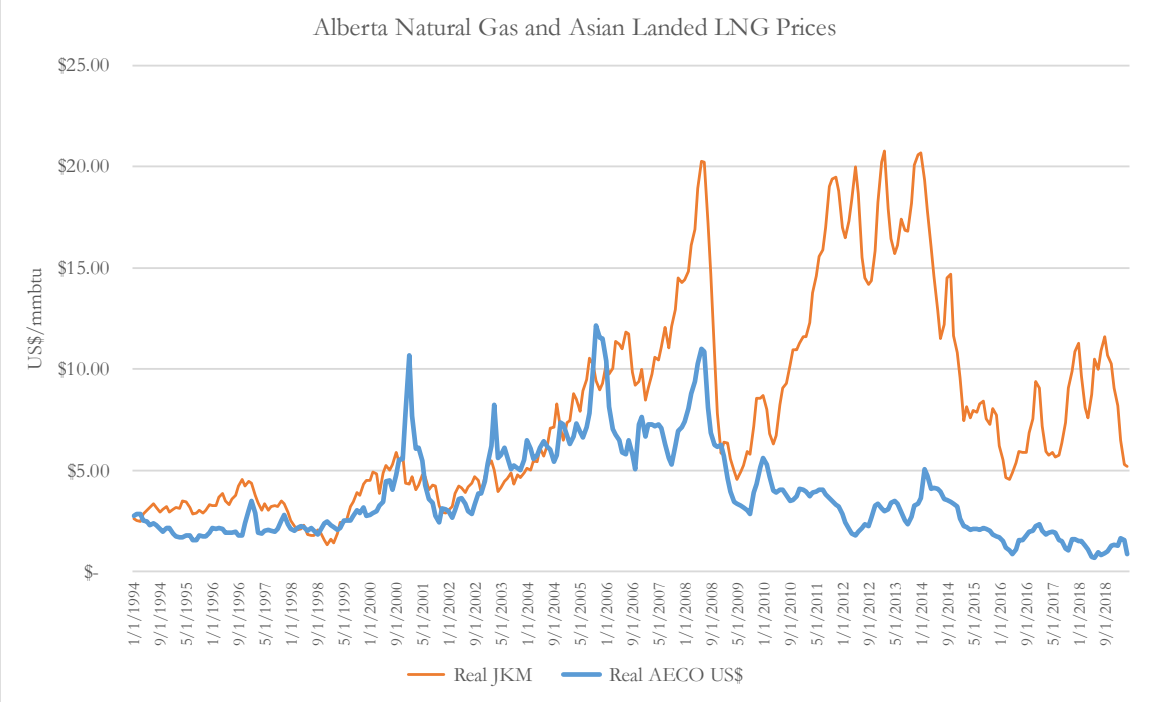

Figure 1: Natural Gas Prices in Canadian and Japanese Markets

[4] "Platts JKM™ is the Liquefied Natural Gas (LNG) benchmark price assessment for spot physical cargoes. It is referenced in spot deals, tenders and short-, medium- and long-term contracts both in Northeast Asia and globally." https://www.spglobal.com/platts/en/our-methodology/price-assessments/natural-gas/jkmt-japan-korea-marker-gas-price-assessments

A number of LNG export projects were proposed, planned, invested in, and built in the years following the 2011 Tohoku earthquake and resultant nuclear accidents at Fukushima Daiichi. During this period, all of Japan's nuclear reactors were taken offline, and large quantities of LNG were imported to replace the lost megawatts of electric power, causing the large increase seen in the JKM price marker. As nuclear plants begin to come back online in Japan, and the global LNG supply has expanded, the premium prices at JKM have begun to fall back in line with other natural gas markets around the world. Although Japan, with little to no gas supplies of its own, will continue to import gas from other markets, it seems unlikely that the large price premium observed from 2011-2016 will be a permanent feature of this market, which currently trades below $6/MMBtu.

The price of LNG in Japan has dropped markedly in the last six months, and even more dramatically in the last 3 years.[5] The following chart in Figure 2 shows the spread between JKM LNG and the Henry Hub index price of North American natural gas.

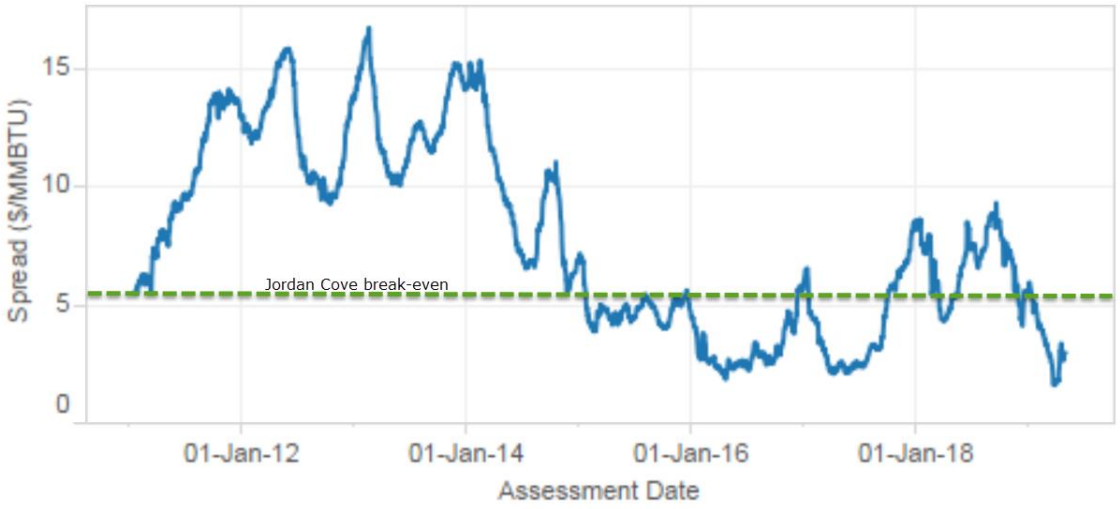

Figure 2: Recent JKM Price Changes

Beyond just the costs of feed gas itself, the costs of building, maintaining and operating an LNG export terminal must be recovered from the sale of LNG in the export market. The Jordan Cove Energy Project proposes to operate as a tolling model, providing liquefaction,

[5] *LNG Daily*, S&P Global Platts. https://www.spglobal.com/platts/en/products-services/lng/lng-daily

storage, and transport services to buyers of natural gas, who will pay a tolling fee per unit (MMBTU) based on the costs involved.[6]

Reviewing the materials submitted to FERC by the applicant allows us to calculate the tolling fee that would be needed to fully recover the costs of the project. Similar data is available for the British Columbia LNG terminal that received its FID last year. LNG Canada, sited at Kitimat, British Columbia, is larger than Jordan Cove, closer to inexpensive Alberta natural gas, and has better technology.[7]

The industry leader in North America is Cheniere Energy.[8] They have massive projects already in operation and plan an additional 30 MTPA to come into operation in the near future. Their data is contained in many sources and is generally subject to SEC rules on reporting.

The following table compares the three projects:

	Jordan Cove	LNG Canada	Cheniere
Output (MTPA)	7.8	14	31.5
Pipeline Cost (Billion $)	$ 2.46	$ 4.77	
LNG Project Cost (Billion $)	$ 7.30	$ 10.77	$ 30.00
Required Profit Margin for FID (Billion $)	$ 0.98	$ 1.55	$ 3.00
Total (Billion $)	$ 12.05	$ 19.18	$ 33.00
Per MTPA	$ 1.54	$ 1.37	$ 1.05
Annualized/MTPA @ 10% Real RoR	$0.16	$0.15	$0.11
Annualized/MMBTU	$3.33	$2.95	$2.26
O&M	$ 0.05	$ 0.04	$ 0.02
O&M/MMBTU	$0.94	$0.83	$0.32
Natural Gas Basis Differential ($/MMBTU)	($0.07)	($0.64)	$0.00
Required Margin @ FID	$4.27	$3.78	$2.58
Transportation to Asia ($/MMBTU)	$0.87	$0.87	$1.50
Required Margin at Asian Market	**$5.07**	**$4.01**	**$4.08**

Table 1: Comparison of Jordan Cove, LNG Canada, and Cheniere

[6] "Tolling" is an industry term that indicates that natural gas suppliers can bring natural gas to the LNG facility and have it compressed into liquified natural gas and delivered to the final market. The facility operator does not own the product at any point.

[7] Compression of natural gas into a liquid can be done by electricity or natural gas. Electricity is less expensive and more reliable. Jordan Cove's competitors are using electricity. Jordan Cove is using natural gas.

[8] Cheniere Energy, once an importer of LNG to its Sabine Pass, LA terminal, became the first Gulf Coast LNG exporter in early 2016. https://www.cheniere.com/terminals/lng/

The calculation of the minimum tolling fee that an LNG project can charge and make an acceptable project starts with the proposed output in millions of metric tons per annum. The pipeline cost from existing natural gas hubs to the project is added in the second line.

The cost per MMBTU (Millions of British Thermal Units) is derived by dividing the cost per MTPA by the BTU content of a metric ton of LNG.

Annual O&M costs are assumed to be 3% of the total project cost. Cheniere has a lower O&M cost available from its financial reports and financial presentations.

The basis differential for natural gas supplies is discussed below. Put simply, natural gas costs less at the well head – Alberta or Texas/Louisiana – than it does at the end of the pipeline.

The required profit margin is assumed to be 10% of the total investment. This is a standard industry assumption reflecting the risks of investing in the volatile LNG industry.

Transportation to Asia is taken from Cheniere's financial reports and estimates for West Coast projects. The West Coast is closer to Asia and has a significant transportation advantage.

The final line, in bold, sums the costs and arrives at the amount that the projects require as a fee for natural gas suppliers to take their feed gas to Asia.

The next chart (Figure 3) shows the price of Canadian natural gas in Alberta, the cheapest possible feedstock for the project plus the Jordan Cove tolling fee, as compared to the JKM price marker. The convergence of these two series seen in recent years suggests that the economics of this project are questionable at best.

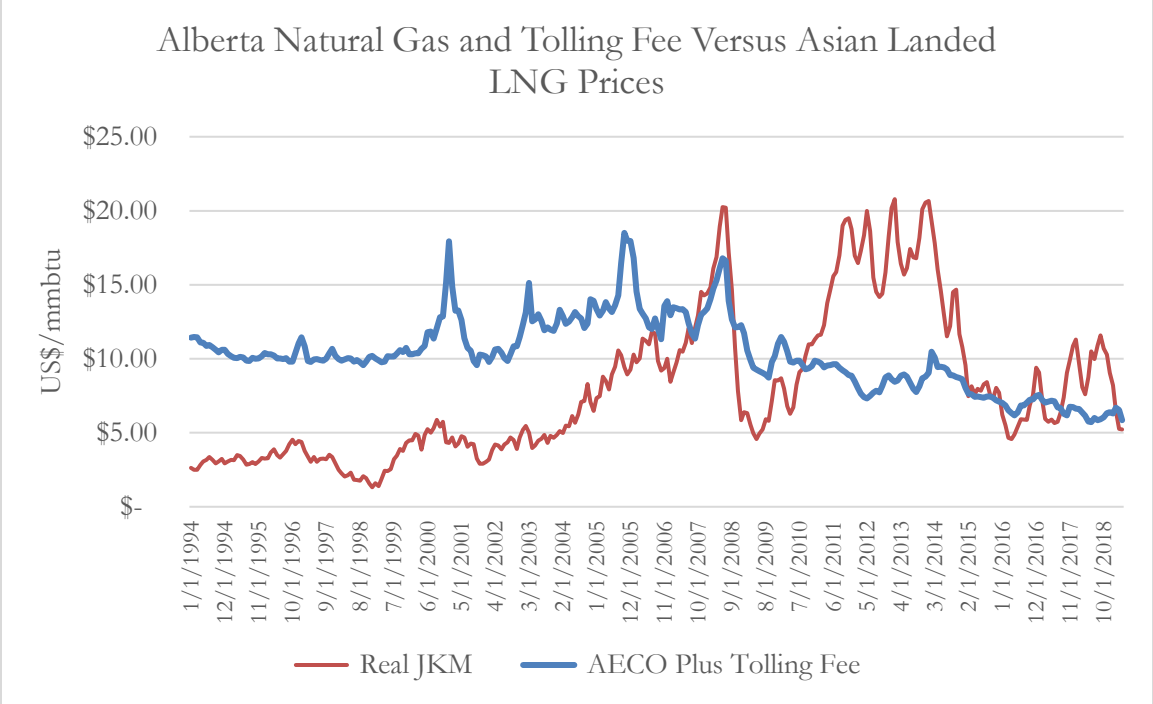

Figure 3: Delivered Cost and Asian Prices

In addition to our retrospective analysis, McCullough Research has developed a Monte Carlo model designed to predict the probability of success for West Coast LNG export terminals.

The Monte Carlo method was invented by Stanislaw Ulam during the Second World War at Los Alamos National Laboratory where models were used to help design the first thermonuclear weapons. One of the challenges Dr. Ulam and his colleagues faced in developing atomic fission was the sheer complexity of the possible reactions. Calculating over all possible interactions was impossible given the limited computers of his era (who generally were staff doing computations on mechanical calculators). The Monte Carlo method relies on large volumes of random samples. Each pick of variables is called a "game" and the results, when averaged, closely approximate what a very extensive analysis might develop. Today, Monte Carlo models are frequently used in economics, finance, engineering, and science.

Our model compares all the possible combinations of feed gas and Asian landed gas prices observed over the past decade, to generate a total of 92,416 games. Even with the unusually high post-earthquake prices of 2011-16 included in the study period, this analysis indicates that the probability of Jordan Cove successfully reaching FID is no more than 34%, as shown in Figure 4 below.

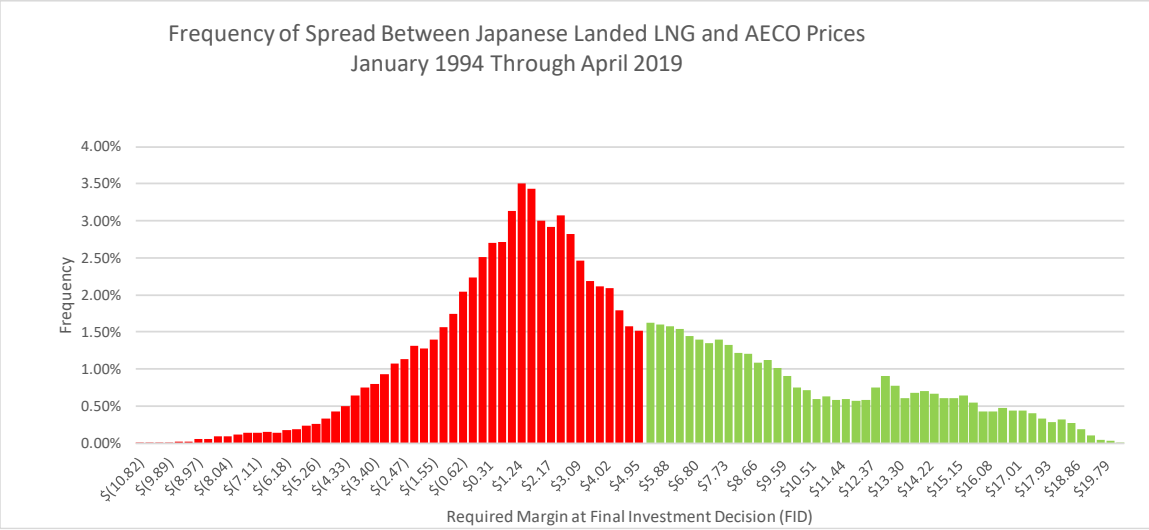

Figure 4: Monte Carlo Results

The modeling suggests strongly that more often than not, the spread between these prices is substantially less than what would be required to cover the costs of Jordan Cove, let alone earn any profits.

A critical issue in the future of Jordan Cove is the supply of natural gas and, very importantly, its price. The West Coast's major market for natural gas is in California. Pipelines extend into California from the north (Alberta and Colorado) and the east (the Gulf States).

Not surprisingly, prices are lower at the wells and increase with distance. Since California enjoys competition between different sources, the price for natural gas tends to increase or decrease with the major trading hub at Henry Hub, Louisiana. When prices fall at Henry Hub, competitors elsewhere in the U.S. and Canada must lower their prices to compete.

The locations where multiple suppliers and customers meet to negotiate transactions are known as a "hub". The term is meant to remind us of a wheel where spokes (pipelines) fan out from a central location.

On the West Coast there are ten major hubs as shown in the map in Figure 5:

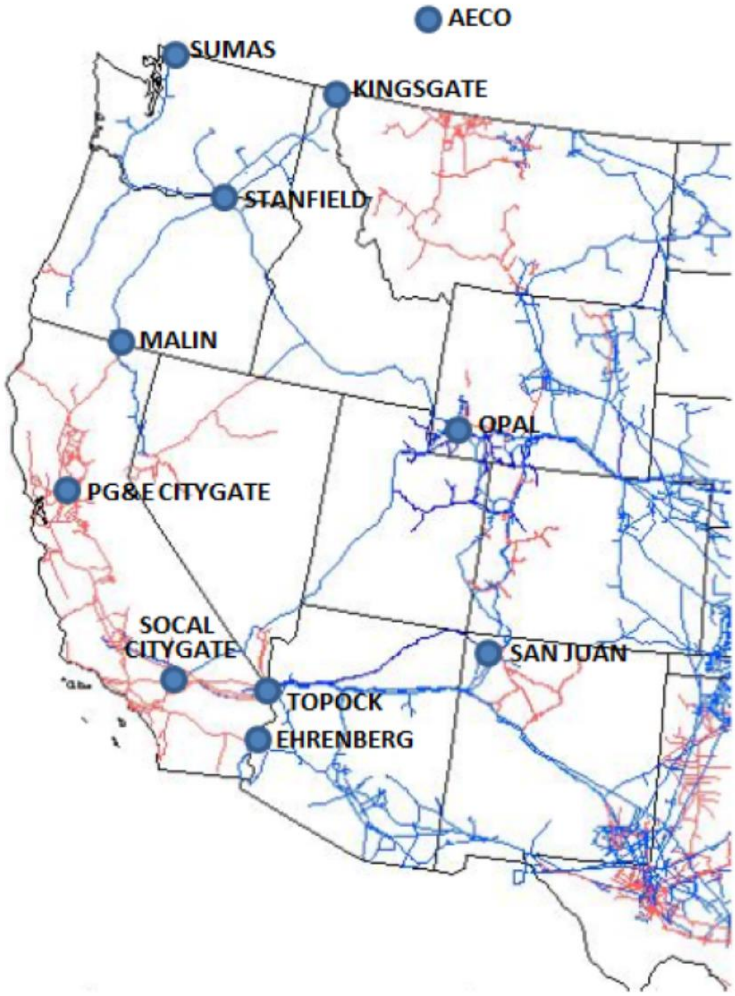

Figure 5: West Coast Natural Gas Hubs and Pipelines[9]

The trader's term for the difference in prices between hubs is *basis differential*. This value represents the expected difference between lower priced areas like Alberta and high-priced areas like Southern California. Traders watch these differentials and seize upon moments when they can profit by moving natural gas between hubs.

Financial markets like the Chicago Mercantile Exchange (which now includes the New York Mercantile Exchange – NYMEX) and the Intercontinental Exchange (ICE) document prices at the various hubs and facilitate long term commodity contracts.

[9] Bonneville Power Administration. Power Market Price Study and Documentation, BP-18-E-BPA-04. Page 40. https://www.bpa.gov/secure/Ratecase/Documents.aspx

An LNG export project like Jordan Cove requires a firm supply of feed gas delivered to its location, which is the purpose of the Pacific Connector pipeline connecting the proposed export terminal to the natural gas trading hub at Malin, Oregon near the California border.

The commercial success of the project thus very much depends on future movements in the price of gas at Malin. Commodities futures contracts, used to hedge against the risk of adverse price movements, are typically executed with respect to a basis differential, which specifies a discount or premium above or below an index price. Gas futures are priced with respect to the spot price at the Henry Hub in Louisiana, which is the delivery location specified by NYMEX for natural gas futures contracts and thus serves as the index price of US natural gas.[10]

As shown in Table 2 below, most Pacific Northwest gas hubs trade at a discount to Henry Hub, while California markets trade at a premium. The basis differential from Henry Hub at Malin is an estimate of the cost of long-term gas supply to the Jordan Cove project, while the competing LNG Canada project will be able to source its feed gas at a much lower price, due to the much wider basis discount seen at the AECO hub in Alberta.[11]

[10] "Henry Hub refers to the central delivery location (or, hub) located near the Louisiana's Gulf Coast, connecting several intrastate and interstate pipelines. Henry Hub has been used as a pricing reference for the futures since April 1990." https://www.cmegroup.com/trading/why-futures/welcome-to-nymex-henry-hub-natural-gas-futures.html

[11] "The AECO-C price is derived from the U.S. Henry Hub market price, taking into account transportation differentials, regional demand, and the U.S./Canadian dollar exchange rate. Similarly, the Alberta Reference Price (ARP) is derived from the AECO-C price, taking into account Alberta pipeline transportation costs." https://www.aer.ca/providing-information/data-and-reports/statistical-reports/commodity-prices-methodology

BPA Rate Cases: Power Risk and Market Price Studies						
FY	2014	2015	2016	2017	2018	2019
Henry Hub	$4.08	$4.35	$3.86	$4.05	3.24	3.25
AECO	-0.37	-0.39	-0.4	-0.42	-0.61	-0.64
Kingsgate	-0.19	-0.19	-0.16	-0.16	-0.2	-0.21
Malin	-0.09	-0.08	-0.03	-0.04	-0.07	-0.07
Opal	-0.12	-0.13	-0.13	-0.15	-0.13	-0.13
PG&E	0.25	0.27	0.31	0.32	0.34	0.36
SoCal City	0.05	0.05	0.24	0.26	0.22	0.22
Ehrenberg	0.05	0.05	0.12	0.13	0.04	0.04
Topock	0.05	0.05	0.12	0.13	0.04	0.04
San Juan	-0.12	-0.1	-0.16	-0.17	-0.13	-0.13
Stanfield	-0.15	-0.14	-0.1	-0.11	-0.14	-0.14
Sumas	-0.03	-0.06	-0.09	-0.1		

Table 2: BPA Rate Case Basis Differentials

Table 2 shows estimates for basis differentials developed by the Bonneville Power Administration.[12] Their estimate for 2019 is that Alberta's natural gas prices are $.64/MMBTU less than the hub at Henry Hub, Louisiana. By the time natural gas has travelled to the Oregon/California border, the price advantage has fallen to $.07/MMBTU. One of the reasons why LNG Canada has received its Final Investment Decision is that its natural gas supply is directly from the oil and natural gas fields priced at the AECO hub.

In conclusion, Jordan Cove faces a number of insurmountable challenges:

1. Jordan Cove's costs are higher – roughly $1 / MMBTU more – than its competitors.
2. With the rapid decline in Asian landed LNG prices, it is unlikely that it will reach a Final Investment Decision.
3. Its technology is likely to be less reliable and more costly than the electric compression methods used elsewhere.

As with a number of other LNG export projects proposed for the Pacific Northwest, the chances of its successful completion seem quite low.

[12] Bonneville Power Administration. Power Market Price Study and Documentation for BPA Rate Case in 2014, 2016, 2018, 2020. (e.g. BP-20-E-BPA-04) https://www.bpa.gov/secure/Ratecase/Documents.aspx

Exhibit C

Sign In

BUSINESS // ENERGY

Leaks threaten safety — and success — of America's top natural gas exporter

By Jenny Mandel and Jie Jenny Zou

May 30, 2019 | Updated: May 30, 2019 7:09 a.m.

A man fishes as the sun sets along the channel between Sabine Pass and Keith Lake in 2017.

Photo: Ryan Pelham / Ryan Pelham/The Enterprise

This story was reported as part of a partnership between E&E News and the Center for Public Integrity , and co-published by the Houston Chronicle.

In just three years, a 1,000-acre complex surrounded by Louisiana swampland has become the unlikely epicenter of America's booming natural gas business.

Exhibit C

Sign In

November, Cheniere opened a second terminal — eclipsing competitors racing to construct their first sites. The company is in talks to close its third deal with China, worth an estimated $18 billion.

But cracks in Cheniere's runaway success story have started to show.

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Last year, gashes up to six feet long opened up in a massive steel storage tank at Sabine Pass, releasing super-chilled LNG that quickly vaporized into a cloud of flammable gas. Federal regulators worried the tank might give way, spilling the remainder of the fuel and setting off an uncontrollable fire. It wasn't an isolated event: Another tank was leaking gas in 14 different places. Both tanks remain out of service over a year later.

Investigators soon discovered that Cheniere grappled with problems affecting at least four of the five tanks at the terminal over the past decade. And officials at the Pipeline and Hazardous Materials Safety Administration, known as PHMSA, have found the company to be less than forthcoming in the ongoing investigation, noting Cheniere's "reticence to share [its] sense of what might have gone wrong."

The leaks are a red flag at a time of unprecedented expansion in the LNG industry, which promotes the fuel as not only safe but also a clean, more climate-friendly alternative to

more potent than carbon dioxide at warming the Earth's atmosphere. Leaks erode the fuel's climate advantage over coal.

Cheniere spokesman Eben Burnham-Snyder said workers and the public were never in danger, and last year's leaks were about one hundredth of a percent of the facility's permitted greenhouse gas emissions for the year. The tanks, he added, meet "all federal and state safety requirements." But some other LNG export projects — including Cheniere's newest terminal in Corpus Christi, Texas — have opted to use more expensive tank designs that offer greater protection against leaks and fires.

Exhibit C

drilling boom. The company upended the energy market when it began sending LNG overseas in 2016, quickly turning America into a top seller of the fossil fuel.

Over a dozen U.S. export projects are now in development, including a $10 billion project by ExxonMobil and Qatar Petroleum on the Texas side of Sabine Pass. Federal regulations, though, haven't kept pace. They were written for simpler import and gas-storage facilities, not complex, multibillion-dollar export facilities. In April, the White House directed regulators to update LNG safety rules. But it's unclear what that will look like — or whether any new design requirements would apply to projects already in the works.

The industry trade group Center for Liquefied Natural Gas said its members — which include Cheniere — support the effort to revamp current regulations. That "goes hand in hand with our industry's focus on continuous improvement," spokeswoman Daphne Magnuson wrote in a statement. "We see a bright future for U.S. LNG and significant benefits to the planet at large."

'A continuing public safety threat'

On January 22, 2018, a Sabine Pass worker saw a pool of LNG vaporizing in the night air beside one of the storage tanks. Paint had peeled off the side and ice had formed at the top. The company mobilized, securing the area.

The biggest immediate risk was that the cloud of low-lying natural gas building around

PHMSA, inspected the tank and found the outer wall had cracked in four places and was still leaking gas.

Investigators also found vapor escaping from more than a dozen points around the base of a second tank, suggesting damage there, too. On February 8, PHMSA ordered both tanks shut down. During a public hearing in Houston in March, Halliday said there would be no way to put out an entire tankful of LNG if it caught fire.

"Sabine has been unable to correct the long-standing safety concerns ... and cannot identify the circumstances that allowed the LNG to escape containment in the first place," PHMSA wrote in its uncharacteristically forceful order. "Continued operation of the

Exhibit C

Sign In

Cheniere quickly went into damage control mode, fighting the order while playing down the risks to the roughly 500 people who work on-site. “We want to stress that there was and is no immediate danger to our community, workforce, or our facility from this incident, nor is there any impact on LNG production,” Burnham-Snyder, the spokesman, said at the time.

Cheniere has been tight-lipped even with investigators. But information has trickled out, suggesting deeper problems at the site. During the investigation, the company acknowledged that four of its five tanks had experienced a total of 28 temperature anomalies since 2009, increasing in frequency after the shift to exports in early 2016. Cold spots on LNG tanks can suggest leaks or insulation problems, and when the outer wall of a tank like those at Sabine Pass gets too cold, it can become brittle and crack.

In the summer of 2016 the company hired consultants to study the temperature problems but didn’t inform regulators or share the report with them until after the 2018 leaks. The Federal Energy Regulatory Commission, or FERC, requires LNG companies to disclose temperature deviations. Cheniere’s filings for that period read: “None to report.”

Asked about the discrepancy, the company’s spokesman did not address it but wrote, “Cheniere is committed to compliance and timely reporting.”

PHMSA’s investigation is ongoing; it has not fined Cheniere for the 2018 incident or its

fact, threatened to sue PHMSA if it released additional information in response to public records requests.

A lawyer for the company sent a seven-page letter to the agency in August, warning that disclosure would cause “irreparable commercial and competitive harm to Cheniere” by revealing its facility design. “Competition amongst LNG export projects to complete construction in the most efficient manner possible and to provide lowest prices to customers is vital to continued success,” the letter added. In October, a Cheniere attorney agreed to PHMSA’s request for an informal meeting to hash out how best to address the leaks, but only if the agency affirmed it would keep the company’s records confidential.

Exhibit C

Sign In

would amount to “a continuing public safety threat over the years and decades to come.” Burnham-Snyder said the company has since reached an agreement with the agency and is moving forward with repairs. It expects to have the tanks in service by the end of this year.

Ernie Megginson, an engineer who consulted on another project, Magnolia LNG, said he doesn’t understand Cheniere’s secrecy about the incident.

“There’s no reason a specific tank design or a drawing or a photo of the incident cannot be shared publicly,” he said. “For an issue of this magnitude, Cheniere, as a leader in this industry, should lead the way in safety and transparent reporting.”

Regulatory vacuum

The problems at Sabine Pass may not extend broadly across the industry for the simple reason that a number of new projects are opting to use safer tanks.

The ones at Sabine Pass have a single layer of steel that can withstand LNG’s ultra-cold temperatures. That inner wall is surrounded by a second layer of steel that holds insulation in place but isn’t meant to come into contact with the LNG, and placed in a pit large enough to capture the entire tank contents in case of a spill. Several export projects that started out as import terminals use that tank design. But all brand-new, approved projects will use a more expensive design with two layers of cold-tolerant material

The cheaper design is allowed under federal regulations. But Megginson said he was warned early on that it would be difficult — maybe impossible — for Magnolia LNG to get that option approved.

“FERC can be persuasive,” he said, noting that the agency could impose additional rounds of engineering review that would add up to a costly delay.

Texas LNG, Venture Global LNG and Cheniere’s own Corpus Christi plant are among the projects that originally proposed using the cheaper tanks but changed course. When it updated its design, Texas LNG cited a lower fire risk associated with the pricier option.

Exhibit C

more than half that of Corpus Christi, thanks to Sabine Pass' existing tanks and jetties for imports. The same paper said the more expensive design is "intrinsically safer" and has become the industry norm.

Asked why it used different types of tanks at its two sites, Cheniere wrote in a statement that it considered "the particular location, needs, and characteristics of each facility, and has demonstrated that both tank design options can safely meet our business and operational requirements."

FERC spokeswoman Tamara Young-Allen said the agency "does not have a preference on the type of tank" and either could be suitable, depending on the size of the site. The cheaper tanks "usually require a significant amount of land in order to meet the PHMSA's regulations," she said.

Tank design isn't the only area where federal rules haven't kept up with the LNG industry. In 2016, research commissioned by PHMSA suggested explosions are a bigger risk at export facilities than import terminals because of flammable gases used to liquefy natural gas. FERC instructs companies to calculate the consequences of a potential explosion at their facilities, but LNG safety expert Jerry Havens warns that these assessments may severely underestimate the risk.

Havens described the worst-case scenario as "cascading explosions that could destroy a plant and possibly extend damages to the public beyond the facility boundary."

Cheniere has been key to the Trump administration's "energy dominance" agenda, which centers on oil and gas exports. In November, Commerce Secretary Wilbur Ross helped Cheniere unveil its Corpus Christi terminal, the country's first LNG export facility to be built from scratch. That same month, Energy Secretary Rick Perry appeared alongside company executives in Poland to celebrate a 20-year contract. Billionaire investor Carl Icahn, a longtime Trump confidant who served briefly as a special White House advisor, is Cheniere's largest shareholder as of March.

The company's early start has all but guaranteed success. It reported $471 million in profit for 2018 and is projected to become one of the world's top five suppliers of LNG next year

Exhibit C

But the company was on the verge of collapse when it took a multibillion-dollar gamble to retrofit Sabine Pass for exports. In his book The Frackers, Wall Street Journal reporter Gregory Zuckerman details a 2009 meeting in which the co-founder of natural gas producer Chesapeake Energy convinced skeptical Cheniere executives to make that pivot. Chesapeake would be able to sell more natural gas and Cheniere, "a company that seemed on its last breath," would avoid financial ruin, Zuckerman writes. Cheniere enlisted Washington power brokers to make the case for LNG exports.

By the end of President Barack Obama's first term, natural gas had become a fixture of his energy strategy. In early 2012, he spoke glowingly of natural gas as an economic and environmental plus, predicting the country would soon be exporting it. Two months later, federal officials approved Cheniere's export plans.

"I would credit most of the company's success not to the implementation of a long, hard, thoughtful vision, but sort of serendipity and good luck," said Tyson Slocum, energy director at Public Citizen, a consumer advocacy organization. "Cheniere is the concession stand at the movie theater of the U.S. fossil fuel business."

It's no wonder, said Slocum, that Cheniere is stocked with ex-Obama officials. Among the company's ranks are former Energy Department officials Burnham-Snyder (now company spokesman), Christopher Smith (now a senior vice president), Robert Fee (now chief of staff) and Steven Davidson (now community affairs manager).

directors — earning more than $1 million in compensation, including company stock. Zichal, who now oversees corporate engagement at The Nature Conservancy, declined to comment about her role on the board but said she has divested her Cheniere shares. While at the White House, Zichal was an early architect of the Clean Power Plan, a climate policy that would have pushed states away from coal toward natural gas and renewables but was withdrawn by President Donald Trump.

Cheniere has positioned itself as a leader on climate and sustainability. On its website, the company acknowledges "the scientific consensus on climate change," calls the Paris climate accord a "good start," and champions efforts to capture carbon emissions. Its

Exhibit C

But increasingly, environmentalists do not. Ongoing research has produced mounting evidence suggesting natural gas isn't much better than coal for the climate because of widespread methane leaks. That research does not yet account for LNG exports, which likely worsen the total climate impact for gas.

Industry's response has been somewhat contradictory. In 2018, Cheniere joined oil and gas titans like ExxonMobil and Chevron to form a research group aimed at reducing methane emissions. But those same companies, including Cheniere, also belong to the American Petroleum Institute, a trade group that has aggressively lobbied against methane regulations it called "overly burdensome" and "costly."

That stance runs counter to Cheniere's oft-repeated motto of "operational excellence." The company website notes that "LNG has positive climate benefits, but excessive methane leakage can erode this advantage."

That's not the only threat methane poses to the company. Cheniere has cited worsening disasters from climate change as a business risk, including 2017's Hurricane Harvey, which temporarily shuttered Sabine Pass.

"Changes in the global climate may have significant physical effects, such as increased frequency and severity of storms, floods and rising sea levels," the company's 2018 annual report warned. "If any such effects were to occur, they could have an adverse effect on

Jenny Mandel is a reporter at E&E News, an outlet covering energy and the environment. Jie Jenny Zou is a reporter at the Center for Public Integrity, a nonprofit investigative newsroom in Washington, D.C.

TOP

Exhibit C

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Exhibit D

INVESTOR BRIEFING — MAY 2019

JORDAN COVE IS RISKY BUSINESS

The Jordan Cove Energy Project (JCEP) proposed by the Canadian Pembina Pipeline Corporation is comprised of the Jordan Cove LNG project and the Pacific Connector Gas Pipeline (PCGP). The LNG project consists of a natural gas liquefaction and storage facility and an LNG export terminal in Coos Bay, OR; the PCGP would be a 229-mile 36-inch buried natural gas pipeline that would originate in Malin, OR at the existing hub of the Canadian GTN and U.S. Ruby Pipelines. The project would also require the expansion of the Malin compressor station.

KEY RISKS

√ **STRONG AND GROWING RESISTANCE**: Five federally-recognized Tribes and 415 of 420 project intervenors oppose the Jordan Cove Energy Project (JCEP); a total of nearly 90,000 comments were filed on two recent state permit applications; a 2018 statewide poll shows majority opposition.

√ **REGULATORY RISKS**: Pembina has only obtained a handful of around 50 state and federal permits or approvals for the current application; FERC denied the previous application in 2016; the Oregon Department of Environmental Quality denied the Clean Water Act permit application in May 2019.

√ **MARKET RISKS**: A tight, competitive global market and LNG glut coupled with the rise of short-term "portfolio" models makes Jordan Cove profitability a long shot.

√ **SAFETY/LIABILITY RISKS**: Terminal and facility sites are in major earthquake and tsunami zones; the pipeline would cross 229 miles including steep landslide, earthquake and/or wildfire-prone terrain.

√ **EMINENT DOMAIN**: As of the end of April, over 40% of impacted landowners have refused to sign easements; dozens of communities, several commissioners of affected counties and the majority of Oregonians oppose eminent domain for private gain.

√ **ENVIRONMENTAL JUSTICE IMPACTS**: The vast majority of potentially impacted communities have higher than average percentages of vulnerable populations. The project would bury pipe across ancestral lands of 14 Tribes.

√ **CLIMATE IMPACTS MAKE THIS IRRESPONSIBLE ENERGY DEVELOPMENT**: JCEP would add 36.8 million new metric tons of greenhouse gas emissions to the atmosphere per year.

Exhibit D

B U Y E R B E W A R E

DON'T BANK ON JORDAN COVE

The Jordan Cove Energy Project (JCEP) has been an unactualized idea for 14 years and counting.

Initially proposed as an import project in 2005, Calgary-based Pembina Pipeline Corporation bought Veresen and the JCEP export project in 2017. The new owner's principal assets include oil pipeline networks in Alberta and British Columbia. Pembina has never successfully developed any projects in the U.S. Pacific Northwest, where fierce opposition has already scuttled more than a dozen major fossil fuel infrastructure proposals.

As global energy markets evolve dramatically with the world's transition to renewable energy, the JCEP export terminal looks ever more at risk of becoming a stranded asset. A report on the projected full lifecycle greenhouse gas emissions from the project said this, "In order to address the global climate crisis, emissions from all sources of fossil fuel must be reduced to zero by mid-century. Building and operating this project will undermine that goal."[1]

Moreover, the egregious potential impacts and intense community opposition should steer banks away from further involvement in this project. Banks financing Pembina would share responsibility for the impacts. Top bankers of Pembina include RBC, Bank of Nova Scotia, CIBC, TD and JPMorgan Chase.[2]

For years, *Washington Analysis* was optimistic about the Jordan Cove project, but since the 2016 FERC denial they have consistently reported that the "Jordan Cove redux" is "not looking good."

"Ultimately, we remain bearish on this project's chances of being constructed."
- *Washington Analysis report sent* out by Rob Rains, 2018.

The News-Review

Roseburg, Oregon Vol. 149 No. 255 www.nrtoday.com

SATURDAY, MARCH 12, 2016 $1.00

Feds say no to Jordan Cove

Spokesman for Pacific Connector Pipeline says company is weighing its options after decision by Federal Energy Regulatory Commission

TROY BRYNELSON

Federal regulators have denied the Jordan Cove LNG Project.

The announcement, which came Friday afternoon, during

gas pipeline from Malin to Coos Bay where the gas would be super-chilled and condensed into a liquid and shipped to Asian markets.

said. "It was just a shock and then the next (feeling

"I looked out the window, at my mountain and my home, and I thought 'We protected it. We protected Oregon. We were David and

Mail Tribune

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Republicans should support private property rights

BY BILL GOW | December 31, 2017

Pacific Standard

A MASSIVE PIPELINE IS BEING PLANNED IN OREGON. BUT LOCAL LANDOWNERS WON'T GO DOWN WITHOUT A FIGHT.

KATE WHEELING · APR 12, 2018

(Photo: Markus Spiske/Unsplash; GIF: Taylor Le)

A proposed natural gas pipeline is uniting Oregonians acros the political spectrum.

Set Weather

OREGON BUSINESS NEWS

OREGONLIVE The Oregonian

Survey: Oregonians oppose Coos Bay gas export project

Updated May 26, 2018; Posted May 26, 2018

Pembina faces uncertainty over timing of permit order for Jordan Cove LNG export project

Houston (Platts)--29 May 2018 324 pm EDT/1924 GMT

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Report: Jordan Cove LNG Project Would Be Largest Emitter Of Greenhouse Gasses In Oregon

Mail Tribune

NEWS SPORTS LIFE OBITS TEMPO OPINION OUTDOORS WEATHER LOCAL

… the project has changed and the world has changed, meriting examining the project anew. The question isn't whether we need to build infrastructure … but whether this large-scale fossil fuel project still makes sense."

— U.S. Senator Jeff Merkley, December 2017

Create jobs without jeopardizing our future

BY SEN. JEFF MERKLEY | December 07, 2017

When Jordan Cove LNG announced its plan in 2012 for a liquefied nat Coos Bay, it painted a compelling picture. The project would create hu improve port infrastructure in a region hit hard by the loss of sawmills would lessen the carbon dioxide pollution driving climate disruption b

To my concern about the rights of landowners in the path of the 230- company responded that it would secure right-of-way through negoti seizing land through eminent domain.

Opinion

The New York Times

OP-ED CONTRIBUTORS

The Next Standing Rock? A Pipeline Battle Looms in Oregon

By Don Gentry and Emma Marris

March 8, 2018

OPPOSITION IS STRONGER THAN EVER. AND GROWING.

Southwest Oregon is home to rugged mountains, wild salmon, biologically diverse forests and strong communities that value indigenous sovereignty and property rights. Opponents believe that all of this is threatened by a fracked gas pipeline that could trample farms, ranches and traditional tribal territories to reach a proposed LNG export terminal in Coos Bay, Oregon. The majority of Oregonians—across the political spectrum—are opposed to this project as was demonstrated in a 2018 statewide poll.[3] Pembina and its investors should expect to see continued diligent and focused resistance.

The Jordan Cove Energy Project has been proposed in some form or another for over 14 years, and yet remains fraught with controversy, complexity and uncertainty. Pembina, like its predecessor Veresen, erroneously paints a picture of a beneficial project that unequivocally deserves and will get a green light. Company spokespersons emphasize supporters and proponents who look narrowly at promises of temporary jobs and tax revenues. They tend to minimize or ignore the strength of commitment and increased effectiveness of Oregonians who resolutely oppose the Jordan Cove Energy Project. There is growing awareness of the existing industries and precious resources that would be jeopardized, as well as the costs to taxpayers and the project's likely intended and unintended consequences. In August 2018, over 40,000 comments of opposition were filed against JCEP's Clean Water Act permit application. In February 2019, more than 50,000 opponents filed comments with the Oregon Department of State Lands against the company's Removal-Fill application, protesting what would be the largest dredging project in recent Oregon history, bringing damage to coast-lines, fishing, tourism, oyster beds and marine businesses. Potential investors must exercise due diligence and learn the consequences of this proposed project.

"As I have maintained from the beginning, it is unacceptable to use eminent domain—a power designed to accomplish critical public projects—to advance a foreign-owned, private, for-profit project....Jordan Cove will contribute massively to pollution that is profoundly damaging our state and our world. Generations from now, our grandchildren will wonder why we continued to burn fossil fuels when the catastrophic consequences were so evident. Thus, it becomes clear that we have to shift from building large-scale fossil fuel infrastructure, including Jordan Cove, and instead invest massively in building the enormous backlog of infrastructure projects that will improve our state and nation, not damage it."

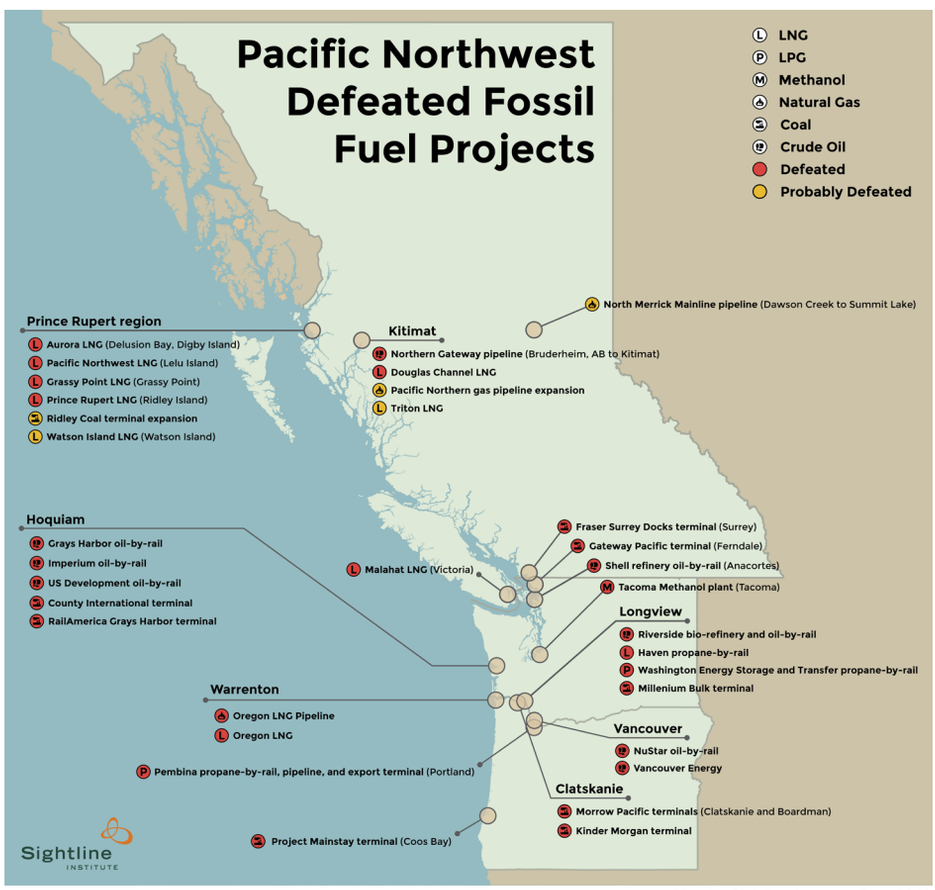
- U.S. Senator Jeff Merkley, *Medford Mail Tribune*, December 2017.

Photo by Alex Milan Tracy

REGULATORY ROADBLOCKS

Numerous developers have attempted to use the Pacific Northwest as a thoroughfare to export fossil fuels from deposits in the western interior of North America. A sophisticated and relentless movement dubbed “The Thin Green Line” has stopped one proposal after another by working effectively within the statutory and regulatory systems designed to protect natural resources, human rights and other critical interests of the broader public.[4] Oregonians opposing the Jordan Cove Energy Project are part of this movement.

The Federal Energy Regulatory Commission (FERC) is the major permitting authority for such projects and in 2016, they denied the Jordan Cove application primarily due to the Project's failure to demonstrate need that would outweigh adverse effects. After failing to get a rehearing, the company reapplied the following year, beginning the FERC process for a third time. But even if the current Commission decides differently on this round, other regulatory barriers exist. Project application materials indicate that approximately 50 local, state, and federal permits are needed to proceed. Pembina's predecessor didn't manage to obtain more than a handful of permits before the 2016 FERC denial and the new owner is struggling, as well. In September 2018, JCEP withdrew its application to the Energy Facility Siting Council (EFSC) for an exemption to the requirement for a power generation site certificate, after reports that the Oregon Department of Energy recommended denial of the application. The subsequent design change for the electrical system requires purchase of up to 1/2 of necessary electrical power for LNG terminal.[5] In November 2018, Oregon’s Land Use Board of Appeals (LUBA) found that Coos County had not adequately justified the project’s significant negative impacts to the Coos Bay estuary, as well as to commercial and recreational fisheries and access to shellfish beds.[6] A few months later, a Douglas County Circuit Court Judge ruled in favor of impacted private landowners, nullifying the County’s Conditional Use Permit extensions and thereby revoking permits for construction of a section of the Pacific Connector Gas Pipeline. This sent Pembina back to square one for permission to construct the pipeline in Douglas County’s Coastal Zone Management Area.[7] And in its most significant loss yet, on May 6, Oregon’s Department of Environmental Quality denied the project’s Clean Water Act permit application.[8] The Clean Water Act gives states the authority to deny this essential permit if projects would degrade water quality and uses. The Pacific Connector Gas Pipeline would cross streams and rivers 500 times, many that provide critical habitat for the Endangered Coho salmon and other fish, as well as drinking water for southern Oregon residents.



Map by Sightline Institute, Dec. 2018

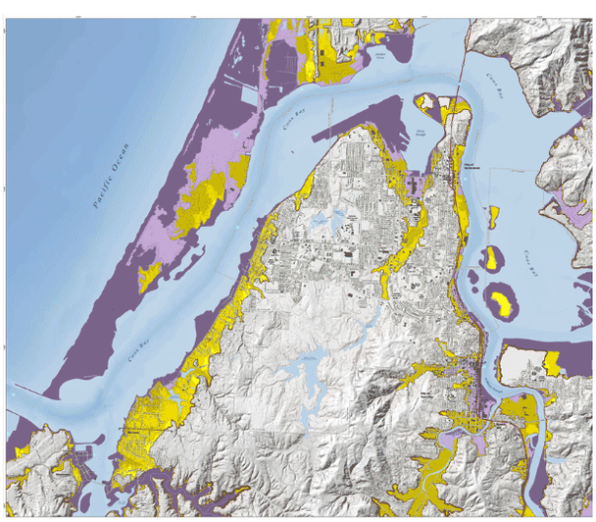
SAFETY RISKS

The proposed Pacific Connector Gas Pipeline would transport gas compressed up to 1,600 psig (or even 1,950 psig pursuant to later authority) along its length of 229 miles. Once in the Coos Bay area, the gas would be converted to LNG at 1/600th of its volume by freezing it to -260 degrees F and stored in tanks until export on 950-foot ships. The entire project would be sited in the region of the Cascadia Subduction Zone, deemed by foremost seismic experts to be the most likely area on the Pacific Northwest coast to experience a major (magnitude 8.7-9.2) earthquake and resultant tsunami during the lifetime of the project.[9] The area is also subject to navigational challenges made more difficult by weather and coastal configuration.

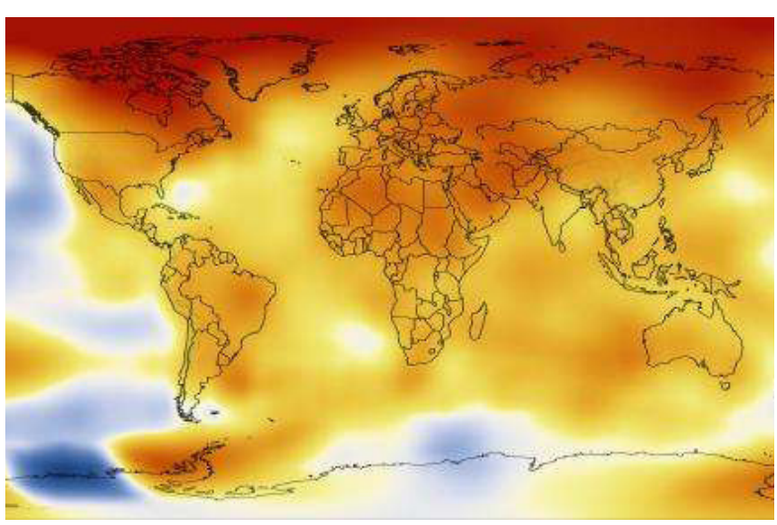
The Coos Bay area will suffer almost unimaginable human and property damage when the inevitable earthquake occurs. Facilities, built on sand, silt, organic mill waste and dredging spoils, may not withstand liquefaction caused by the shaking. The massive tsunamis that would follow will cause their own form of damage, which would be exacerbated exponentially if by happenstance an LNG tanker were present. State hazard experts have raised concerns that safety measures incorporated into the proposed Jordan Cove LNG terminal design fall short of adequacy.[10] FERC, in the 2015 Final Environmental Impact Statement for the last iteration of this project, estimated that over 16,000 Coos Bay residents lived within Zones of Concern where they would likely be at least injured by an incident involving the release of highly flammable LNG and ignition sources.[11]

The 229-mile pipeline could increase wildfire risks across a four-county region that already reels from wildfire costs and damage. The DEIS for the project (pp. 4-770-71) indicates that 95% of the pipeline would be built to Class 1 specifications--the lowest legally allowed in terms of design, materials, testing and operational standards. In case of fire, for example, application materials indicate that shut-off valves across most of the pipeline could be as much as 20 miles apart (Resource Report 11, p. 7). An explosion during southern Oregon's lengthening and intensifying fire season could be catastrophic, costing state and local communities millions of dollars in fire-fighting costs, timber and property loss and reduced tourism revenue.[12] A buried, highly pressurized natural gas pipeline could preclude effective fire-fighting techniques simply by its presence.[13] Wildfire concerns are among the numerous factors that the Jackson County Board of Commissioners featured in their oppositional comment to the Department of State Lands on the Removal-Fill permit sought by JCEP.[14] The pipeline would also traverse 117 miles of steep slopes; 94 miles of pipeline would be buried in soils that have been identified as having a high or severe erosion potential.[15]

TSUNAMI: Oregon Department of Geology and Mineral Industries map showing projected inundation from earthquake scenarios. Proposed LNG terminal location shown inundated at top.



CLIMATE CHANGE: Oregon's climate is projected to warm on average 3–7°F by the 2050s with decreased snowpack and drier summers that make forests more susceptible to bigger, more dangerous wildfires.



INDIGENOUS RIGHTS

Jordan Cove LNG would cross the traditional territories of 14 federally recognized Tribal Nations. FERC has invited all impacted Tribes to participate in the licensing process of the Jordan Cove project.[16] Six Tribes, including The Klamath Tribes; the Confederated Tribes of the Grand Ronde Community of Oregon; the Yurok Tribe; the Karuk Tribe; the Confederated Tribes of Coos, Lower Umpqua & Siuslaw Indians (CTCLUSI); and the Cow Creek Band of Umpqua Tribe of Indians have filed as intervenors in the federal regulatory process.[17] The Klamath Tribes, the Yurok Tribe, the Karuk Tribe, the Confederated Tribes of Siletz Indians and the Tolowa Dee-Ni Nation have all declared strong opposition to the proposed project,[18] while other tribes like the CTCLUSI have filed numerous comments stating concerns regarding impacts to their cultural resources.[19] Representatives of several Tribes spoke passionately against the project at the June 8, 2018 meeting of the Oregon Environmental Justice Task Force. The Task Force concluded the meeting with agreement that the Jordan Cove Energy Project is not in the best interests of the State of Oregon.[20]

Many banks, including some that finance Pembina, have policies in place requiring them to comply with the United Nations "Universal Declaration of Human Rights," which includes the United Nations "Declaration on the Rights of Indigenous Peoples." The implementation of these policies means that,

> [Businesses] should avoid infringing on the human rights of others and should address adverse human rights impacts with which they are involved. The responsibility to respect human rights is a global standard of expected conduct for all business enterprises wherever they operate. It exists independently of States' abilities and/or willingness to fulfill their own human rights, obligations, and does not diminish those obligations. And it exists over and above compliance with national laws and regulations protecting human rights. The responsibility to respect human rights requires that business enterprises seek to prevent or mitigate adverse human rights impacts that are directly linked to their operations, products or services by their business relationships, even if they have not contributed to those impacts.[21]

Banks have demonstrably contributed to human rights abuses through their financing of several fossil fuel infrastructure projects and bear the same risk in the case of the Jordan Cove Energy Project.[22] The large and visible public campaign against Wells Fargo for its support of Energy Transfer Partners in the wake of the Standing Rock resistance, with myriad abuses of the human rights of indigenous people, is evidence of the hazards of financing such projects. Electing to fund companies that attempt to construct fossil fuel projects without obtaining the "Free Prior and Informed Consent" of Native Peoples can result in significant public relations troubles; it is clear that many of Oregon's native people do not consent to installation of the Pacific Connector Pipeline. Don Gentry, Chairman of the Klamath Tribes, stated in a letter to FERC while the agency was considering JCEP's request for rehearing of FERC's 2016 denial:

> The route of the LNG pipeline shows it going through areas where villages once existed and it may unearth human remains since graves with human remains have been found in these areas....The route also would go under the Klamath and Rogue Rivers, which since time immemorial have been and continue to be important sources of fish for Tribal members. The losses of our cultural resources and risks presented by the Project clearly outweigh any benefits to the public from building the LNG pipeline and the Jordan Cove terminal for the export of LNG.

"As long as this proposal hangs over the river, the Klamath will stand in fierce, firm and unwavering opposition."

- Don Gentry, Chairman of the Klamath Tribes, "The Next Standing Rock? A Pipeline Battle Looms in Oregon," *New York Times*, March 2018.

Photo: Rick Rappaport

LANDOWNER RIGHTS

Fossil fuel developers and investors would be wise to recognize that the use of eminent domain by a private corporation to seize private property is perceived across the political spectrum as an iniquitous infringement on private property rights. County Commissioners in Jackson and Douglas Counties have commented to FERC and the Army Corps of Engineers—formally opposing the potential use of eminent domain by this project. Likewise, Oregon's U.S. Senators Jeff Merkley and Ron Wyden have spoken out against eminent domain and Congressman Peter DeFazio introduced legislation in 2012 (H.R. 3913) and again in 2019 (H.R. 2198) to prohibit eminent domain for construction of pipelines serve an LNG terminal for export.

As of April 26, 2019, approximately 40% of landowners have refused to sign right-of-way easements and dozens of impacted landowners have denied access for a variety of surveys needed.[23] In fact, the inability of the project sponsors to secure easements from landowners for the pipeline was responsible in part for the rejection of the project by FERC in 2016.[24]

Oregonians have proven to be fiercely protective of their land, lifestyles and property rights. After living under threat of an intrusive pipeline for over a decade, many landowners have vowed not to settle with the company. Pembina has likely underestimated these landowners' resolve, setting the stage for a prolonged and very public battle over the legitimacy of a Canadian fossil fuel corporation seizing property from American citizens.

Brown Family Farm

The Brown Family maintains 253 acres of farm and forest land that has been in their family since the 1930s. Neal Brown purchased the property shortly before shipping out for World War II, later telling his children he would never live anywhere other than his farm and forest land in Douglas County's Camas Valley. Daughter Pamela Brown Ordway says, "This land is part of my Dad's legacy and because of our connection to this place and our love for our father, we are committed to protecting it for future generations." Ordway and sisters Barbara Brown and Liz Hyde vow the Brown Family will remain steadfast in their opposition to the Pacific Connector Gas Pipeline.

Gow Family Ranch

"I own a 2,500-acre ranch where I've made a living running cows since 1991.... About 12 years ago, a company told me they wanted to run a gas pipeline right through the middle of my land. I said no, and I've been saying no ever since....Jordan Cove cannot be built without eminent domain. I've endured 12 years of living hell fighting this thing.... And I'll keep fighting, because I don't put a price on my family, and I don't put a price on my land or my health." - Bill Gow, *Medford Mail Tribune*, December 2017.

ENVIRONMENTAL JUSTICE

The Environmental Protection Agency defines environmental justice as, “the fair treatment and meaningful involvement of all people regardless of race, color, national origin, or income, with respect to the development, implementation, and enforcement of environmental laws, regulations, and policies.” The agency declares a goal that, “everyone enjoys the same degree of protection from environmental and health hazards, and equal access to the decision-making process to have a healthy environment in which to live, learn, and work.”[25] These environmental justice goals are major issues in fossil fuel development. For example, a federal court in *Standing Rock Sioux Tribe v. U.S. Army Corps of Engineers* found among other issues that the environmental justice analysis that is required under NEPA had been inadequately performed and that potential negative environmental impacts on Tribal rights guaranteed by Treaty had been ignored.[26] That finding stalled the project. Repercussions from this and other cases strongly suggest that minority and vulnerable populations affected by fossil fuel infrastructure will continue to gain high profile attention, and may even obtain specific remedies.

AIR POLLUTION: The location proposed for the compressor station would place a disproportionately harmful burden on people of color in Malin, Oregon. Compressor station in Texas featured here. (Photo of Texas compressor station compliments of Earthworks.)

Across nearly its entire geographic extent, the Jordan Cove project's negative impacts will be borne by some of the state's most vulnerable communities. Demographics from all but one Census tract involved from Coos Bay to Malin show higher percentages of American Indian, low-income, elderly, people of color and disabled populations than state averages.[27] Historically, boom and bust developments like Jordan Cove and the Pacific Connector Pipeline have brought with them increased crime, domestic violence, traffic congestion, noise and air pollution and pressure on existing services, as well as housing shortages and unaffordability.[28] There is no reason to believe that this project will be any different.

Pembina is proposing to expand the compressor station in Malin, OR in order to transport gas from connecting pipeline infrastructure to the export terminal. The community of Malin is 65% Latino/a, while the rest of Klamath county is only about 13% Latino/a, placing a harmful burden disproportionately on people of color.[29] In 2018, Oregon's Environmental Justice Task Force held meetings in Klamath County that focused on concerns about the pipeline and compressor station, including proposed air quality degradation from methane and other toxic emissions and noise pollution.[30]

“I do not think a private, for-profit company should be able to condemn private property in order to build a pipeline through someone’s backyard. The U.S. Constitution limits the use of eminent domain to actions necessary for ‘public use.’”

- U.S. Representative Peter DeFazio, December 2018.

CLIMATE

Banks have policies to promote responsible energy development through their investment practices. A 2018 study of project GHG emissions found that it would result in 36.8 million metric tons of CO2e per year, or the annual equivalent of emissions from 7.9 million passenger vehicles. Furthermore, the study found that not only is there no evidence that LNG exports replace coal in global markets, the projected methane leakage associated with the Jordan Cove Energy Project would result in greater GHG emissions than would be associated with a coal-fired power plant.[31]

In November 2018, Governor Kate Brown was re-elected to office with a mandate to take action on climate change. Three years earlier, she committed with other state and local government officials to reduce GHG emissions by 80%-95% below 1990 levels by 2050.[32] If the JCEP were to be built, its proportional share of the allowable emissions would necessarily grow while providing no energy benefit to the state.[33] Hosting this project would thwart Oregon's goals against its own best interests.

The effects of climate change are being felt progressively more intensely. The urgent messages from the scientific community calling for dramatic reductions in fossil fuel are coming forth loud and clear, and increasing numbers of Oregon's and the world's citizens are calling for action.[34]

"The project would increase the flow of fossil gas to the global market and in doing so would run counter to the goals of the Paris Agreement on Climate Change. The project would undermine Oregon's potential to play a leadership role in addressing global climate change."

- Lorne Stockman, Senior Research Analyst, Oil Change International, lead author of "Jordan Cove LNG and Pacific Connector Pipeline Greenhouse Gas Emissions Briefing," January 2018, page 9.

NOTES

1 Oil Change International, “Jordan Cove LNG and Pacific Connector Pipeline Greenhouse Gas Emissions Briefing,” January 2018, p. 1.

2 Financial information sourced from Bloomberg Financial L.P. via Rainforest Action Network, as of March 2018.

3 Policy Interactive, “Jordan Cove LNG Survey,” January/February 2018, https://www.policyinteractive.org/jordan-cove-lng/.

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5 Nigel Jaquiss, “Oregon Department of Energy Recommends Denying Jordan Cove Liquified Natural Gas Project an Exemption: Recommendation Could Slow Development of Controversial, Long-planned Coos Bay Facility,” Willamette Week, September 1, 2018, https://www.wweek.com/news/2018/09/01/the-oregon-department-energy-recommends-denying-jordan-cove-liquified-natural-gas-project-an-exemption/; Supplemental Resource Report JCEP LNG Terminal Project Docket No. CP17-495-000 J1-000-RPT-JCL-00017-00 Rev A," http://elibrary.ferc.gov/idmws/file_list.asp?accession_num=20190502-5124.

6 Elliott Davis, “Jordan Cove LNG Terminal,” July 31, 2018, https://crag.org/jordan-cove-lng-terminal/.

7 Max Egener, “Douglas County court nullifies key Jordan Cove Energy Project permit,” January 23, 2019, https://www.nrtoday.com/news/environment/jordan_cove/douglas-county-court-nullifies-key-jordan-cove-energy-project-permit/article_c7b49d1d-3e3e-507c-857b-fa56d8b995a4.html).

8 Richard Whitman, ODEQ to Derik Vowels, JCEP, May 6, 2019, https://www.oregon.gov/deq/FilterDocs/jcdecletter.pdf; Oregon Department of Environmental Quality, Evaluation and Findings Report Section 401 Water Quality Certification for the Jordan Cove Energy Project, May 2019, https://www.oregon.gov/deq/FilterDocs/jcevalreport.pdf.

9 Chris Goldfinger et al, “Turbidite Event History—Methods and Implications for Holocene Paleoseismicity of the Cascadia Subduction Zone,” https://pubs.usgs.gov/pp/pp1661f/.

10 Oregon Department of Geology and Mineral Industries comments in “State Agency Consolidated DEIS Comments to FERC,” April 12, 2015, p. 149; Ted Sickinger, Jordan Cove series in *The Oregonian,* June 27, 2014.

11 FERC, Final Environmental Impact Statement: Jordan Cove Energy and Pacific Connector Gas Pipeline Project, CP13-483-000, CP13-492-000, p. 4-1031.

12 Motion to Intervene of Seneca Jones Timber Company, FERC Docket #CP17-494-000, November 21, 2017

13 Firefighters United for Safety, Ethics, and Ecology (FUSEE) urges denial of the removal-fill permits for the Pacific Connector fracked gas pipeline and Jordan Cove LNG export terminal proposals, 2019 Report.

14 Jackson County Board of Commissioners to Oregon Department of State Lands re: Application APP0060697, January 22,2019.

15 “Supplemental Data Request from Oregon Department of Environmental Quality under CP17-494, et. al…," 12/20/2018, pp. 66-67, https://elibrary.ferc.gov/idmws/file_list.asp?accession_num=20181220-5186.

16 The FERC Docket for the the Jordan Cove LNG and Pacific Connector Gas Pipeline (Dockets CP17-494-000 and CP17-495-000) includes letters to the 14 Federally Recognized tribes that would be impacted by the proposed project. On the eLibrary (https://elibrary.ferc.gov/idmws/search/fercgensearch.asp) search key words "Letter Inviting."

17 See the following for Tribal intervenor filings:
- The Klamath Tribes (https://elibrary.ferc.gov/idmws/file_list.asp?accession_num=20171023-5044);
- The Klamath Tribes Youth Leadership Council (https://elibrary.ferc.gov/idmws/file_list.asp?accession_num=20171026-5286);
- Confederated Tribes of the Grand Ronde Community of Oregon (https://elibrary.ferc.gov/idmws/file_list.asp?accession_num=20171116-5009);
- Yurok Tribe (https://elibrary.ferc.gov/idmws/file_list.asp?accession_num=20171026-5286);
- Karuk Tribe (https://elibrary.ferc.gov/idmws/file_list.asp?accession_num=20171026-5145);
- Confederated Tribes of Coos, Lower Umpqua & Siuslaw Indians (https://elibrary.ferc.gov/idmws/file_list.asp?accession_num=20171025-5223);
- Cow Creek Band of Umpqua Tribe of Indians (https://elibrary.ferc.gov/idmws/file_list.asp?accession_num=20171023-5508).

NOTES

18 See the following for Tribal Government Positions of Opposition:
- Klamath Tribes (http://klamathtribes.org/news/wp-content/uploads/Klamath-Tribes-oppose-Jordan-Cove-Pacific-Connector-Comments-9-1-17.pdf);
- The Karuk (https://elibrary.ferc.gov/idmws/file_list.asp?accession_num=20170719-0060);
- The Yurok (https://elibrary.ferc.gov/idmws/file_list.asp?accession_num=20170714-0104);
- The Tolowa-Dee-Ni (https://elibrary.ferc.gov/idmws/file_list.asp?accession_num=20181214-4001);
- The Confederated Tribes of Siletz (https://www.thenewsguard.com/news/opposing-siletz-tribe-opposes-jordan-cove-lng/article_9bc01138-54de-11e9-8933-cb0c47247a2a.html).

19 Comments of Confederated Tribes of Coos, Lower Umpqua & Siulaw Indians on Oregon DSL Application under CP17-494, et. al. 02/05/2019. http://elibrary.FERC.gov/idmws/file_list.asp?accession_num=20190205-5127.

20 Live video feed of the June 8, 2018 meeting of the Environmental Justice Task Force Meeting. Rogue Climate Facebook Page: https://www.facebook.com/rogueclimate/videos/905631742943143.

21 Guiding Principles on Business and Human Rights - Implementing the United Nations' "Protect, Respect and Remedy" Framework, United Nations, 2011.

22 https://www.banktrack.org/news/new_briefing_paper_how_banks_contribute_to_human_rights_abuses.

23 156 total ROW easements on the DEIS's preferred route have been recorded at Coos, Douglas, Jackson, Klamath counties as of April 26, 2019 out of the approximately 257 timber and non timber private landowners affected on the preferred route. https://elibrary.ferc.gov/idmws/file_list.asp?accession_num=20190329-3018.

24 "March 11, 2016: Order Denying Applications for Certificate and Section 3 Authorization," https://www.ferc.gov/CalendarFiles/20160311154932-CP13-483-000.pdf.

25 https://www.epa.gov/environmentaljustice.

26 Oliver Wood, "Standing Rock Sioux Tribe v. U.S. Army Corps of Engineers," Public Land and Resources Law Review, Volume 0, Article 4, p. 1.

27 U.S. Bureau of the Census, American Community Survey, 2017, https://factfinder.census.gov/.

28 Bret A. Weber, Julia Geigle, and Carenlee Barkdull, "Rural North Dakota's Oil Boom and Its Impact on Social Services," Social Work, January 2014, pp. 62-72 and Ruth Seydlitz, Shirley Laska, "Social and Economic Impacts of Petroleum 'Boom and Bust' Cycles," U.S. Department of the Interior, Minerals Management Service University Research Initiative, June 1994.

29 U.S. Bureau of the Census, American Community Survey, 2017, https://factfinder.census.gov/.

30 Rogue Climate Facebook Page.

31 Oil Change International, p. 5.

32 "Global Climate Leadership Memorandum of Understanding (MOU)," https://www.theclimategroup.org/sites/default/files/under2-mou-with-addendum-english-us-letter.pdf.

33 Oil Change International, p. 8.

34 For example, Intergovernmental Panel on Climate Change, Global Warming of 1.5 °C, October 2018 and U.S. Global Change Research Program, Fourth National Climate Assessment, November 2018.

www.rogueclimate.org

Jordan Cove LNG was also featured as a case study in
BANKING ON CLIMATE CHANGE: FOSSIL FUEL FINANCE REPORT CARD 2018,
by Rainforest Action Network, BankTrack, Indigenous Environmental Network,
Sierra Club, Oil Change International, and Honor the Earth:

Michael Graybill
63840 Fossil Point Road,
Coos Bay OR 97420

15 January 2019

To whom it may concern:

This cover letter and the narrative contained in this transmittal are submitted in response to a solicitation for comments on a joint permit application issued by the Oregon Department of State Lands (DSL) on 7 November, 2018. The relevant DSL reference number is "60697 Revised". The permit application was submitted to the Department of State Lands by Jordan Cove Energy Project L.P. The work proposed in the Joint Permit Application will support the proposed construction of a Liquefied Natural Gas Export terminal and a 229-mile-long high-pressure natural gas pipeline to supply the liquefaction terminal to be constructed on the shore of the Coos Estuary in Oregon.

The comments attached to this letter are based on my review of the materials presented in the DSL joint permit application. I have structured the comments in a format that I hope will assist personnel responsible for making decisions on the permit. The comments included in this document are primarily directed a part one of the application materials which address aspects of the LNG terminal and LNG transport elements of the project. My comments do not include a review of aspects of the natural gas transport pipeline as there was insufficient time to conduct an analysis of this aspect of the project. The comments and examples provided herein are not exhaustive but should provide illustrative examples of salient features of the material presented in the application to substantiate why the permit application fails to meet the criteria for issuance of a permit as outlined in ORS 196.800 -196.990, OAR 141-085-0506 – OAR 141-085-0550 and other policies and practices governing the activities of the Department. **The information and analysis of the application provided in these comments support a decision to deny the permit as requested by the applicant.**

Comments attached to this letter are presented in thematic chapters in order to facilitate your review. The chapters relate to discreet aspects of the activities encompassed in the DSL joint permit application. A description of the chapter headings follows:

Chapter 1 Introduction and overview of comments including reasons to substantiate a **decision to deny** issuance of the requested fill and removal permit based on DSL joint permit application
Chapter 2 Comments regarding proposed dredged material transport and disposal
Chapter 3 Comments on the proposed wetland impact mitigation actions
Chapter 4 Comments on the proposed navigation access channel
Chapter 5 Comments on the proposed navigation reliability improvement actions
Chapter 6 Comments relating to proposed horizontal directional drilling operations
Chapter 7 Comments regarding the feasibility of the work proposed.
Chapter 8 Comments regarding the Access and Utility Corridor

Chapter 9 Comments regarding wetland impacts not discussed in the application
Chapter 10 Comments regarding the pile dike rock apron
Chapter 11 Comments regarding the marine slip and tanker berth
Chapter 12 Comments regarding the impacts to recreation, fishing and public uses
Chapter 13 Comments regarding errors, omissions and insufficiencies of the application.
Chapter 14 Marine slip tsunami considerations
Chapter 15 Environmental Justice Considerations.

The analysis and the examples provided in these comments should provide ample evidence to substantiate a decision to deny the permit request. Thank you for providing an opportunity to comment on the proposed work. If you have any questions or require additional analysis in order to support a decision to deny this permit, please do not hesitate to contact me.

Kind Regards

Michael Graybill
Cell: 541 294-8235
mhodbill@gmail.com

Comments of Michael Graybill in response to DSL joint permit application and call for comments on a proposal from Jordan Cove Energy Project L.P. to the Oregon Department of State Lands on 7 November 2018.

Chapter 1: INTRODUCTION AND OVERVIEW OF COMMENTS INCLUDING REASONS TO SUBSTANTIATE A DECISION TO DENY ISSUANCE OF THE PERMIT

Permits and authorizations sought regarding work proposed in DSL joint permit application should be denied for the reasons listed in this and subsequent chapters of this document.

1. Pending actions by other permitting agencies may render parts or the entirety of this request moot.

A decision to approve the work described in the permit application may potentially pre-empt or conflict with two comprehensive National Environmental Policy Act (NEPA) decision making processes related to this project. Both reviews are in progress and will address aspects of the work described in the DSL permit application subject the federal NEPA evaluations. The Federal Energy Regulatory Commission (FERC) is in the process of preparing an Environmental Impact Statement (EIS) in response to a request initiated by the same applicant who submitted DSL joint permit application 60697. As required by NEPA, the EIS being prepared by FERC will include a thorough analysis of alternatives to the proposed action. Although this application is also subject to an analysis of alternatives by DSL as outlined in OAR 131-085-0565 and ORS 196.600 – 196.99 the DSL joint permit application lacks an analysis of alternatives of salient aspects of the proposed work. The Records of Decision resulting from the FERC EIS and a second EIS being prepared by the USACE to evaluate options to deepen and widen the Federally authorized navigation channel in the Coos Estuary may render some, or all, of the proposed actions included in this permit application moot or unviable. No action on this permit should be taken that would pre-empt or be inconsistent with implementation of the actions embodied by the forthcoming Records of Decisions linked to the FERC EIS and USACE EIS referenced above. The only action available to assure that an agency decision on this permit application does not pre-empt or conflict with the forthcoming Records of Decision is to deny the permit and the authorization requests embodied in it.

2. Information presented in the application may not represent the entirety of the project's impacts; the application does not adequately demonstrate that the work proposed has "independent utility".

The Department of State Lands should thoroughly evaluate the "independent utility" of this permit application prior to issuing a permit decision (see OAR 141-085-0565). Several factors raise questions related to the independent utility of this permit application. One factor is the fact that in 2018, the applicant paid $4 million to the Port of Coos Bay to support the evaluation of a plan to deepen and widen the federal navigation channel in the Coos Estuary. The EIS being prepared by the US Army Corps of Engineers is being conducted at the request of the Port of Coos Bay but the applicant of DSL permit 60697 is financing costs related to the preparation of the EIS in large measure. When the applicant's financial support of a proposal to expand the Federal navigation channel is coupled with the applicant's proposal to construct a marine slip capable of berthing LNG carriers that significantly exceed the current maximum vessel size authorized by the US Coast Guard, it is reasonable to question if the full scope of the project includes expanding the Federal navigation channel in addition to the work proposed in the DSL joint permit application. If authorized, expansion of the Federal Navigation Channel

may involve dredging up to 15 million cubic yards of sediment and bedrock from the Coos Estuary and disposal of dredged material on the seabed in or near the boundary of the state territorial sea. The EIS for the Federal Navigation Channel expansion project is the project referenced in comment 1 (above). Additional comments regarding the request to construct a marine slip to accommodate vessels larger than those permitted by the US Coast Guard for the current federal navigation channel are included in specific chapters following these general comments.

It is reasonable for a reviewer to question the full scope of the applicant's plan to develop an LNG export terminal in the Coos Estuary. The DSL is required to determine if a permit application has "independent utility" (OAR 141-085-0565 (3)(a). If a bona fide nexus exists between the work outlined in DSL joint permit application 60697 and the proposal to deepen and widen the federal navigation channel in the Coos Estuary, permit 60697 should be denied because it fails to demonstrate that the requested work outlined in the application has "independent utility" as referenced in OAR 141-085-0565.

3. Reasonable alternatives to the actions proposed have not been identified or evaluated. In some proposed actions having impacts to wetlands, no alternatives to the proposed action have been enumerated or evaluated.

The DSL joint permit application fails to provide a thorough articulation and analysis of practicable alternatives to numerous actions having significant potential impacts to the wetlands and waters of the state. Oregon Revised Statutes and Administrative rules obligate DSL to first consider options that avoid or minimize impacts to wetlands and waterways. Numerous actions outlined in the application with potentially serious permanent impacts are presented without any articulation or analysis of alternatives to the proposed actions. The information presented in the DSL joint permit application lacks sufficient detail and analysis to enable reviewers to determine if, or how, the applicant determined the actions proposed most effectively avoid or minimize environmental and social impacts while addressing the stated need for the project. An incomplete list of illustrative examples is provided below. Additional examples are outlined in Chapters 2-13:

a) The site selection analysis used to substantiate the preferred location at the port of Coos Bay failed to consider Humboldt Bay California as a potential export terminal alternative. Using Google maps, the straight line distance between the proposed Malin Oregon natural gas transport hub and the port of Coos Bay, Oregon is approximately 172 miles. The straight line distance between the Malin, Oregon gas pipeline hub and the port of Humbolt Bay, California is approximately 163 miles. Both Ports have similar transport distances to possible LNG import destinations in Asia. As an example the distance to Tokyo Japan from Humboldt Bay is 4,950 miles. The distance from Coos Bay is 4,870 miles. The Federal navigation channel in Humboldt bay is maintained by the US Army Corps of Engineers at a depth of 38' and a width of 400'; larger than the navigation channel in the Coos Estuary thus exceeding the necessary navigation channel specifications defined by the applicant:
https://www.spn.usace.army.mil/LinkClick.aspx?fileticket=3_WqkYwno-o%3d&portalid=68
I found no reference to Humboldt Bay in the analysis of alternative sites even though this site appears to have some of the attributes used to evaluate other potential sites.

b) The analysis of alternatives used by the applicant is not comprehensive or robust. The applicant appears to have structured the analysis of alternative site locations by choosing locations in Oregon and Washington and then applying selection criteria to assure that the locations evaluated are less desirable than the Jordan Cove site. The DSL application materials related to site selection could readily be interpreted as having been reverse engineered to substantiate the foregone conclusion that the Ingram yard site is the only suitable location. The analysis of alternatives used to substantiate the selection of Coos Bay as the only suitable site capable of meeting the stated purpose of the project is inadequate because the analysis fails to include at least one potential alternative location in the analysis.

c) The scope and complexity of individual elements of this project involve wetland impacts that exceed the entire scope and complexity of many individual permit applications submitted to the Department. As presented, the application lacks sufficient information to enable reviewers to determine if individual work elements proposed are the alternatives that most effectively avoid or minimizs impacts to wetlands. No permit should be issued until the applicant has demonstrated that the impacts to wetlands of the individual tasks outlined in the proposed work are unavoidable. The material provided in the application has failed to pass this test and the permit should be denied.

d) I was unable to locate any discussion of alternatives related to the design of the navigation access channel, the pile dike rock apron, the eelgrass mitigation site selection or the analysis of alternative approaches to the proposed partial dike removal strategy that is the basis of the Kentuck wetland mitigation project design.

e) I have structured my comments to address individual project elements so it is possible to evaluate the full scope of each project element having potential to impact wetlands and waterways. The hope is that this approach will facilitate a thorough evaluation of each project element including the description of the need for action proposed, the analysis of alternatives to the proposed actions considered to avoid or minimize wetland impacts and the actions to be taken to compensate for unavoidable impacts.

4. The size of the facility required to meet the purpose of the project has not been adequately substantiated.

The statement of need to construct a liquefaction facility having an annual capacity of 7.8 million tonnes per annum is inadequately substantiated in the DSL joint permit application. It is not possible to determine if all of the impacts to wetlands and waterways associated with the proposal (including but not limited to the need for the navigation reliability improvements or the pile dike rock apron) are required to meet the stated purpose of the project.

OAR 141-085-0550 (5) (f) requires:

"(f) A description of the project purpose and need for the removal or fill. All projects must have a defined purpose or purposes and the need for removal or fill activity to accomplish the project purpose must be documented. *The project purpose statements and need for the removal or fill documentation must be specific enough to allow the Department to determine whether the applicant has considered a reasonable range of alternatives*." (emphasis added)

Section (3) of the application Project purpose and need (Page 2) states:

"The Project is a market driven response to the burgeoning and abundant natural gas supply in the US Rocky Mountains and Western Canada markets and the growth of international demand, particularly in Asia. The overall Project purpose and need is to construct a natural gas liquefaction and deep-water export terminal capable of receiving and loading ocean-going Liquified Natural Gas (LNG) carriers, in order to export natural gas derived from a point near the intersections of the GTN Pipeline system and Ruby Pipeline System."

The project purpose statement does not specify the amount of LNG required to meet the purpose. An earlier planning stage for this same LNG facility in Coos Bay considered 6.8 mtpa of LNG a sufficient quantity to satisfy the need and purpose of the project. The difference between a proposed LNG facility having a proposed 6.8 mtpa capacity and a 7.8 mtpa capacity appears to have significant and avoidable impacts on Oregon wetlands and waterways. In order to attain the expanded 7.8 mtpa export capacity proposed, the applicant has stated there is now a "need" to excavate approximately 580,500 cubic yards of sub tidal estuarine sediments at 4 locations along the margin of the Federal Navigation Channel These are collectively referred to as "navigation reliability improvements"(NRI's) [See Table 1.1-1 (Page 10) of Resource Report 1 submitted to the FERC September 2017 and Table 6.1 (page 36) of Joint permit application]

Other examples to illustrate how the it may be possible to attain the purpose of the project while avoiding or minimizing numerous impacts to the wetlands contained in the permit application are outlined in the chapters that follow this introduction. **The authorization sought by this application should be denied because insufficient information has been provided to enable reviewers and permitting agencies to conduct the requisite evaluation needed to determine if the impacts are required to attain the project purpose.**

5. Some of the actions proposed may be not be feasible or practical.

Based on the information provided in the DSL joint permit application, the applicant proposes work that may not be technically feasible. Examples include but are not limited to: a) The APCO dredged material disposal sites may lack the capacity to handle the total project lifespan volumes of sediments identified by the applicant to be delivered to those sites. b) The plan to mitigate the permanent destruction of an eelgrass bed proposes to create an eelgrass bed by dredging a sump-like feature in an intertidal sand flat to an elevation that may persist for the three year time span of the modeling studies conducted by the applicant but are not likely to persist on a permanent basis. c) The horizontal directional drilling under the Coos estuary to accommodate passage of the 36"diameter gas delivery pipeline was considered but deemed technically infeasible in a previous application to the Federal Energy Regulatory Commission. The applicant has not demonstrated how a directional drilling operation once deemed infeasible is now possible. A previous application by Jordan Cove to FERC proposed laying the gas transmission pipeline across the bay using an open cut and burial process that had huge potential wetland impacts. If a permit is issued as requested, and the proposed horizontal directional drilling operation is found to be infeasible, the agency is likely to receive a permit request from the applicant to lay the pipeline across the Coos Estuary using means that do not involve horizontal directional drilling. Until solid evidence is provided that the issue identified in the comments above and elsewhere in the comments that follow, including evidence that the proposed horizontal directional

drilling is feasible and will be the only method used traverse the estuary, no permit should be issued. Should the agency decide to issue a permit, absolute conditions should be included that preclude permit revision requests to lay the pipeline across the estuary that involve disturbance to wetlands that are not listed in the original permit application.

6. The proposal includes avoidable impacts to wetlands

Elements of the proposed work may result in avoidable or unnecessary levels of impacts to the environment and existing economic activities including fishing and recreation. Examples of these include, but are not limited to: a.) The temporary dredged material transport pipelines proposed by the applicant may interrupt the movement of marine mammals, fish and invertebrates, and interfere with commercial oyster mariculture operations. b.) The need to construct a dredge loading and unloading facility to transport sediments from the proposed eelgrass mitigation site to the proposed APCO dredged material disposal sites #1 and #2 has not been be justified sufficiently to substantiate the impacts these facilities may have on the environment. c.) The applicant has not provided adequate information to justify the proposed size, shape and alignment of the navigation channel approach and marine slip. D) The applicant has not adequately justified the need for the Navigation Reliability Improvements. A reasonable alternative exists that eliminates the need for the Navigation Reliability Improvements. Additional analysis to support this is provided in later chapters of these comments.

7. Information essential to an objective assessment of wetland impacts is missing or inadequate.

Elements of the application lack adequate detail to objectively evaluate the potential impacts of the proposed work. Examples of the insufficiency of the application include but are not limited to: a) The absence of reference to the materials used and volumes of sediments and fluids produced by the horizontal directional drilling operations intended to carry the Trans Pacific Pipeline under the Coos Estuary. b) I was unable to locate any reference to a plan to manage the production, handling, transport, and disposal of the directional drilling borehole cuttings and fluids. c) The eelgrass mitigation area is listed as a 9.3 acre site but only 3.4 acres of the site will be planted with eelgrass. The proposal does not provide an adequate description of likely impacts to the wetlands surrounding the area to be planted that may result from site preparation and eelgrass planting activities.

8. Risks associated with the LNG transport project element are not adequately addressed.

If constructed the proposed natural gas transportation and export facility and its associated components (gas transport, LNG production, LNG transport) will introduce an avoidable, high risk activity adjacent to a major Oregon coastal population center in a wetland rich physical setting that is not suited to accommodate this kind of inherently dangerous activity. The proposed fill and removal activities work will enable the construction of a Liquefied Natural Gas export facility at a location in the Coos Estuary with known and avoidable risk attributes. Jordan Cove Energy, LP. Is a member of the Society of International Gas Tanker and Terminal Operators. Despite this membership, and despite the analysis of alternative sites provided by the applicant, the location of proposed facility is not consistent with recommended industry standards for siting and development of LNG facilities advocated by the Society of International Gas Tanker and Terminal Operators (See Information paper No. 14 entitled: "Site Selection and Design for LNG Ports and Jetties with views on Risk Limitation during port navigation

and cargo operations" published in 1997 by the Society of International Gas Tanker and Terminal Operators Ltd., ISBN: 1 85609 129 5).

Specifically, the marine slip and access channel site selected by the applicant is inherently unsafe and the applicant's questionable analysis of its suitability should be rejected because it fails to consider numerous site attributes essential to deciding if the proposed site is a feasible location for the proposed LNG production facility. The applicant's proposal includes several inconsistencies with the industry recommended standards included in the SIGGTO document. These inconsistencies include, but are not limited to:

a.) The proposed facility is situated on the outside corner of a bend in a navigation channel that supports large deep draft vessel traffic upstream from the proposed facility.

b.) the configuration of the navigation channel connecting the proposed LNG liquefaction facility and tanker berth to the open waters of the ocean includes several risk factors. The entrance to the existing navigation channel is routinely subject to extreme ocean conditions that preclude large vessel transits to and from the harbor. The weather limited use of the Federal Navigation Channel has previously contributed to the grounding and total loss of a large bulk cargo vessel (MV New Carissa) while she waited at sea for suitable conditions in the navigation channel to permit entrance to the Coos Estuary.

c) The estimated transit time between the LNG tanker berth and the open waters of the Pacific is 90 minutes. The long transit time to safe open water is inconsistent with the short escape route transit times to open water recommended by the tank vessel shipping industry in the document referenced above.

d) The inbound and outbound route of the navigation channel requires transiting vessels to navigate a sharp, 90-degree bend that is flanked on the outside of the curve by a rocky bottom and shoreline. This likely grounding area is a populated area that includes housing for US Coast Guard Emergency services personnel and is the location of campus of the University of Oregon's institute of Marine Biology. I have personally witnessed one grounding of a large bulk cargo vessel that failed to negotiate the bend in the channel near Charleston/Barview. Earlier in 2018, a commercial salmon fishing vessel sat hard aground for three weeks on the rock training jetty on the South Eastern tip of the North Jetty at the channel entrance. In a prior year, an inbound 85-foot-long commercial trawl vessel capsized on the Coos Bay bar. The incident involved crewmember fatalities. The capsized vessel was carried into the estuary by an incoming tide before it sunk and came to rest on the bottom near the landward end of the North Jetty. The sunken vessel lay at the margin of the Federal navigation channel for nearly a year creating a navigation hazard to all transiting vessels until salvors refloated and removed the wreck.

The LNG transport element of this project involves vessels much larger than many of the deep draft vessels that currently call on this port. The nature of the risks associated with transporting a hazardous cargo such as LNG stand in stark contrast to the nature of the risks posed by the bulk cargo wood product vessels that currently and have historically used the Coos Bay Navigation channel. A deliberate or accidental grounding or breach of a large LNG cargo vessel in the Coos Bay Federal Navigation channel involving a cargo containment failure holds potential to result in an uncontrolled release of a highly dangerous cargo that poses profound and predictable risks to the environment, wetlands, and the surrounding human population. These risks are unprecedented and avoidable.

e) The – 37' MLLW maintenance depth of the federal navigation channel when combined with the 12-meter (39.3') draft authorized in the US Coast Guard waterway suitability analysis cited by the applicant and the requisite 10% of draft under keel clearance depth means the Federal Navigation channel will only be suitable for LNG vessel transits during tides greater than 5.9'MLLW. This means that berthed LNG tank vessels will be "trapped" at the berth and unable to transit the estuary during emergencies when tidal elevations in the estuary are below 5.9'. Any rational analysis that includes consideration of public welfare and safety should require the applicant to address the risks identified above as well as the risks identified elsewhere in this report. The applicant should be required to consider alternative terminal siting scenarios that reduce or eliminate the risks to people and the environment that are embedded in the applicant's proposal. **No permits should be issued until an analysis of the cumulative risks of all aspects of the Natural gas transport pipeline, the LNG production terminal and the LNG transportation operations is conducted**.

9. The full scope of the project does not appear to be addressed by the application. <u>The independent utility of the proposed work is suspect,</u> and the full scope of the project may not be feasible because it may exceed some practical physical limits of the Coos Estuary.

The applicant has expressed an intent to construct an LNG production facility and berth for LNG vessels that exceeds the present-day operational specifications of the navigation channel by proposing an access channel, slip and vessel berth configuration capable of handling vessels larger than those currently authorized by the US Coast Guard for this port. Resource report 1 (Sept 2017 document page 22) states:

> *"The LNG carrier loading berth will be capable of accommodating LNG carriers with a cargo capacity range of 89,000 cubic meters to 217,000 cubic meters. The USCG Letter of Recommendation ("LOR") and Waterway Suitability Report ("WSR") currently allows LNG carriers up to 148,000 cubic meters to dock at the LNG Terminal berth".*

Unless it is the intent of the applicant to berth vessels with cargo capacities up to 217,000 cubic meters, it is not clear why it would propose to build a berth capable of handling vessels of this size. The Coast Guard has determined the maximum safe size LNG vessel characteristics for the Coos Bay Navigation channel and vessels having cargo capacities of 217,000 cubic meters are well beyond the current limits imposed by the navigation channel. It appears the only feasible way for the port of Coos Bay to safely accommodate vessels of the size proposed by the applicant is to deepen and widen the navigation channel beyond the current specifications. Preliminary estimates suggest deepening and widening the navigation channel to safely accommodate LNG with capacities up to 217,000 cubic meters will involve removal of approximately 15,000,000 cubic yards of material from the Coos Estuary. This significant volume of dredging is not referenced in the DSL Joint application even though it appears to be essential to the attainment of the design specifications of the facilities described in this application.

Concurrent with this fill and removal application, Jordan Cove Energy (the applicant) is also supporting work to deepen and widen the Coos Bay Federal navigation channel, but no reference to the proposed navigation channel expansion work has been included in the Joint Permit application currently being reviewed by DSL. With the encouragement of and over $4 million of 2018 financial support

provided by the Jordan Cove LNG terminal project proponents, the Port of Coos Bay has recently (2017) submitted a request to the US Army Corps of Engineers to examine the feasibility of deepening and widening the federal navigation channel in the Coos Estuary. The US Army Corps of Engineers has initiated NEPA EIS Scoping for this proposed work and a draft EIS for this study is in preparation.

It is premature to predict the outcome of the most recent EIS process initiated by the Port as the draft EIS is currently in preparation. It is reasonable to state that the feasibility of dredging the channel to the depth and width necessary to accommodate very large LNG cargo carriers of the size desired by the LNG terminal proponents will be greatly influenced by the geology and physical configuration of the Coos Estuary. The Coos Bay Navigation channel expansion EIS process being conducted by the USACE should help to determine if using the Federal Navigation Channel for large LNG tank vessels of the size preferred by the project applicant (up to 217,000 cubic meters cargo capacity) is within or beyond the practical physical and geological limitations imposed on the port of Coos Bay. Thus, it is premature to consider issuing a permit to construct a marine slip and navigation access channel as proposed in application.

It is reasonable to infer that in order to use the stated vessel design capacity of the LNG carrier berth proposed by the applicant, a description of the overall scope of the project should include a statement of the necessity to expand the depth and width of the existing navigation channel. The failure of the applicant to note that deepening and widening the navigation channel will be necessary in order to attain the design specifications of the access channel, marine slip and LNG loading berth, raises questions related to the independent utility of the project description and work proposed in this joint permit application**. No permit should be issued in the absence of an affirmative determination of the *independent utility* of the proposal as described in OAR 141-085-0565 (3) (a). If expansion of the channel *is* required to realize the design capacity of the proposed LNG carrier berth the current proposal should be denied because it fails to demonstrate that the project has independent utility, Further, if a determination is made that expansion of the navigation channel is required in order to realize the design capacity of the terminal, no permit should be issued before the federal navigation channel EIS being conducted by the US Army Corps of Engineers is completed and determines that the channel expansion required by this project is feasible.**

10. Comprehensive risk benefit evaluations of the proposed work are being conducted that should inform DSL's evaluation of the proposal and assessment of the project's feasibility and its impacts to wetlands and waterways.

It is irresponsible to exclude the pending draft findings of evaluations being prepared by the Federal Energy Regulatory Commission and the US Army Corps of Engineers from the Joint Permit application review process. The actions impacting wetlands and waterways that are the focus of this permit application represent a subset of the total cumulative impacts attributable to the larger project activities. The work proposed in this permit is linked to other impacts that are beyond the central focus of the wetland regulations germane to the jurisdiction of the DSL that are the focus of DSL joint permit application. But these evaluations will certainly address issues related to the design and feasibility of the project that should be incorporated into the DSL permit process. For example; the scope of the DSL review of the Pacific Connector Pipeline is primarily focused on impacts to wetlands and waterways associated with the construction and installation of a high-pressure natural gas pipeline along the

proposed 229-mile-long pipeline route (DSL wetland and waterway permit program). Aspects of design, alignment, and construction methods and purchase and sale agreements being reviewed as part of the EIS have significant bearing on determining the feasibility of the entire project. These essential aspects of the proposed gas pipeline, terminal and LNG transportation systems, even if built in compliance with DSL requirements, are largely beyond the scope this application. Similarly, the proposed navigability improvements associated with this project are being reviewed (in part) through the regulatory lens limiting the scope of the analysis of impacts. Wetland impacts linked to the proposed marine slip, navigation access channel, and navigation reliability improvements will be evaluated primarily on the basis of on how the proposed changes will impact certain wetland uses and values, recreational uses, fish, and fisheries. The fact that the proposed navigation related projects and wetland impacts will facilitate the transport of a cargo type that exposes thousands of people to a new, low-probability, high-consequence risk environment may not receive the rigorous evaluation deserving of this use by the current permit review process.

The cumulative impacts of the proposed gas pipeline, LNG production terminal and LNG transport system are in the process of being more thoroughly evaluated by two federal agencies: FERC (the evaluation of the proposed LNG terminal and pipeline project including the cumulative impacts of the project) and USACE (the evaluation of the proposal to deepen and widen the federally authorized navigation channel). The forthcoming EIS documents should include a thorough articulation and evaluation of the cumulative impacts of the proposed work as directed by NEPA. It is premature and unreasonable to consider issuance of a DSL fill and removal permit prior to or without consideration of the completion of these studies.

11. Evaluation of alternatives that avoid or minimize impacts to wetlands.

A permit should not be issued without a robust analysis of alternatives to the plan proposed by the applicant. The DSL joint permit application provides an insufficient analysis of alternatives to numerous significant aspects of the proposed work. This permit application should be characterized as incomplete or insufficient until the application includes requisite analysis of alternatives articulated in Oregon Statutes and administrative rules. The analysis of alternatives method is a widely used and legally required method to compare relative impacts of proposed approaches to avoiding and minimizing the social and environmental impacts of a proposed activity. DSL is required to evaluate approaches to projects that avoid or minimize impacts to wetlands while addressing the need for the project and must base permit decisions on an analysis of alternatives. DSL joint permit application completely lacks the requisite analysis of alternatives decision-making structure for several salient aspects of the project. Instead the DSL joint permit application solicits comments on a single, "take-it-or-leave-it" option. **This application is insufficient at best. If a permit is issued in response to this application, the action by the permitting agency is potentially in violation of existing policy and law. The permit should be denied because it lacks sufficient information to support an objective decision-making process that is consistent with prevailing law and procedure germane to a project of this nature**.

At a future time, the applicant should be granted permission to re-apply on the condition that any re-submitted application include requisite information in a format that enables regulatory agencies and the public to evaluate, select or reject any action/s proposed by the applicant. Information presented to agency by the applicant must be sufficient to enable the agency to comply with

appropriate state and federal statutes and regulations. The information presented in the DSL joint permit application fails to meet this standard. The application should be denied or remanded to the applicant with specific instructions directing the applicant to address the insufficiencies of the current application. Should the applicant submit an application that includes sufficient information to enable an objective analysis of impacts of the proposed work, the revised/resubmitted application should be circulated to the public for comment.

The applicant has provided the DSL with a technical memorandum (pages 276-296) intended as an analysis of alternatives to avoid or minimize impacts to wetlands. While the technical report demonstrates the applicant has considered some measures to avoid or minimize impacts to wetlands, the factors considered in the technical memorandum fail to adequately evaluate several substantive alternatives to the project that may substantially reduce impacts to wetlands that the applicant has deemed "unavoidable". Examples of alternative approaches that should be considered include but are not limited to:

1. A no action alternative is required to be considered by Federal agencies and should also be evaluated by state agencies reviewing this proposal.
2. Alternatives involving liquification terminal configurations with capacities other than the 7.8 million tons per annum should be evaluated. The applicant has inadequately substantiated need for the facility to produce 7.8 mtpa in order to meet the project purpose. LNG terminals with production capacities of less than 7.8 tons per annum are currently under construction elsewhere and a facility with a smaller capacity than that proposed by the applicant should be enumerated and evaluated. An LNG export terminal Coos Estuary having a smaller annual production capacity only slightly smaller than that proposed by the applicant the holds potential to meet the stated purpose of the project (build a west coast terminal to export LNG to Pacific Rim nations) while simultaneously avoiding the need to construct and maintain the navigation reliability Improvement projects proposed by the applicant. This alternative alone could avoid permanently impacting over 26 acres of estuarine wetlands by eliminating the need to dredge over 584,000 cubic yards of estuarine habitat during construction and regularly disturbing important sub tidal estuarine habitats through maintenance dredging operations.
3. Additional alternative terminal designs/capacities/operations that do not require construction or maintenance dredging of the Navigation Reliability Improvements proposed by the applicant should be enumerated and evaluated.
4. Alternatives to the navigation channel approach proposed by the applicant should be enumerated and evaluated including designs that do not require the fill associated with the construction of the pile dike Rock apron proposed by the applicant.
5. Alternatives to the berth configurations proposed by the applicant and
6. Alternatives to the Kentuck Slough Wetland mitigation actions proposed by the applicant.

12. Aspects of the work proposed in the DSL permit application may be rendered moot and unnecessary as a result of reviews of this project being conducted by other agencies.

Oregon Statute Requires the Department of State Lands to consider alternatives that avoid, minimize impacts to wetlands but broader aspects of this project are currently being reviewed by other agencies. This broader review and analysis is likely to result in a modification of the project described in the DSL application. Section 6.1 (Page 86) states the applicant it is seeking authorization from the

Federal Energy Regulatory Commission (FERC) under section 3 of the Natural Gas Act. The FERC evaluation will include a mandatory analysis of alternatives to the proposed project as well as an evaluation of the project's feasibility. A Draft EIS is being prepared by FERC and is slated for release sometime in Spring of 2019. The EIS being conducted by FERC is required by federal law to consider a range of alternatives to the proposed work and consider a range of impacts that include but are not limited to the wetland impacts analysis being conducted by DSL in response to this application. It is possible that one or more of the proposed actions included in the DSL fill and removal permit application will be rendered moot by the environmental impact analysis being conducted by the FERC. **At minimum, DSL should take no action on the Jordan Cove Energy Project proposal before considering the outcome of alternatives analysis being conducted by the FERC**

13. **This project appears to be inconsistent with the Governor's executive order on Environmental Justice and should be reviewed by the Governors Environmental justice task force as part of the permit review process.**

When state agencies make decisions that affect our environment it is critical that low-income and minority populations are not disproportionately affected. The Environmental Justice Task Force (EJTF) was created by the 2007 Legislature to help protect Oregonians from disproportionate environmental impacts on minority and low-income populations (Senate Bill 420). The EJTF encourages state agencies to give all people knowledge and access to improve decisions that affect environment and the health of all Oregonians.

This project holds potential to disproportionately impact minority and low income populations. Elements of the project bear the signature characteristics that are the focus of the Governor's executive order12898 on Environmental Justice. The astoundingly voluminous, disjointed and highly technical manner in which material is presented in the application, severely limits or precludes non-technical and language challenged individuals from conducting a reasonable evaluation of the potential impacts of the project. This application is not accessible to an audience having an average or below average English proficiency. **This document is inaccessible to many readers including low income and minority individuals likely to be impacted by the actions proposed.**

The impacted resources are important to minority populations and low-income residents in the vicinity of the proposed work. The pipeline route and LNG liquification facility and LNG shipping channel work will impact the traditional homelands and culturally significant landscapes of six federally recognized tribes. The streams, wetlands, shoreline, intertidal resources, and sub tidal habitats continue are used as locations for fishing, gathering and transportation by native American and low-income residents. Other LNG terminals have been proposed in other Oregon Locations but the communities in those areas rejected the proposals as infeasible because these (less disadvantaged?) communities were unwilling to accept the risks associated with LNG production and transport. The application remains the only viable proposal in Oregon and it is notable that this remaining proposal hold potential to differentially impact low income, minority and linguistically challenged populations

The considerable safety risks associated with this project hold potential to be disproportionately borne by communities identified by the Environmental Justice Task Force and Executive order 12898. No permit should be issued until a plain language version of the proposed work is available and a

thorough and objective evaluation of how the proposed work will impact economically, linguistically and culturally disadvantaged populations.

Comments of Michael Graybill in response to DSL joint permit application and call for comments on a proposal from Jordan Cove Energy Project L.P. to the Oregon Department of State Lands on 7 November 2018

Chapter 2: COMMENTS REGARDING DREDGED MATERIAL TRANSPORT AND DISPOSAL

The application from Jordan Cove Energy Project L.P. to the Oregon Department of State Lands has many aspects that substantiate a decision to deny the permit requested by the applicant. Examples include, but are not limited to:

1. **The APCO 1 &2 dredged material disposal sites have not been fully evaluated to determine if the sites can feasibly accommodate the proposed uses as disposal areas for an estimated 1,824,300 cubic yards of dredged material.** The APCO sites are slated to receive material excavated from the initial dredging of NRI's and eelgrass mitigation areas, and the material derived from maintenance dredging of the slip, access channel and NRI's for the life of the project (see pages 883-886). On page 849 the consultant states: *"However, disposal of all capital material at APCO Site 2 is contingent upon assessments of slope stability, the ability to ensure an adequate residence time, and safe access for equipment".* I was not able to locate any additional information related to the proposed APCO dredged material disposal sites to confirm that the sites possess the requisite attributes to determine if it is, in fact, feasible for to use the sites for the proposes proposed.

As stated above, applicant has proposed that in addition to the material dredged during initial construction of the NRI's and eelgrass mitigation area, material derived from maintenance dredging of the NRI's, the slip, and the access channel will also be placed at APCO sites 1 & 2. (Page 874). Assuming a 30 year project lifespan, the applicant has provided an estimate for the volume of maintenance material to be dredged from the slip and access channel, *"The total anticipated volume of maintenance material that will be dredged over a 30-year period is approximately 0.98 mcy*" (page873) and for the Navigation reliability improvements: *"The total dredging volume required over the 30 year planning horizon is approximately 200,000 cy"* (page 874). Thus, in addition to the 584,300 cubic yards of material to be placed at the APCO 1 and 2 sites during initial NRI construction activities (page872), and the 40,000 cubic yards of material dredged from the eelgrass mitigation site (page 864), the APCO disposal sites must also be capable of spoiling and additional 1.2 million cubic yards of material produced over an expected 30 year project lifespan. The combined total of material from all sources is 1.82 million cubic yards.

A variety of factors may control the likely maximum sediment holding capacity of the APCO #1 and #2 dredged material disposal sites. They include, but are not limited to:

a.) The mechanical shear strength of stacked unconsolidated sediments may set the upper volume limit of the sites. Unconsolidated sediments can only be stacked so high within a defined basal "footprint". The angle of repose of unconsolidated sediments will set the upper limit of volume if sediments are stacked to maximally utilize the basal area "footprints" of APCO areas #1 and #2.

b.) Estuarine soil loading characteristics underlying the dredged material disposal sites may set the upper limit of the mass that can be supported without deforming the underlying plastic estuarine sediments. At other locations in the Coos Estuary (e.g. Eastside) it has been necessary to discontinue use of dredged material disposal sites adjoining the federal navigation channel because additional weight loading on the estuarine soils underlying that dredged material disposal area would result in

displacement of sub surface estuarine soils into the adjoining navigation channel. A similar situation may also impose mechanical soil loading limits at the APCO disposal sites.

The applicant's dredged material management plan(DMMP) (Pages 843-909) includes a three factor (technical, logistical, and environmental) site selection feasibility analysis. The feasibility determination of the APCO 1 & 2 disposal sites to accommodate the uses proposed was based on a series of assumptions that require additional confirmation. Several of the assumptions raise serious questions as to the overall geotechnical capacity of the APCO sites to handle the total volume of material destined for the sites. **No permit should be issued before the applicant provides evidence to demonstrate that it is feasible to use the APCO dredge material disposal for volumes of material the applicant has proposed to deposit on these sites.**

2**. The dredged material management plan feasibility analysis was also based on multiple unconfirmed assumptions including assumptions that:**

a) It will be possible to use a hydraulic suction cutter dredge to excavate the anticipated volume of 505,500 cubic yards of bedrock from the NRI's (page 872) and

b) it will be possible to transport fragmented bedrock spoils via pipeline using the proposed 8-mile-long hydraulic dredged material pipeline and booster pump system. (see section 5.2 Page 903)

The consultant's report in Attachment E raises serious questions that the proposed methods of sediment excavation and transport will be feasible for the large volumes of bedrock associated with the NRI's in the lower bay.

The application is vague and non-committal regarding the actual methods that will be used to excavate and transport bedrock sediments from the NRI sites. Hydraulic suction cutter dredge and pipeline transfer are listed as the preferred methods, but information provided by the consultant raises serious questions regarding the ability of hydraulic dredging and pumping systems to handle the bedrock in the NRIs. Alternative excavation and transport methods are discussed in notable detail, but references throughout the discussion are couched with terms like "could be used" Other rock excavation methods discussed involve barge mounted clamshell dredges, drop chisels, or excavators that load rock onto barges or scows for transport to the disposal site.

In spite of the questionable feasibility of excavating and transporting bedrock using a hydraulic dredge and pipeline system, the only method proposed to transfer sediments across the intertidal zone near the APCO sites is via a hydraulic transfer pipeline. Alternative, mechanical material transfer methods are mentioned in the DMMP but the discussion includes explicit reference to substantial additional wetlands impacts associated with mechanical transfer. If a hydraulic dredge and pipeline system will not work to excavate and move sediments from the NRI dredge sites to the area near the APCO sites, requiring alternative dredge methods that use barge transportation instead, it is reasonable to question if the proposal to hydraulically pump this same dredged bedrock rock material from the temporary barge berth moored adjacent to the APCO disposal site up slope, and into the APCO decant ponds perched atop the existing fill will be a suitable method. **No permit should be issued until unresolved questions related to the methods used to: a) excavate bedrock sediments from the NRI's, b) transport these rock sediments to the APCO offloading site and c) transfer dredged bedrock across the intertidal zone adjacent to the APCO site up and into the APCO dredged material decant ponds.**

3. **Alternatives to dredged material transport**

The applicant has proposed to transport 300,000 cubic yards of mechanically excavated sand sediment from the natural berm at the shoreline of the marine slip via barge or scow to a temporary barge mounted hydraulic sediment transfer pipeline system moored in 20' of water near the Mill Casino in North Bend. Material offloaded at this pumping station will be transported via a 24" in pipeline to a decant pond in the Northwestern corner of the proposed Kentuck Slough Mitigation area. The applicant claims this is the only feasible means of transferring these sediments to the mitigation area. Land-based transfer methods were considered but ruled out over concerns that increased truck traffic on East bay road was unacceptable. The applicant failed to mention that routine commercial truck traffic is a primary and customary use of East Bay road. A rock quarry located at the upper end of Kentuck Slough is one of the primary sources of aggregate products for the Southern coast. Quarry operations create regular traffic by loaded aggregate trucks including articulated tractor trailers equipped with tandem 20 cubic yard belly dump trailers. In addition to trucks coming from and going to the quarry, East bay road is also actively used as a log haul road.

On the morning of 7 January 2019, I spent 1.5 hours observing vehicle use of East Bay Road and wildlife use of the proposed Kentuck Slough mitigation site. Quarry trucks and log trucks were by far the most frequent vehicles using East Bay Road in the period between 9:30 am and 10:45 am. I estimate that over 30 trucks passed the intersection of Kentuck Way and East Bay drive while less than 20 passenger vehicles used the road. Using 40 cubic yard capacity transport equipment to haul material (similar to the equipment already in use), a preliminary analysis suggests it should be possible to deliver 300,000 cubic yards of material in 7,500 round trips. As an example; if one considers a one-year, 8 hour per day, 5 day per week work schedule, land-based delivery should not result in an appreciable increase in traffic above the levels currently occurring along this route. Land based transport of dewatered fill material to the Kentuck site can eliminate most if not all of the estuarine wetland impacts associated with the barge and pipeline delivery system proposed by the applicant.

No permit to permit transfer dredged sediments to the Kentuck slough mitigation site via pipeline should be issued until the applicant conducts a more thorough analysis of the feasibility of transporting dewatered sediments to the site via upland routes.

4. Page 102 (section 6.2.7 Attachment A) indicates a Temporary Dredge Off-loading Area will be constructed adjacent to the federal navigation channel NW of the APCO #2 site. The only material explicitly designated to be transported to the APCO sites via dredge are 46,535 cubic yards of dredged sediments derived from dredging work associated with the construction of the eelgrass mitigation site [Section 6.2.9.2 (Page 110)]. With the possible exception of the inconclusive methods associated with dredging the bedrock from the NRI sites, all other sediments destined for the APCO #1 and #2 are to proposed be delivered to the APCO sites via hydraulic pipeline. The work associated with the Navigation Reliability Improvement projects proposes to route a 24" pipeline right past the proposed temporary dredge loading area in the channel to the west of the eelgrass mitigation site (Figure 12, page 47). Sediment dredged from the eelgrass mitigation site will need to be transported distances similar to the distance sediments derived from NRI dredge area #3 and a much shorter than the transport distances for NRI dredge areas #1 and #2. It is not stated why materials derived from the NRI dredge areas will be transported from the excavation locations via pipeline but the sediments from the eelgrass mitigation area will be transported by a combination of hydraulic pipelines and waterborne scow/barge.

If the pipelines installed to transfer sediments from the NRI areas are suitable for transporting sediments greater distances than the transport distance required for the eelgrass mitigation site, the applicant should evaluate the feasibility of using the pipeline installed to transport sediments from the NRI areas to the APCO disposal site to also transport sediments from the eelgrass mitigation site. Using the temporary NRI sediment transport pipeline to also transport sediment from the eelgrass mitigation site could potentially eliminate the need to construct temporary barge loading and offloading facilities to complete the mitigation area sediment transport work.

The Horizontal Directional Drilling (HDD) operations required to route the Pacific Connector Pipeline under the Coos estuary are expected to produce an estimated minimum of 3,900 cubic yards of excavated sediment. I was unable to determine if the DSL joint permit specifies where excavated sediments will be brought to the surface during the HDD operations or where those sediments will be spoiled. Further, the DSL joint permit application does not discuss estimated volumes, chemical characteristics or how fluids associated with the HDD operations will be treated and disposed of, it can be assumed that sediments and drilled fluids will be brought to the surface in the vicinity of two or more of the proposed inbound and outbound pipeline HDD surface penetrations; 1) a site near the shoreline of Kentuck Slough; 2) two sites in the vicinity of the South end of the Hwy. 101 bridge over the Coos Estuary and; 3) one site at the proposed Pacific Connector pipeline terminus at the South Dunes LNG terminal location. Two of the HDD surfacing locations are in the vicinity of the APCO dredged material disposal sites. The DSL joint permit application does not specify if materials derived from the HDD operations will be spoiled at the APCO sites in addition to the aforementioned sources to be deposited there. Because the proposed HDD operations will take place in close proximity to the shoreline of the estuary, and because HDD operations will produce a considerable volume of drilled sediment and drilling fluids, an operations and management plan for the HDD operations should be made available for agency and public review before a permit is issued. No permit should be issued before a robust characterization of materials to be produced and methods used to dispose the material produced by the HDD operations is provided

Comments of Michael Graybill in response to DSL joint permit application and call for comments on a proposal from Jordan Cove Energy Project L.P. to the Oregon Department of State Lands on 7 November 2018

CHAPTER 3: COMMENTS ON PROPOSED WETLAND COMPENSATORY MITIGATION MEASURES.

1. The Compensatory Wetland Mitigation proposed for impacted eelgrass habitats will not replace the functions of the impacted eelgrass habitat.

The Off-Site, In-Kind compensatory mitigation plan proposed to address impacts to eelgrass habitats has design attributes that raise serious questions regarding the long-term viability of the proposal. The impacted eelgrass bed is positioned on a sloping tidal and sub tidal channel margin with uninterrupted access to deeper water habitats. The proposed CWM for eelgrass will create a "stranded" intertidal eelgrass habitat isolated from deeper water at low tide. The lower limit of the impacted eelgrass community is likely controlled by water depth. The proposed CWM does not have these functional attributes.

2. **In Kind replacement of impacted estuarine habitats other than eelgrass is possible but was adequately considered.**

As proposed, the compensatory wetland mitigation (CWM) for all project related (pipeline, terminal and LNG transport) wetland impacts deemed unavoidable by the applicant will be addressed at two locations; a 100-acre diked wetland at the mouth of the Kentuck Slough on the Coos Estuary and a 9.3-acre tideflat situated 500 yards south of the western extent of the SW Oregon Airport runway. This centralized "all in one place" compensatory mitigation strategy has been substantiated, in-part, on the basis that wetland impacts occurring along the 230-mile-long pipeline route involve multiple impact locations with limited individual spatial extents.

I concur that the circumstances associated with the pipeline pose challenges to the more ecologically preferable On-Site, In-Kind replacement methods of compensatory mitigation. However, the circumstances regarding wetland impacts in the Coos Estuary are not the same as those along the pipeline route. The Off-Site, Out-of-Kind compensatory mitigation proposed for impacted estuarine wetland habitats other than eelgrass is a less ecologically preferable method than a strategy the involves In-Kind replacement of wetland functions and values. [See OAR **141-085-0510** Definitions (30):"Ecologically or Environmentally Preferable" means compensatory mitigation that has a higher likelihood of replacing functions and values or improving water resources of this state]. **Opportunities to replace the types of estuarine wetland functions and values that this project will remove via In-Kind mitigation exist in the Coos Estuary and should be more thoroughly examined before issuance of a permit.** For example the applicant could consider excavation of prior filled tidelands to replace tideflat and eelgrass habitat instead of proposed Kentuck and eelgrass mitigation actions.

3. **By far, the greatest impacts to wetlands encompassed by this project will take place at the sites chosen to conduct compensatory mitigation for impacts to wetlands**!

Alternative mitigation sites and approaches that minimize impacts to wetlands should be identified and prioritized over the preferred mitigation proposals proposed by the applicant. **No permit should be issued until a comprehensive analysis of alternative mitigation strategies having fewer wetland impacts is undertaken.**

Table 6.1 (page 38) entitled "Removal-Fill Wetland and Waters Impacts Summary Table" includes a section entitled "Freshwater Wetlands". The table identifies impacts to 11 discreet freshwater wetlands having a total area of 1.911 acres to be impacted by the project. The table infers it is a precise and comprehensive accounting of all wetland impacts. It includes an accounting of fill and removal associated with installation of fence posts in wetland K and even provides calculations on the volume of fill to be placed on a .001-acre wetland to a depth of 68 feet. However, Table 6.1 fails to include reference to and account for 100 acres of existing fresh water wetlands at the Kentuck Mitigation site (page 88) that will be permanently impacted by the proposed mitigation action. This same table also fails to include reference to the 9.3 acres of existing estuarine tideflat habitats (page 88) that will be impacted by the construction of the proposed eelgrass mitigation area.

Table 6.1 also fails to include reference to the wetland impacts associated with the installation of the Pacific Connector gas pipeline along the margin of Kentuck Slough. (see pages 1160 and 1176). I was unable to find a description of how the pipeline will be installed across the wetlands at Kentuck Slough, but it is reasonable to presume that open cut trench type installation methods will be involved. It is also reasonable to presume that pipeline installation and its associated wetland impacts will occur prior to the wetland enhancement actions proposed as compensatory wetland mitigation at this same location. By prioritizing Off-Site Out-of-Kind mitigation and selecting the Kentuck Slough Site over other in-Kind compensatory wetland mitigation options at other locations, the applicants appear to have circumvented the need to account for and mitigate for the considerable wetland impacts associated with placement of over 1,500 yards of natural gas pipeline in wetlands at Kentuck Slough.

The Kentuck site includes a notable wetland impact that was not part of the analysis used to justify the selection of the Kentuck site as the preferred alternative (if there ever were alternatives). A wetland impact entirely unrelated to the impacts of the project that is an outcome of the inadequate and questionable methods used to identify the Kentuck site as the one and only preferred location to be used to compensate for the entirety of project related wetland impacts, is a requirement to permanently fill a .85-acre forested wetland at the margin of the Kentuck site The compensatory mitigation actions planned for Kentuck resulted in the "unavoidable" need to fill these wetlands. The justification given is to protect the septic tanks of adjacent property owners (Pages 102- 1105). A map of the location of the forested wetland at the Kentuck site that will be filled in order to protect septic tanks of adjacent property owners is on page 1176. **The need to fill and permanently destroy an.85-acre forested wetland to protect a couple of septic tanks would not be necessary if an alternative, more ecologically preferable site or suite of sites were chosen to perform the required compensatory mitigation work (See 4. Below).**

4. **Alternatives designed to meet the project goal that avoid or minimize impacts to wetlands have not been adequately evaluated.**

The current owners of the Jordan Cove energy project purchased the project from a sequence of several companies that owned the project since it began over 10 years ago. Pembina didn't buy a natural gas export facility, they bought the idea of one and paid real cash for the idea. The only tangible things Pembina purchased were the background project development consultant reports, some easement contracts and all the permit work done by the company that sold Pembina the idea. It is not surprising that Pembina is reluctant to consider alternatives to the project concepts they purchased when they bought this company, they paid good money for the prior work! Because Pembina recently

purchased an eelgrass mitigation plan focused on a 9.3-acre plot of DSL tideland, does not mean that plan is feasible or practicable. A "preferred" alternative is not necessarily a feasible or practicable one. The eelgrass mitigation plan provides reviewers with objective criteria in which to evaluate the process used to evaluate alternative sites and the rationale underlying the site selected as the preferred alternative.

In contrast to the transparent alternatives analysis used to identify the preferred location for the eelgrass mitigation, I was not able to find any comparable analysis of alternatives to substantiate why the Kentuck Slough site was selected to mitigate non-eelgrass wetland impacts linked to the proposed terminal construction and the gas pipeline. The only alternatives analysis I was able to find is a single sentence statement on page 1123 as follows: "The proposed Kentuck Project site was selected partly through the same investigation of eelgrass sites". As a result, it is not possible to determine if the Kentuck site and the proposed actions for the site represent the alternative that maximally avoids or minimizes wetland impacts. As articulated elsewhere in these comments, it is not likely that the actions proposed by the applicant represent the approach that minimizes wetland impacts. The applicant has proposed compensatory mitigation actions for wetland impacts that can be avoided by design changes, site selections and alternative construction methods that have not been articulated or evaluated. It is important to emphasize that the locations proposed as the "preferred alternative" compensatory mitigation sites require wetland impacts that could be avoided by pursuing alternative mitigation locations and actions (e.g. shape of navigation access channel, annual production capacity of LNG terminal, avoidance of need for NRI's).

Other less impactful, ecologically preferable approaches to the applicant's proposed compensatory mitigation appear to be available. The proposed navigation channel access, pile dike rock apron, and the Navigation reliability improvements involve substantial avoidable wetland impacts that are also discussed in Chapters of this document related to those aspects of the project. **No permit should be issued without an analysis of alternatives to the proposed wetland mitigation actions.**

5. **Use of sand as fill at Kentuck tidal marsh wetland restoration site should not be used to adjust the grade of the wetland surface.**

The applicant proposes to spoil 300,000 cubic yards of aeolian dune sand excavated from a portion of the sand berm at Ingram yard on the wetlands of the Kentuck slough (Page 1132) a description of how this material will be distributed on the site or a satisfactory description of the underlying rationale describing why fill from this location was chosen to achieve the restoration objectives at the Kentuck site.

Section 2.1 entitled "Actions Concerning the Location of the Discharge" Page 280 includes the following statement

> *While not previously used as a dredge disposal site, the Kentuck Project is also characterized by substrates consisting of interbedded layers of sand and silt beneath an approximately 1-to 2-foot-thick surface layer of fill. Dredge material is composed largely of sand and silty sand, similar to the existing substrate at these sites.*

In this statement, and in statements presented on page 1123, the applicant appears to justify the use of porous, unconsolidated sediment as part of the plan to restore a tidal marsh habitat at the Kentuck

Slough site by noting the sand fill previously spoiled on the top of the historic cohesive salt marsh soils and the presence of salt marsh vegetation along the Coos Bay North Spit. This is not a sufficient justification to substantiate the placement of sand fill on an estuarine tidal marsh restoration site in that portion of the estuary.

The applicant has noted that approximately 1-2' of sand fill appears to have been previously deposited on the natal wetland soils at Kentuck. The applicant then characterizes the vegetative communities at the site as "degraded". It is entirely possible that the "degraded" conditions at the site are the result of the historic introduction of the sand fill. Introduction of additional sand derived from the Ingram Yard dune site to adjust grades at Kentuck holds potential to diminish the likelihood that the grading and planting treatments proposed will successfully restore the desired historic estuarine tidal marsh wetland conditions. The applicant has stated the soils in the Kentuck inlet are predominantly silts and loams [Coquille silt loam and Nestucca silt loam (page 1123)]. These finer, more cohesive sediments have completely different characteristics than the sandy, no cohesive soil types proposed to be used by the applicant as part of the salt marsh restoration mitigation actions.

Because the proposed fill material does not match the historic wetland soil type that is the target of the proposed restoration work at this location, **use of sand fill at the restoration site should be strictly limited to non-wetland restoration aspects of the actions proposed for the Kentuck site such as elevating the golf course road, and temporary fill for access roads and construction of water control structures.**

By the applicant's own admission, the application fails to provide a description of salient aspects of the proposed mitigation work needed for permit reviewers and members of the public to evaluate project design. Page 1123 includes the following statement:

> *"Site construction methods, including timing and approaches to material import and dewatering, top soil salvage, mass grading, channel construction, erosion control measures, etc. will be prepared as part of final design with documentation provided to ODSL and other agencies either prior to permit issuance or as a condition of permits.*

6. The applicant should be required to evaluate a restoration treatment alternative that involves the total removal of the levee along the margin of Kentuck Creek.

Following the dike breach tidal reflooding restoration actions planned for the site at East Bay drive, the levee along Kentuck Creek will continue to impair the function of the partially reflooded wetland. The soils in the existing levee are likely to contain heavy, cohesive silts and muds similar to the historic soils in the vicinity. In contrast to the actions proposed by the applicant, complete removal of the Kentuck Creek levee will increase the total wetland area to be restored by removing the footprint of the levee, restore lost hydrological linkages between Kentuck Creek and its associated wetlands, reduce the volume of fill material needed to be brought to the site from remote locations by eliminating the need to construct the "new and improved Kentuck levee" described on page 1176, and will provide a soil source to adjust the elevation of treated wetland areas that more closely matches the historic estuarine marsh soil type/s than the imported sand fill proposed by the applicant. Alternative methods to protect properties upstream from Kentuck reflooded wetlands could involve relocating the existing tidegate under East Bay Drive further upstream.

7. The proposed gas transmission pipeline route traverses most of the length of the proposed Kentuck Mitigation site. The wetland fill and removal impacts associated with the installation of the pipeline are not adequately addressed in the application.

I was unable to identify a rationale underling the decision to route the pipeline through the Kentuck Slough wetlands or installation details for the pipeline segment that traverses the Kentuck site, but it is reasonable to consider that installation of the pipeline will impact existing wetlands at the site as installation will take place prior to work proposed as mitigation actions. Further, as part of the proposed restoration plan, the applicant has proposed to construct a "proposed new improved Kentuck levee location" (page 1176) parallel to the proposed pipeline route. No rationale has been given for the need to even retain the existing Kentuck levee to achieve the restoration outcomes at Kentuck let alone providing a rationale to construct a "new improved levee" as part of the compensatory wetland mitigation actions focused at this location. Although I was not able to locate a discussion of the need to retain and expand the existing levee at Kentuck, I can think of no reasonable wetland restoration objective that supports a decision to expand the Kentuck levee. It is not difficult to envision that the "new improved Kentuck levee" might work remarkably well as a service road for the pipeline that runs parallel to it. It may be just as appropriate to refer to the so named "new improved Kentuck levee" as the "Kentuck slough pipeline service road". No mitigation is proposed for the wetland impacts associated with pipeline installation or the maintenance road/new improved levee at the Kentuck Slough location.

8. The applicant's characterization of the existing wetlands at Kentuck as "degraded" should be compared critically to the functions and values of the existing wetlands at the Kentuck site.

The mosaic of fresh water wetlands and open water areas that currently comprise the entirety of the proposed Kentuck slough mitigation area is clearly an artifact of historic diking and draining practices. However, the applicant has grossly underrepresented the functions and values of the existing wetlands at Kentuck. The area supports high tide resting areas for shorebirds, feeding areas for waterfowl, is occupied by beavers and other wetland dependent species. The area is not a uniform wetland type but a complex mosaic of wetland types with various dominant vegetative species and seasonal open water habitats.

No permit should be issued without a more thorough analysis of the functions and values of the existing fresh water wetlands that will be impacted by the applicant's proposal to reestablish estuarine tidal hydrology to the Kentuck wetlands as a compensatory wetland mitigation action. Page 1126 includes a brief hydrogeomorphic characterization of the vegetative communities, but this characterization is insufficient to discuss other ecological aspects of the functions and values of the Kentuck wetland complex

I visited the Kentuck slough site on 6 January 2019. During an informal, 30-minute mid-morning survey of the site using vantage points along road margin of East Bay Drive and Golf Course lane, I observed, active use of the site by approximately 30 Pintail Ducks, 10 Mallard Ducks, 50 American Widgeons, over 100 Canada Goose, American Shovelers, Pied Billed Grebes, Greater Yellowlegs, Roosting and feeding Red Shouldered Hawks, American Coots and numerous species of passerine birds including crows, jays, sparrows, titmice and wrens. In addition, I observed fresh evidence that the site is being used by beavers (gnawed willow stumps) and river otters or raccoons (scat at the shoreline containing shellfish remains. In its present condition, the site could readily be considered a birding

hotspot on the margin of the Coos estuary and a wetland of local if not regional significance. In the flooded portion of the estuary to the west of the east bay road segment that crosses Kentuck slough I observed a single Western Grebe and a greater yellowlegs. It is clear that these two wetland habitats are serving very different functions and values. The fresh water functions and values to be lost as a result of the restoration treatments proposed in this application cannot be overlooked and should not be underestimated. **Priority should be given to identifying potential sites that satisfy the compensatory wetland mitigation requirements of the agency that have fewer impacts to existing wetland functions and values than those that would occur at the Kentuck site should the proposed actions be permitted.**

The Kentuck site is a diked and drained tidal wetland that likely historically supported a mosaic of intertidal mudflats, tidal channels and emergent tidal marsh habitats that had an unimpaired connection to the adjoining portions of the estuary. The fresh water wetlands that occur at the Kentuck site at present are doubtless a result of the the changes to the hydrology of the area within the areas surrounded by the dikes around the perimeter of the proposed mitigation area. One of the dikes functions to isolate the wetlands from the influences of Kentuck Creek and the other major dike functions to isolate the wetlands from the adjoining estuary. Today, whatever estuarine wetland functions that may have once occurred there have been fully replaced by fresh water wetland functions and values. The present-day wetlands that occur throughout the site are supported by the fresh water hydrology that presently influences the site. The former, historic estuarine wetland mosaic at the Kentuck site has been replaced with a functioning freshwater wetland mosaic. The estuarine functions that once occurred at the site might be better characterized as “absent” than “degraded”. The longstanding hydrologic modifications linked to the diking and tide gating of the Kentuck estuarine wetlands did not degrade the estuarine habitats they impacted, they virtually eliminated them.

Given the current use of the site by wetland dependent species such as shorebirds, waterfowl, beavers etc., it is inaccurate to characterize the fresh water wetland habitats that presently occupy the Kentuck site as “degraded”. The applicant has pointed to the presence of nonnative vegetation as in indication of the degraded condition of the wetlands at the site (page 1126) but DSL compensatory wetland mitigation policy states that “Simply having a high cover of non-native or invasive vegetation does not qualify the site as degraded” (DSL Removal fill guidebook Chapter 8 page 8-14 https://www.oregon.gov/dsl/WW/Documents/Removal_Fill_Guide.pdf)

Thus, the proposed actions at Kentuck Slough should be characterized as involving the permanent destruction of approximately 100 acres of functioning fresh water wetland habitats. This reviewer recognizes that this site was designated as a “medium priority mitigation area” when the Coos Bay Estuary management plan was developed in the 1980’s. At the time the site was identified as a potential mitigation area, it was managed as a golf course and active measures were in place to dewater the site to the greatest extent possible (as evidenced by the high-volume dewatering pump system in the SW corner of the site). It has been over a decade since active dewatering of the site was practiced. In the years that golf course operations ceased at the site wetland conditions have returned with vigor. The wetland conditions on the site when “the approximately 100-acre historical flood terrace was delineated as an emergent wetland (palustrine emergent Cowardin class) plant community dominated by lawn grasses, with scattered native and ornamental tree plantings” (page 1126) virtually all of the ornamental tree planting have have died and the grasses and forbs bear little resemblance to a lawn.

When taking the impacts to the existing wetlands at Kentuck into account, the compensatory mitigation plan for estuarine wetland impact actions proposed by the applicant at Kentuck will result in a *larger* aerial extent of fresh water wetland impacts than the combined total of freshwater wetland impacts associated with the construction of the pipeline, terminal and shipping channel.

Considering the substantial impacts to existing wetlands associated with the proposed eelgrass and Kentuck slough mitigation actions, no permit should be issued until the applicant demonstrates that the mitigation sites chosen are the sites having the least impacts to existing wetlands. Other sites on the shore of the Coos estuary do not have the same wetland functions and values as those found at the Kentuck wetlands. As an illustrative example, there are numerous prior filled estuarine wetland sites that support few or no existing wetlands that should be evaluated and could be restored to estuarine function. These include but should not be limited to filled historic estuarine tidelands in the vicinity of Pony Slough including but not limited to the APCO sites, the dredged material disposal islands across from the downtown districts of North Bend and Coos Bay and filled estuarine tidelands in the Empire district. Some of the example locations cited above hold greater potential for In-Kind compensatory mitigation. It may not be possible nor necessary to identify a single site meeting all the compensatory estuarine wetland mitigation needs. In light of the substantial impacts associated with the Kentuck and eelgrass mitigation sites, a more thorough and critical analysis of multi-site mitigation alternatives should be required as part of the analysis. **Prior to issuance of a permit, DSL should require the applicant to identify and reevaluate other locations suitable the compensatory wetland mitigation activities associated with this project. The applicant should be required to include but limit this evaluation to an examination of restoring tidal hydrology to prior filled tidelands in the Coos Estuary that are not currently functioning as wetlands.**

9. Some impacted wetlands in the area of the proposed facilities on the North Spit appear to have the characteristics of "Interdunal wetlands" that DSL has identified as wetlands of special conservation concern (https://www.oregon.gov/dsl/WW/Documents/wetland_cons_concern.pdf).

DSL mitigation policies appear to require "In Kind" mitigation for these wetlands types. The current wetland mitigation plan does not appear to propose "In-Kind" mitigation for the impacts to these wetlands. DSL should determine of any of the wetlands identified on the North spit or along the pipeline route are classified as wetlands of conservation concern. In-Kind mitigation should be required for impacted wetlands along the pipeline route and in the vicinity of the facilities in Coos Bay that fall under the category of "wetlands of conservation concern".

10. Zoning of the proposed eelgrass mitigation site may prohibit dredging required by the eelgrass mitigation plan.

The proposed eelgrass mitigation site and at least one of the four proposed Navigation Reliability Improvement sites occupy a portion of the estuary classified as "52-Natural Aquatic" in the Coos Bay Estuary Management Plan. This same zoning designation is also identified in the City of Coos Bay's Land Use Ordinance 312. The compensatory mitigation actions proposed for eelgrass will involve dredging approximately 46,535 cubic yards of sediment from this zoning district. A similar volume of dredging will be required for the Navigation Reliability Improvements.

In the absence of necessary land use permits, the mitigation actions described in this section should be designated as "not-feasible" because dredging, as proposed by the applicant, is explicitly

prohibited in the 52-Natural Aquatic zoning district of the Coos Estuary. Zoning compliance authorization to undertake the proposed eelgrass mitigation dredging work will likely require amendment of the Coos Bay Estuary Management Plan and the City of Coos Bay's land use ordinance. Both the estuary Management Plan and the City land use ordinance are part of Oregon's Coastal Zone Management plan that has been acknowledged by the US Department of Commerce under provisions of the Federal Coastal Zone Management Act. **No permit should be authorized for the above described work prior to the applicant demonstrating that the proposed work is a permitted land use in the area proposed. Should DSL choose to issue a fill and removal permit for the proposed work, the permit should, at minimum, be conditioned on the applicant's ability to obtain requisite land use authorizations.**

Comments of Michael Graybill in response to DSL joint permit application and call for comments on a proposal from Jordan Cove Energy Project L.P. to the Oregon Department of State Lands on 7 November 2018

CHAPTER 4: ACCESS CHANNEL COMMENTS.

Introduction

Construction of the access channel will result in the removal of approximately 1.9 million cubic yards of material from approximately 22 acres of estuarine wetland habitats (page 860). This total encompasses not less than 1.25 acres of intertidal, 4.25 acres of shallow sub-tidal, and 17.7 acres deep-water estuarine habitats that include unvegetated intertidal and sub tidal flats, .06 acres of tidal salt marsh and 2.26 acres of eelgrass meadow habitat [table 6-2 (pages 36-39)]. Of all the various elements in this project, the access channel represents the single project element having the greatest spatial and long-term wetland impacts. As such, **the design of the access channel should be reviewed critically and alternative designs that reduce or minimize wetland impacts should be given explicit attention.**

1..**No justification is given to substantiate the orientation or shape of the access channel footprint and no mention is made of other access channel orientations or shapes considered.** Section 6.2.1 includes a one sentence statement regarding the purpose of the Access channel (page 91):

> *"The access channel and slip will be configured and oriented so that LNG carriers can dock safely, away from other ship traffic in the FNC, and to facilitate emergency egress."*

The remaining portion of the paragraph includes a description of the general shape, perimeter dimensions and depth of the proposed access channel. Section 6.2.1 substantiates the proposed depth of the access channel but fails to substantiate the orientation or size and shape of the perimeter of the channel.

It is necessary to substantiate and critically evaluate the shape of the access channel perimeter because this single project element is responsible for the largest wetland impacts associated with the construction of the LNG facility. It is particularly important to evaluate and substantiate the configuration and orientation of the western flank of the access channel in part because the proposed configuration will necessitate the construction of a pile dike rock apron at the top of the cut line of the western flank of the access channel. When considered alone, the pile dike rock apron is a project element having significant permanent impacts to estuarine wetland habitats and habitat function and values.

Alternative channel configurations or designs having potentially fewer wetland impacts should be proposed and evaluated. Because the applicant has given no indication that other access channel orientations, configurations or construction methods were considered and rejected, it is not possible for reviewers to determine if the access channel configuration proposed is the design having the least wetland impacts while still addressing the stated purpose of the channel. DSL statutes and rules require applicants to propose and evaluate alternative project designs in order to determine identify and select the project design that avoids or minimizes impacts to wetlands. **The applicant has failed to demonstrate that the requisite alternatives analysis has been conducted regarding the design of the access channel.** As an illustrative example, it is reasonable to question if a minor adjustment to the orientation of the slip or the angle of the western flank of the access channel or the slope angle

between the access channel and the adjoining tideflats might eliminate the need to construct the rock apron while still accomplishing the stated purpose of the access channel. **No permit should be issued unless the applicant conducts the requisite analysis of alternative designs needed to affirm that the proposed design is the best option to minimize or avoid wetland impacts.**

2. Maintenance dredging of the proposed access channel following construction is expected to produce 115,000 cubic yards every three years or 160,000 every five years. Initial access channel construction dredging work is described in Section 6.2.1.1 (page 92). Material removed from the access channel is to be transported to the APCO dredged material disposal site. During initial construction, materials to be deposited at the APCO sites will be transferred via pipeline, barges or scows to a temporary barge equipped with a hydraulic dredged material transfer pump and pipeline system. It appears there will be a need to operate a dredged material transfer system at the APCO sites during initial construction and then every three years thereafter. I was unable to find a plan for the mobilization and demobilization of the temporary barge berth and hydraulic sediment transfer system at the APCO dredged material disposal site. The application notes that special measures will be required to protect the eelgrass beds in the vicinity of the dredged material transfer pipeline connecting the material offloading barge and the APCO sites. If this transfer system will be mobilized and mobilized every three years, eelgrass beds in the vicinity are likely be impacted by this periodic ongoing disturbance. **No permit should be issued until the applicant provides a plan outlining the intended process used to mobilize and demobilize the sediment transfer system at the APCO dredged material disposal site.**

3. Reference is made to how rock material excavated from the access channel will be handled following excavation but **no description of the type/s, anticipated volumes or the methods used to excavate rock encountered during access channel construction is provided**. Other sections of the application indicate rock excavation will require blasting to fragment bedrock encountered in some of the Navigation Reliability Improvement areas, but the description of rock volumes and methods used for rock excavation, transport, and disposal from the access channel is not specified [Section 3.5.2 **No permit should be issued before the applicant clarifies the volume of rock expected to be encountered during access channel construction. The applicant should also be required to specify methods used to excavate and transfer rock encountered during construction of the access channel to the designated disposal area.**

4. A narrative description of the dimensions of the access channel is provided in Section 6.2.1 (page 91) entitled "Access channel". **The applicant states design details regarding the access channel are provided in Attachment D.2. However, the drawings presented in attachment D.2 do not contain any design details for the access channel (pages 420-421).** The drawings in attachment D.2 are titled "Conceptual Layout of Slip construction Berm". The only information in attachment D.2 relates to the design of the Temporary barrier berm and the Temporary Barge slip. A plan view drawing of the access channel can be found on page 859 of the application but this drawing is not referenced in the narrative description related to this project element. **The applicant should be required to provide the omitted access channel design detail information in order for the agency to complete its review of the application.**

5. Reviewers are directed to Table 6-2 for additional information related to the construction of the access channel but the manner in which information is presented in table 6-2 makes it difficult to readily determine the aggregate total area of wetland habitats to be impacted as a result of the construction of

this project element or other individual project elements such as the rock pile apron. (also see comments related to the rock pile apron and editorial insufficiencies related to table 6-2 elsewhere in these comments). A partial description of the total acreages of wetland types impacted by the proposed access channel configuration is provided on page 860 of the application but this description is not referenced in the description of the project. Reviewers are left to search around in the 1,600-page document for relevant information. This is unacceptable and provides editorial barriers to discourage all but the most committed reviewers who are conversant in the jargon laden, highly technical and poorly organized presentation of subject matter in the application.

Comments of Michael Graybill in response to DSL joint permit application and call for comments on a proposal from Jordan Cove Energy Project L.P. to the Oregon Department of State Lands on 7 November 2018.

CHAPTER 5: COMMENTS ON THE PROPOSED NAVIGATION RELIABILITY IMPROVEMENTS

1. DSL should deny the applicant's request to construct the proposed "Navigation Reliability improvements" because it appears possible to attain 99.5% of the stated purpose of the project without excavating the proposed "Navigation Reliability Improvements".

The projected "loss" of production at the proposed liquefaction facility is based on an insufficiently demonstrated requirement that the capacity of the facility must be 7.8 mtpa in order to satisfy the Project's purpose and need.

OAR 141-085-0550 lists Application Requirements for Individual Permits. Section (2) states:

> ***(2) Complete and Accurate Information Required****. Failure to provide complete and accurate information in the application may be grounds for administrative closure of the application file or denial, suspension or revocation of the authorization.*

OAR 141-085-0550 (5) (f) requires

> "(f) A description of the project purpose and need for the removal or fill. All projects must have a defined purpose or purposes and the need for removal or fill activity to accomplish the project purpose must be documented. *The project purpose statements and need for the removal or fill documentation must be specific enough to allow the Department to determine whether the applicant has considered a reasonable range of alternatives*." (emphasis added)

Section (3) of the application Project purpose and need (Page 2) states:

> *"The Project is a market driven response to the burgeoning and abundant natural gas supply in the US Rocky Mountains and Western Canada markets and the growth of international demand, particularly in Asia. The overall Project purpose and need is to construct a natural gas liquefaction and deep-water export terminal capable of receiving and loading ocean-going Liquified Natural Gas (LNG) carriers, in order to export natural gas derived from a point near the intersections of the GTN Pipeline system and Ruby Pipeline System."*

2. The application does not state why the design capacity of the proposed LNG liquefaction plant must produce 7.8 million tonnes per annum (mtpa) in order to attain the project purpose.

Table 1.2.2 (page 11) of Resource Report 1 submitted to the FERC September 2017 is entitled "Major Changes from CP13-483-000 for the JCEP LNG Terminal Facilities" and states *"The LNG production capacity of the LNG Terminal has been increased to 7.8 mtpa. This was previously 6.8 mtpa*". It appears that the revised 7.8mtpa capacity of the proposed LNG export facility may have been established in part by assessing the currently available capacity of two existing natural gas transmission pipelines; (GTN and Ruby See Page 7 Resource Report 1). When the Ruby and GTN pipelines were constructed, their design

capacity was likely established without any consideration of the natural dynamics of the Coos Estuary or impacts to wetlands and waterways of the state of Oregon. It also appears that at one point in the planning stage for an LNG facility in Coos Bay having the same purpose, the applicant considered 6.8 mtpa of LNG a sufficient quantity to satisfy the need and purpose of the project.

3. The difference between a proposed LNG facility having a proposed 6.8 mtpa capacity and a 7.8 mtpa capacity appears to have significant and avoidable impacts on Oregon wetlands and waterways.

In order to attain the expanded 7.8 mtpa export capacity, the applicant has stated there is a new "need" to excavate approximately 580,500 cubic yards of sub tidal estuarine sediments at four locations along the margin of the Federal Navigation Channel These are collectively referred to as "navigation reliability improvements"(NRI's) [See Table 1.1-1 (Page 10) of Resource Report 1 submitted to the FERC September 2017 and Table 6.1 (page 36) of Joint permit application]

The application states:

> "…*without the Navigation Reliability Improvements, the LNG facility would not be able to optimize its production capacity and export 7.8 mtpa of LNG and therefore would not fully satisfy the project purpose….. Modeling showed that without the NRIs in place, the greater delays imposed by the Pilots on LNG ship transits of the channel due to environmental conditions would result in a potential loss of production at the facility equal to about 38,000 tonnes of LNG. This would result in a direct loss of revenue of about $8.0 million per year for the facility."* (page 2)

Increasing the LNG production capacity from 6.8 to 7.8 mtpa will enable the applicant to use a larger percentage of the uncommitted capacity of the GTN and Ruby pipelines. However, by increasing the proposed annual LNG production capacity of the terminal from 6.8 mtpa to 7.8 mtpa, the applicant states it then becomes necessary to excavate the NRI's in order to safely ship an unsubstantiated increase in the proposed production volume of LNG.

The applicant is proposing it is necessary to excavate 584,500- 700,000 cubic yards of sub tidal estuarine habitat to permanently modify sub tidal estuarine habitats at the margin of the federal navigation channel in the Coos estuary in order to fully utilize a proposed facility designed to export 7,800,000 tons of LNG per annum. The sole justification for the need to excavate the "Navigation Reliability Improvements" is based on a weather dependent navigation model projection that estimates it is possible to export up to 7,762,000 metric tons of LNG per annum in the absence of the NRIs. [7,800,000 mtpa (proposed capacity) minus 38,000 mtpa (modeled annual "loss" of production in absence of proposed NRIs) equals 7,762,000 mtpa].

Using information provided in the DSL Fill and Removal Permit application, the applicant has suggested that an export facility having a capacity of 7.762 mtpa (99.5% of the proposed expanded 7.8 mtpa capacity) could be constructed without the need to excavate and routinely dredge the NRI's. Information provided to the FERC in September 2017 Resource report 1 further suggests a plant having a capacity of 6.8 mtpa is sufficient to satisfy the purpose and need of the Project. A primary objective of Oregon Fill and Removal statute is to avoid or minimize the need to engage in fill and removal activities in waters of the state. The applicant has not adequately proposed or evaluated alternatives designed to avoid or minimize the need to dredge the estuary in order to meet the stated purpose and need of the

project. **A permit to excavate the proposed NRIs should not be issued unless the applicant adequately demonstrates the project's purpose and need could not be met by constructing a facility with a production capacity that does not require modifications to the federal navigation channel.**

The proposed Navigation Reliability Improvement (NRI) work will entail the excavation, mobilization and transport of approximately 700,000 cubic yards of bedrock and unconsolidated sediment. Material dredged from the four areas is to be transferred as a liquid slurry via a 24" diameter pipeline to a disposal site (APCO sites 1 and 2) in the vicinity of the Hwy 101 Bridge in North Bend. The maximum estimated pipeline length is approximately 8.3 miles. The pipeline will be laid at the bottom of the Federal navigation channel connecting each of the four NRI dredge areas to the APCO sediment disposal sites. Dredging work tied to this aspect of the JCEP is estimated to directly impact 35.4 acres of subtidal estuarine habitat.

Additional examples of the insufficiency of this portion of the application include, but are not limited to:

4. **Compensatory mitigation to address temporary and permanent impacts to affected habitats is not fully addressed**.

Although the application states that 35.4 acres of subtidal estuarine habitat will be directly impacted because of the NRI dredging work, the application does not mention how the impacts to these habitats will be mitigated. In some situations, the proposed dredging work will convert subtidal soft bottom habitat to a bedrock sub-tidal hard bottom habitat. In all situations, the proposed initial impacts will require follow-on maintenance dredging work that will result in regular disturbance to the biological communities that interact with these habitats. In the absence of the proposed work, the sub tidal habitats adjacent to the Federal navigation channel would not experience direct impacts related to excavation, or ongoing disturbance related to maintenance dredging. The proposed NRI dredging work will impact sub tidal habitats that are not currently subjected to dredging. The impacts of initial dredging and subsequent maintenance dredging will disrupt the function of these habitats for an indefinite period of time into the future. It is unlikely that the impacts resulting from the proposed dredging work will have a positive effect on the environment. It is more likely that the dredging work will have a detrimental effect on the ecological functions and values of the wetland habitats in the proposed NRI dredge areas. The nature and extent of the negative effects on subtidal habitats in the proposed NRI dredge areas should be characterized.

This reviewer recognizes that current DSL fill and removal guidelines do not require compensatory mitigation for deep sub-tidal habits. However, this should not preclude DSL from considering the impacts associated with dredging and altering these habitats when the agency weighs the proposed benefits of the project against the overall impacts to public uses, wildlife, fish and public trust water resources. Although not required under current regulations, a plan designed to mitigate these impacts could be developed to characterize the wetland functions and values that would be impacted because of the planned construction and maintenance of the proposed NRI's. The plan could articulate the steps needed to replace the functions and values to be lost. A proposed mitigation plan would better enable the agency to determine the extent of impacts to public resources resulting from the proposed NRI's.

2. **The estimated NRI sediment volumes to be dredged are not consistently specified.**

The narrative project description of the NRI's on Page 100 (6.2.5.1) estimates dredged volumes to be approximately 590,000 cubic yards. However, Resource Report 1 (document page 26, pdf page 67) states *"The total volume of capital dredge material from these excavations is approximately 700,000 cubic yards."* Elsewhere in the application, the aggregated total of the estimated sediment volumes listed for each individual dredge area is 583,400 cubic yards (350,200 cy for area 1, 184,000 cy for area 2, 25,200 cy for area 3, and 24,000 cy for area 4). This is a volume estimate discrepancy of 116,600 cubic yards! Is the volume to be dredged 700,000 cubic yards as per info on page 4, 583,400 cubic yards as per info on page 5, or some other unspecified amount? If 700,000 cubic yards of bedrock and unconsolidated sediment is proposed to be dredged, transported, and spoiled at an upland disposal site as part of the NRI component of the JCEP proposal, the applicant should be required to provide consistent estimates of the volume of material to be dredged and spoiled. Accurate information is essential to determining if the disposal area has sufficient capacity to handle the material to be dredged. **Based on the information provided in the DSL joint permit application it is not possible to accurately determine the volume of material to be dredged, transported and disposed of by this aspect of the proposal. The applicant should be required to specify the locations of all sediment removal areas and provide accurate estimates of sediment volumes for each location to be disturbed. No permit should be issued in the absence of this information.**

3. A substantial portion of the total volume of material to be dredged in NRI Dredge areas #1 and #2 is bedrock. These dredge areas are situated up to 8.3 miles from the proposed dredged material disposal areas. The information in the DSL joint permit application states "Dredging will be accomplished with mechanical or hydraulic methods." However, the DSL joint permit application does not state the type of mechanical methods or equipment that will be used to excavate the bedrock sediments identified in Dredge areas #1 and #2. Further, the DSL joint permit application does not include information regarding the feasibility of pumping dredged bedrock sediments via a hydraulic pipeline up to 8.3 miles in length to the proposed upland disposal area. The proposal to transport dredged sediments via a 24" pipeline suggests that bedrock fragments to be transported will have a maximum particle dimension of something less than 24" overall. Does this mean that excavated bedrock fragments will be ground to a dimension suitable for transfer as a liquid slurry? Will the appropriate fractured bedrock particle sizes be produced on the seafloor by the dredge cutter head or will unsorted fractured bedrock particles be brought to the surface and sized for transport by some other means? Information regarding specific methods to be employed for bedrock excavation work is essential to asses potential water quality related impacts of this work. For example, a rotating rock cutter head capable of fracturing bedrock with particle sizes sufficient for pipeline transport is likely to produce more suspended sediments during dredging than a mechanical scoop type excavator that raises larger rock fragments to the surface that are subsequently fractured to a size sufficient for transport as a liquid slurry. These distinctions have significant water quality and habitat impact implications.

Until the applicant provides specific information regarding the mechanical methods to be used to fracture and excavate the bedrock encountered in the course of implementing the NRI dredging work, it is not possible to assess the potential impacts that these activities have on the environment. It is essential for permit reviewers to have sufficient information to asses if the methods proposed to handle, transport, and dewater spoiled dredged material are feasible or pose unnecessary, avoidable risks to the

environment and economic activities in the vicinity of the project. **No permit should be issued until the applicant provides sufficient information to enable regulatory agencies and the public to clearly understand the specific methods to be used to excavate, transport, spoil, and dewater the bedrock sediments encountered in the Navigation Reliability improvement dredge areas.**

4. Transporting irregularly shaped freshly fractured rock particles via an 8.3-mile-long pipeline would seem to hold greater potential risk for pipeline clogging and sediment transport system failures than using a similar sized system used to transport finer, sandy and silty sediments. **The applicant should provide evidence to demonstrate that the proposed hydraulic pipeline transport method is feasible and is the most appropriate transport method for the type of bedrock sediments that will be encountered in the NRI dredge areas.**

5. **There is potential for booster pump and temporary dredge material transfer pipeline interactions with marine mammals including harbor seals, Steller sea lions, California sea lions and Orcas.** The Marine Mammal Protection Act requires activities that may impact marine mammals to be identified and appropriate permits for take to be issued if appropriate. The application states that "Booster pumps would be required to move material to the disposal sites." The number, location, and configuration of these pump stations is not described in the DSL joint permit application. The proposed NRI sediment transport pipeline route traverses a large segment of the estuary. While much of the pipeline will rest on the bottom, it is assumed that the booster pump stations will operate on the water surface with inflow and outflow pipeline segments rising from the bottom to the pump stations at the surface along the pipeline route. The proposed NRI pipeline route will run past at least two known harbor seal haul out and pupping sites. Consideration of marine mammal haul out sites should be given when specifying the locations and operation of sediment transfer pipes and pump stations. Pump stations should not be permitted in locations where the above bottom inflow and outflow pipeline segments interrupt the unrestrained ingress and egress routes used by seals to access the haul out and pupping areas. In addition, no portion of the sediment transport pipeline that rests on the bottom should be permitted if it interrupts the free movement of marine mammals using the area. NRI Dredge areas #2 and #3 appear to be closest to the aforementioned harbor seal haul out and pupping areas. In areas where dredging activities take place in the vicinity of a marine mammal haul out site, activities that disrupt the normal behavior of animals using the haul out sites should not be permitted.

Comments of Michael Graybill in response to DSL joint permit application and call for comments on a proposal from Jordan Cove Energy Project L.P. to the Oregon Department of State Lands on 7 November 2018.

CHAPTER 6: COMMENTS RELATED TO PROPOSED HORIZONTAL DIRECTIONAL DRILLING OPERATIONS

The applicant proposes to use horizontal directional drilling (HDD) to pull a 36 inch diameter high pressure welded steel pipeline under a tidally influenced portion of the Coos River. Examples of the insufficiency of the application include, but are not limited to:

1. The applicant proposes to use HDD as the preferred method of installing the natural gas transfer pipeline under the Coos Estuary. This method, however, was previously deemed to be infeasible by the applicant in a previous iteration of this project reviewed by the Federal Energy Regulatory Commission. Additional discussion related to the feasibility of the proposed use of Horizontal directional drilling is included in Chapter 7 of these comments.

2. Horizontal directional drilling will involve the removal of sediments including drilling fluids from the borehole in order to make way for the pipe intended to fill the excavated space. Although the application provides no discussion of the volume or nature of the sediments to be brought to the surface by these operations, the distances proposed to be horizontally drilled, and the diameter of the pipeline to be routed through the borehole, enable a sufficiently robust minimum estimate of the volume of the sediment that will be brought to the surface as a result of the HDD operations to demonstrate the need for the applicant to provide a more robust characterization of, and evaluation of the HDD operations wherever they will be used during pipeline construction.

The following analysis is derived from information provided by the applicant:

> Minimum borehole size;
> 36” diameter (7.07 square feet)
>
> Minimum estimated aggregate length of HDD boreholes to be drilled in Spread 1 of the pipeline route; 14,850 lineal feet including;
>
> > 4,250 lineal feet for Coos Bay West borehole (drawing 38)
> > 9,000 lineal feet for Coos Bay East borehole (drawing 39)
> > 1,600 lineal feet for Coos River (drawing 40)
>
> Estimated minimum volume of sediment to be brought to the surface in Spread 1 of the pipeline route as a result of proposed HDD activities = Cross sectional area of borehole x length of borehole.
> 7.07 SQ FT x 14,850 LF = 104.989 cubic feet (Approximately 3,888 cubic yards)

If the above analysis is an accurate approximation of the proposed HDD work in spread 1, nearly 4,000 cubic yards of raw sediments will be brought to the surface by the HDD operation in spread 1 of the proposed pipeline route alone. If improperly handled, this volume of sediment holds potential to impact wetlands and water quality during construction and disposal. **The volume, composition, condition, handling, treatment if necessary, and disposal of sediments brought to the surface by HDD operations along the pipeline route must be elucidated in order to adequately asses any potential impacts to the**

surrounding environment or other health and safety related matters. The permit should be denied until adequate information pertaining to the proposed HDD operations.

3. The DSL joint permit application provides a coarse resolution map indicating the landfall locations of the HDD boreholes but it does not provide sufficient information to characterize which shorelines will be used as the base for the HDD operations. For example, the estimated 9,000 lineal foot borehole under the east portion of the Coos Estuary will likely require set down and assembly areas for the 9,000-foot-long pipeline segment that will be assembled and pulled through the borehole. In addition, the HDD boring equipment is likely to require an unspecified area to accommodate drilling equipment, drilling lubricating fluid storage and handling areas as well as areas for on-site sediment storage and dewatering/treatment. If sediments will be transported away from the drilling location additional area will likely be required at the drill site to load and transport sediments and liquids produced at the site.

4. The volumes, characteristics, handling and disposal procedures associated with fluids to be added or produced as part of the HDD operations should be elucidated in order to enable the objective risk and benefit analysis required by this permit, NEPA, Section 404 of the CWA, and Section 408 of the Rivers and Harbors Act and provisions of the ESA.
No permit should be issued without ample opportunity for the permitting agencies and the public to review and evaluate a detailed plan that addresses the aforementioned and other issues related to the HDD activities proposed by the applicant. The current application lacks sufficient information to provide an adequate evaluation of the potential risks and/or benefits to wetlands and waterways of a pipeline route requiring the level of HDD work proposed. **The permit application should be denied unless additional information is provided to enable a robust evaluation of the proposed activity.**

Comments of Michael Graybill in response to DSL joint permit application and call for comments on a proposal from Jordan Cove Energy Project L.P. to the Oregon Department of State Lands on 7 November 2018.

CHAPTER 7: COMMENTS ON PROJECT FEASIBILITY AND SITE SELECTION

A *feasible* project includes design elements and attributes that assure a proposed project's purpose and the benefits linked to its purpose are attainable as described. **No permit requiring impacts to wetlands or public uses of waterways should be issued for projects that are not feasible** (i.e. not feasible = unable to achieve the stated purpose/s and benefit/s of the project that are used to justify the impacts to wetlands and waterways associated with the project). Several aspects of the Jordan Cove project raise questions related to the feasibility of the work proposed. For illustrative purposes, a partial list of examples is provided below:

1. Introduction, context, and importance of assuring this project is feasible.

The wetlands waterways and shoreline of the Coos Estuary bear more than ample evidence of historic human modifications resulting in regulated and unregulated dredging and filling activities that have impacted wetlands. Many of the historic dredging and filling activities in the Coos Estuary preceded the adoption of wetland conservation policies including the fill and removal program statutes administered by DSL, and numerous state and federal wetland and watershed conservation and restoration programs. Today, fewer than 10% of the original tidal salt marsh habitats remain in the Coos Estuary. The other 90% of the original tidal marshes have been altered by these historic diking and filling activities. (see "History of estuarine wetland development and alteration: What have we wrought" ME Boule, KF Bierly - Northwest Environmental Journal, 1987)

The wetlands and waterways of the Coos Estuary also bear a conspicuous legacy of historic dredging and filling projects undertaken *following* the adoption of the wetland Fill and Removal statutes implemented by DSL and undertaken with wetland fill and removal permits issued by DSL. Several of these permitted projects failed to achieve the originally proposed project purposes and benefits. Examples of permitted wetland fill and removal projects in the Coos Estuary that resulted in wetland impacts but never attained the proposed project purpose/s include but are not limited to: 1) A barge slip constructed in the 1980's by the Port of Coos Bay on the North Spit. 2). A "T" dock on the North Spit of the Coos Estuary and 3). A salmon aquaculture facility on the North Spit of the Coos Estuary. Each of these examples involved wetland and waterway impacts that were deemed by the permit applicants to be unavoidable in order to satisfy the stated purposes and needs of the project. When DSL and other agencies issued permits, the wetland impacts and loss of public uses were considered acceptable when the stated project purposes and benefits were weighed against these impacts. For various reasons, the cited examples never attained the project purposes or addressed the "needs" identified in the permit applications.

Thus, the agency authorized the project permit holders to impact Oregon's waterways in order to accommodate the purported benefits associated with these projects. The impacts to the wetlands and waterways came about, but the benefits that were supposed to have offset those impacts have yet to be realized as originally proposed. It is reasonable to conclude that these projects *failed* because one or more aspects of the project was not feasible. Because permitting agencies issued permits for projects that turned out to be *not* feasible, these permitted projects resulted in unnecessary, unsubstantiated, and avoidable impacts to Oregon's wetlands and waterways.

Feasibility factors considered by this review

No less than four factors contribute to determining the feasibility of a proposed project. A brief description of the factors considered in this review is presented below and is followed by a more detailed analysis of how these factors relate to a determination of the feasibility of the Jordan Cove Energy Project.

a. *Factors related to technical feasibility*: A project should not be considered feasible if aspects of the proposed work are not technically achievable.

Examples of technical feasibility include but are not limited to compliance with applicable laws and regulations, ability to accomplish the wetland restoration actions and achieve the wetland restoration/mitigation outcomes proposed. At least one of the examples of the permitted projects listed above appears to have been infeasible because of technical design flaw considerations. The salmon ranching aquaculture facility operations were infeasible because lower than planned for numbers of returning adults could not justify continued operations. The technical infeasibility was further reinforced following the adoption of the wild fish management policy by the Oregon Department of Fish and Wildlife. The facility closed not long after it was built and has remained inoperable to this day. The wetland impacts associated with the long disused aquaculture facility's fish ladder persist to this day.

Construction methods proposed must achieve desired functions and outcomes in order for a project to be feasible. Examples of technical considerations associated with the Jordan Cove proposal that raise questions regarding the likely feasibility of the project include but are not limited to: 1.) the hydraulic suction cutter dredging method for bedrock removal and transport, 2.) horizontal directional drilling for pipeline under the estuary, 3.) the capacity of APCO dredged material disposal site to accommodate total volume of material proposed for this site

b. *Factors related to operational feasibility*: A project should not be considered feasible if the economic factors underlying the project's purpose result in the disuse of the project or if the project lacks interested users.

One or more of example projects listed above appear to have been infeasible in part for operational reasons. None of the hoped-for barge customers ever came to use the barge slip. None of the hoped-for vessel traffic ever came to use the "T" dock. In order for a project to be feasible, the project must be designed to operate in a manner that enables the attainment of the stated purpose. Examples of operational aspects of the Jordan Cove project that raise questions regarding the operational feasibility of the project include but are not limited to: 1.) demonstration that the applicant has secured a guaranteed feed gas supply capable of producing the annual volume of LNG product proposed. 2.) Demonstrated assurance that the applicant has identified and secured agreements with customers committed to purchasing and shipping LNG produced at the LNG terminal. 3.) Demonstration of continued favorable market conditions during life of project . 4.) Availability of the types and sizes of vessels required to transport the LNG produced by the terminal.

c. *Factors related to safety and protection of public welfare*. A project should not be considered feasible if attainment of the project purpose exposes the public to undue risks.

d. *Factors related to the independent utility of the project*. A project should not be considered feasible if impacts to wetlands and public waterways *in addition* to the impacts stated by the project proponent are required to attain the stated purposes and benefits of the project.

COMMENTS RELATED TO THE TECHNICAL FEASIBILITY OF THE WORK PROPOSED IN THE DSL FILL AND REMOVAL PERMIT APPLICATION SUBMITTED BY THE JORDAN COVE ENERGY PROJECT.

1. **It may not be feasible to place all the dredged material spoils at the APCO dredge material disposal areas.**

The APCO 1 &2 dredged material disposal sites have not been fully evaluated to determine if the sites can feasibly accommodate the proposed uses as disposal areas for an estimated 1,824,300 cubic yards of material excavated from the initial dredging of NRI's and eelgrass mitigation areas, as well as the material derived from maintenance dredging of the slip, access channel and NRI's for the life of the project (see pages 883-886). On page 849, the consultant states: *"However, disposal of all capital material at APCO Site 2 is contingent upon assessments of slope stability, the ability to ensure an adequate residence time, and safe access for equipment".* I was not able to locate any additional information related to the proposed APCO dredged material disposal sites to confirm that the sites posses the requisite attributes to determine if they are in fact feasible for the uses proposed.

The applicant has proposed that in addition to the material dredged during initial construction of the NRI's, material derived from maintenance dredging of the NRI's, the slip, and the access channel will be placed at APCO sites 1 & 2. (Page 874). I was unable to find applicant-provided information related to the expected life of the project but assuming a 30 year project lifespan, the applicant has provided an estimates for the volume of maintenance material to be dredged from the slip and access channel: *"The total anticipated volume of maintenance material that will be dredged over a 30-year period is approximately 0.98 mcy*" (page873) and for the Navigation reliability improvements: *"The total dredging volume required over the 30 year planning horizon is approximately 200,00 cy"* (page 874). In addition to the 584,300 cubic yards of material to be placed at the APCO 1 and 2 sites produced by initial NRI construction activities (page872), and the 40,000 cubic yards of material dredged from the eelgrass mitigation site (page 864), the APCO disposal sites must also be capable of spoiling an additional 1.2 million cubic yards of project maintenance dredged material produced over an expected 30 year project lifespan. The combined total of material from all sources is 1.82 million cubic yards.

The applicant's dredge material management plan (Pages 843-909) includes a three factor (technical, logistical, and environmental) site selection feasibility analysis. The feasibility determination of the APCO 1&2 disposal sites to accommodate the uses proposed was based on a series of assumptions that require additional confirmation. Several of the assumptions relate to the overall geotechnical capacity of the APCO sites handle the total volume of material destined for the sites. **The applicant has not demonstrated that it will be feasible to use the APCO sites to receive the volume of material proposed to be spoiled at those locations. No permit should be issued until the applicant demonstrates that the APCO sites are suitable for the proposed uses.**

2. **The recommended method of hydraulic dredging and transfer for the Navigation Reliability Improvements (see section 5.2 Page 903) is not likely to be a feasible method to excavate the bedrock in the NRI sites.**

The four dredging areas encompassed by the navigation reliability Improvements will require dredging approximately 584,300 cubic yards of material, of which 505,500 cubic yards is rock and 78,800 cubic yards is sand (page 872). The applicant proposes to transfer all material dredged from the navigation reliability improvement sites to the APCO disposal site by a hydraulic pipeline. The DMMP feasibility analysis is based on multiple unconfirmed assumptions including assumptions that it will be possible to use a hydraulic suction cutter dredge to excavate the anticipated volume of 505,500 cubic yards of bedrock from the NRI's, and that it will be possible to transport the fragmented bedrock via a 8-mile-long hydraulic dredged material pipeline system.

It is clear the consultant who prepared the DMMP was not confident about the feasibility of the applicant's preferred hydraulic suction cutter dredging and pipeline sediment transfer system. The Dredge Material Management plan narrative includes numerous references that cast doubt on feasibility of using hydraulic excavation and transport methods for the NRI work. The consultant's report (page 872) states: *"Two methods of dredging are identified as the most practical, given the historical dredging practices in the region, the material types being dredged, and the location and condition of the placement sites: (1) mechanical dredging via clamshell or excavator; and (2) hydraulic cutter suction dredging".* On pages 875 and 876, the consultant includes information that can readily be interpreted as suggesting methods other than the hydraulic excavation and transport proposed may be more feasible:

- "*For the navigation reliability improvements, the mechanical dredge would be outfitted with a heavy-duty clamshell."* This statement suggests it may not even be feasible to use conventional clamshell dredge to excavate the bedrock encountered in the NRIs.
- "*Although an excavator is better suited for dredging in-situ soft rock with its higher breakout capacities, outfitting the mechanical dredge with the heavy-duty rock clamshell bucket with pick point teeth would support rock dredging. The mechanical dredge might need to chisel the harder rock if the clamshell bucket is not heavy enough to break out the rock".* This statement suggests it may not even be feasible to dredge the rock from the NRI's using a heavy-duty clamshell dredge equipped with pick point teeth and it may be necessary to use other means to loosen the rock in order to excavate it. Blasting was also listed as a possible means of fragmenting the bedrock.
- *"For the navigation reliability improvements, after excavation, the sand or rock material would be placed in a scow or on a deck barge and transported, with the assistance of a tugboat, to a suitable Temporary Dredge Off-Loading Area."* This statement suggests it may not be feasible to transport dredged rock material using the proposed 8-mile-long hydraulic transfer pipeline.
- *"However, mechanical offloading would require the scow or barge be moored at an appropriate berth with an appropriate depth of water (approximately 25 feet). Where this may not be feasible, either because of eelgrass impacts or the length of trestle required, hydraulic offloading would be considered as an alternative".* This statement suggests it may not be feasible to offload scows laden with fractured rock and transfer them to the APCO 1&2 disposal sites using the hydraulic pipeline transfer system proposed by the applicant.

- *"Hydraulic dredging is most efficient when working with fine materials and sands since they are easily held in suspension. Coarser materials, including gravel, may be hydraulically dredged; however, these materials require a greater demand of pump power and can cause excessive wear on pumps and pipes".* This statement suggests it is not likely to be feasible to transport fractured rock sediments using the hydraulic dredge material transport pipelines system proposed by the applicant.
- *"For the navigation reliability improvements, which includes soft rock (sandstone and siltstone) at Dredging Areas #1 and #2, a 27-30 inch size hydraulic dredge (depending on available equipment on the West coast) is assumed to allow for sufficient cutter-head power for cutting into the rock".* The assumptions included in this statement suggest the consultant was unwilling or unable to confirm that this method would be feasible.

3. The feasibility of the proposed horizontal directional drilling (HDD) has not been demonstrated.

The applicant proposes to use HDD as the preferred method of installing the natural gas transfer pipeline under the Coos Estuary. This method was previously deemed to be infeasible by the applicant in a previous proposal to the Federal Energy Regulatory Commission. A reference to the applicant's prior claim that it is not feasible to use HDD methods to lay the pipeline across the estuary, appears in the DSL permit application Table A *entitled "Jordan Cove LNG project and Pacific Connector Pipeline Project SEF level 1 site history information and Pipeline stream Crossing Information"* (Page 1016). This table states the project will involve excavating 29,486 cubic yards of sediment from the Coos estuary in order to place 12,845 lineal feet of gas pipeline in the bay using a crossing method called "Wet Open-cut" The rationale given is *"Wet open cut only feasible practical in bay crossing method"*. The applicant now claims the HDD under the estuary is technically feasible but has not provided additional material to demonstrate feasibility. If a permit is issued and it is found that HDD it is not feasible, the applicant is likely to approach the agency seeking permission to lay the pipeline across the estuary using the wet open cut trench methods previously proposed. This method will have dramatic and unacceptable impacts on estuarine wetland habitats, water quality, commercial oyster production, and special status species. **No permit should be issued until the applicant provides information to demonstrate the technical feasibility of the propose Horizontal Directional Drilling methods described in the application.**

4. The proposed eelgrass mitigation work may not be feasible as proposed because current zoning does not permit dredging in the area identified by the applicant and because the physical conditions of the proposed mitigation work may not permanently persist in the landscape.

Work proposed in the Coos Estuary will take place in the political jurisdictions of the cities of Coos Bay and North Bend and Coos County. Actions proposed will need to comply with the zoning and land use regulations administered by these jurisdictions. Resource report 1 includes a discussion of zoning and land use requirement but fails to mention the zoning of the proposed eelgrass mitigation area. The only reference this reviewer found is a statement in Resource report 1 (Sept 2107 Resource report 1 document page 41) as follows: *"Also within Coos Bay, adjacent to the Southwest Oregon Regional Airport, would be the Eelgrass Mitigation Site, which would cover approximately 7.5 acres of open water and bay bottom, with approximately 33 acres used during construction for work area and dredge lines."* The proposed eelgrass mitigation work requires dredging in an area designated in the Coos Bay Estuary Management Plan as "Natural Aquatic-52". (see map on page 864). Dredging is not

permitted in Natural Aquatic -52 zones by Coos County or the City of Coos Bay zoning and land use ordinances. Resource report 1 makes no reference that the applicant has requested or has obtained the zoning and land ordinance changes required to conduct the eelgrass mitigation work as proposed.

A detailed description of the likely infeasibility of the eelgrass mitigation actions to permanently persist in the landscape are described in chapter 3 of these comments.

No permit should be issued before the applicant demonstrates that zoning of the proposed eelgrass mitigation area will permit the dredging related work proposed as part of compensatory wetland mitigation actions to address permanent impacts to eelgrass and that the dredging will create physical conditions at the eelgrass mitigation site that will permanently persist in the landscape.

5. The project may not be feasible because it poses undue risks to the safety of people and property in the vicinity of the project.

Safety considerations have been used by the applicant to justify the unavoidable necessity of certain project related wetland impacts. The applicant has listed multiple safety considerations as essential design elements of the project. Examples include, but are not limited to:

a. Safety factors used to justify impacts to wetlands and waterways associated the export terminal siting and design.

- Need to place fill on wetlands to elevate facility above the tsunami inundation zone.
- Need to use a slip and access channel berth design as opposed to constructing an over water jetty type berth having fewer wetland impacts
- Need to choose a site to address aircraft and aviation operational safety
- Need to place fill to create multiple access roads into the facility
- Need for liquefaction facility to addresses heat and radiation safety standards
- Need to widen the Trans Pacific parkway at the Hwy 101 junction.
- Need to site the SORC in the immediate vicinity of the liquefaction facility

b. Safety factors used to justify impacts to wetlands and waterways associated with LNG transport system.

- Need for the Navigation Reliability improvements
- Need for a disabled tanker berth
- Need for access channel size and depth
- Need for escort tug and safety zone around transiting ships

c. Safety factors used to justify impacts to wetlands and waterways associated with natural gas pipeline transport system

- Need to control vegetation along pipeline corridor
- Need to site pipeline route in certain locations.

The applicant has determined that the project would not be feasible if certain safety design factors were not included (e.g. see page 245 for discussion of need to fill wetlands to raise facilities above tsunami levels and to fill wetlands to construct two entrances to the plant for emergency reasons). The applicant cites various safety standards and documents to substantiate the necessity that safety related aspects of the project design necessitate wetland impacts. One such document is

listed in Attachment B.1 on Page 248 of the application under the section entitled "10.5 References". the document, hereinafter referred to as "SIGTTO 1997" is cited as follows:

Society of International Gas Tanker and Terminal Operators (SIGTTO). 1997. Site Selection and Design for LNG Ports and Jetties (Information Paper No. 14) http://www.sigtto.org/publications/publications-and-downloads.

The SIGTTO 1997 document focuses on the elimination of LNG spillages both at the ship/shore interface and in the navigational approach channels. The paper concentrates on issues which can be solved when an LNG terminal is being designed. The paper establishes a basis for safe terminal design and considers safety factors in the port approach. The following excerpts from the SIGTTO 1997 publication relate to the safety and thereby the inherent feasibility of the terminal site selected by the applicant:

- *"At the time of site selection, the level of marine risk is determined by the position chosen for the terminal and this is especially true for terminals handling hazardous cargoes such as LNG". (SIGTTO 1997 page 4)*
- *"… risks identified during planning should be controlled by suitable equipment and pre-arranged procedures. This should include the on-going need to keep other industry or populations remote from the plant". (SIGTTO Page 4)*
- *"However, whatever remote frequencies may be tolerated for a smaller release, there is no acceptable frequency for a large release". (SIGTTO Page 4)*
- *"In essence, the issue being addressed is how to best minimize port risks by design factors at the start of a project". (SIGTTO Page 4).*

The applicant makes frequent reference to safety requirements associated with the LNG liquefaction terminal component of the project. **The SIGTTO document referenced above also includes several additional safety considerations related to the suitability/safety/feasibility of the preferred site proposed by the applicant that were not discussed by the applicant.** Example of safety factors included in these industry guidelines include but are not limited to the following:

Chapter 5 (page 5) of the SIGTTO 1997 document addresses the "Development of LNG Standards" and directs readers to a discussion of *"The references mentioned in chapter 6 direct port designers to construct jetties handling hazardous cargoes in remote areas where other ships do not pose a (collision) risk and where any gas escape cannot affect local populations". (SIGGTO Page 5).*

Even though the applicant cites the SIGTTO safety standards to justify certain wetland impacts associated with the "preferred alternative" site chosen, the applicant's "preferred alternative" does not appear to meet the important safety standard referenced above. An estimated 17,000 people live within the area that may be impacted by an accidental or intentional release and ignition of vaporized LNG at the terminal site or along the proposed LNG tank vessel route. The proximity of a population this large to the proposed facility poses safety risks that appears to be inconsistent with recommended LNG industry and US Coast Guard safety standards.

No public agency should issue a permit for a project that will expose the public to unnecessary safety risks. DSL should consider safety aspects of the project as a component of its assessment of project feasibility whether or not those safety considerations have been identified by

the project applicant. **In spite of the applicant's contention that the "preferred site alternate" is a feasible location for the proposed work, the site appears to include fundamental and unresolved safety considerations that raise questions regarding the practical feasibility of using the Port of Coos Bay as a location for an LNG export facility**. In addition, references to the safety of the ship-based LNG transport component of the project are limited to discussion of the Navigation Reliability Improvements and a justification of unavoidable wetland impacts linked to the proposed width of the marine slip. The application does not provide information or analysis regarding the safety of LNG vessels while in transit between the LNG liquefaction and loading facility and the Federal navigation channel entrance, or during operational emergencies such as accidental groundings and vessel fires, or extreme hydro-meteorological events including but not limited to storms, earthquakes, or tsunamis. Further information from the SIGGTO document states:

- *"From a navigational standpoint … the paper suggests that while the human controls called upon during ship manoeurving deserve high ranking, of themselves, they can never be considered one-hundred percent secure; this is because questions of human error can prevail." (SIGGTO Page 4)*
- *" … in some circumstances, such as a large LNG release close to a populated area, it may be impossible to devise a realistic contingency plan because of the nature of the problem" (SIGGTO Page 5)*

6. As proposed, it will not feasible for LNG vessels to transit the navigation channel at any time other than during tides greater than 6' 3" above MLLW.

Stated another way, the existing Federal navigation channel is *unsuitable* for LNG vessel traffic most of the time because the tide height is *lower* than 6' 3" most of the time. The navigation suitability determination conducted by the applicant, and approved by the US Coast Guard, has demonstrated that vessel transit conditions occur in the Coos Estuary that are suitable for scheduled transits of vessels having a 12-meter draft. However, the suitability study does not address safety concerns associated with a possible need to make unscheduled, emergency use of the channel, such as those encountered during the arrival of sea waves from remote or local seismic events, or from accidents, or deliberate acts of terrorism.

The Federal navigation channel is maintained at -37 'below mean low-low water. The 12-meter draft approved by the Coast Guard for LNG vessels equates to 39 feet 4 inches. The Coast Guard requires an additional depth amounting to 10% of the vessel draft for under keel clearance. That's 3.9 feet = 3'11". Thus, the minimum depth required to safely operate an LNG vessel having a draft of 12 meters is 39' 4" + 3' 11" = 43' 3". To attain the required depth of 43' 3" the Federal navigation channel needs and additional 6' 3" of tide water on top of the 37' Federal navigation channel depth which is measured from the mean low-low water mark. 37'+ 6' 3" = 43' 3".

The need for 43 feet 3 inches of depth to transit an LNG tanker in the Federal navigation channel means that ANY time the tide elevation in the Coos Estuary is lower than 6'3" it will not be feasible for an LNG carrier to safely use the Federal navigation channel. I have not done the calculations on the percentage of time that unsuitable tide elevations

are below 6'3" in Coos Bay, but simple (and verifiable) answers to this question are "a lot of the time" or "most of the time". On the day I wrote this (January 16, 2019) however there were 22 hours when the tide elevation was lower than 6'3" in Coos Bay. It is not necessary to evoke a tsunami scenario to point to the safety related risks associated with the inability of a vessel to use the channel for emergencies or other unscheduled transits. One only needs to consider that moving a vessel (for any reason) into the channel at tide elevations lower than 6' 3" is *not* feasible. Vessels will be "trapped" at the berth by the tide most of the time. This observation supports the applicant's need to dredge the berth and access channel to 49' because doing so will create the only location in the estuary having sufficient draft to keep a vessel from grounding during periods of low tide. This observation also supports the observation that full design-scale operation of the LNG terminal will require deepening and widening the Federal Navigation channel raising questions related to the **independent utility** of the work described in this application. Subsequent to the issuance of this permit, it is highly likely that the applicant will approach DSL and the US Army Corps of engineers with a proposal to expand the Federal navigation channel. The applicant's unstated but reasonably anticipated request for authorization to further impact wetlands by expanding the Federal navigation channel will doubtless be justified in the name of safety and economic expediency, but leaves questions related to the independent utility of the current application unresolved.

6. If attainment of full design capacity of the project requires deepening and widening the Federal Navigation Channel, it may not be feasible because the requisite channel expansion work may exceed some practical physical limits of the Coos Estuary.

The geologic setting and physical configuration of the Coos Estuary impose practical limits on the nature and scale of maritime activities suited to this port. The proposed use of the Federal navigation channel is conceivably at or beyond several of these practical physical limits. The current Federal navigation channel is maintained at a depth of -37' MLLW. Work in the 1990's to expand the Federally navigation channel to its currently authorized operating depth and configuration involved excavation of substantial quantities of bedrock in the lower reaches of Coos Bay.

The applicant has expressed an intent to construct an LNG production facility and berth for LNG vessels that exceed the present-day operational specifications of the navigation channel by proposing an access channel, slip and vessel berth configuration capable of handling vessels larger than those currently authorized by the US Coast Guard for this port. With the encouragement of and over $4 million of financial support provided by the LNG terminal project proponents, the Port of Coos Bay has recently (2017) submitted a request to the US Army Corps of Engineers to examine the feasibility of deepening and widening the Federal navigation channel in the Coos Estuary. The US Army Corps of Engineers has initiated NEPA EIS Scoping for this proposed work and a draft EIS for this study is in preparation.

The EIS for the most recent (1993) Federal navigation channel deepening project evaluated options to excavate the channel up to 3 feet deeper than the currently approved depth of -37' MLLW. This prior analysis clearly demonstrates that work to

expand the Federal navigation channel beyond its currently authorized configuration will require removal of tens of millions of cubic yards of additional sand and bedrock sediments. The Port of Coos Bay's current EIS request would involve deepening and widening the federal navigation channel well beyond the scale evaluated in the studies conducted in the early 1990's that identified the physical challenges and prohibitive costs associated with dredging into the bedrock underlying the bottom of the estuary.

It is premature to predict the outcome of the most recent EIS process initiated by the Port as the draft EIS is currently in preparation. It is reasonable to state that the feasibility of dredging the channel to the depth and width necessary to accommodate very large LNG cargo carriers of the size desired by the LNG terminal proponents will be greatly influenced by the geology and physical configuration of the Coos Estuary. The Coos Bay Navigation channel expansion EIS process being conducted by the USACE should help to determine if using the Federal Navigation Channel for large LNG tank vessels of the size preferred by the project applicant [up to 217,000 cubic meters cargo capacity Resource report 1 (Pages 56 and 63)] is within or beyond the practical physical and geological limitations imposed on the port of Coos Bay. Thus, **it is premature to consider issuing a permit to construct a marine slip and navigation access channel as proposed in application. The DSL permit request should be denied.**

Comments of Michael Graybill in response to DSL joint permit application and call for comments on a proposal from Jordan Cove Energy Project L.P. to the Oregon Department of State Lands on 7 November 2018.

CHAPTER 8: COMMENTS ON THE PROPOSED ACCESS AND UTILITY CORRIDOR

The applicant has proposed to construct an elevated earth fill causeway connection between the LNG liquefaction facility on the Ingram yard property and other facilities located on the South Dunes property. The causeway will cross two of the largest wetlands in the terminal area. In several instances, the renderings of structures in the permit application fail to provide information critical to an objective assessment of impacts on wetlands. They include but are not limited to:

1. Figure 6.1-16 (Page 79) includes cross section C-C showing placement of fill on top of wetland 2013-6 and 2013-2. The information on the length and location of section C-C is insufficient, and the applicant should be required to modify the section to provide additional information needed to evaluate the impacts to the wetlands in this figure. While the northerly limit of Section C-C begins in the central portion of wetland 2013-6, the southerly limit of section C-C stops at the northerly margin of wetland 2013-2. As a result, it is not possible to determine the relationships between the surface elevations of these wetlands. Also, the location of section C-C does not make it possible to determine the surface elevation or topography of Wetland 2013-2 or the elevation of the proposed 36"-diameter culvert connecting wetland 2013-6 and wetland 2013-2. **The applicant should be required to provide a new section enabling permit reviewers to better evaluate the relative heights of these wetlands and important aspects of the proposed 36" diameter culvert.**

2. Figure 6.1.5 (Page 68) proposes to install a 36" diameter culvert having a length of approximately 200' to connect wetland 2013-6 and Wetland 2012-2. On page 282 the applicant states the culvert *"will aid in maintaining water circulation and faunal movement following construction".* Further on page 282 the applicant states *"A culvert connecting Wetland 2012-2 with Wetland 2013-6 will provide passage for amphibians, small mammals, and other organisms, and will restore a surface water connection between these wetlands that currently does not exist".* Presumably this culvert will be buried under the access and utility corridor. The application does not state the elevation at which will the culvert be placed relative to the soil surface or the annual variation water surface elevations in these wetlands. As a result, **it is not possible for a reviewer to evaluate the likelihood that the culvert connectivity approach proposed by applicant is feasible or will attain the stated functions**.

The applicant has stated that a surface water connection between wetlands 2013-6 and 2012-2 does not currently exist. What then is the need for or value of placing a culvert to establish a surface water connection? Do the seasonal changes of water surface elevations of these wetlands vary in sync with or independently of one another? What are the existing ground water linkages between these wetlands and how will the construction of the access and utility corridor impact these linkages? Is the intent of the culvert to replace hydrological links between the wetlands that will be impacted by the construction of the Access and Utility corridor? Will the ends of the culvert be permanently submerged? What are the expected water surface elevations, water depths and flows anticipated in the culvert? How was the size and placement of the culvert determined? **Unless substantial flows are expected to exchange and refresh the water in the culvert, dissolved oxygen levels of water and sediment in the culvert may be diminished or fully depleted during periods of low flux creating a passage barrier for aquatic organisms**. **Alternately, during periods where the ends of the culvert are fully submerged by**

seasonal variations in surface water elevations, the culvert may have limited or no value or function as a passage corridor for the "small mammals" identified by the applicant.

The size and proximity of these wetlands to one another suggests that terrestrial, amphibious, and avian species utilizing these wetlands are able to move freely between them in their current condition. How will the construction and operation of the Access and Utility corridor impact movements of terrestrial, amphibious, avian and aquatic species between these wetlands? As the construction of the Access and Utility Corridor is highly unlikely to enhance the connectivity of these wetlands, their functions and values are likely to be degraded during and following construction of the Access and Utility Corridor. **DSL should require the applicant to more explicitly address the degradation of functions and values of these wetlands resulting from the construction of the access and utility corridor**

3. Drawing number DS3218 (page 1075) indicates a bridge having a length of approximately 425' traversing an area of wetlands. This map appears to be in the vicinity of the "Access and Utility Corridor" referenced elsewhere in the permit application. While the wetlands identified in the vicinity of the bridge on Drawing number DS3218 are not specified, they appear to be in the same location as wetlands designated elsewhere in the application as wetland 2013-6 and 2013-2. A portion of the bridge span in Drawing number DS3218 appears to traverse the location of a proposed 36'diameter culvert designed to provide connectivity between wetlands 2013-6 and 2013-2 (page 79). The application thus includes two alternative solutions to protecting wetlands while constructing an Access and Utility Corridor over the most extensive fresh water wetlands found on the LNG terminal site. One alternative proposes an access and utility corridor that incorporates a 425' long bridge crossing over wetlands 2013-6 and 2013-2 (page 1075). The current, "preferred" alternative advanced by the applicant proposes to abandon the bridge wetland crossing proposal and replace a 425'-long bridge with an earth berm causeway atop the wetland with a 36" diameter culvert underneath it. **The applicant should be required to substantiate why the previously planned bridge over the wetlands has been abandoned and replaced with a plan that has greater impacts to wetland functions and values.**

A possible rationale to support Jordan Cove's decision to not build a bridge on the Access and Utility corridor may be found in Table 1.2.2 (page 10) of Resource Report 1 submitted to the FERC September 2017. The table is entitled "Major Changes from CP13-483-000 for the JCEP LNG Terminal Facilities". The applicant identifies that the design in CP13-483-000 included an access bridge from the South Dunes to the LNG Terminal in the Utility Access corridor and proposes to delete the bridge from the design. The reason given to delete the bridge provided in table 1.1-2 is based on a proposed change in the location of the fire department. No reference is made to the impact of this proposed change on wetlands underlying the Access and Utility corridor. Clearly this design change holds potential to impact the wetlands in the vicinity of the Access and Utility Corridor.

In order to address DSL's permit review criteria, applicants must provide an analysis of alternatives designed to avoid or minimize impacts to wetlands. Although this reviewer was unable to locate any analysis of alternatives to the proposed solution to construct an access and utility corridor consisting of an earth fill causeway with 36" diameter wetland connection culvert, the materials provided by the applicant appear to provide an alternative to the proposed work. Although a more thorough analysis is warranted, it appears reasonable to conclude that a 425' long bridge span above two adjoining wetlands holds potential to have significantly less impact on wetland functions and values

than the earth fill causeway affixed with a 36" diameter culvert; the action proposed by the applicant. DSL should not issue a permit until the applicant has enumerated and evaluated alternatives to the proposed solution. DSL should not issue a permit that includes proposed actions that fail to avoid or minimize impacts to wetlands to the maximum practicable extent. **An Access and Utility corridor that incorporates a bridge over adjacent wetlands is very likely to have fewer spatial impacts and impacts to wetland function as and values than a permanent earth fill and culvert.**

4. The proposed Access and Utility corridor may impact wetlands of conservation concern

The Oregon Department of State Lands has identified interdunal wetlands as a wetland type of Conservation concern (https://www.oregon.gov/dsl/WW/Documents/wetland_cons_concern.pdf) The wetlands impacted by the proposed access and utility corridor appear to resemble this wetland type.

Section 6.1.2 entitled "Site Preparation and Ground Improvements" (Page 89) states the finished grade elevations for the Access and Utility Corridor well be *"approximately +46 to 66 feet NAVD".* This section further defines Ground improvement actions to be taken as:

> *"Ground improvements refer to the removal of an organic layer of soil, followed by vibratory compaction of the subsurface sand below and on the perimeters of the project design footprint. Any ground improvements will occur within the JCEP Project Area and under the toe of the slope. Site work will begin with grubbing and removal of the organic layer, followed by sand vibratory compaction, which includes filling localized compacted areas with sand to make the soils more dense. Compaction may be followed by excavation and deep soil mixing or peat removal in areas containing peat to reduce settlement. Ground improvements will result in temporary impacts where they affect wetlands and overall are not anticipated to affect wetland hydrology".*

Wetlands 3013-2 and 2013-6 almost certainly share a common groundwater source known as the dunes aquifer. Sands in the dune system were deposited by aeolian processes that other investigators have characterized. Vertical and horizontal water infiltration rates through these wind deposited sand sediments are considerably different with the difference being attributed to the shape and orientation of the wind deposited sand particles. The dune sand system in the vicinity of the terminal appears to have substantially greater horizontal flux rates through the accumulated sediments than the vertical flux rates. The "deep soil mixing" and "sand-vibratory compaction" sitework prior to the construction of the access and utility corridor is likely to alter the horizontal groundwater flux rate that is fundamental to the function of these wetlands. **No permit should be issued before an evaluation of how the site work and associated construction of the access and utility corridor is likely to alter or impact the ground water system that supports wetlands 2013-2 and 2013-6.**

Comments of Michael Graybill in response to DSL joint permit application and call for comments on a proposal from Jordan Cove Energy Project L.P. to the Oregon Department of State Lands on 7 November 2018.

CHAPTER 9: IMPACTS TO WETLANDS NOT ADEQUATELY DISCUSSED IN THE APPLICATION.

Introduction:

As proposed, the project will result in longstanding and avoidable post project "Legacy Impacts" to wetlands following the end of the project.

Dredging and filling involves earthwork. The Coos Bay estuary bears the scars of 150 years of projects that, for one reason or another included a need to dredge, drain or fill its wetlands or waterways. The shoreline is scattered with wetlands stacked under dozens of feet of sediments dredged from the channel, it has miles and miles of dikes and tidegates that altered huge sections of estuarine wetland habitats. Over the years no less than ten projects involved digging mud and sand from the channel bottom to make the Federal navigation channel ever deeper and wider in the name of commerce and economic development. The last time the channel was expanded we ran out of sand and encountered the bedrock that underlies the bottom of the bay. At some point there has to be a limit. Will that limit be when 100% of the shoreline is lined with steel sheet piling and rock revetments? Will that limit come when all the wetlands have been impacted? The marshes of the Coos estuary stand at 90% impacted, 10% remaining.

The current project is the next in this 150-year string of projects that have dug, filled, drained and most recently chiseled away at the bedrock bottom and shoreline of this estuary. This proposal is the first major proposal in many years to further reduce the remaining area of intertidal and shallow sub tidal tideflats by digging yet another hole in the side of the estuary in the name of economic development. The project proposes to dig out a new portion of the estuary and stack it up on a former piece of the estuary that has already had sediments dredged from the bottom in support of some now long forgotten economic development project. There is a pattern here. Economic development projects come and go but the legacy of their wetland impacts and the cumulative loss of the benefits once provided by those wetlands continues long after the hoped for economic benefits of a project are gone. While it is difficult for me to believe, the proponents of this project anticipate it will have a lifespan of 25 years. The earthwork required to achieve the benefits of this limited term project lifespan will persist for many centuries after the project has come and gone.

The only way the DSL Director can issue a permit to impact wetlands is if the benefits of the project offset the impacts to Oregon's wetlands and waterways. The DSL Director also has the authority to place conditions on any wetland fill and removal permit the agency issues. Time will tell if this project produces the hoped-for benefits being advanced by this project's proponents, but one thing is certain; at some point in the future this project will end, and its promised benefits will end too. When the benefits of a project that impact wetlands end, the only thing that will remain is the impacts to the wetlands that the project produced.

We need to end the time where wetland impacts having timespans greater than two years are considered "permanent" wetland impacts. DSL has the ability to distinguish long term but reversable impacts from "permanent" impacts. Greater consideration to measures designed to minimize impacts to wetlands must be given prior to granting permission to permanently impact wetlands. We now live in

a time where it is possible to restore longstanding historically impacted wetland habitats. This is evidenced by the applicant's proposed wetland mitigation plan to restore a historically impacted wetland. The community of Coos Bay is home to two organizations that have been pioneers in the field of wetland and watershed restoration; The South Slough National Estuarine Research Reserve and the Coos Watershed Association.

When the public benefit that a project provides comes to an end, the party responsible for any long term but reversable impacts to those wetlands should be required to restore the wetland functions that occurred there before the start of the project. **If DSL is compelled to issue a permit for this project, a time dependent condition should be placed on the permit. At the end of the project, when the benefits of the project that justified the impacts to wetland are no longer being realized, the permit holder should be required, at minimum, to restore the long term impacted wetlands to a pre-impact condition.**

Although only certain types of wetlands impacted by this project will require compensatory mitigation under DSL fill and removal program rules, large additional areas of wetlands associated with this project will be impacted even if state laws do not require compensatory mitigation to offset those impacts. Those impacts should not be overlooked or undervalued in the agency's analysis of impacts. Attachment I (pages 1078-1349) includes an extensive and detailed discussion of project impacts requiring compensatory mitigation. The discussion and analysis in the section is so extensive that it might lead one to believe that this section is a comprehensive accounting for all the wetland impacts associated with this project. Attachment "I" however is not a comprehensive accounting for all wetland impacts associated with this project.

Oregon's fill and removal law only requires compensatory mitigation for impacts to certain types of wetlands (such as vegetated marshes). Other types of impacts to wetlands such as sub-tidal estuarine habitats do not benefit from the protective compensatory mitigation provisions of the fill and removal law. This exemption from required compensatory mitigation should not be construed as meaning that these wetlands do not also provide public benefits or support recreation or fisheries; attributes that DSL is obliged to protect on behalf of the public. The exemption from compensatory mitigation requirements should also not preclude these impacts from being included in DSL's evaluation of the cumulative impacts to wetlands associated with this project. A large proportion of the total wetland impacts associated with this project involve impacts to functioning wetland types that do not currently require compensatory mitigation. The lack of a requirement for compensatory mitigation should not exempt the applicant from providing a full analysis of all anticipated wetland impacts. DSL should not overlook the totality of impacts to wetlands while evaluating the costs and benefits of the project. **DSL should, as part of its permit review, consider that the proposed benefits of the project will impact large spatial areas of sub tidal estuarine wetland habitats in addition to the wetland impacts requiring mitigation that are the focus of much of the permit application.**

The applicant fails to adequately address how the proposed construction of the LNG terminal facilities will impact ground and surface water flux between the Dunes aquifer and the receiving waters and wetlands of the adjoining Coos Estuary. Domain boundaries of models, and model simulations that I have been able to find in materials submitted by the applicant are primarily concerned with potential flux of salt water toward the fresh water aquifer resulting from withdrawal of fresh water from the aquifer. The models and narrative discussion fail to adequately discuss the impacts of changes

of fresh water fluxes from the fresh water aquifer to the habitats and wildlife of the adjoining estuary resulting from construction and operation of the North Spit LNG terminal.

Issues with potential impacts to wetlands of the North Spit to be considered include, but are not limited to:
1. The proposal to stack and dewater dredged sediments above the water table at the Jordan Cove and South Dunes LNG Terminal areas will alter rainwater infiltration and seasonal groundwater recharge dynamics that support wetlands in the vicinity of the project.

2. Deposition and dewatering of sediments dredged from the navigation reliability improvement sites at the APCO #1 and #2 dredged material disposal sites will initially elevate the soil surface a minimum of 37 to 49 feet above the existing soil surface elevations at these sites. These activities hold potential impact ground water quality and seasonal groundwater recharge dynamics of wetlands in the vicinity of the dredged material disposal sites.

3. **Proposed work in the Jordan Cove plant area a will impact the hydrology and the wetlands in the area.**

Prior to planned placement and dewatering of sediments above the existing grades at in the LNG terminal area, the applicant proposes to excavate, dewater, compact and stabilize soils that will underly the LNG terminal structures (see Section 6.1.2 page 89). Excavation and dewatering actions are aimed at removing lenses of unstable peat and clay from the sediment horizons underlying the locations of LNG terminal structures. Proposed soil dewatering operations involve constructing a network of shallow water wells that will be installed and operated in the project areas to be excavated prior to final grading and facility construction. The objective is to compact and stabilize the soil below proposed LNG terminal structures. Aspects of the soil stabilization dewatering well network are described in Resource Reports submitted to the FERC "*The dewatering system will consist of well points having 12-inch-diameter slotted polyvinyl chloride (PVC) screens, extending from 20 feet below natural grade to 50 feet below natural grade. Well points will be spaced approximately 200 feet apart. Each well point will be fitted with a 5- to 7.5-horsepower pump. KBJ anticipates that a maximum of 22 pumps will be required at any one time during the project."* Water pumped from the soil stabilization sites will be spilled onto the soils at other locations in the project area where it is expected to infiltrate into the porous soils and reenter the groundwater system of the Dunes Aquifer.

Ground water exposed during fresh water phase of excavation of the proposed marine slip will also be pumped away from the excavation site to facilitate sediment removal using conventional land-based excavation and sediment transportation methods. When the water table in the fresh water excavation phase of slip construction is exposed to a point where conventional excavation methods are no longer viable, excavation equipment and land-based sediment transport to disposal areas will be replaced with floating dredge equipment and liquid sediment slurry pipeline sediment transfer methods. Piped sediments will be pumped to sediment disposal areas within the terminal area where they will be dewatered. The following description of the coupled surface and ground water system known as the Dunes Aquifer is derived and excerpted from a report entitled: "Ground-Water Availability from a Dune - Sand Aquifer Near Coos Bay and North Bend Oregon" by M.A. Jones, US Geological Survey open file Report 90-563. Portland OR 1992:

Hydrogeology (Page 4):
The Dune Sand aquifer is about 13 miles long and 1.5 miles wide. The aquifer is bounded to the west by the Pacific Ocean, the shore of the Coos estuary to the south, Tenmile Creek to the north and the North Slough of the Coos Estuary to the east. The total area of the Holocene Dune sand deposit that contains the aquifer is 19.5 square miles. The surface of the groundwater aquifer is exposed as a one quarter to one half mile wide deflation plane east of the foredune that fronts the Ocean along the entire length of the aquifer. "This flat plane is commonly saturated as a result of seasonal ground-water fluctuations…"

Hydrogeologic Framework (Page 5):
"The Dune-sand aquifer is generally on the order of 100 feet thick. Maximum thickness is about 200 feet in the area near Horsfall and Spirit Lakes…"

"The thickness of the deposit varies because of differences in the surface topography and the altitude of the base of the deposit. The surface topography of this deposit ranges from 60 feet below sea level in the offshore region of the study area to over 100 feet above sea level in areas of the bare sand ridges. The altitude of the base of this deposit ranges from 180 feet below sea level in the area of Horsfall and Spirit Lakes to a few feet above sea level in the northeastern part of the study area (fig. 4). "

Figure 4.(Page 6):
The base of the Holocene-age sand dune aquifer deposit in the vicinity of the proposed Jordan Cove LNG terminal is between 80-110 feet below sea level.

Ground water levels and Movement (Page 9)
A series of lakes lie just to the north of the proposed LNG terminal location. In addition, a series of wells operated by the Coos Bay North Bend Water Board are used to provide a supply industrial and domestic water. As a result of the use of the aquifer by a municipal water authority, Water levels in the lakes and in an extensive series of wells have been carefully studied through the years.

"Water levels in the lakes are and expression of the water table and are continuous with the dune aquifer (Robinson, 1974)…." "Seasonal variations of water levels in the lakes and the wells are similar" "Historically, the lakes have been observed to have varied 3 to 6 feet."

"Water table contours in figure 8 indicate that ***the general direction of ground-water flow in the dune aquifer is towards*** *the Pacific Ocean,* ***Coos Bay, (emphasis added)*** *North Slough, and Tenmile Creek. Horizontal ground-water gradients North of Beal Lake are as much as 50 feet per mile from east to west. South of Beale Lake,* ***the ground water flows*** *eastward toward North Slough, westward toward the Pacific Ocean, and* ***southward*** *through or beneath Horsfall and Spirit Lakes* ***toward Coos Bay with gradients from 10 to 30 feet per mile." (emphasis added)***

The Jones 1992 description of the Dunes aquifer in the reference above, as well as descriptions of the aquifer included in the materials submitted by the applicant, clearly demonstrate that there is a significant horizontal flux of fresh water from the Dunes aquifer into the Coos Estuary in the region of the proposed Jordan Cove LNG terminal. The North Spit area is a porous sand system underlain by impervious sediments. Importantly, the western and southern boundaries of the aquifer drain into the tidally influenced wetlands of the Coos estuary to the south and east and the marine waters of the

Pacific to the west. It is important to state that the lateral boundaries of the Dunes aquifer in the vicinity of the estuarine shoreline are not bounded by impervious materials. Further, it is also important to note that horizontal flux rates of water in the aquifer are far greater than the vertical flux rates.

The seasonal flux of fresh surface and ground water moving from the dune aquifer into the estuary likely plays a role in the seasonal surface topography of the water table that supports wetlands on the North Spit. These dynamics include the timing of the seasonal expression of the water table above and below the existing land surface topography and the wetlands that are associated with these seasonal variations. Further, the unconstrained link of the aquifer to the adjoining estuarine tideflats likely plays an important habitat defining role in seasonal estuarine interstitial soil pour salinities of the intertidal and sub tidal wetlands exposed to the horizontal flux of ground water. The estuarine wetlands that receive water from the dune aquifer supports biota including mollusks, fish, and plants that are likely responding to seasonal variations of fresh ground water discharges into the estuary from the Dune aquifer.

The Applicant proposes to install several thousand lineal feet of steel sheet pile bulkhead along the shoreline of the estuary in the vicinity of the LNG loading berth, disabled vessel lay berth, and material offloading facility (Resource report 1 Figure 1.3-6) The overall length of the sheet piling bulkhead is not fully described but based on proposed dredging depths of the slip and access channel and the bollard heights and hard arm elevations necessary to clear the deck heights of the LNG tankers sheet piling bulkhead lengths can reasonably expected to be on the order of 100’ - 150’. Dredged sediment surface depths in the berthing area are proposed to approach 50 feet below mean low-low water and are to project an additional 35 feet above the ordinary high water level. It will be necessary to drive the sheet piling into the sediments well below the level of the dredged sediment surface meaning creating a barrier that is impervious to water movement that extends over most if not all of the entire height of the dune aquifer water column along the length of the proposed sheet piling bulkheaded estuarine shoreline.

Construction of the sheet pile bulkhead at the LNG terminal will likely serve to alter groundwater flux in the direction of the estuary along the length of the shoreline to be bulkheaded with sheet piling. The alteration of fresh water flux to the estuary holds potential to increase interstitial estuarine sediment pore water salinity resulting in a negative impact to biota occupying the site that is adapted to existing conditions of unrestrained fresh water flux into the estuary from the dune aquifer.

Alteration of fresh water flux into the estuary resulting from the installation of an impervious sheet pile bulkhead will also likely alter the duration of the and height of the seasonal expression of the water table above the surface of the North Spit wetlands in the vicinity of the project. **Modification of submergence times and water depths of seasonally flooded fresh water wetlands in the project area resulting from changes to horizontal movement of ground water in the dune aquifer should be examined prior to issuance of a permit.**

4. Implications for rainwater infiltration and aquifer recharge

The depth and porosity of sediments overlying the dune aquifer that supports wetlands in the vicinity of the terminal play a role in defining the rate of rainwater infiltration and aquifer recharge. Actions proposed by the applicant are likely to alter infiltration rates impacting wetland functions dependent on the current conditions**.** Studies cited by the project applicant indicate that vertical ground water flux rates are as much as 200 times slower than horizontal measured horizontal flux rates. This appears to be linked to the sediment particle shape and particle orientation tied to the Holocene aeolian and littoral sediment transport and deposition processes that created the North Spit of Coos Bay. Issues involved include but are not limited to:

- The applicant proposes to dramatically increase the sediment surface elevations overlying the dune aquifer at several locations in the LNG terminal area and the area overlying the water table under the APCO #1 and #2 sediment disposal areas. **The proposed surface elevation changes are likely to alter the rate of delivery of rainwater to the underlying aquifer and the wetlands supported by the aquifer.**

- The removal of peat and clay sediments, and compaction and stabilization of soils underlying structures of the proposed facility hold potential to alter the vertical and horizontal flux rates of ground water in where soil stabilization treatments are proposed.

- Construction of the berthing area is proposed to include installation of 6,000 pilings including replacement and displacement type pilings. Placement of large numbers of pilings also holds potential to alter horizontal flux of ground water. Pilings can also alter vertical flux rates by creating vertical pathways that facilitate the flux of water.

- Construction of roads, parking areas and structures will cover the existing dune surface groundwater recharge area with impervious surfaces that will alter the volume, location and rate of delivery of rainwater to the underlying aquifer and the wetlands they support.

5. **Effects on Henderson Marsh**

The proposed marine slip area overlays a historic portion of Henderson Marsh, one of the only North Spit locations to discharge surface water into the estuary. I found no discussion of how the proposed activities are likely to impact surface water discharges entering the estuary from the Henderson marsh area. **The DSL permit review should include a consideration of how the proposed activities will impact ground and surface water discharge characteristics entering and emanating from the Henderson Marsh wetland complex.**

I was unable to find a detailed description of the vessel slip construction sequence. The sequencing of sheet pile installation and excavation work holds potential to either accelerate or diminish the rate, timing, and volume of fresh water movement from the dune aquifer into the adjoining estuarine wetland habitats. For example, if construction of the temporary barge landing precedes installation of the sheet piling perimeter of the fresh water portion of the slip, the horizontal flux of fresh water from

the dune aquifer through the temporary berm could be expected to increase as a result of removal of soils in the fresh water slip construction area.

If the fresh water phase of the slip construction involves excavation of sediments below the water table, prior to sheet pile installation, flux of fresh water through the berm into the adjoining estuarine wetland habitats can be expected to increase. Conversely, if the fresh water phase of slip construction involves extensive pumping and dewatering of the slip excavation area, the surface elevations of the water table in the vicinity of the slip area will be lowered, as a result of the construction work. This holds potential to impact the seasonal dynamics of the Henderson marsh wetlands that adjoin and underly the project site as well as the estuarine salt marsh and tideflat wetlands adjacent to the construction area.

6. **Reduction of aquifer discharge due to dredging for the slip**

Wetlands in the Dune system are closely linked to the groundwater of the dunes aquifer. Excavation of the 20 plus-acre slip will decrease the area available for groundwater recharge in southern portion of the Dune aquifer because once the slip is excavated, rain falling on the slip will fall directly into the estuary instead of onto the present-day land cover and into the aquifer. The area in the vicinity of the proposed project area receives an average of 65 inches of rain per year. The 22-acre reduction in the size of the aquifer is likely to result in and annual reduction of 119-acre feet of fresh water input to the dune aquifer. **The anticipated permanent annual volume of water lost to the aquifer is not insignificant and the DSL should include the loss of groundwater aquifer recharge among the negative impacts to water resources linked to the applicant's proposal**.

7. **Degradation of the dunes aquifer and associated wetlands**

Spoiling and dewatering saturated estuarine sediments on sites overlying the dune aquifer holds potential to introduce salt containing estuarine water into the underlying fresh water portions of the dune aquifer. Further, the porosity and permeability characteristics of the sediments to be dredged from the estuary and placed atop the wind deposited sediments of the project site are likely to differ substantially from the native Holocene dune soils at the site. *The DSL review of the application should include consideration that dredged estuarine sediment soil pore water salinities could degrade the water quality in the dune aquifer.* **The DSL review should also include consideration of how sediments placed above the dune aquifer might alter or degrade the infiltration characteristics and ground water recharge characteristics of the dune aquifer and the wetlands that are supported by the aquifer.**

8. **The DSL review of the proposal should include consideration of changes to vertical and horizontal fresh water flux rates into the dune aquifer and its associated wetlands as well as the adjoining wetlands of the Coos estuary during the various construction phases of the slip, and LNG terminal facilities** including but not limited to:

1. the fresh water excavation phase of the slip while the temporary shoreline berm is in place,
2. during the construction and operation of the temporary barge berth,
3. during dredging of the fresh water portion of the slip prior to installation of the sheet piling bulkhead
4. following placement of the sheet piling bulkhead
5. during soil stabilization sediment dewatering work,

6. following compaction and stabilization of sediments underlying structures,
7. following installation of the 6,000 replacement and displacement pilings
8. during and following dredged material deposition and dewatering of terrestrial and estuarine sediments placed on top of existing soil surfaces above the dune aquifer
9. following removal of the temporary shoreline berm,
10. following excavation of the navigation channel approach and turning basin.

Comments of Michael Graybill in response to DSL joint permit application and call for comments on a proposal from Jordan Cove Energy Project L.P. to the Oregon Department of State Lands on 7 November 2018.

CHAPTER 10: COMMENTS REGARDING THE PILE DIKE ROCK APRON

No permit to construct the Pile Dike Rock Apron should be issued until sufficient information is provided to assess the impacts of the pile dike rock apron structure. There are numerous examples where the permit has insufficient information about the Pile Dike Rock Apron. They include but are not limited to:

1. There is insufficient information in section part F Page 12 which indicates a total fill below the highest measured tide at 39,483 Cubic Yards. Does this fill volume include the fill material to be placed during construction of the pile dike rock apron? Does this fill volume include the fill material to be placed on wetlands at the Kentuck Slough Wetland mitigation site?

2. Table 6.1 Wetland Impacts Summary table (Page 36) identifies wetland habitat types to be permanently impacted by the placement of rock fill to construct the Pile Dike Rock Apron. It is not possible to determine the total volume of permanent fill material required to be placed in order to construct the Pile Dike Rock Apron. Permanent sand and fill material associated with the Pile Dike Rock Apron structure is noted in 4 locations in the "Impact Description" of Table 6.1; 1).Coos Bay intertidal mudflat /sand, 2).Coos Bay Shallow Subtidal,3).Coos Bay Eelgrass, and 4).Coos Bay Deep Subtidal. The manner in which information regarding the Pile Dock Rock Apron is presented in Table 6.1 makes it difficult if not impossible to discern the volume of permanent fill to be placed on "Mudflats" habitat types in order to construct the Rock Pile Apron. Further, it is not possible to understand how the "Total Mudflats" fill volume of 37,789 cubic Yards was derived from the volume estimates presented in the column above this sub-total. permanent estuarine mudflat fill was determined as the numbers presented under the "Permanent Fill" column in the Estuarine Mudflat section of table 6.1

3. Page 88 includes a description of the pile dike rock apron as a rock fill structure approximately 50' wide, 3' thick and 1,100 feet long. The description on page 88 estimates the total rock volume required to construct the pile dike rock apron at 6,500 cubic yards. The description does not clearly state the types and areas of estuarine habitats to be impacted by the structure. Further the description on page 88 does not provide enough detail to determine how the uppermost surface of the rock apron structure will compare to the adjacent undisturbed sediment surface. For example, will the unconsolidated estuarine sediments in the footprint of the structure be excavated prior to placement of the rock fill so that upon completion of construction, the upper surface of the fill is flush with the surrounding undisturbed sediment surface or will the rock be placed on top of the existing sediment surface thereby creating a 3' tall rock berm that runs roughly perpendicular to the prevailing currents in the area? Unless additional design information is provided, it is not possible to reasonably asses the likely impacts of the structure to the wetlands directly within the footprint of the structure or the telegraphic impacts of the structure on adjoining wetlands

4. The applicant states the proposed purpose of the rock apron is to protect pile dike structure 7.3 owned by the US Army Corps of Engineers. The structure is vulnerable to failure from anticipated sediment erosion and channel migration at the margin of the proposed Navigation access channel. The applicant has stated that excavation of the navigation access channel will have telegraphic impacts to

the estuary substrate adjacent to the cut line of the dredging operations as the sediments at the margin of the dredged area adjust to the newly dredged channel margin. The pile dike structure was constructed many years ago to reduce erosion, longshore sediment transport and retreat of the natural shoreline of the estuary in the vicinity of proposed work. Construction of the proposed LNG tanker berth and the navigation access channel will likely change the nature shoreline processes in the vicinity of the pile dike structure which may render the original function of the pile dike 7.3 moot. Has the applicant or the Corps of engineers determined if the pile dike structure will have any function following the construction of the navigation channel access? No permit should be granted to construct the proposed rock apron until it is affirmed that it is necessary to protect this potentially redundant structure. Is the intent of the Rock apron to replace the function of Pile dike 7.3 or does pile dike 7.3 serve some other function that must be protected?

5. The proposed Pile Dike Rock Apron is a significant structure with potentially significant impacts to wetlands and estuarine processes, functions and values in the vicinity. In the absence of any other work proposed by the applicant the need for this structure should be thoroughly evaluated. Further, in order to fulfill its statutory charges, DSL should require the applicant to provide design solutions that avoid or minimize the need to place this fill. Alternatives to the proposed action to construct the pile dike rock apron should be enumerated and thoroughly evaluated before any permit is issued to construct this structure as proposed.

Examples of possible alternate approaches that should be evaluated include but are not limited to

1. Possible elimination/removal of pile dike 7.3.
2. Possible relocation of pile die 7.3 to a location not impacted by the anticipated channel margin equilibration processes.
3. Possible modification of the slope of the proposed Navigation Access Channel margin so that post construction channel migration/equilibration is taken into consideration thereby eliminating the need to protect pile dike 7.3 using the methods proposed.
4. Possible realignment of the dredge cut line of the navigation access channel to accommodate post construction slope adjustments before they place pile dike 7.3 at risk
5. Possible design and construction of a new/replacement pile dike structure at the current location after navigation access channel margin construction equilibration subsides in the vicinity of the current pile dike.

A 3’ tall, 1,100-foot-long rock barb structure projecting from the intertidal shoreline into the sub tidal portion of the estuary holds potential to impact recreation, navigation, estuarine wetland functions and values, and wildlife in the vicinity of the structure. In addition to the Rock Fill described above, Page 111 includes a reference the design of the Pile Dike Rock Apron that also includes extending the LNG berthing slip sheet pile bulkhead at the northwest corner of the access channel an additional 100’ to minimize slope cut back at this location. *No permit should be issued for this structure before thoroughly evaluating the impacts identified above*.

Table 6.1. includes an erroneous and inaccurate characterization of the wetland impacts associated with the construction of the rock apron. Under the column heading “Impact Description”, references to the “rock apron” appears in three sections: “Mudflats”, “Vegetated Shallows”, and “Deep Subtidal”. The narrative description of the rock apron presented on page 88 of the application describes

the it as a linear structure created by placing rock and boulder fill on top of undisturbed intertidal and sub tidal habitats along the western margin of the cut line of the access channel. The Mudflat section of Table 6.1 does not identify any permanent fill material placement associated with the rock apron. Only temporary fill is referenced in the mudflat section. Fill associated with the construction of the rock apron is clearly intended to be permanent. It impossible to determine the area of non-eelgrass and non-deep-water habitat types that will be impacted or the volume of material to be placed on emergent marsh, unvegetated intertidal, and shallow sub tidal habitats using the information presented in table 6.1.

Table 6.1 does not provide a complete description of fill associated with the construction of the proposed rock apron. Further, Table 6.1 lacks a complete description of the types and aerial extent of the habitats that will be impacted as a result of the construction of the rock apron. As a result, it is not possible to conduct a thorough, objective assessment of the impacts to wetland habitats associated with the construction of the rock apron. The information regarding this project element is incomplete. No permit should be issued until the applicant provides sufficient information about this project element to enable an objective assessment of its impacts.

Comments of Michael Graybill in response to DSL joint permit application and call for comments on a proposal from Jordan Cove Energy Project L.P. to the Oregon Department of State Lands on 7 November 2018.

CHAPTER 11: COMMENTS ON THE PROPOSED NAVIGATION ACCESS CHANNEL AND MARINE SLIP

1. Alternatives to the proposed orientation and configuration of the navigation channel access and marine slip are not sufficiently documented in the permit application.

The applicant has provided documentation leading to a decision to select the Ingram yard as the location of the proposed marine slip. However, after the site was identified as the preferred location, the proposal to dredge 5.7 million cubic yards of sediment in the LNG terminal area described in the DSL joint permit application is presented single "take-it-or-leave-it" option. This approach is inconsistent with the explicit directives of the DSL wetlands and waterways permitting program. No permit should be issued without the analysis of alternatives approach mandated by Oregon statutes and administrative rules including an evaluation of approaches designed to avoid or minimize impacts to wetlands.

2. Dredging of the access channel and slip

The drawings that accompany the application show that the access channel will be dredged to 49 feet but will join the Federal Navigation channel that is only 37 feet in depth. This 12-foot difference will mean that the access channel and slip will involve excavation of a sump-like feature next to the Federal Navigation channel. Two consequences are likely from this difference. Water and bedload sediments may potentially become "trapped" in this sump-like excavation. If flushing rates are poor, water in the sump may become hypoxic thus influencing water quality and living marine resources. Bedload sediments from the Federal Navigation channel will move into the newly dredged access channel and slip and reduce its depth, meaning that additional maintenance dredging will become necessary.

There are proposed mitigation actions in associated with the construction of the navigation access channel and marine slip aspects of the project. However, no mitigation is proposed for the permanent impacts to the subtidal estuarine habitats that will be impacted by the Navigation Reliability Improvements (NRI) that are also part of this application. No justification is provided to explain the necessity to mitigate the impacts to some estuarine habitats but not others.

3. **The Navigation channel access and slip proposed by the applicant appears to be designed to accommodate vessels that are substantially larger than what is needed to satisfy the stated purpose and need of the project.**

The applicant has proposed a marine slip designed (among other things) to berth and load LNG carrier vessels with cargo capacities between 89,000 cubic meters and 217,000 cubic meters. [See Table 1.1-1 of Resource Report 1 (page 10) submitted to the FERC September 2017 entitled "Major Changes from CP13-483-000 for the JCEP LNG Terminal Facilities"]. A 2008 Waterway Suitability Report prepared by the US Coast Guard and referenced by the applicant has established a limit for the draft, beam and length of vessels that can be safely operated in the Federal Navigation Channel of the Port of Coos Bay. The DSL fill and removal application [section (5) project specific criteria and alternatives analysis (pages 10 - 11)] states:

> *"The WSR (USCG 2008) was reviewed and assessed for the project and the assessment determined that the Federal Navigation Channel was suitable for transit by a 148,000 cubic meter cargo capacity LNG carrier (JCEP et. al. 2017). The current Federal Navigation Channel navigational depth of -37 ft. MLLW is thus generally considered sufficient for the sizes of LNG carriers that would likely be serving the proposed LNG facility.*

The USCG has established an upper limit for LNG carriers using the Coos Bay Federal Navigation channel with overall dimensions of 950 feet in length x 150 feet beam x 40 feet draft with a nominal LNG cargo capacity of 148,000 m^3 ships (page 278). However, the application states: *"The size of LNG carrier that can be accommodated by the LNG berth is unchanged at 89,000 cubic meters to 217,000 cubic meters*". [Table 1.2-2 (pages 10) of September 2017 Resource Report 1 to the FERC entitled "Major Changes from CP13-483-000 for the JCEP LNG Terminal Facilities"]

In contrast to the nominal dimensions and capacities of the vessels authorized by the US Coast Guard, the nominal dimensions of a "Q-Flex" design membrane type LNG tank vessel with a cargo capacity of 216,200 cubic meters; similar to the capacity proposed by the applicant, are; 1,033.5 feet in length x 164.04 feet beam x 41.01 feet draft. Similarly, the nominal dimensions of a 4 tank "Moss type" LNG tank vessel with a cargo capacity of 217,000 cubic meters are; 1,033 feet in length, x 164 feet beam x 39.37 feet draft.

The Navigation channel access and slip proposed by the applicant appears to be designed to accommodate vessels that are substantially larger than what is needed to satisfy the stated purpose and need of the project. While the US Coast Guard has determined 148,000 cubic meter cargo capacity LNG vessels can safely navigate the Federal navigation channel, the applicant is seeking DSL authorization to construct a loading berth designed to accommodate vessels having cargo capacities up to 217,000 cubic meters; 47 % larger than authorized by the US Coast Guard waterway suitability report. The applicant has not adequately substantiated the need to construct a navigation access channel and slip designed to accommodate LNG tank vessels with overall dimensions and cargo capacities 47% larger than the largest vessels that can safely navigate the Federal Navigation Channel. Attachment B.1 (page 240) states:

> *"The U.S. Army Corps of Engineers ("USACE") suggested that JCEP examine the possibility of a smaller marine slip at the LNG Terminal. The USACE believes that the size of the marine slip could be reduced because the USCG's Waterway Suitability Assessment and Letter of Recommendation limited the size of LNG vessels calling on the LNG Terminal to no larger than 148,000 cubic meters ("m3") in capacity)".*

The applicant rejects this suggestion stating that the US Coast Guard has determined that the proposed slip width of 800' is justified in order to safely maneuver LNG carriers at the berth. The applicant fails to substantiate the need for the North-South linear dimensions of the berth. 217,000 cubic meter cargo capacity vessels are approximately 85 feet longer than vessels having a capacity of 148,000 cubic meters. An 800'-wide marine slip designed to accommodate vessels with a maximum length of 950 feet instead of vessels with a length of 1,033 feet is likely to require less sediment disturbance. It appears possible to reduce the volume of material to be dredged and filled by constructing a "shorter" 800'-wide slip sized to accommodate the largest vessels that can safely transit the navigation channel.

DSL removal fill permit evaluation criteria requires applicants to demonstrate proposed alternatives designed to minimize unavoidable impacts to wetlands and waters of the state. The elements of this project involving the largest volumes of sediment disturbance are associated with the construction of the marine slip and the navigation access channel. It is reasonable to infer that a building a marine slip 85' shorter along its north to south axis than the one proposed will enable the purpose of the project to be attained while reducing the volume of material to be excavated and spoiled.

The applicant has provided information to substantiate why the terminal location was selected but by proposing a single design for the marine slip and access channel, the applicant has failed to demonstrate that the proposed design of the navigation access channel and marine slip is the alternative that maximally avoids and minimizes impacts to wetlands as required by DSL fill and removal program guidelines.

Similarly, the configuration, orientation, and overall dimensions of the navigation access channel are presented as a single "take-it-or-leave-it" alternative. (Figure 6.1-4 page 67). The applicant has proposed an access channel configuration that originates on the westerly flank of the slip and projects in a southwesterly line across the intertidal and sub-tidal areas to the south of the "Henderson Property" wetlands (Figure 6.1-4 page 67) that adjoin the western side of the marine slip. The interface of the western extent of the dredged cutline of the Access Channel and the existing estuarine sediment surface is expected to move in a westerly direction following initial excavation [See Resource report 1: (Figure 1.3-5), Plot plan of marine facilities]. This post-dredging "equilibration" process is anticipated to impact a pile dike rock apron built and maintained by the US Army Corps of Engineers. A minor adjustment of the shape or orientation of the western flank of the navigation access channel holds potential to eliminate the need for this entire structure. Additional analysis of the Pile Dike Rock Apron is detailed in Chapter 10 of this document. Additional analysis of the navigation access channel is provided in Chapter 4 of this document.

Comments of Michael Graybill in response to DSL joint permit application and call for comments on a proposal from Jordan Cove Energy Project L.P. to the Oregon Department of State Lands on 7 November 2018.

CHAPTER 12: COMMENTS OF THE PROPOSED PROJECT ON IMPACTS TO NAVIGATION, RECREATION AND FISHING

OAR 141-085-0565 outlines the Department determinations and considerations in Evaluating Individual Permit applications;

> Excerpt from OAR 141-085-0565:
> (3) Department Determinations. The Department will issue a permit if it determines the project described in the application:
> (a) Has independent utility;
> (b) *Is consistent with the protection, conservation and best use of the water resources of this state* as specified in ORS 196.600 to 196.990; and
> (c) *Would not unreasonably interfere with the paramount policy of this state to preserve the use of its waters for navigation, fishing and public recreation*, when the project is on state-owned lands. (emphasis added)

The comments that follow should demonstrate that if implemented as proposed, the project will result in significant, unreasonable negative impacts on the use of Coos Bay waters for navigation, fishing and public recreation.

1. LNG vessel traffic in Coos Bay will unreasonably limit access to in-bay crab fishing areas.

Most recreational and all commercial crab fishing in the estuary is undertaken using rings. Deploying a string of baited crab rings and then requiring fishers to vacate the deployment area leaving the rings unattended for 30 minutes around slack high tide while an LNG tanker and its associated safety zone passes will seriously diminish the effectiveness of one of the most important methods used to capture crabs in the Coos Estuary. For bay crabbing, as the tide approaches slack high water it is important to check rings on a more frequent basis as this is the time of greatest crab movement and feeding activity. Because crab rings do not retain crabs while the ring is at rest on the bottom, the only way to capture crabs using rings is to bring them rapidly to the surface while actively feeding crabs are present on the baited ring. In contrast to a recreational fishery using traps, the effectiveness of capture using crab rings is based on the frequency upon which the rings, once deployed, are recovered/brought rapidly to the surface. Requiring rings to "soak" for a period of 30 minutes or more will not improve their capture success rate. If transiting LNG carriers require recreational fishers to leave deployed rings unattended for 30 minutes, this requirement will likely render this type of harvest method infeasible/impractical.

Virtually all boat based recreational crab fishing takes place within a two-hour time period centered over slack high water (http://www.scod.com/cities/crabs/crabbing.html). Depending on the number of fishers aboard, it is not uncommon for boat based recreational fishers in Coos Bay to deploy a string of rings or traps consisting of 6, 9,or 12 rings or traps per vessel. It typically takes several minutes to recover, clear, and redeploy each crab ring or trap in a string. It is common practice for

recreational fishers to deploy a string a rings or traps one hour before the slack tide, and check/tend individual rings and traps continuously during the ensuing leadup to slack high water and during the hour following the slack high water. A 30-minute interruption caused by a transiting LNG carrier at in the peak period of fishing activity having a 2 hour feasible time window centered over high tide can readily and reasonably be characterized as a *major* disruption of one of the most important (and valuable) recreational uses of the Coos Estuary.

Requiring recreational vessels to clear long established and preferred crab fishing areas for a half hour to accommodate the passage of an LNG tank vessel will greatly disrupt and interfere with both recreational and commercial crab fishing in the Coos Estuary. While the application describes a moving 500-yard security/safety zone surrounding LNG vessels transiting the estuary, the application does not say where recreational vessels involved in recreational crabbing and fishing activities will be required to go (page 10). The description of areas of the estuary of importance to commercial and recreational crabbers in the Coos Estuary presented on page 10 is an incomplete list. Perhaps the most important area for commercial bay crabbers is a region of the estuary on the margin of the Federal Navigation channel which parallels the south edge of the North Jetty. (https://myodfw.com/articles/where-crab-clam-coos-bay) The Federal navigation channel makes its closest approach to the North Jetty in this region of the bay. Crabbers working in the area between the North Jetty and the Federal navigation channel will be unable to vacate the moving 500-yard safety/security safety zone surrounding a transiting LNG vessel as there is not room to move away from the channel without grounding on the rock jetty. The applicant fails to identify important crab fishing locations in the lower bay where small vessel operators that may become "trapped" between the shore and the moving safety/security zone of an LNG vessel transiting the Federal navigation channel.

Recreational and commercial crabbers and boaters operating vessels to the North and West of the Federal navigation channel required to vacate the moving safety/security zone of a transiting LNG vessel may be faced with a choice of grounding their vessel in the natural shallows at the margin of the bay or on rock revetment structures at the margin of the bay. The other choice available to vessel operators working in areas to the north and west of the federal navigation channel that lack sufficient space to vacate the moving safety/security zone of a transiting LNG carrier is to cross the navigation channel in front of the path of the oncoming LNG vessel. The north Jetty and the shoreline of the North Spit are within the 500-yard safety/vessel exclusion zone of the Federal Navigation channel in numerous locations meaning that these locations are unsuitable for use as refuge/safety areas for recreational vessels to muster during the passage of an LNG vessel. As a result, it may be necessary for recreational vessels to cross the navigation channel in advance of an LNG tanker passage in order to find a suitable muster area that is outside the 500-yard LNG vessel safety/vessel exclusion zone.

2. The description of impacted resources fails to identify the lower bay as a location used by recreational boat operators, paddle sport enthusiast and commercial shellfish harvesters. These recreational and commercial activities will also be impacted by the passage of LNG carriers transiting the bay. Specifically:

a.) The description of impacted resources fails to identify the lower bay on the inside of the North Jetty as a popular recreational surfing spot, particularly during high and near slack outgoing tides, commonly in the winter months or periods of high ocean surf conditions. Surfers access this location by off highway vehicles via the North Spit or by paddling across the estuary from shore points in Charleston.

Surfing in the lower bay is typically associated with winter periods of large ocean swells and strong fresh water runoff. Transiting LNG tank vessels will impact surfing in this location.

b.) The description of impacted resources fails to identify the area of the lower bay, including the area between the Jetties at the entrance to the channel as an important location for recreational salmon fishing in the lower estuary. The practice of "mooching the Bar" is widespread in the fall season and is centered almost exclusively around the hour before and the hour following slack high water. The Transiting LNG vessels will

c.) A commercial crab fishery exists in the lower portion of the bay including the area between the north and south Jetties. This fishery uses commercial crab "rings". Unlike commercial crab traps, deployed crab rings lie flat on the bottom permitting both legal and sub-legal sized crabs unimpaired freedom to enter and depart the ring while deployed. For rings to capture crabs, they must be regularly pulled swiftly to the surface requiring regular tending to fish effectively. The in-bay commercial crab fishery is currently limited to weekdays. In contrast, the recreational crab fishery is permitted year-round, all days of the week.

d.) Sub tidal clam populations in the lower bay have historically been subject to commercial and recreational harvest by fishers employing scuba. The lower bay is also a popular location for boat based recreational scuba divers. Both commercial and recreational scuba diving in the estuary are highly tide dependent activities centered on periods of slack water high and low tides. The safety exclusion zone surrounding LNG vessels transiting the federal navigation channel will impact the ongoing recreational and commercial use of the estuary by scuba divers.

3. LNG vessel traffic in Coos Bay will unreasonably Impact ocean based fisheries.

For a variety of reasons, including fishing seasons and ocean conditions, individual boats involved in commercial fisheries including but not limited to the crab, salmon and pink shrimp work as a fleet. This means that when the season is open and weather conditions are right, many (most?) of the boats in the fishery all head out to sea together. When crab season begins, it looks like a parade in front of my house with boats streaming out of the harbor one after another. Particularly in winter, during commercial crab season, when weather imposes more limitations on the bar than any other time of year, boats at sea work their crab pots while watching the weather conditions decline. Members of the fleet are talking with one another and everyone is paying attention to bar conditions and the tides.

Particularly in declining and marginal weather conditions, the vessels at sea in the commercial fleet all begin to head home around the same time. The previous outbound parade of boats reverses direction and the whole fleet heads for the bar. It can take the entire window of suitable incoming high tide conditions on the bar for the fleet to get back into the harbor. When the tide reverses and begins to ebb, conditions on the bar degenerate rapidly and in a matter of minutes the bar conditions can change from marginal to impassable. Boats that miss this window are forced to ride out the storm at sea until the next high flood tide.

There is not sufficient time to add an LNG ship transit to this scenario without having negative impacts on the existing use of the navigation channel by fishers. If the bar is closed for a half an hour over the high flood tide, to accommodate passage of an LNG carrier made up to multiple tractor tugs, somebody is going to get stuck at sea in bad weather conditions. JCEP has stated the total time required

for an LNG carrier to transit between the harbor entrance and the proposed berth is 90 minutes and that no individual location in the estuary will be impacted for more than 30 minutes. Roughly one third to one half of the LNG carrier's total transit time will occur when LNG vessels transit the lower portion of the bay that is also used by commercial and recreational vessels based in the Charleston harbor. Taking a half hour chunk out of the extremely limited time that the commercial fleet uses to cross the bar to enable an LNG tanker to transit the bar will only have negative impacts on fisheries. Those impacts are serious and potentially life threatening.

The Dungeness crab fishery in Oregon has been characterized as a "derby fishery". During the first days and weeks of the season, a substantial portion of the total annual commercial crab landings are caught in the first days and weeks of the season. Having gear in the water for "the first pull" is critically important. In the days just prior to the start of the commercial crabbing season, fisheries management agencies provide a very narrow window of time for commercial fishers to set out their gear before the first pull of the season. Smaller vessels in the fleet must make multiple trips to sea in order to get all their gear in the water. Thus, in the days leading up to the opening of the commercial crab season and in the days and weeks immediately following the season opening, there are hundreds of commercial vessel crossings over the Coos Bay Bar by boats loaded to capacity with crab pots and live crab. The restrictions imposed by LNG carriers transiting the lower portion of the Coos Bay federal navigation channel will result in significant, quantifiable, negative impacts on use of the channel by commercial fishing vessels. These impacts are not consistent with DSL's duty under OAR 141-085-0565. **The permit should be denied because the work proposed will result in unreasonable interference with use of state waters for fishing and recreation.**

4. LNG vessel traffic in Coos Bay will unreasonably Impact recreation.

Kayaking and stand up paddle boarding are increasingly popular recreational pursuits in the lower portion of the estuary during calm water conditions. Paddle craft operators using the lower portion of the estuary embark for shore launch points on the margin of the bay near the Charleston Marina Complex. It is not uncommon to see Kayak fishers transit the Federal navigation channel between the submerged training jetty near the entrance of the Charleston Channel (known locally as "the cribs") to shore points on the bay shore of the North Spit. Transiting LNG carriers will disrupt this increasingly popular recreational activity.

Construction of the access channel will impact access to and use of the estuary shoreline. The proposed access channel and berth will create an impassable barrier of deep water where an intertidal shoreline currently exists. The shoreline to be impacted will be very near the BLM boat ramp on the North Spit. This facility was developed specifically to encourage recreational access. Shore based fishers and beachcombers currently use the shoreline area of the proposed access channel for recreation. **Construction of the access channel and marine terminal will permanently impact shoreline access and recreational activities associated with the shoreline.**

Comments of Michael Graybill in response to DSL joint permit application and call for comments on a proposal from Jordan Cove Energy Project L.P. to the Oregon Department of State Lands on 7 November 2018.

CHAPTER 13: COMMENTS REGARDING ERRORS, OMISSIONS, AND INSUFFICIENCIES CONTAINED IN THE APPLICATION MATERIALS AND THE UNACCEPTABLE WAY MATERIAL HAS BEEN PRESENTED FOR THE PUBLIC REVIEW COMMENT PROCESS

1. DSL should reject the application on the basis that the materials presented in the application are not presented in a manner suitable for public review and comment.

The overwhelming volume of material included in the application review documents lacks the basic editorial structure needed for reviewers to navigate within and between elements of the documents provided for review, and includes, unnecessary, redundant, erroneous, and unrelated information that interferes with or precludes a thorough, efficient review of the project elements related to the DSL removal fill permit program. The 3,638 pages of material provided for public review and comment in the fill and removal permit application is a complex and disjunct assemblage of documents generated over several years of correspondence and consulting contracts. The quantity and format of materials presented for public review is unrealistic and overwhelming. The presentation of thousands of pages of material precludes adequate opportunity to evaluate a coherent characterization of this project by reviewers lacking familiarity with technical documents and precludes thorough, efficient review by non-affiliated technical experts in the time allotted for public comment.

Some of the documents provided for review describe project elements proposed by previous iterations of this project that have been supplanted and made redundant by newer, revised proposals. Other documents include comparisons of how the activities currently proposed compare to previous proposals that are no longer under consideration. Including descriptions of previously preferred alternatives no longer under consideration only serves to make it more difficult for reviewers to discern and evaluate the actions encompassed by the current version of the permit application.

There are so many redundancies, and layers of appendices and cross references within the application materials that is difficult, if not impossible, to consistently and accurately cite a document reference or page number in review comments. Inclusion of redundant, extraneous and superfluous information makes review of the document cumbersome more laborious. The following examples are included to illustrate the unrealistic quantity of material presented for public comment and the unwieldly presentation of information in the application materials:

1. The application contains a table of contents but the table of contents of the 3,638-page application fails to include page number references forcing reviewers to scroll through a very large document to find individual references cited in the application materials.

2. In the absence of page numbers provided by the applicant in some (but not all) of the application materials, I used the DSL permit application page numbers assigned by the Adobe Acrobat reader application to reference information in the application cited in my comments. As an example, the “Project Description in Attachment A.5 of Part 1 of the application can be found on page 125 of the Adobe Acrobat reader program .pdf document provided by DSL even though this particular attachment has page numbers at the bottom of the page. In this case, the printed

page number at the bottom of the "Project Description" presented as Attachment A.5 is "page 4". I cited this section in my comments as "(Page 125)".

3. The application includes "Attachment E: (Dredge Material Management Plan)" which consists of "F" Appendices. "Attachment F.1" immediately follows Appendix "F" of Attachment E (page 994). Attachment F.1 includes some tables presented with numerical designations (e.g. table 4 on page 1010) while other tables in the attachment F.1 bear letter designations (e.g. Table A on page 1016)

4. Attachment B.1. (Resource Report 10 pages 217-275) makes extensive reference to information contained in "Resource Report 1" but does not provide the referenced information in the application. This citation requires permit reviewers to find the information contained in Resource Report 1 on the FERC document directory. The html address given for Resource Report 1 provided in the permit application leads to a FERC document library page listing links to 40 or so PDF documents having coded titles. In order to find "Resource Report 1", it is necessary to search through the list of document links in the library until Resource Report 1 is discovered. This is not acceptable. All information required to describe the proposed project should be included in the application materials. The application should be rejected because it is incomplete. No permit should be issued until all relevant information pertaining to the potential impacts of the project is presented in the application.

5. Resource Report 1 (referenced in the DSL permit application but retrieved from the FERC Document library and viewed as a .pdf file) includes a table of contents that includes page number references and numbered pages throughout the document. Page number references in my comments related to Resource Report 1 use the printed page numbers included the archived document, not the page numbers assigned by the Adobe Acrobat reader used to access the document.

6. I accessed on the FERC document library on December 24th, 2018 to look at "Appendix B.1 Cumulative impacts Analysis" of "Resource Report 1" referenced in the DSL application. The appendix did not contain any narrative other than the cover sheet. Has a cumulative effects analysis been conducted for this project? If not, when will this analysis be completed? It is not possible to evaluate the cumulative effects of the project without this analysis. It should not be the responsibility of permit reviewers to perform a cumulative effects analysis. This should be the responsibility of the applicant. DSL should not issue a permit until the applicant provides a cumulative impacts analysis of wetland impacts for the project that is accessible to comment upon.

7. It is not possible to easily differentiate the surface types indicated in the key on the map presented in Attachment H: Site Restoration Plan (page 1070). Further, no Legend/Key is provided on any of the subsequent detailed maps making it necessary to scroll back and forth between the map on Page 1070 that includes a legend/key. This may be appropriate for a paper document but it is not appropriate for an electronic file format document.

8. The first section of Table 6.1 [entitled "Wetland Impacts" (page 36)] is a category bearing the heading "Mudflats". The table includes the following three entries for habitats that are not classified as mudflats:

- The first row in this section is titled “Wetland APC-A2”
- The third row of this table is titled “Coos Bay Salt marsh @ AC”
- Row ten under the “Mudflat section is titled “Coos Bay Salt Marsh @ TMBB”

The “Mudflats” impacts section includes erroneous totals because they incorporate non-mudflat, emergent wetland habitats in the summary totals. The application should be rejected because it contains erroneous information.

9. Table 6.1 includes a column heading “Sheet No. ID” but no information is presented in the area under the column. Additional inaccuracies, omissions and insufficiencies in Table 6.1 are described in my comments related to the Pile Dike Rock Apron.

10. The narrative related to the construction of the Access and Utility Corridor [Section 6.2.3.1 entitled “Constructions means and methods (page 97)] includes the following statement:

> *“Areas where ground improvements and/or disturbance will occur in wetlands outside the toe of slope will be restored to pre-project conditions following construction, per the Site Restoration Plan detailed in Attachment H.”*

Attachment H (Pages 1069-1077) is entitled “Site Restoration Plan”. However, the entire attachment includes a series of 8 plan view drawings, each bearing the title; “Surfacing Site Plan”. Information presented in Attachment H incidentally identifies the locations of existing wetlands but nothing in the attachment shows anything related to restoration of wetlands on the site. The primary information content of the drawings is related to identifying the materials that will be used to treat the surfaces of areas to be filled. Therefore, the content presented in attachment H appears to have nothing to do with the stated title of the attachment. No other description of the site restoration plan was found making it impossible to conduct an objective evaluation of this aspect of the proposed work. **No permit should be issued in the absence of a site restoration plan that provides and explicit description of the measures that will be taken to restore individual impacted wetlands. Further, any permit issued should include performance requirements and standards to confirm that wetlands impacted by construction activities have been restored to an agreed upon pre-project condition.**

11. The narrative related to the construction of the Access and Utility Corridor [Section 6.2.3.1 entitled “Constructions means and methods (page 97)] also includes the following statement:

> *“Additional measures for avoiding and minimizing impacts to wetlands and waters are discussed further under Section 6.C, below*.”

A search of the document for the phrase “Section 6.C” indicates the application document includes two references to this phrase; 1) the reference cited above and 2) a use of the phrase on Page 92 describing the construction means and methods used to dredge the access channel. Here, Section 6.2.1.1 includes the following text:

> *“Dredging methods described for the access channel will be generally similar to those that will be used in other dredge areas associated with the Project, including those for the Navigation Reliability Improvements and Eelgrass Mitigation site. Activities taking place at those sites are described in further detail in Section 6.C below*.”

No other reference to Section 6.C was found in the application. The application appears to be incomplete and it certainly appears to have serious editorial shortcomings. Reviewers are sent on a wild goose chase to search for references cited in the application materials that cannot be found. In one case, an entire attachment fails to provide information referenced in the document and in the stated title of the attachment (See discussion of Attachment "H" above).

The failure of Attachment H to provide the wetland restoration actions referenced on page 97 and the failure to include the information regarding eelgrass impacts referenced on page 92 are examples of how this application fails to provide essential information related to construction impacts to wetlands. **As presented, this application lacks sufficient information to enable an objective reviewer to determine the likely impacts to wetlands associated with the proposed work. DSL should not issue a permit in the absence of this essential information. The permit request should be denied or a decision to issue a permit should be postponed or conditioned on the applicant's resubmission of a revised application that addresses the demonstrated and unacceptable level of content and editorial deficiencies in the application as presented.**

12. The application includes no less than 16 references to "Table 6-1". A document search of the phrase "Table 6-1" provides the following citations that include a reference to "Table 6-1":

1. Page 4 *"Wetland impact quantities are provided in Table 6-1."*

2. Page 7 *"Quantities for impacts to vegetated shallows are provided in Table 6-1".*

3. Pages 12 and 13 include four references to Table 6.1 under Section 6 E of the application form which requires applicant to describe "Fill Volumes and Dimensions (if more than 4 impact sites, include a summary table as an attachment)". Because the project involves impacts to more than 4 sites, the applicant directs reviewers to *"See Table 6-1, Wetlands and Water Impact Summary Table"*

5. Page 14 of the DSL application form includes section (8) entitled "Impacts, Restoration/rehabilitation, Compensatory Mitigation. Part "A" of section 8 requires applicants to "Describe unavoidable environmental impacts that are likely to result from the proposed project. Include permanent, temporary, direct, and indirect impacts." The first sentence of the applicant's response under this section directs reviewers to *"See Table 6-1 for detail on the extent of Project specific unavoidable permanent impacts to wetlands and waters resulting from construction of the LNG Terminal."*

6. Page 29 is a table of contents for Part 1 of the Removal Fill Permit Application. Table 6-1 is listed as *"Wetlands and Water Impact Summary Table"*

7. Pages 35 is a cover sheet for Table 6-1 entitled "Wetland and Water Impact Summary Table" However, the table that follows on pages 36 and 37 is entitled "*Table **6.1** Wetland impacts*" (emphasis added). See text following this tabulation for additional discussion related to table 6.1.

8. Page 94 is a description of the wetland and waterway impacts associated with the construction of the Temporary Materials Barge Beth. The first sentence directs reviewers to

table 6-1 as follows: *"Fill and removal impacts will result from construction of the TMBB and access channel. These impacts are detailed in Table 6-1,"*

9. Page 94 is a description of the wetland and waterway impacts associated with the construction of the Marine Offloading Facility. The first sentence directs reviewers to table 6-1 as follows: *"Construction of the MOF will result in permanent fill and removal impacts within Coos Bay, as detailed in Table 6-1".*

10. Page 97 is a description of the wetland and waterway impacts associated with the construction of the Access and Utility Corridor. Reviewers are directed to table 6-1 as follows: *"The construction will result in permanent and temporary impacts to Wetlands 2013-6 and 2012-2 west of Jordan Cove Road, and Wetlands C and E east of Jordan Cove Road, as detailed in Table 6-1"*

11. Page 99 is a description of the wetland and waterway impacts associated with the construction of the South Dunes site. The first sentence directs reviewers to table 6-1 as follows: *"Wetland impacts associated with development of the South Dunes site are detailed in Table 6-1"*

12. Page 101 is a description of the wetland and waterway impacts associated with the construction of the Navigation Reliability Improvements. The final sentence directs reviewers to table 6-1 as follows: *"The wetland and waterway impacts associated with the NRIs are detailed in Table 6-1"*

13. Page 102 is a description of the wetland and waterway impacts associated with the construction of the Trans Pacific Parkway widening. The final sentence directs reviewers to table 6-1 as follows: *"Embankment widening and placement of riprap below HMT elevation will result in permanent impacts to unvegetated mudflats, as detailed in Table 6-1"*

14 Page 111 is a description of the wetland and waterway impacts associated with the construction of the pile dike rock apron. Reviewers directed to table 6-1 for a detailed list of impacts

15. Page 854 is a Table of Contents to a consultant's report which lists Table 6-1 as *"Preferred Material Management Alternative for Construction Activities"*

16. Page 904 *"Table 6-1 outlines the preferred material management alternative for excavation and dredging of the slip and access channel and the Navigation Reliability Improvement areas adjacent to the Federal Navigation Channel."*

A document search for the phrase "Table 6-1" reveals **the only table in the document bearing the designation "Table 6-1" on page 905**. The Title of Table 6-1 on page 905 is *"Preferred Material Management Alternative for Construction Activities".* The table lists the volume of material that will be excavated from the slip and access channel during a "Fresh water Dredging Phase" and a "Salt Water Dredging Phase". A row at the bottom of the table that includes the phrase *"Eel grass Mitigation Dredging"* is the only explicit reference to wetlands contained in the table. No additional explicit reference to wetlands or wetland impacts is included in Table 6-1.

This reviewer later discovered that the application also includes a table bearing the designation **Table 6.1" (not 6-1)** found on Pages 36 and 37 of the application. "Table 6.1" on pages 36 and 37 is not identified while searching the document for the phrase "Table 6-1" even though the document makes 16 references to the table in this manner. After an unnecessary effort to find the cited reference for Table 6-1, reviewers are compelled to deduce that Table 6.1 appears to contain the information referenced in citations 1-16 outlined above.

Because the Table of Contents and the bulk of the application materials lack page references, and because the document includes multiple editorial insufficiencies, reviewers are required to expend extraordinary effort to confirm the content and assertions embodied in the application. In this case a period (as in "Table 6.1") substituted for a dash (as in "Table 6-1") in a reference to a table made it nearly impossible to locate information cited on numerous occasions in the document using the Adobe acrobat search tool. It took approximately three hours for this reviewer to conduct the nearly meaningless analysis listed above and to reach the nearly insignificant determination described above. This infuriating distraction and others described in this chapter detract reviewer's attention from an objective analysis of the work proposed and its associated impacts on wetlands. Instead, reviewers are compelled to wade through a poorly organized document that includes erroneous, improperly indexed, fragmented, and at times meaningless content. **The permit should be denied because the organizational structure of the document precludes an efficient, objective assessment of the proposed work and its associated wetland impacts.**

13. Section (4) Description of Resources in the Project Area (page 7), Part (3) describes mudflats in the project area. The application states:

"Mudflat resources within the JCEP Project Area are described in the wetland delineation reports for the JCEP Project Area that are included in Attachments C.1 to C.8 and Figures 4.1-1 to 4.1-7. Quantities for impacts to mudflats are provided in ***the Bulk Upload Template (Table 4.2).****" (emphasis added)*

A word search of the permit application failed to identify the phrases "Bulk Upload Template" or "Table 4.2" that included any information regarding mudflats at any other location in the document other than the reference cited above. As a result, it was not possible for me or other reviewers to verify the content of the cited document or evaluate the quantities of impacts to mudflats tied to this proposal.

14. A four-sentence long description is provided to describe the mudflats in the vicinity of Ingram Yard (page 7). The description contains the following statement: *"Plant life is not typically abundant along these intertidal mudflats and adjacent shallow subtidal areas."* It stands to reason that vegetation on a mudflat would be sparse because mudflats are intertidal and sub-tidal estuarine habitats defined in part by the absence of vegetation. If vegetation was abundant on these intertidal areas, they would not be classified as mudflats. The statement contributes nothing to the understanding of the resources in the project area. Unvegetated estuarine intertidal and sub tidal mudflats are among the most extensive resources to be impacted in the area of the navigation access channel. At minimum, the narrative description of the resources should include information regarding the area of the habitat or the size of the resource.

15. Page 7 of the permit application [(4) Description of Resources in the Project Area] includes a two-paragraph section with the heading "4. VEGETATED SHALLOWS". Paragraph two contains the following statement: *"Vegetated shallows within the JCEP Project Area where a concurrence has not been issued*

are described in the wetland delineation reports that are included as Attachments C.9 to C.13. Quantities for impacts to vegetated shallows are provided in Table 6-1."

16. A search of the permit application for the phrase "Attachment C.9" takes reviewers to a document bearing the heading "Attachment C.9" on page 366 of the permit application. Attachments C.9 (page 366) and C.10 (page 368) appear to be $437 permit review invoices issued by Heather Howard at the Department of State Lands issued on April 18th and 19th of 2018.

17. Attachment C.11 (pages 370-389) appears to be a description of a paved portion of tax lot 800 that functions as the parking lot for the Myrtlewood RV park. In addition to the irrelevant attachments reference above, Attachment C.11 also appears to be irrelevant as it contributes nothing to the description of "Vegetated Shallows" in the project area. Inclusion of these and other irrelevant documents in the permit application requires permit reviewers to spend precious time searching the permit application and reviewing documents that contribute little if anything to an understanding of the scope of the project and the potential impacts of the proposed actions on wetlands of the state. I will long remember reading Attachment C.11; a 19-page-long report prepared by a 4-person consulting team whose collective efforts confirmed that a paved parking area contains no wetlands! I was little comforted (and cynically humored) to learn that when the lead author visited the paved parking lot described in Attachment C.11, he characterized the conditions of parking area in the report as follows: *"Normal conditions were present throughout the study area."* [see "2. site alterations" Attachment C.11 page 371). I must confess that even though Attachment C.11 borders on the absurd, I must support the consultant's determination in this otherwise useless document that the month of July represents the dry season.

18. Attachment C.12 (pages 390 -405) is a wetland delineation report for an estuarine shoreline and intertidal area to the north of the APCO 2 dredged material disposal area. A word search of this attachment for the phrase "vegetated shallows" found no use of the term "vegetated shallows". Similarly, none of the other attachments referenced on page 7 under the heading "vegetated shallows". Contain the phrase "vegetated shallows". Thus, in contrast to the applicant's claim that the attachments referenced in paragraph 2 under the heading "(4) VEGETATED SHALLOWS" contain information about vegetated shallows, these attachments contain no information about vegetated shallows and contribute nothing to a characterization of vegetated shallows in the project area. This is but one more example illustrating that this application includes an unacceptable level of irrelevant and unnecessary information, dead end citations, in a byzantine document structure that is enough to drive even the most dedicated and objective content reviewers to distraction. The sloppy, unacceptable manner that information is presented in this document is more than a distraction; it really pisses me off! Yeah, and Happy New Year too! While I understand that DSL is not responsible for the timing of the issuance of the public notices for permit applications, the fact that the applicant dropped this permit application on DSL on the eve of the winter holiday season is not lost on me. Forcing the public to review this poorly prepared, 3,638-page permit over the holiday season in order for the agency to comply with a mandated permit review response period is an irritant that is difficult to view as a coincidence and does little to curry the favor of this reviewer!

19. Another example of the amateurish, unacceptable organization of the information presented in the application document: Document section heading number 6.2.1.1 is found on page 92 but document

section heading number 3.5.2 is found on Page 134. This irrational and incoherent document indexing system precludes any coherent search of the document.

20. Table A of Part 1 Attachment F.1 Attachment A (what kind of irrational/incoherent editorial document structure is that?) (Page 1016) is headed *"Jordan Cove LNG Project and Pacific Connector Pipeline Project - SEF level 1 site History Information and pipeline Stream Crossing Information".* Table A Includes a reference to a 12, 845.19 foot - long wet open-cut pipeline crossing of the Coos Estuary at milepost 2.92R that involves an estimated excavated volume of 29,496 cubic yards. This table also mentions states; *"Wet open cut only feasible practical in bay crossing method".* If wet cut pipe installation is the proposed method that will be used to install the LNG supply pipe across the estuary, then the permit application should explicitly discuss impacts and mitigation measures to address the impacts. If Open Wet Cut pipe installation will not be used, all reference to it should be deleted so that reviewers are not required to address potential impacts of extraneous superfluous information.

21. Resource Report 1 (pdf page 164) includes a cover page for a figure entitled: *"Figure 1.5-5 Conceptual Layout of Slip Construction Berm".* However, the figure that follows the cover page is entitled: *"Figure 1.5-5 Peat, Driftwood, and Clay Locations - South Dunes".*

It is unrealistic to expect members of the lay public, or independent expert subject matter reviewers, to be forced into reviewing the inadequately indexed, disjointed, extraneous, and redundant material presented in the application documents. The application should be rejected as incomplete because it lacks adequate structure to enable efficient public review and comment.

Comments of Michael Graybill in response to DSL joint permit application and call for comments on a proposal from Jordan Cove Energy Project L.P. to the Oregon Department of State Lands on 7 November 2018.

CHAPTER 14: COMMENTS REGARDING TSUNAMI IMPACTS AT THE MARINE SLIP

Project plans for tsunami impacts

FERC Resource Report 1 is referenced on page 119 of Attachment A entitled A.2 General project description. Amazingly, in contrast to the absence of numbers in Part 1 of the permit application Resource Report 1 includes page numbers! Fancy that eh? Well, on document page 24, (.pdf page 65) Under a section entitled "1.3.6.5 Emergency Lay Berth" the applicant includes the following description of a tsunami wall to be built along the western flank of the marine slip.

> *"Along the western property line, but on the Project side of the Henderson Property buffer zone, a tsunami flow control wall will be constructed. The flow control wall shall be of sufficient height and strength to prevent overtopping into Henderson Property and limit the drag due to the tsunami current loads on LNG carriers within the marine slip. The wall height shall be approximately 34.5 feet and determined in accordance with the design tsunami criteria. The wall will run from the southwest side of the LNG tank impoundment area down to the entrance to the slip."*

On document page 64 of resource report 1, Section 1.3.6.4.1 the applicant provides the following description of an 80.5-foot-tall sheet pile wall to be constructed as the foundation and mooring structures for the LNG carrier loading berth. Section 1.2.6.4.1 in its entirety reads as follows:

> *The physical berth will be constructed of steel sheet piles to support surface structures (i.e., the loading area) or provide the foundation for the breasting and mooring structures. Under the loading facility, the wall will extend from the bottom of the slip at elevation -45.97 (minimum) to approximate elevation +34.5 (NAVD88). This face will extend north and south to capture the outermost breasting structures and then turn to the east, creating a setback wall for the remainder of the slip.*

The narrative describing the 34.5' wall designed to deflect incoming water from an anticipated tsunami does not specify the base elevation of the wall, so it is not possible to determine the design height tsunami because the narrative did not specify the vertical reference datum (mean sea level? Mean of the Higher High water? North American Vertical Datum? Above the top of the backfilled sheet pile bulkhead on the western flank of the marine slip?). However, Resource report 1 figure 1.3.6 provides elevation views of the marine berth suggesting the tsunami wall will be built on top of an earth surface graded to an elevation of +20' (NAVD 88). Thus, it is reasonable to conclude that the elevation of the top of the tsunami wall will be approximately 54.5' above NAVD 88.

Given that other facilities at the terminal will be constructed atop earth fill with elevations approximately 46-60 feet, it is reasonable to assume the design tsunami runup elevation is approximately 60' above MHHW. On the eastern side of the marine slip, the top of the sheet pile wall of the loading berth will project to an approximate above water elevation of 34.5". The narrative also lacks a reference to the vertical datum. But Illustration 1.3.6 of resource report 1 includes reference to NAVD 88 as the vertical datum benchmark. It appears that tsunami wave events having runup elevations above 34.5' NAVD 88 will overtop the eastern flank of the slip at the LNG loading berth and marine offloading facility.

The waterway suitability analysis conducted by the US Coast Guard has determined the federal navigation channel is suitable for vessels having drafts up to 12 meters (39.5'). because no explicit reference to the base vertical datum used for the tsunami wall and the sheet pile berth walls is provided, it is not possible to precisely determine how a berthed vessel and the berth will function during a tsunami event having a projected runup that approximates or potentially exceeds the height of the mooring and breasting structures that will be used to secure the vessel to the berth during loading operations. The potential exists that during a design height tsunami event having a runup height of 60 feet, the top of the vessel berth will begin to approach the total draft of the LNG carrier at the berth. It is reasonable to assume that a water height flux of this magnitude will exceed the design strengths of the mooring structures and mooring lines used to secure the vessel to the berth.

Certainly, in order to accommodate water surface elevation changes of this magnitude, it will be necessary for ship personnel to be on hand to adjust mooring lines to accommodate these changes. During a locally generated tsunami event, there is a reduced chance that personnel will be on hand to manage lines during the initial or subsequent tsunami waves. The Society of International Gas Terminal and Tanker Operators (SIGTTO) states that exposure of a moored LNG carrier to wave heights having significant heights exceeding 1.5 meters and periods greater than 9 seconds could break a ship's mooring lines. Thus, it is highly likely that the absence or lack of adequate personnel to tend lines during a tsunami event will result in mooring line or mooring structure failures leading to an untethered vessel adrift in the slip.

Tsunami events involve multiple wave sequences. Should an initial water surge event break the mooring lines, subsequent tsunami surges are likely to wash an unmoored vessel ashore or aground. Tsunami wave trains include both peak runup and runout events. Runout periods can produce much lower water levels than those regularly experienced. In addition to the extraordinary risky circumstances posed by a 60' wave runup event a runout event of low water also poses significant risks to berthed vessels and vessels in transit. Because the non-emergency channel depth conditions in the Coos Estuary limit vessel traffic in the navigation channel to tide elevations greater than 6', there will be frequent time periods where the channel will not have sufficient depth to enable safe transit by an LNG carrier. This may limit the ability of an LNG carrier to gain access to open water in response to a remotely generated tsunami.

As an example to highlight the lack of suitability of the Coos Bay navigation channel to provide and adequate escape route to open water, consider an earthquake event in Alaska having an estimated Coos Bay tsunami arrive time of approximately 4 hours: Should the aforementioned earthquake occur on 16 January 2019, conditions in the Coos Bay federal navigation channel will be unsuitable for LNG vessel transits for a period of 22 hours. (see tide table for 16 January 2019). Although emergency responders would have sufficient notice directing mariners to disembark and seek refuge in deep water, a berth LNG carrier would be "trapped" at the berth unable to make transit because there would be insufficient water depths in the channel to safely transit from the berth to the open waters of the Pacific.

The current channel configuration may be suitable for scheduled high water transits of LNG carriers, but it is unsuitable as a means of emergency egress for LNG carriers on a daily basis. Some periods of unsuitable conditions persist for continuous periods of up to 22 hours in a single day. I don't know about you, but I'd be willing to stick my neck out and say that **the Coos Bay Navigation channel is not suitable for the proposed activity because it lacks sufficient conditions to provide for safe emergency egress between the terminal and the open water of the Pacific.**

Comments of Michael Graybill in response to DSL joint permit application and call for comments on a proposal from Jordan Cove Energy Project L.P. to the Oregon Department of State Lands on 7 November 2018.

CHAPTER 15: COMMENTS REGARDING THE ENVIRONMENTAL JUSTICE RAMIFICATIONS OF THE PROPOSAL

This project appears to be inconsistent with the Governor's executive order on Environmental Justice and should be reviewed by the Governors Environmental justice task force as part of the permit review process.

When state agencies make decisions that affect our environment it is critical that low-income and minority populations are not disproportionately affected. The Environmental Justice Task Force (EJTF) was created by the 2007 Legislature to help protect Oregonians from disproportionate environmental impacts on minority and low-income populations (Senate Bill 420). The EJTF encourages state agencies to give all people knowledge and access to improve decisions that affect environment and the health of all Oregonians

This project holds potential to disproportionately impact minority and low-income populations. Elements of the project bear the signature characteristics that are the focus of the Governor's executive order12898 on Environmental Justice. The astoundingly voluminous, disjointed and highly technical manner in which material is presented in the application, severely limits or precludes non-technical and limited language proficiency individuals from conducting a reasonable evaluation of the potential impacts of the project. This application is *not* accessible to an audience having an average or below average English proficiency. **This document is inaccessible to many readers including low income and minority individuals likely to be impacted by the actions proposed.**

The impacted resources are important to minority populations and low-income residents in the vicinity of the proposed work. The pipeline route and LNG liquification facility and LNG shipping channel work will impact the traditional homelands and culturally significant landscapes of six federally recognized tribes. The streams, wetlands, shoreline, intertidal resources, and sub tidal habitats are used as locations for fishing, gathering and transportation by native American and low-income residents. Other LNG terminals have been proposed in other Oregon locations but the communities in those areas rejected the proposals as infeasible because these (less disadvantaged?) communities were unwilling to accept the risks associated with LNG production and transport. The Jordan Cove LNG project remains the only viable proposal in Oregon. It is notable that this remaining proposal holds potential to differentially impact low income, minority and linguistically challenged populations

The considerable safety risks associated with this project (see Chapter 7 Feasibility considerations) also hold potential to be disproportionately borne by communities identified by the Environmental Justice Task Force and Executive order 12898.

No permit should be issued until a plain language version of the proposed work is available and a thorough and objective evaluation of how the proposed work will impact economically, linguistically and culturally disadvantaged populations.

Jordan Cove comments,
Oregon Department of State Lands,
775 Summer St. N.E., Ste 100,
Salem, OR 97301-1279

Michael Graybill
63840 Fossil Point Road,
Coos Bay
OR 97420

January 29, 2019

To whom it may concern:

This letter and the narrative contained in this transmittal are submitted in response to a solicitation for comments on the Jordan Cove Energy Project LP Department of State Lands removal and fill permit 60697 revised.

These comments are in addition to those I submitted on 15 January 2019 and are based on my review of the materials regarding the Horizontal Direction Drilling (HDD) plans presented in the permit application to DSL. The information in the permit regarding the HDD crossings of the Coos Bay estuary is incomplete, does not allow for a thorough evaluation of the options for this activity, and has demonstrated that the HDD plans for Coos Bay are not feasible. Based on the inadequacy of the HDD aspects of the application alone, the permit should be denied.

This document also includes comments to further substantiate that the application fails to meet the test of "independent utility" as required by the DSL permit review process. The comments provide new information to confirm addition to the $4 million to support the evaluation of the expansion of the federal navigation channel provided by the applicant in 2018, the applicant has committed to provide an additional $3.5 million in support of the navigation channel expansion project during 2019. I also provide additional evidence that full implementation of the proposed project design will require expansion of the federal navigation channel in addition to the scope of work described in permit application 60697 revised. There does not appear to be a distinction between the proposed Jordan Cove LNG terminal project and the federal navigation channel expansion project under consideration by the US army Corps of engineers.

Finally, this transmittal provides additional information related to the impact of the proposed project on use of the lower portion of the estuary as a temporary refuge anchorage area for commercial fishing vessels. Use of the estuary for this purpose will be impacted by the proposed use of the channel by LNG carriers requiring a safety exclusion zone.

As with previous comments submitted in response to the call for public comments on DSL permit #60697, all page number references contained herein are page numbers assigned by the Adobe Acrobat reader to the DSL issued PDF version of the application.

Thank you for providing me with this opportunity to comment.

Comments Regarding the Jordan Cove Energy Project LP Horizontal Directional Drilling Operations.

As noted in Chapter 6 of my previous comments, the Horizontal Directional Drilling methods proposed to install the Pacific Connector gas transmission pipeline under the Coos estuary are unlikely to be feasible. The items listed below provide further evidence to demonstrate that the plan offered by the applicant is largely conceptual and lacks tangible evidence that it will be feasible. Examples illustrating the lack of data needed to confirm feasibility and data to demonstrate that the proposed methods exceed standard practices and capacities of the technology are provided below. Further, the geotechnical consultant's analysis and the description of the HDD process to be employed provide considerable evidence to support a determination that the proposed HDD bay crossings are *not* feasible. Additional Illustrative examples are provided below:

1. Pages 2,799 – 2,800 of the application include a discussion of the size of the HDD launching and receiving pits needed to support drilling operations:

> *"The launching and receiving pits required for 'Direct Pipe' are more substantial and complicated than entry and exit pits typically used in HDD installations." In addition, the pipe thruster has a lower tolerance to movement than HDD rigs and the anchoring system must be designed to limit the movement of the pipe thruster during DP installation. Because the MTBM (microtunnel boring machine) is relatively heavy, it can be difficult to steer in soft or loose soils. In very soft soils, the MTBM will often sink from its own weight, making it difficult to stay on the design alignment."*

A statement on Page 2,810 describes the east end of the Kentuck slough entry point as *"very soft to soft silt expected to a depth of 100 feet".* These soil types appear to be the same soil types described as unsuitable for Microtunnel Boring Machine operations on Page 2,799 (see quote above). **The application does not describe how the unsuited soft soils will be stabilized to keep the proposed MTBM operations at the east bay entry point at Kentuck Slough from sinking under its own weight**. **No permit should be issued until the applicant demonstrates that the proposed method of MTBM is feasible at the Kentuck Slough HDD entry point**.

2. Page 2,800 includes a section entitled: *"Limitations and considerations of Direct Pipe".* It contains the following statement that raises doubt about the applicability or feasibility of this technology for the 8,972' long East Bay HDD pipeline route and the 5,192' long West bay HDD under-bay pipeline routes:

> *"For MTBM diameters less than 40 inches, the internal space is not large enough to house the hydraulic power packs within the MTBM. As a result, the hydraulics required to power the MTBM must be routed from the power packs on the ground surface through the product pipe. Because of the practical limits of routing hydraulic hoses,* ***the maximum drive length is about 1,000 feet"*** (emphasis added).

Table 1 on page 2,800 is entitled; *"Direct Pipe Diameter and Length limitations*". This table indicates the *"Maximum drive length"* of a 36" diameter pipe is 1,000'. Given that the East Bay HDD under bay

crossing length is 8,972 feet long and the West Bay HDD under bay crossing length is 5,192 feet long, the Direct Pipe construction methods proposed by the applicant do not appear to be an appropriate or feasible method of construction of the under-bay pipeline segments.

3. The consultant's report raises further doubt regarding the reliability or feasibility of the Direct Pipe HDD drilling technology proposed by the applicant. This technology has only been used in three locations in the United States and only 20 locations in Europe. Further, the contractor states *"Our feasibility evaluation of the proposed Coos Bay East HDD is based on limited subsurface data. Our conclusions should be considered preliminary pending completion of a subsurface exploration program".* (Page 2,802).

4. Only two exploratory sub surface borings have been completed in the vicinity of the proposed HDD pipeline route and neither provide evidence that a suitable rock substrate is available along the proposed pipeline route to support HDD operations. Boring WCB-3 reached a depth of 50.5 feet below mudline and boring B-1 reached a depth of 101.5' below mudline (page 2,804). Both of the borings encountered loose sand and alluvium. Neither of these borings reached bedrock. Further, neither of the borings came anywhere close to the proposed -190' elevation (depth) of the bottom tangent of the under-bay pipeline HDD crossings. The applicant has stated that the feasibility of the proposed HDD technology is based *"with the assumption that the bottom tangent and horizontal curve will be within bedrock at that depth. This assumption is critical for the feasibility of this option".* (page 2,805). However, the applicant has provided no empirical data to support a finding that the proposed HDD method will be feasible in this setting.

5. It is also evident that the HDD geotechnical consultant is uncertain that the proposed 8,972' single entry-exit Coos Bay East HDD under bay pipeline crossing was feasible. In addition to the Single HDD option, the HDD feasibility report for the Coos Bay East Crossing also includes a proposal to accomplish the crossing in two segments instead of one. The consultant states:

> "*Due to the substantial length of the proposed HDD, GeoEngineers evaluated two potential alternatives for accomplishing the proposed Coos Bay East 36-inch HDD installation; a single 8,972-foot-long alternative and two shorter HDDs connected by an open cut tie-in located within the tidal flats of Coos Bay. The following describes the basis of design for these two alternatives."* (Page 2,804).

The Dual HDD option described on page 2,805 includes an intermediate entry point in the middle of the tideflat portion of the estuary, 250' south of Glasgow point (see figure 4A page 2,819). The conceptual design of this mid-bay HDD operations location suggests that an area of estuarine wetlands amounting to approximately 2.02 acres will be impacted.

The narrative on page 2,806 includes a discussion of the additional planning and permitting that would be required if the Dual HDD with Tie in Option were selected.

> *"Because of the location of the shared in-water entry workspace in Coos Bay for the dual HDD option, access to the tie-in workspace location will have to be provided by barges or other marine vessels and will be much more difficult than a typical land-based HDD site. Because of tidal fluctuations, the tidal flats within the in-water workspace will be exposed at times such that dredging will be required between the navigation channel and the workspace area so that equipment barges can access the workspace. There is an existing shallow natural channel extending from the mouth of Kentuck Slough to the navigation channel that may be incorporated into the access route to the shared workspace to reduce the amount of dredging that would be required. A dredging plan will likely be required to address the dimensions and depth of the access channel, the dredging procedures and placement or disposal of spoils. In addition, the dredging plan will likely need to be permitted through the Army Corps of Engineers, Department of State Lands and/or other state and federal agencies. The HDD contractor can provide details of their plan to access the in-water workspaces as part of their HDD drill plan and provide input regarding areas to be dredged. However, we assume that the project owner would be responsible for permitting dredging activities".* (emphasis added)

The discussion on 2,806 and 2,807 continues to describe the nature of estuarine dredging work, barge operations and pile placement work that would be required elements of the Dual HDD with tie-in Option. The work described involves estuarine wetland impacts that are not addressed in the permit application.

> *"Once the entry tangent is reamed to its final diameter, a relatively large drilling fluid returns pit and or containment such as sheet piling may be required at entry to contain drilling fluid returns that surface at the entry point. Containment and recycling operations will need to be executed considering tidal fluctuations. Alternatively, large-diameter casing could be installed prior to reaming operations at the water side entry points to contain drilling fluid on the barge or other containment structure".* (emphasis added)

No permit should be issued before the applicant is required to describe which of the two options outlined in the Geotechnical consultant's report will be employed to route the Pacific Connector Pipeline under the Coos Estuary. If the applicant states its intent to use the Dual Entry HDD option, DSL should require the applicant to fully describe all aspects of the Dual entry HDD operations having potential impacts to wetlands and waterways.

6. The long distances of the HDD boreholes will require a specialized magnetic cutter head steering system which requires placement of a "secondary coil wire" that must be anchored to the bottom of the estuary above the proposed borehole route (page 2,808). No characterization or discussion is provided regarding potential wetland impacts associated with placement or removal of the "secondary coil wire"

7. The entire length of the Kentuck mitigation site will be used as a staging, equipment laydown area and pipeline stringing work space for the HDD operations (page 2,808) The application does not discuss how these operations will impact the existing wetlands at the Kentuck slough mitigation site.

8. The application does not provide sufficient information to assess the probability that the HDD operations will result in the release of drilling fluid into the surrounding sediments or the surface water overlying the HDD borehole route. In a Section entitled "Hydraulic Fracture and Drilling Fluid Surface Release" (Page 2,810) the application states:

> *"Formational drilling fluid losses typically occur when the drilling fluid flows through the pore spaces in the surrounding formation. Thus, a formation with a higher porosity can potentially absorb a larger volume of drilling fluid than a formation with a lower porosity. Coarse sands and gravel units with low percentages of silt and clay and fractured rock formations have a moderate to high susceptibility for drilling fluid loss. Without additional subsurface information along the HDD alignment, it is not currently possible to estimate the risk of substantial formational fluid loss"*. (Emphasis added)

Given that the only sub surface borehole information provided in the application characterizes sand as a major constituent of the sub surface formation, conditions conducive to drilling fluid flows through pore spaces appear to match the conditions susceptible to formational drilling fluid releases **No permit should be issued without additional geotechnical information necessary to objectively asses the likelihood that the proposed HDD operations will result in a release of drilling fluids into the surrounding substrate or the overlying wetlands and surface waters.**

9. Statements on page 2,810 suggest conditions on the east end of the Kentuck slough HDD entry point are highly susceptible to hydraulic fracture and release of drilling fluids into the surrounding surface water:

> *"Downhole drilling fluid pressures can easily exceed the shear strength of soil formations. In general, fine-grained soils such as silt and clays have a relatively moderate to high risk of hydraulic fracture…" "We expect that there is a high risk of hydraulic fracture and drilling fluid surface release along the east side entry tangent of the long, single HDD option and HDD 2 of the Dual HDD with Tie-In option"*. (Emphasis added)

The applicant suggests that a "large diameter casing *can* be utilized to mitigate the potential for hydraulic fracturing" but does not state if either HDD option will actually involve installing a protective casing at this location. **No permit should be issued before the applicant clearly describes if large diameter casing will be installed in soil types and conditions susceptible to hydraulic fracturing such as those that exist in the vicinity of Kentuck Slough**.

10 The applicant implies that the single-entry HDD under bay crossing option is the preferred option that will be employed if a permit is issued, but the consultant's HDD analysis and report is replete with references to the Dual HDD option. For example, page 2,810 contains the following statement:

> *"For the dual HDD option, drilling fluids will be released to the Coos Bay floor at the conceptual entry points at the tie in location in Coos Bay during normal operations of*

> *drilling fluid circulation, unless they are contained at the* water *side entry points during pilot hole operations through use of a conductor casing".*

Certainly, **no permit should be issued for a plan to release drilling fluids onto the floor of the estuary before a thorough analysis of the impacts of this activity is conducted**. It is not clear why the application includes such a detailed characterization of the Dual-entry HDD option if the single-entry option is the method to be used. The Dual-entry HDD option is not presented as an alternative that was considered but rejected when compared to the preferred single-entry HDD option. Rather, the Dual-entry HDD option appears to be presented as the approach that will be used following the likely failure of the single-entry HDD option.

If the single-entry HDD option is the approach the applicant intends to use, all references to the Dual entry option should be removed from the application. If the Dual entry HDD option is the option likely to be used in preference to the Single-entry option, a substantially more detailed analysis of the Dual entry HDD option will be required. **No permit should be issued that includes the proposed Dual entry HDD option without requiring the applicant to provide a complete analysis of the wetland impacts associated with this option, a thorough analysis of alternatives to the proposed approach, as well as a mitigation plan to address the impacts associated with it.**

11. Pages 2,810 and 2,811 include the following statement:

> *"Additional measures will need to be implemented during reaming operations to contain the drilling fluids. During reaming operations, the volume of drilling fluid that surfaces at the entry point could be reduced by not reaming the pilot hole through the entry tangent until the final reaming pass. Once the entry tangent is reamed to its final diameter, a relatively large drilling fluid returns pit and or containment such as sheet piling may be required at entry to contain drilling fluid returns that surface at the entry point".* (Emphasis added)

I found no description of the abovementioned sheet piling drilling fluid return pit or containment structure. **No permit should be issued until the applicant provides information describing the construction, use and removal of this and other temporary or permanent structures required to accomplish the HDD operations.**

12. I found no description of the plan to contain handle and dispose of the borehole cuttings produced by the HDD drilling and reaming operations. The application includes the following statement: *"The diameter required to install a 36-inch pipeline will vary from 48 to 54 inches depending on the confirmed geotechnical strata and the contractor's judgment."* (Page 3,12O). Based on a 48" diameter borehole, and the proposed lengths of the two under bay HDD crossings, an estimated 18,855 cubic yards of material will be brought to the surface as part of the HDD operations. **No permit should be issued until a through description of all aspects of the proposed HDD methods is provided to enable an objective assessment of the risks, feasibility, wetland impacts, and mitigation measures associated with these activities.**

Comments regarding the failure of the application to pass the test of "independent utility" as required by OAR 141-085-0565 (a)

Before any permit is issued, DSL should determine the intent of and need for the applicant to deepen and widen the Coos Bay federal navigation channel as an integral part of the overall design of the Jordan Cove Energy Project. The following comments are intended to supplement the comments that I provided under item #9 in Chapter 1 of my comments to the Oregon Department of State Lands dated 15 January 2019:

1. The existing navigation channel depth and width is inaccessible to over half of the global LNG carrier fleet. More than half of vessels in the global LNG carrier fleet exceed the LNG carrier capacity established by the Coast Guard for the existing Coos Bay Federal Navigation Channel. The USCG has established a limit of LNG carriers with overall dimensions of 950 feet in length x 150 feet beam x 40 feet draft with a nominal LNG cargo capacity of 148,000 m^3 ships (DSL permit application Page 287). As of 2018, only 206 of the 440 vessels in the global LNG carrier fleet have rated cargo capacities less than 148,000 cubic meters. However, the proposed design capacity of the Jordan Cove LNG carrier berth in Coos Bay is 217,000 cubic meters. An additional 213 LNG carriers in the global LNG carrier fleet have rated cargo capacities between 148,000 cubic meters and 217,000 cubic meters. An additional 21 vessels in the global LNG carrier fleet have cargo capacities in excess of 217,000 cubic meters [See appendix 6 page 84 (https://www.igu.org/sites/default/files/node-news_item-field_file/104747-IGU-Book-Final_062818.pdf)]. Thus, the design capacity of the proposed LNG carrier berth will be capable of accommodating 419 of the 440-vessel fleet.

2. There is a global trend toward a jump in the size of conventional LNG carriers from around 145,000 cubic meters to larger carriers of 210,000 - 265,000 cubic meters. LNG carriers with capacities suited for the existing Navigation Channel in Coos Bay are being phased out of the global LNG carrier fleet and all of the vessels being added to the fleet exceed the rated Coast Guard capacity of the existing Coos Bay Federal Navigation channel. During the life of the proposed Jordan Cove LNG project, fewer and fewer vessels capable of using the existing Coos Bay navigation channel will be available to call on the terminal.
(http://www.ivt.ntnu.no/ept/fag/tep4215/innhold/LNG%20Conferences/2007/fscommand/PS6_3_Noble_s.pdf). Twenty-two LNG carriers in the global fleet were laid up as of the end of 2017. 100% of the LNG vessels laid up by the end of 2017 had cargo capacities of 148,000 cubic meters or less. In addition, 39 LNG carrier vessels were on order worldwide at the end of 2017, None of the LNG vessels on order at the end of 2017 will have cargo capacities at or below 148,000 cubic meters. All LNG carriers on order as of the end of 2017 will have capacities in excess of the 148,000 cubic meters [See appendix 6 page 84 https://www.igu.org/sites/default/files/node-news_item-field_file/104747-IGU-Book-Final_062818.pdf)].

3. **Jordan Cove LLC is supporting a concurrent effort to deepen and widen the Federal Navigation Channel in addition to pursuing a permit for the work outlined in DSL permit application # 60697.**

Jordan Cover Energy LLC is the primary entity providing financial support, via a contract with the Oregon International Port of Coos Bay, to prepare an Environmental Impact statement related to expansion of the Federal Navigation Channel in Coos Bay. During 2018, Jordan Cove Provided $4 million to the Port in support of the Coos Bay Navigation Channel Expansion Study. The January 2019 Port of Coos Bay Commission meeting packet indicates that during 2019, Jordan Cove will contribute up to $3.5 million toward the evaluation of the Federal Navigation Channel Expansion Project.

Unless Jordan Cove requires a deeper and wider navigation channel to support its proposed operations, it is not evident why it would be willing to provide $7.5 million over a two year period to support a study to expand the federal navigation channel being conducted by the US Army Corps of Engineers (see USACE project number CENWP-PM-E-17-05 NWP-2016-235). It is reasonable to conclude that the work proposed in DSL Permit application #60697 describes only a portion of the total work required to construct and operate an LNG export terminal in Coos Bay. **Additional work being evaluated by the US Army Corps of engineers in project number CENWP-PM-E-17-05 NWP-2016-235 appears to be an integral element of the proposed Jordan Cove LNG project. DSL application #60697 fails the test of Independent Utility and should be denied.**

Comments regarding the impact of the proposed use of the Federal Navigation channel by LNG carriers on existing uses of the bay for Navigation and fishing.

Construction of Navigation Reliability Improvement Dredge areas one and two will impact use of the estuary for navigation and fishing related activities. The lower portion of the Coos Estuary is used by Commercial fishing vessels as a transient anchorage area and a topside fishing gear mobilization and demobilization area. The area that these activities take place lies north of the entrance to the Charleston channel and east of the federal Navigation channel. The proposed Navigation Reliability improvement areas #1 is situated in the same vicinity of the aforementioned uses. During the summer months, out of area commercial salmon troll vessels use the area in the vicinity of NRI #1 as a calm water overnight anchorage. During the winter months, this same area is used as a calm water anchorage location for larger commercial fishing vessels involved in the trawl and crab fisheries. It is likely that the barge mounted dredging operations and hydraulic dredged material pipeline placement in NRI area one will impact use of this site as an anchorage location for commercial fishing vessels.

Commercial fishing vessels transiting to and from the Charleston shipyard and marina use the area of the in the vicinity of NRI dredge area 1 to raise and lower rigging including poles used to tow nets and trolling lines and to suspend equipment designed to stabilize the vessel. Dredging operations in the vicinity of NRI area 1 will impact the use of this site for these purposes.

Mike Graybill additional comments:

The comments that follow should demonstrate that if implemented as proposed, the project will result in significant, unreasonable negative impacts on the use of Coos Bay waters for navigation, fishing and public recreation.

1. LNG vessel traffic in Coos Bay will unreasonably limit access to in-bay crab fishing areas.

Most recreational and all commercial crab fishing in the estuary is undertaken using rings. Deploying a string of baited crab rings and then requiring fishers to vacate the deployment area leaving the rings unattended for 30 minutes around slack high tide while an LNG tanker and its associated safety zone passes will seriously diminish the effectiveness of one of the most important methods used to capture crabs in the Coos Estuary. For bay crabbing, as the tide approaches slack high water it is important to check rings on a more frequent basis as this is the time of greatest crab movement and feeding activity. Because crab rings do not retain crabs while the ring is at rest on the bottom, the only way to capture crabs using rings is to bring them rapidly to the surface while actively feeding crabs are present on the baited ring. In contrast to a recreational fishery using traps, the effectiveness of capture using crab rings is based on the frequency upon which the rings, once deployed, are recovered/brought rapidly to the surface. Requiring rings to "soak" for a period of 30 minutes or more will not improve their capture success rate. If transiting LNG carriers require recreational fishers to leave deployed rings unattended for 30 minutes, this requirement will likely render this type of harvest method infeasible/impractical.

Virtually all boat based recreational crab fishing takes place within a two-hour time period centered over slack high water (http://www.scod.com/cities/crabs/crabbing.html). Depending on the number of fishers aboard, it is not uncommon for boat based recreational fishers in Coos Bay to deploy a string of rings or traps consisting of 6, 9,or 12 rings or traps per vessel. It typically takes several minutes to recover, clear, and redeploy each crab ring or trap in a string. It is common practice for recreational fishers to deploy a string a rings or traps one hour before the slack tide, and check/tend individual rings and traps continuously during the ensuing leadup to slack high water and during the hour following the slack high water. A 30-minute interruption caused by a transiting LNG carrier at in the peak period of fishing activity having a 2 hour feasible time window centered over high tide can readily and reasonably be characterized as a *major* disruption of one of the most important (and valuable) recreational uses of the Coos Estuary.

Requiring recreational vessels to clear long established and preferred crab fishing areas for a half hour to accommodate the passage of an LNG tank vessel will greatly disrupt and interfere with both recreational and commercial crab fishing in the Coos Estuary. While the application describes a moving 500-yard security/safety zone surrounding LNG vessels transiting the estuary, the application does not say where recreational vessels involved in recreational crabbing and fishing activities will be required to go (page 10). The description of areas of the estuary of importance to commercial and recreational crabbers in the Coos Estuary presented on page 10 is an incomplete list. Perhaps the most important area for commercial bay crabbers is a region of the estuary on the margin of the Federal Navigation channel which parallels the south edge of the North Jetty. (https://myodfw.com/articles/where-crab-clam-coos-bay) The Federal navigation channel makes its closest approach to the North Jetty in this region of the bay. Crabbers working in the area between the North Jetty and the Federal navigation channel will be unable to vacate the moving 500-yard safety/security safety zone surrounding a

transiting LNG vessel as there is not room to move away from the channel without grounding on the rock jetty. The applicant fails to identify important crab fishing locations in the lower bay where small vessel operators that may become "trapped" between the shore and the moving safety/security zone of an LNG vessel transiting the Federal navigation channel.

Recreational and commercial crabbers and boaters operating vessels to the North and West of the Federal navigation channel required to vacate the moving safety/security zone of a transiting LNG vessel may be faced with a choice of grounding their vessel in the natural shallows at the margin of the bay or on rock revetment structures at the margin of the bay. The other choice available to vessel operators working in areas to the north and west of the federal navigation channel that lack sufficient space to vacate the moving safety/security zone of a transiting LNG carrier is to cross the navigation channel in front of the path of the oncoming LNG vessel. The north Jetty and the shoreline of the North Spit are within the 500-yard safety/vessel exclusion zone of the Federal Navigation channel in numerous locations meaning that these locations are unsuitable for use as refuge/safety areas for recreational vessels to muster during the passage of an LNG vessel. As a result, it may be necessary for recreational vessels to cross the navigation channel in advance of an LNG tanker passage in order to find a suitable muster area that is outside the 500-yard LNG vessel safety/vessel exclusion zone.

2. LNG vessel traffic in Coos Bay will unreasonably Impact ocean-based fisheries.

For a variety of reasons, including fishing seasons and ocean conditions, individual boats involved in commercial fisheries including but not limited to the crab, salmon and pink shrimp work as a fleet. This means that when the season is open and weather conditions are right, many (most?) of the boats in the fishery all head out to sea together. When crab season begins, it looks like a parade in front of my house with boats streaming out of the harbor one after another. Particularly in winter, during commercial crab season, when weather imposes more limitations on the bar than any other time of year, boats at sea work their crab pots while watching the weather conditions decline. Members of the fleet are talking with one another and everyone is paying attention to bar conditions and the tides.

Particularly in declining and marginal weather conditions, the vessels at sea in the commercial fleet all begin to head home around the same time. The previous outbound parade of boats reverses direction and the whole fleet heads for the bar. It can take the entire window of suitable incoming high tide conditions on the bar for the fleet to get back into the harbor. When the tide reverses and begins to ebb, conditions on the bar degenerate rapidly and in a matter of minutes the bar conditions can change from marginal to impassable. Boats that miss this window are forced to ride out the storm at sea until the next high flood tide.

There is not sufficient time to add an LNG ship transit to this scenario without having negative impacts on the existing use of the navigation channel by fishers. If the bar is closed for a half an hour over the high flood tide, to accommodate passage of an LNG carrier made up to multiple tractor tugs, somebody is going to get stuck at sea in bad weather conditions. JCEP has stated the total time required for an LNG carrier to transit between the harbor entrance and the proposed berth is 90 minutes and that no individual location in the estuary will be impacted for more than 30 minutes. Roughly one third to one half of the LNG carrier's total transit time will occur when LNG vessels transit the lower portion of the bay that is also used by commercial and recreational vessels based in the Charleston harbor. Taking a half hour chunk out of the extremely limited time that the commercial fleet uses to cross the bar to

enable an LNG tanker to transit the bar will only have negative impacts on fisheries. Those impacts are serious and potentially life threatening.

The Dungeness crab fishery in Oregon has been characterized as a "derby fishery". During the first days and weeks of the season, a substantial portion of the total annual commercial crab landings are caught in the first days and weeks of the season. Having gear in the water for "the first pull" is critically important. In the days just prior to the start of the commercial crabbing season, fisheries management agencies provide a very narrow window of time for commercial fishers to set out their gear before the first pull of the season. Smaller vessels in the fleet must make multiple trips to sea in order to get all their gear in the water. Thus, in the days leading up to the opening of the commercial crab season and in the days and weeks immediately following the season opening, there are hundreds of commercial vessel crossings over the Coos Bay Bar by boats loaded to capacity with crab pots and live crab. The restrictions imposed by LNG carriers transiting the lower portion of the Coos Bay federal navigation channel will result in significant, quantifiable, negative impacts on use of the channel by commercial fishing vessels. These impacts are not consistent with DSL's duty under OAR 141-085-0565. **The permit should be denied because the work proposed will result in unreasonable interference with use of state waters for fishing and recreation.**

3. LNG vessel traffic in Coos Bay will unreasonably Impact water and shoreline recreational activities.

Kayaking and stand up paddle boarding are increasingly popular recreational pursuits in the lower portion of the estuary during calm water conditions. Paddle craft operators using the lower portion of the estuary embark for shore launch points on the margin of the bay near the Charleston Marina Complex. It is not uncommon to see Kayak fishers transit the Federal navigation channel between the submerged training jetty near the entrance of the Charleston Channel (known locally as "the cribs") to shore points on the bay shore of the North Spit. Transiting LNG carriers will disrupt this increasingly popular recreational activity.

Construction of the access channel will impact access to and use of the estuary shoreline. The proposed access channel and berth will create an impassable barrier of deep water where an intertidal shoreline currently exists. The shoreline to be impacted will be very near the BLM boat ramp on the North Spit. This facility was developed specifically to encourage recreational access. Shore based fishers and beachcombers currently use the shoreline area of the proposed access channel for recreation. **Construction of the access channel and marine terminal will permanently impact shoreline access and recreational activities associated with the shoreline.**

4. The description of impacted resources fails to identify the lower bay as a location used by recreational boat operators, paddle sport enthusiast and commercial shellfish harvesters.

Recreational and commercial activities will also be impacted by the passage of LNG carriers transiting the bay. Specifically:

a.) The description of impacted resources fails to identify the lower bay on the inside of the North Jetty as a popular recreational surfing spot, particularly during high and near slack outgoing tides, commonly in the winter months or periods of high ocean surf conditions. Surfers access this location by off highway vehicles via the North Spit or by paddling across the estuary from shore points in Charleston.

Surfing in the lower bay is typically associated with winter periods of large ocean swells and strong fresh water runoff. Transiting LNG tank vessels will impact surfing in this location.

b.) The description of impacted resources fails to identify the area of the lower bay, including the area between the Jetties at the entrance to the channel as an important location for recreational salmon fishing in the lower estuary. The practice of "mooching the Bar" is widespread in the fall season and is centered almost exclusively around the hour before and the hour following slack high water. The Transiting LNG vessels will

c.) A commercial crab fishery exists in the lower portion of the bay including the area between the north and south Jetties. This fishery uses commercial crab "rings". Unlike commercial crab traps, deployed crab rings lie flat on the bottom permitting both legal and sub-legal sized crabs unimpaired freedom to enter and depart the ring while deployed. For rings to capture crabs, they must be regularly pulled swiftly to the surface requiring regular tending to fish effectively. The in-bay commercial crab fishery is currently limited to weekdays. In contrast, the recreational crab fishery is permitted year-round, all days of the week.

d.) Sub tidal clam populations in the lower bay have historically been subject to commercial and recreational harvest by fishers employing scuba. The lower bay is also a popular location for boat based recreational scuba divers. Both commercial and recreational scuba diving in the estuary are highly tide dependent activities centered on periods of slack water high and low tides. The safety exclusion zone surrounding LNG vessels transiting the federal navigation channel will impact the ongoing recreational and commercial use of the estuary by scuba divers.

5. Construction of Navigation Reliability Improvement Dredge areas one and two will impact use of the estuary for commercial fishing related activities.

The proposed project will impact use of the lower portion of the estuary as a temporary refuge anchorage area for commercial fishing vessels. Use of the estuary for this purpose will be impacted by the proposed use of the channel by LNG carriers requiring a safety exclusion zone and by the dredging activities in Navigation Reliability area 1.

The lower portion of the Coos Estuary is used by Commercial fishing vessels as a transient anchorage area and a topside fishing gear mobilization and demobilization area. The area that these activities take place lies north of the entrance to the Charleston channel and east of the federal Navigation channel. The proposed Navigation Reliability improvement areas #1 is situated in the same vicinity of the aforementioned uses. During the summer months, out of area commercial salmon troll vessels use the area in the vicinity of NRI #1 as a calm water overnight anchorage. During the winter months, this same area is used as a calm water anchorage location for larger commercial fishing vessels involved in the trawl and crab fisheries. It is likely that the barge mounted dredging operations and hydraulic dredged material pipeline placement in NRI area one will impact use of this site as an anchorage location for commercial fishing vessels.

Commercial fishing vessels transiting to and from the Charleston shipyard and marina use the area of the in the vicinity of NRI dredge area 1 to raise and lower rigging including poles used to tow nets and trolling lines and to suspend equipment designed to stabilize the vessel. Dredging operations in the vicinity of NRI area 1 will impact the use of this site for these purposes.

Exhibit G

RESUME

Michael Graybill
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EMPLOYMENT

Manager, South Slough National Estuarine Research Reserve (1985 – 2013)

EDUCATION/TRAINING

B.S. Biology: Kutztown State University PA (1976).

M.S. Biology: University of Oregon, Oregon Institute of Marine Biology (1981).

Post graduate professional training and work experience:

- Governor's natural office internship with Gail Achterman, senior natural resource policy analyst for Governor Neil Goldschmidt's. (six months, 1988-89). Reviewed National Forest Management plans, Natural Resource agency budget requests.
- Natural resource management professional development work experience: Studied in Botswana, Namibia, Swaziland and South Africa. Training and professional contacts emphasized protected area management, estuarine research and coastal zone management issues. (three months, 1991).
- Several advanced management courses offered as professional development opportunities to state senior executive service employees of Oregon.
- Physical processes in Estuaries Course, UC Berkeley, Department of Civil Engineering. (50 hours, 1992).
- Biological oceanographer, National Oceanic and Atmospheric Administration Southwest Fisheries Center. Porpoise stock assessment cruises in the eastern tropical Pacific Ocean. (nine months at sea 1980-84).
- Chief Scientist aboard the NOAA ship McArthur. (1993) 10 day, 9-night research cruise west of Coos Bay with simultaneous round-the-clock shipboard sampling in the Coos Estuary, Oregon. Cruise objective was to characterize nearshore ocean production during the spring transition and characterize links between the nearshore ocean and the Coos Estuary.
- Co-Principal Investigator for NOAA National Center for Coastal Ocean Science, aquatic invasive species program grant. (2008-2010). $100,000 award to characterize the status of a non-native intertidal gastropod mollusk (*Assiminea parasitologica*) first detected in the Coos estuary in 2007.

ADMINISTRATIVE AND POLICY EXPERIENCE

Coos Bay Oil Spill Response Coop: (2017 – present).
Environmental and Wildlife specialist member

Advisory Committee member, Oregon Sea Grant Advisory Committee: (2017 – present) https://seagrant.oregonstate.edu/about/leadership-advisors

Advisory Committee member, Coastal Oregon Marine Experiment Station, Oregon State University (COMES): (1989 - present). Charter member and first elected vice president of the advisory board. As a member of a diverse board I represent coastal zone stewardship issues. COMES is the first agricultural experiment station in the nation dedicated to marine resources. As a board member I have served on faculty search committees, developed meeting agendas, and identified emerging issues on the Oregon Coast. I advise members of the COMES faculty and advocate for the COMES program with elected and appointed policy makers. (http://marineresearch.oregonstate.edu/assets/page_folders/about_us/mission.htm)

South Slough National Estuarine Research Reserve (SSNERR) Manager: (1985 - 2013). SSNERR is a 5,000 acre research natural area administered jointly by the Oregon Division of State Lands and the National Oceanic and Atmospheric Administration's Office of Coastal Resource Management. The management objectives of the Reserve include coastal stewardship, research, education, and low intensity recreation. (http://www.oregon.gov/DSL/SSNERR/).

- Financial responsibility: Budget and projects in excess of $1,000,000 per year.
- Supervise a staff of 17, a seasonal staff of 2-16, and a 30 person volunteer program. Develop and implement policy on behalf of an 8-person Management commission appointed by the Governor of Oregon.
- Designed, developed funding for, and have overseen construction of research, education, housing, administration, and maintenance facilities at the Reserve totaling approximately $10M.
- Oversaw acquisition of seven properties for the Reserve totaling approximately 200 acres.
- Produced three comprehensive management plans and a upland habitat restoration plan for the Reserve. Current management plan (2006 – 2011) at: http://www.oregon.gov/DSL/SSNERR/docs/mngtpln.pdf

Tillamook Bay (Oregon) National Estuary Program Management Committee (TBNEP): (1994 - 1998). The TBNEP was created to develop a comprehensive conservation and management plan (CCMP) for the Tillamook estuary and watershed, an area encompassing approximately 500 sq. mi. During plan development, the management committee oversaw the day-to-day activities of the NEP staff, reviewed research findings, and formulated recommendations for the Policy Committee. The National Estuary Program is administered by the US Environmental Protection Agency as part of the Clean Water Act. Upon adoption of the CCMP the project name was changed to the Tillamook Bay Performance Partnership. (http://yosemite.epa.gov/r10/ecocomm.nsf/bd5af81c438305ea88256b58006146ea/b17a49c0b52448e18825657e005f69ac!)

Leadership team member, Oregon Solutions Program. Coast and Ocean Facility, Charleston, Oregon (2007). Planning team member to build a facility to house

multiple natural resource agencies and University personnel on the Oregon Institute of Marine Biology campus.

LEADERSHIP OF NON-GOVERNMENTAL ORGANIZATIONS

National Estuarine Research Reserve Association (NERRA): Professional organization formed to increase public understanding of estuaries (http://www.nerra.org/). Charter member and member of the executive committee since 1986-2013. NERRA president elect (1989-1991), NERRA president (1991-1993), and NERRA legislative affairs committee chairman (1993-1994).

Member Coastal and Estuarine Research Federation (http://www.erf.org/) (1991 - present). International professional scientific organization focused on coasts and estuaries. Conference co-chair November 2009 biennial meeting in Portland, Oregon (http://www.sgmeet.com/cerf2009/).

Friends of South Slough Reserve inc., Founding member and member of the Board of Directors (1992-2013). The "Friends" is the primary non governmental supporting organization of the SSNERR (http://www.friendsofsouthsloughreserve.org/).

Coos Watershed Association: Co-founder and past vice president of board of directors. (1992 –2013) CWA is a landowner association formed to attain sustainable development of natural resources in the 600 sq. mi. watershed of the Coos estuary (http://www.cooswatershed.org/). Association membership includes representatives encompassing over 80% of the lands and waters within the watershed. Played lead role to develop the mission statement and organizational bylaws. Board directs activities of executive director and seasonal grant supported staff. Major focus of group has been ecosystem restoration with an emphasis on salmon habitat restoration. Association serves on the President's forest ecosystem province team's advisory group for the southern Oregon province.

Oregon Coastal Environments Awareness Network, (OCEAN): Founding member of organization [501c(3)] dedicated to increasing public awareness of coastal environments. Organization has played a lead role in designing and developing the CELN project outlined below. (1992 - 2013).

Coastal Environments Learning Network (CELN): Lead board member of a multi-institution initiative to develop a linked network of coastal natural areas in on the Southern Oregon Coast designed to operate a regional educational and research program focused on coastal landscapes. Developed grant funding and in-kind support (>$250,000) to advance the CELN concept and to support the City of North Bend Oregon's renovation of the visitor information center on Hwy. 101. Exhibits now guide visitors to CELN sites.

South Coast Saturday Academy, SWOYA Boys and Girls Club: Founding member of South Coast Saturday academy board of directors. Played a lead role in drafting an agreement which led to the merger of the Saturday Academy educational enrichment program the Southwest Oregon Youth Activities sports and fitness program. Both programs focus on pre school and school age youth. (1986-1995).

South Coast Land Conservancy. (1995 – 2019) Founding board member of 501(c)(3) non for profit land trust focused on coastal habitats in Southern Oregon. SCLC owns and manages a small tract of land adjacent to the Coos Estuary and has partnered with the Elk River Land Trust to protect several hundred acres of mature low elevation forest adjacent to the Elk River and the Grassy Knob wilderness area on the SW Oregon coast. The SCLC has also assisted landowners in the Coquille River valley by designing and managing a 60 acre flood plain wetland restoration project that included a $250,000 grant from the Governor's watershed enhancement board and partnering with the Southern Oregon Land Conservancy to protect wetlands in the Myrtle Point.

TEACHING EXPERIENCE/PUBLIC SPEAKING

Marine Biology on Three Seas program Co-administrator and Faculty member: (1984 -1985) Developed and lead a three academic quarter, upper division undergraduate university program as partnership between University of Oregon and Northeastern University. Students studied at field stations based in Oregon, Jamaica and Massachusetts. Duties included recruitment, curriculum development, logistics and administration, and instruction.

Summer Session Faculty: University of Oregon's Institute of Marine Biology Instructor, BI 458: Biology of Seabirds and Marine Mammals (1982-1984).

Invited Keynote Speaker: Third annual National Watchable Wildlife Conference, Burlington, Vermont. Audience of approximately 1,000 participants (1994)

Watchable Wildlife Training Course Curriculum Development Team and Session Leader: Week long Biodiversity; course for federal employees sponsored by US Bureau of Land Management Phoenix training center. Courses offered at field sites in Oregon, Arizona, and California (1992-94).

Keynote speaker, Oregon Shorebird festival (2004) (http://www.fws.gov/oregoncoast/shorebirdfestival.htm). Presented numerous seminars for Shoreline Education for Awareness docent training program (1998 – present) (http://www.sea-edu.org/seminars.html)

INTERNATIONAL EXPERIENCE AND TRAINING

Coastal Zone Management Seminars Africa (1991) Presented seminars and lectures in South Africa and Namibia to university audiences and professionals in natural area management.

Countryside Exchange Program Team Member; Blackwater Estuary, Essex, England (May 1999). "Managed Shoreline Retreat" planning team. Member of a 7 person international team of professional experts in community planning, conservation, and economic development. Assisted participating community during a week long intensive residential consultation aimed at providing team sponsors with new perspectives on environmental and agricultural issues related to sea defenses and coastal habitat restoration. Project team worked with community leaders to recommend implementation strategies for managed shoreline retreat and tidal wetland restoration.
(http://www.glynwood.org/Programs/PastPrograms/CountrysideExchange.html

Advisor, Commission for Environmental Cooperation La Paz Mexico (April 1999). The Commission for Environmental Cooperation (CEC) is an international organization created by Canada, Mexico, and the United States under the North American Agreement on Environmental Cooperation (NAAEC). The CEC was established to address regional environmental concerns, help prevent potential trade and environmental conflicts, and to promote the effective enforcement of environmental law. NAAEC sets up governmental advisory committees (GACs), which consist of representatives of federal and state or provincial governments who offer advice on the implementation and development of the agreement. I participated in a GAC meeting whose focus was regional coordination of ocean governance. Key topics included state of the environment reporting and coordinated, tri-national conservation of highly migratory species.

International Negotiations Training Workshop Participant (April 2001) Workshop co-sponsored by the National Oceanographic and Atmospheric Administration Office of Coastal Resources Management and the United States Institute of Peace. (http://www.usip.org/). The two day session, held in Washington, DC included approximately 25 participants from several nations. The US Institute of Peace was established and is funded by Congress to provide analysis, training, and tools that prevent and end conflicts, promote stability, and advance the field of peace building and conflict management.

Integrated Coastal Zone Management Exchange Program Participant; (2004 and 2005) Bitung (Sulawesi), Indonesia. Hosted by the International City/County Management Association (ICMA) and USAID. Bitung, a city with a population of more than 100,000, is on the northern shore of Lembeh Strait, known for its diverse, endemic rich marine life. In an effort to improve the environment, the city partnered with the USAID-funded Coastal Resources Management Program (CRMP), to develop a marine managed area. The ICMA CityLinks program supported the work undertaken by the CRMP by providing assistance in areas where CRMP does not have experience, particularly with the cities' role in integrated coastal management. Through the ICMA CityLinks Program, Bitung invited the Coos Bay Port Authority, the University of Oregon's Institute of Marine Biology (OIMB) and SSNERR to assist with the project. The Port, OIMB and the SSNERR staff participated in exchanges to Indonesia and

hosted events for Bitung officials in the United States. (http://icma.org/inter/rc_prog_overview.asp?Region_ID=2&CR_ID=280).

In addition to the International training programs outlined above, during the past 25 years I have undertaken self-guided professional development investigations of coastal zone management and natural area management in the following countries: Botswana, Canada, France, Great Britain, Haiti, Jamaica, Mexico, Puerto Rico, Namibia, Panama, Peru, Chile, Venezuela, French Polynesia, South Africa, Swaziland, Tahiti, Zimbabwe, the Falkland Islands, and the Channel Islands (UK)

OTHER RELEVANT EXPERIENCE

Current Oregon Drivers License
Fluent in Microsoft Office applications
Oregon Boater Education Card and ability to operate and maintain boats
Construction and wood working skills
Certified scuba diver
Oregon Commercial Fisherman

Exhibit I

Oregon
Kate Brown., Governor

Department of Fish and Wildlife
Wildlife Division
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Salem, OR 97302
(503) 947-6300
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February 3, 2019

Robert Lobdell, Aquatic Resource Coordinator
Department of State Lands
775 Summer St. N.E., Ste 100
Salem, OR 97301

RE: Jordan Cove Energy Project Removal-Fill Application # APP0060697 Revised

Mr. Lobdell,

The Oregon Department of Fish and Wildlife (ODFW) appreciates the opportunity to provide comment to the Department of State Lands (DSL) on the Jordan Cove Energy Project (the project) application (#APP0060697) for removal and fill activity in wetlands and waterways. The Jordan Cove Energy Project proposes construction of a liquefied natural gas export terminal to be located on the North Spit of Coos Bay (Jordan Cove LNG Terminal; JCEP) and a 229-mile pipeline extending from the intersection of the GTN and Ruby pipelines to Coos Bay (the Pacific Connector Gas Pipeline; PCGP). It is the policy of the state of Oregon to manage fish and wildlife to prevent serious depletion of indigenous species and to provide the optimum recreational and aesthetic benefits for present and future generations of the citizens of this state (ORS 496.012, ORS 506.109). In accordance with our mission, ODFW has reviewed this removal-fill application and offers the following comments and recommendations. Should you have any questions or require any further detail, please contact Sarah Reif, ODFW Energy Coordinator, at 503-947-6082 or sarah.j.reif@state.or.us.

ODFW Comment History

ODFW has been providing assessment and comment on the project since it was first proposed in 2008. Although the project has changed somewhat in scope and location, the proposal includes the same components as originally proposed. The comments provided herein are largely a carry-forward of those submitted by ODFW in previous years, and those most recently submitted by ODFW to the US Army Corps of Engineers for the Jordan Cove Energy project 404/408 Permit Application (NWP-2017-41), to the Oregon Department of Environmental Quality for their Section 401 Water Quality Certification, and to the Federal Energy Regulatory Commission for their 2017 Notice of Intent to Prepare and Environmenal Impact Statement for Docket No. PF 17-4-000. Given the scale of the project and the complexity of the application's 3300 pages, ODFW welcomes additional coordination with DSL if more site-specific recommendations would be needed or helpful.

General Comment on Economic Benefit

ODFW recognizes the project is anticipated to provide immediate economic benefits to the local communities of Coos County and other counties within the range of the pipeline portion of the project. However, this benefit should be evaluated in the context of both the potential adverse environmental effects and negative impacts to the long-standing current and future economically important industries (e.g. commercial fishing, recreational fishing and hunting, aesthetics, wildlife viewing, and aquaculture) that depend on healthy and abundant fish, wildlife, and habitats. Fish and wildlife recreational expenditures in 2008 accounted for 2.5 billion in income for the state of Oregon (Runyan and Associaated 2009). In Oregon, the commercial crabbing fishery is a tremendous economic engine with potential to be impacted by this project. For example, the 2017-2018 Dungeness crab season (December to August) generated $74 million in ex-vessel value (see https://www.dfw.state.or.us/MRP/shellfish/commercial/crab/docs/Crab%20Newsletter_2018_final.pdf, and https://www.dfw.state.or.us/MRP/shellfish/commercial/crab/news_publications.asp) . Like many other important fisheries, Dungeness crab use Coos Bay and the surrounding nearshore area for nursery habitat that may be affected by this project's proposed dredging activity, and the Coos Bay fishing fleet relies heavily on crab for its profits.

Oregon Fish Passage Law Compliance and Consistency

ORS 509.585 (Oregon Fish Passage Law) applies to all project components that cross waters of the state where native migratory fish species are or were historically present. ODFW administers fish passage rules and regulations. The project proposes numerous components that will cross waters of the state, which are defined in OAR 635-412-0005(46). These waterway crossing components and corresponding construction methods include LNG pipeline construction techniques (horizontal directional drilling, conventional boring, dry or wet open cut trenching), new or temporary access roads, and tidegate construction/modification. The extensive road network necessary to access, construct, and maintain the project will cross multiple streams or waterways and will use a variety of road-stream crossing construction techniques and methods (culverts, fords, bridges). In order to mitigate potentially significant environmental harm to the state's fish and wildlife resources, these project components must be designed, constructed, and maintained consistent with Oregon fish passage law and policies.

To fulfill this statutory requirement and ensure the project is designed and constructed consistent with Oregon's fish passage policy, the applicant should submit specific stream crossing design details at each project component that will cross waters of the state of Oregon. The expectation and goal of these design details are to specifically identify and depict how each waterway crossing proposed by the project will meet fish passage rules and regulations. To date the applicant has met with ODFW to discuss conceptual design details, however the applicant has not formally submitted its fish passage plans for ODFW review and approval. ODFW anticipates frequent, interactive coordination with the applicant to complete the fish passage approvals prior to construction.

Oregon In-water Blasting Permits

In-water blasting has the potential to injure aquatic fish and wildlife due to percussive shock waves produced by the energy associated with the explosion. This percussion can cause direct injury and stressors

including bursting of swim bladder, hemorrhage, damage to sensory organs, and trigger displacement behavior in fish species.

As required by OAR 635-425-0000 through 0050 (In-water Blasting Permits) the project shall apply for in-water blasting permits at any stream crossing locations where the use of explosives is desired in the course of removing any obstruction in any waters of this state, in constructing any foundations for dams, bridges, or other structures, or in carrying on any trade or business (OAR-635-425-0005). Further, it is the policy of the Oregon Fish and Wildlife Commission to discourage in-water blasting unless it is the only practicable method to accomplish project goals. ODFW may issue in-water blasting permits only if they contain conditions for preventing injury to fish and wildlife and their habitat (OAR 635-425-0015).

The applicant has engaged ODFW in discussions regarding the need for and intent to apply for in-water blasting permits before construction begins. However, specific locations and plans have not yet been discussed. ODFW understands the applicant has not been able to physically access all stream crossing locations preventing the collection of necessary site-specific geotechnical information necessary to demonstrate in-water blasting is the only practicable method to accomplish project goals at certain locations. ODFW anticipates that frequent and iterative coordination with the applicant subsequent to physical access to in-water blasting location(s) will result in the applicant obtaining blasting permit approval from ODFW for all sites where this construction method is necessary and considered the least impactful method (to fish, aquatic wildlife, and their habitats). The applicant should only submit in-water blasting permit application after obtaining access to site locations and having collected necessary site-specific information to complete applications.

In-Water Work Windows

The application indicates in some sections of the document an intent to follow the ODFW Guidelines for Timing of In-Water Work To Protect Fish and Wildlife Resources (see https://www.dfw.state.or.us/lands/inwater/Oregon_Guidelines_for_Timing_of_%20InWater_Work2008.pdf). However, in other parts of the document the applicant refers to FERC guidelines for wetland and waterbody procedures (Part 2 Attachment P.6). The FERC default in-water work windows identified in this attachment do not align with ODFW recommended work windows and are not adequate to fully protect Oregon's fishery resources at the site-specific scale. Further, Oregon law does not recognize the terms used in the FERC guidance such as "minor waterbody", "intermediate waterbody", or "major waterbody". A FERC "minor waterbody" might be important habitat for threatened or endangered fisheries or other wildlife and warrant greater protections than the generic conditions outlined in the FERC document. The FERC document also provides differing guidance for work in "coldwater" fisheries, however Oregon does not designate waterbodies using these terms. Application of the FERC waterbody procedures will likely create conflict with the definitions and Oregon's Fish Passage Laws and In-Water Blasting Laws, therefore ODFW recommends Oregon's in-water work guidelines be applied to native fish-bearing waterways throughout the project. ODFW recommends that any needed variation from the recommended work windows be discussed with the applicable ODFW Fish District to ensure impacts to fish and aquatic resources are minimized.

Fish and Wildlife Habitat Mitigation Policy Consistency

ODFW recommends that impacts to fish and wildlife habitats be addressed consistent with the ODFW Fish and Wildlife Habitat Mitigation Policy (OAR 635-415-0000 through 0025). This rule governs ODFW's provision of biological advice and recommendations concerning mitigation for losses of fish and wildlife habitat caused by development actions. Based on standards in the rule, ODFW determines the appropriate category to apply to land or water where a development action is proposed. If ODFW determines that such habitat is Category 1, ODFW must recommend that impacts to the habitat be avoided. If impacts cannot be avoided, ODFW must recommend against the development action. If ODFW determines that such habitat is Category 2, ODFW must recommend that impacts to the habitat be avoided. If impacts cannot be avoided, ODFW must recommend a high level of mitigation (as specified in more detail in the rule). If such mitigation is not required, ODFW must recommend against the development action. Subsequent specific mitigation goals follow for habitats determined to be Category 3, 4, 5 and 6, and for which impacts cannot be avoided.

In this comment letter and those submitted to the other state and federal agencies involved in the permitting of this project, ODFW has recommended a coordinated, interagency habitat mitigation plan for the entire project including both the LNG terminal and the pipeline. At this time it is not clear how the applicant intends to approach mitigation beyond what is proposed in the Compensatory Wetland Mitigation Plan (Attachment I to this application, as well as an updated version posted to the FERC docket #CP17-494-000 on 1/29/2019). However, it may be notable to DSL that the applicant and ODFW will be meeting in the coming weeks of February 2019 to provide clarification on their proposed approach to habitat mitigation.

ODFW offers the following analysis and recommendations to address impacts not only to wetlands and waterways, but also to upland habitats. It is ODFW's perspective that upland impacts have the potential to affect habitat functions and values within the wetland and waterways.

When DSL and the applicant are prepared to discuss these comments, ODFW can provide more detailed, site-specific recommendations which have been collected by ODFW District Biologists throughout the years of the project in its various iterations.

JORDAN COVE LIQUEFIED NATURAL GAS (JCEP) FACILITY PROJECT COMPONENT

Introduction

The proposed JCEP project is large in scope, will have ecological impacts, and have legacy implications for aquatic habitats of Coos Bay and upland habitats on the North Spit. The North Spit is one of the only ocean peninsula land features in the state with estuarine, ocean, wetland, and upland habitats available for fish and wildlife within a very small geographical area. This unique landform and bay provide a number of strategic benefits for production of fish and wildlife. Coos Bay is the largest estuary located entirely in Oregon and supports populations of fish and shellfish that contribute to large commercial and recreational fisheries. The aquatic and upland habitats encompassed by JCEP and workforce housing project area have been subjected historically to a number of landscape and waterway alterations including: dredging, rip-rap installation, leveling, and removal of native coastal pine forest, filling of wetlands, and other development related impacts. These habitats historically would have been primarily characterized as

Category 2 or 3 habitats, (providing essential, important, and/or limited habitat function for fish and wildlife) under the ODFW Habitat Mitigation Policy. Although negatively impacted historically, much of the tidal, subtidal, and upland habitats at the proposed project site have received only minimal disturbance in the past two decades and substantial recovery of ecological function has occurred.

Aquatic Estuarine Discussion

According to the DSL removal-fill application, the LNG terminal and associated facilities would permanently impact 22.5 acres of estuarine wetland habitat (identified in the application as those acres requiring mitigation) and an additional 58+ acres of deep subtidal wetland habitat. These subtidal, tidal, intertidal, and shoreline features provide critical habitat for a number of culturally and economically important game and non-game species including, but not limited to: Dungeness crab (*Cancer magister*), red rock crab *(Cancer productus*), cockles (*Clinocardium nuttallii*), gapers (*Tresus capax)*, butter clams (*Saxidomus giganteus)*, littleneck clams (*Protothaca staminea*), rockfish (*Sebastes spp.*), lingcod (*Ophiodon elongates*), greenling (*Hexagrammos decagrammus*), California halibut (*Paralichthys californicus*), English sole (*Parophrys vetulus*), Pacific sand dabs (*Citharichthys sordidus*), ghost shrimp (*Callianassa californiensi*), mud shrimp (*Upogebi pugettensi*), starry flounder *(Platichthys stellatus)*, smelts (Osmeridae family), (Engraulidae family), sardines (Clupeidae family), fall run Chinook salmon *(Oncorhynchus tshawytscha)*, green sturgeon *(Acipenser medirostris)*, white sturgeon *(A. transmontanus)*, (OC) ESA threatened coho salmon *(O. kisutch)*, and possibly Pacific lamprey (*Entosphenus tridentata*). There is some potential that Pacific smelt (eulachon) (*Thaleichthys pacificus)* may be found in the JCEP area of Coos Bay. Additionally, the mudflats in the JCEP area support a commercial ghost shrimp fishery.

Dredging of the Bay and Channel

The JCEP project will dredge materials from North Spit and Coos Bay in order to create the slip for ships to load liquefied natural gas (LNG) and navigate along the Coos Bay channel to the ocean. According the application, dredging of the access channel will remove 1.9 million cubic yards (mcy) of material, which is then proposed for disposal at Ingram Yard, South Dunes site, Roseburg site, and the Kentuck Mitigation Project site. Dredging of the Navigational Reliability Improvements (NRIs) will remove an additional 590,000 cubic yards (CY) of material, which is then proposed for disposal at APCO Sites 1 and 2.

The Port of Coos Bay has also proposed a navigation channel modification project that will convey benefit to the JCEP project both in terms of financial savings and through increased transport efficiency. Accordingly, ODFW contends that the Jordan Cove Energy Project and the Port of Coos Bay navigation channel modification project are connected actions and should be evaluated by all permitting authorities as such. Some of the impacts of the combined projects include:

- Deepening and widening of the existing Coos Bay navigational channel to 37’ deep and 300’ wide
- Expansion of the Coos Bay navigational channel to 45’ deep and 450’ wide from the channel entrance to River Mile 8.2
- Alteration of the hydrodynamic characteristics of the Coos Bay estuarine tidal basin in response to deepening and widening, including:
    - Physical changes in the intrusion of marine waters, coupled with alteration of the salinity regime, conductivity, exchange volume, tidal prism, tidal currents, and other parameters

  - Shifts in the location, configuration, and spatial extent of marine-dominated, estuarine, and freshwater-tidal habitats
  - Changes in the composition of ecological communities that reside within the water column, marine-dominated, estuarine, and freshwater-tidal habitats
  - Changes in the location and potential for rearing of juvenile fish
- Disposal of dredge material at upland sites on the JCEP project lands located southwest of the OR Highway 101 bridge at the APCO Sites, and disposal of dredged material at the Kentuck Project Site;
- Impacts to the ocean floor outside the mouth of Coos Bay where a large quantity of dredged material (estimated at 18-25 million CY) will be deposited at an ocean disposal site, or multiple sites, that have not been fully identified;
- Deposition of dredged materials on the ocean floor will alter the physical characteristics of the benthic habitat due to both the substantial modification of the bottom topography and the anticipated characteristics of the dredged material (e.g. estimated 8.5 million CY of sandstone and siltstone debris);
- Deposition of dredged materials on the ocean floor will impact the benthic communities of resident marine fish and invertebrates, as well as transient species of concern including green sturgeon (*Acipenser medirostris*);
- Dredged materials transported away from the deposition sites have the potential to negatively affect important nearby rocky reef habitats;
- Disposal of dredged materials may occur in areas of heavy Dungeness crab commercial fishing activity, potentially interfering with crab habitat and fishing vessels; and
- Excessive mounding of sediments can alter the wave climate, creating enhanced risk to commercial fishing vessels that navigate nearshore waters during stormy conditions.
- Installation of a large rock apron at the toe of the North Jetty at the entrance to Coos Bay;
- Excavation of a new vessel turning basin with a length of 1400 feet, width 1100 feet at -37 feet deep (constructed approximately between River Miles 7.3 to 7.8);
- Disposal of 590,000 CY of dredged material through mechanical or hydraulic methods (24 inch pipeline laid on bottom of Coos Bay 8.3 miles) then distributed between the APCO 1 and 2 disposal sites;
- Significant impacts to subtidal habitat within Coos Bay that is important for production of species such as Dungeness crab (*Cancer magister*), white sturgeon (*Acipenser transmontanus*), and California halibut (*Paralichthys californicus*).

Marked change will occur to the productivity of the dredged portion of the bay and little recovery is expected over time due to the continual need for maintenance dredging. Maintenance dredging for the JCEP will result in a continually disturbed condition preventing development of any reliable estuarine production in the affected areas. Additionally, the Port of Coos Bay project will likely dredge substantially more on an annual basis.

ODFW recommends DSL consider how the proposed "slip" will create a new deepwater alcove backwater likely resulting in a number of significant biological effects (e.g. change to water flow patterns in the vicinity, salinity patterns, turbidity associated with initial and repeated dredging, and shallow water conversion to deep water). While hydrodynamic models provide some insight into the physical changes that the site and bay may undergo, biological changes should be studied in situ to accommodate unknown

variables. The actual JCEP longer-term, indirect impacts to the larger estuary may not be accurately predicted prior to construction.

No less important are the wildlife resources in the uplands that will be displaced by this complete conversion of upland habitat to a new deep-water terminal/zone and long-term daily disturbance factors attributable to project activities. The magnitude and long-term severity of these potential impacts may be difficult to estimate through models and best professional judgment. ODFW recommends carefully planned and executed long term monitoring of these changes to the bay and estuary for the life of the project. ODFW recommends the monitoring program inform an adaptive management approach to confirm estimates of both impact and mitigation to ensure habitat functions as are fully restored or compensated for commensurate to the actual shorter or longer term impacts of the action.

Upland Habitat Discussion

A notable portion of the impacted uplands at the JCEP site will be converted from terrestrial habitats to aquatic habitats, in order to construct a slip moorage for vessels. ODFW recommends the applicant and DSL address these potential impacts to upland species who would likely lose habitat in the conversion to jurisdictional waterway. Columbian black-tailed deer (*Odocoileus columbianus)* use the flats and vegetated sand dunes within the project area year long. Black bear (*Ursus americanus*) and coyotes (*Canis latrans)* also use upland habitats at the site. There are also 11 species of amphibians (8 salamanders, 3 frogs) at least 10 species of reptiles that have been found to occur on the North Spit. Avian wildlife on the proposed project area are generally diverse and include great blue heron (*Ardea herodias*), snowy egret (*Egretta thula),* and osprey (*Pandion haliaetus)* among many others. Two species that were formerly on the Endangered Species list, bald eagles (*Haliaeetus leucocephalus)* and peregrine falcons *(Falco peregrinus),* use the site seasonally or on occasion.

Adjacent to the slip is a large dune occupied by a mature shore pine vegetation community that is potential habitat for the coastal marten (*Martes caurina*), a State Sensitive species and one that has recently been petitioned for listing on the federal Endangered Species Act list (Federal Register 2015; USFWS deemed the Humboldt coastal marten a distinct population segment but found a listing was not warranted). While information regarding distribution, connectivity of habitat, and abundance is still largely unknown at this time, a group of conservation organizations has also petitioned the Oregon Fish and Wildlife Commission to consider listing the coastal marten on the State of Oregon Endangered Species List. Currently ODFW considers the coastal marten a State Sensitive Species and an Oregon Conservation Strategy Species because of the limited extent of its preferred habitat (late successional mixed conifer forest and apparent association with shore pine) and its apparent low survival rate in fragmented forests elsewhere in the United States. ODFW recommends DSL consider the potential impacts to habitat connectivity for the coastal marten in its review of the habitat conversion at the slip. ODFW is considering this patch of forested dune habitat Category 2 according the ODFW Fish and Wildlife Habitat Mitigation Policy.

Aquatic Freshwater Discussion

In previous versions of the project, ODFW worked with the applicant's consultant to categorize freshwater habitats at the LNG terminal site according to the ODFW Fish and Wildlife Habitat Mitigation Policy. These wetland habitats provide functionally important ecological features on North Spit as they contribute to nutrient cycling where the sandy soil types are very limited in primary nutrients, and are freshwater

refugia within a short distance to saline habitats. The wetlands and open water ponds are important for production of a number of amphibians including rough skinned newts (*Taricha granulosa*), red-legged frogs *(Rana aurora),* as well as several species of tree frog (i.e. Pacific tree frog *Pseudacris regilla*). Three-spined stickleback *(Gasterosteus aculeatus)* occupy a number of the ponds and deeper wetlands. Numerous waterfowl species transition through these ponds including mallards (*Anas platyrhynchos*), greater scaup (*Aythya marila*), wood ducks (*Aix sponsa*), and Canada geese (*Branta Canadensis*).

COMPENSATORY WETLAND MITIGATION PLAN (CWMP)

The comments in this section are applicable to both the JCEP terminal and PCGP pipeline components of the project.

It should be noted that the numbers for waterbody crossings vary across documents. ODFW found differing numbers in the applicant's Compensatory Wetland Mitigation Plan as compared to the FERC Applicant Prepared Biological Assessment and those differed again from the numbers reported in the FERC Resource Reports. Recognizing that project design shifts over time while documents remain static depending on time of publication, it does make it difficult to assess impacts without consistent numbers as well as inconsistent definitions of waterbody (as opposed to the normal terminology used by the state for 'waterway' and 'wetland').

With regard to avoidance and minimization measures discussed in the plan, ODFW appreciates the applicant's efforts to co-locate facility components with existing infrastructure and previously disturbed areas where possible. ODFW supports the minimization measures and best management practices identified in the CWMP, but also directs DSL and the applicant's attention to the comments provided throughout this letter that would further help to minimize impacts to fish and wildlife habitats.

ODFW requests a determination from DSL as to whether the applicant's treatment of temporary versus permanent impacts meets applicable DSL removal-fill statutes and guidance. The applicant notes that while DSL treats any impact duration longer than two-years as permanent, the US Army Corps of Engineers does not define temporary. The applicant states that for the sake of consistency, the Compensatory Wetland Mitigation Plan only addresses 'actual' permanent impacts and temporary impacts will be addressed in a separate site restoration plan. ODFW interprets this to mean that the applicant is considering anything less than a permanent impact to be temporary and therefore not requiring a mitigation offset. This interpretation does not meet the ODFW Fish and Wildlife Habitat Mitigation Policy which directs ODFW to consider the nature, extent, and ***duration*** of impacts and that offsets should persist for the life of the impact. Because of the 'duration' language in the mitigation policy, ODFW bases its recommendations not only on the physical loss of habitat, but also the length of time for which that habitat is unavailable to fish and wildlife (referred to as temporal loss of habitat). Impacts that the applicant might consider temporary in nature might actually result in temporal loss of habitat that should be mitigated in order to prevent depletion of a species with short generational turnover, and to meet the mitigation policy's goal of 'no net loss'. ODFW contends that unavoidable impacts, greater than DSL's 24-month guideline, ought to be addressed in the CWMP.

ODFW seeks confirmation from DSL that out-of-proximity mitigation for freshwater wetland impacts will meet the DSL removal-fill statutes and guidelines. It is ODFW's understanding that mitigation for the unavoidable impacts to freshwater wetlands along the 229-mile pipeline will be consolidated into the

uppermost 10 acres of the Kentuck Mitigation Site in Coos Bay. ODFW reviewed the section of the CWMP that discussed the reasoning for consolidation (page 2). The ODFW Fish and Wildlife Habitat Mitigation Policy recommends in-proximity mitigation for impacts to habitat categories 2 and 3. Since the CWMP did not provide a categorization of habitats according to the ODFW mitigation policy, ODFW is reliant upon DSL's determination that in-proximity mitigation options were considered and found to be untenable or that the Kentuck option provided greatest overall net benefit to Oregon's wetland resources.

ODFW requests confirmation from DSL that permanent and intermittent streams impacted by the project will not reach the volume threshold for inclusion in this removal-fill application. It does not appear that the CWMP addressed impacts to perennial and intermittent streams. It is possible that volume thresholds were not met. But it is also possible the applicant considered those impacts to be temporary (as per their interpretation, see above) and therefore did not include them in the CWMP. However, ODFW contends that some streams may take longer than 24 months to recover their pre-disturbance function and values and should have been considered in the CWMP. As such, ODFW requests DSL confirmation of concurrence with the applicant's determination, otherwise work collaboratively with ODFW and the applicant to rectify this omission.

Kentuck Mitigation Site

The Kentuck mitigation site is approximately 100 acres, with the uppermost 10 acres planned for freshwater wetland habitats and the remainder planned for estuarine wetland habitats. The current mitigation plan proposes a network of tidal channels and removal of a segment of East Bay Drive in order to connect these channels to Coos Bay tidal inflow/outflow. Additionally a portion of Kentuck Creek streamflow will be guided through the new channel network using a modestly complex configuration of culverts and tidegates. The habitats at the Kentuck site have been diked, drained, tidegated, cultivated, grazed, and stream networks channelized since the late 1800's resulting in substantial degradation of the ecological productivity. Historically the site would have been defined as Category-2 intertidal Algae/Mud/Sand habitats, under ODFW Habitat Mitigation Policy, however, currently the function for native fish and wildlife species is considered Category-4 and 5 in some locations. Mitigation restoration will reestablish natural hydrologic regimes to a substantial degree at the site, although the entrance of tidal flow will be truncated partially due to the limited opening through East Bay Drive and partial reintroduction of Kentuck Creek flow. Historically full volume flood flows from Kentuck Creek would have been able to support a broader range of euryhaline conditions for native fish and wildlife. Additionally, tidal flows would have been a combination of sheetflow and channel flow prior to installation of East Bay Drive. The mitigation restoration will establish tidal channel flow, however, without full removal of the length of East Bay Drive (which ODFW is not suggesting as an option), sheetflow will not be re-established.

Algae-mud-sand habitats are considered Category 2 under ODFW Habitat Mitigation Policy. Saltmarsh habitats are also considered Category 2 in function. The JCEP project impacts to intertidal habitats includes primarily: Category 2 Intertidal Unvegetated Sand; Category 2 Shallow Subtidal; Algae/Mud/Sand; Category 2 eelgrass; and Category-3 Deep Subtidal. The majority (very roughly 82 acres; based on LiDAR evaluation) of the Kentuck within the proposed mitigation area is currently below elevation 5.0ft MLLW. Excavation of a tidal channel through East Bay Drive with the current elevations within the mitigation area would allow nearly all lands within the site to be inundated with the majority of tides. The JCEP project proposes using the Kentuck Mitigation site for dredge material disposal

(300,000 CY) that would elevate a substantial proportion of the project area above elevation 5.0ft MLLW decreasing the land area that will be inundated regularly. ODFW recognizes that following placement of fill, the higher elevation areas will eventually vegetate to saltmarsh ecotype, which is considered high in value and limited in Coos Bay. Overall, ODFW supports the applicant's proposal for restoration at Kentuck Slough because, if successful, the project will improve the quality and diversity of rare estuarine habitats.

Eelgrass Mitigation

The proposed project includes construction of a marine terminal slip and dredging of an access channel. These activities will permanently destroy about 1.9 ac of established native eelgrass (*Zostera marina*).

Dredging in the intertidal and shallow subtidal zones within the project area is expected to have significant deleterious effects on native eelgrass habitats and the species found therein. Eelgrass is recognized by ODFW as a Category 2 Habitat and as a Strategy Species by the ODFW Nearshore Strategy (marine and estuarine component of the ODFW Oregon Conservation Strategy). Beds of eelgrass occur at several locations throughout the Coos Bay tidal basin where they provide numerous ecological functions, including heterogeneous habitat for a number of fish and wildlife species, nursery habitat for invertebrates and fish, forage areas for shorebirds and waterfowl, primary production and a source of organic-rich detritus, stabilization of unconsolidated sediments, trapping of suspended sediments, and contribute to improvements to estuarine water quality (Thom et al. 2003; Kentula and DeWitt 2003). In particular, the emergent blades and rhizomes of eelgrass beds provide complex and heterogeneous multi-dimensional habitat within the unconsolidated soft-sediments in the intertidal and shallow subtidal zones. In many cases, the abundance and species composition of macroinvertebrate, shellfish, and fish communities differ within eelgrass beds in comparison with un-vegetated areas where eelgrass is absent. Eelgrass beds are known to provide habitat for numerous species of invertebrates, including polychaete worms, cockles, gaper clams, butter clams, littleneck clams, Dungeness crab, grass shrimp and epibenthic invertebrates such as harpacticoid copepods, isopods, and gammerid amphipods, In addition, eelgrass beds also provide habitat for a diverse community of fishes, including juvenile salmonids, sculpin, English sole, shiner perch, lingcod, rockfish, pipefish, and herring.

Long-term efforts to remove root wads, large woody debris, and other natural structures embedded in the un-vegetated soft sediment of Coos Bay in order to facilitate commercial shipping and recreational boating have greatly exacerbated the lack of structural complexity along the shoreline and further increase the ecological importance of eelgrass beds. The heterogeneous canopies of eelgrass beds provide both primary complexity and an ecological edge effect that presents an important biophysical transition zone for fish and invertebrates that forage in adjacent un-vegetated habitats.

Native eelgrass is recognized by ODFW as a Category 2 Habitat, and the ODFW goal is no net loss of either habitat quantity or quality and to provide a net benefit of habitat quantity or quality (OAR 635-415-0025). To achieve the mitigation goal, ODFW recommends avoidance of the impacts through alternatives to the proposed development action, or mitigation of the impacts (if unavoidable) through reliable in-kind, in proximity habitat mitigation to achieve no net loss of either pre-development habitat quantity or quality.

In order to offset the loss of 1.9 ac of eelgrass the JCEP includes a proposed eelgrass mitigation plan that relies on the "best case scenario" for full success by creating 6.03 ac of eelgrass (3:1 ratio) within a 9.34

ac site in the intertidal zone near the impact area. ODFW has noted a number of potential issues associated with the proposed eelgrass mitigation plan that have not been considered/addressed fully by the applicant.

The eelgrass mitigation plan does not demonstrate that serious consideration has been given to avoidance of the impacts to eelgrass beds. In this regard, the plan should describe the alternative sites that were considered, characterize the location, species composition, and abundance of the eelgrass and other submerged aquatic vegetation at the alternative sites, and provide the rationale for rejection of the alternative sites and acceptance of the proposed site. The existing plan is incomplete because it does not provide a full description of the steps that were taken to avoid adverse impacts to existing eelgrass beds in Coos Bay.

The proposed eelgrass mitigation plan does not give adequate consideration to the difference in habitat quality that is anticipated between the eelgrass impact area and the eelgrass mitigation site. The plan proposes to excavate 9.34 ac of existing algae/mud-sand algae habitat located in the intertidal zone near the North Bend Airport to an elevation of -2.00 ft NAVD, and to convert the algae/mud-sand habitat into 6.03 ac of eelgrass. The proposed conversion of algae/mud-sand habitat to eelgrass habitat is problematic because algae-mud-sand is recognized as Category-2 value habitat under ODFW Fish and Wildlife Mitigation Policy (OAR 635-415). Eelgrass habitat and algae/mud-sand are both considered as Category-2 habitat, but they provide different functions and values. Accordingly, diminishing the quantity and quality of algae/mud-sand habitat in order to offset the loss of eelgrass habitat is not 'in kind' and does not create a 'net benefit', and therefore does not meet the ODFW Fish and Wildlife Mitigation Policy goals for Category 2 habitat.

Earlier attempts to mitigate for the damage or loss of eelgrass beds have met with limited success in Pacific Northwest estuaries. For example, Thom et al. (2008) conducted a review of 14 eelgrass mitigation and transplant projects, and they concluded that it is sometimes possible to restore eelgrass under favorable site conditions and when the reason for the initial loss of eelgrass is understood and corrected. The authors also noted, however, that eelgrass restoration science is hampered by knowledge gaps which reduce restoration success. The underlying mechanisms for recent eelgrass loss in the Pacific Northwest region are not obvious, which suggests that the scientific understanding of eelgrass biology and ecosystem conditions is currently inadequate to fully support environmental management actions (Thom et al. 2008).

There are often hydrologic flow regime complexities that affect potential for success in eelgrass restoration:

- Habitat conditions created through excavation or filling are often ephemeral and subject to subsequent deposition/erosion that results in movement of conditions outside of the range of preferred variability for eelgrass.
- Flow regimes including severity of wave action and current speed contribute to the potential success of a site for eelgrass establishment and growth. Sites that are created through excavation or fill are an artificial modification of conditions that have formed through the geomorphological features that drive flow regimes. Factors such as water depth reflect deposition/erosion rates from water transported sediments. Excavation or filling to a specific elevation is attempting to alter the natural elevation conditions in relation to hydrologic conditions for many sites that might serve as potential mitigation. Resultantly there is limited potential for success of projects that modify water depth/elevation of the substrates for

creating conditions appropriate for eelgrass mitigation unless the site chosen has substrate elevation that has been artificially created from previous disturbance or the conditions are dominated by factors other than hydrology.

- Use of eelgrass sites immediately adjacent to or within the mitigation area for obtaining plants/shoots results in impacts to these locations, potentially weakening the vigor of eelgrass at these locations which is counter to goals.
- Excavation of locations adjacent to existing eelgrass beds can result in hydrologic changes such as erosion of surrounding substrates resulting in impacts to currently productive stands.
- The monitoring plan should include more robust methods such as diver or low tide visual count surveys with established known planting densities at time-0 and subsequent measurable surveys with quantifiable methods.
- Due to the potential for minimal success the eelgrass mitigation ratio is likely insufficient to offset impacts.

For all of the reasons listed in the discussion above, ODFW recommends the eelgrass mitigation strategies be re-evaluated to favor avoidance.

PACIFIC CONNECTOR GAS PIPELINE (PCGP) PROJECT COMPONENT

Introduction

The following narrative is intended to set the general context for the specific comments and recommendation in the table below.

The PCGP removal-fill application to DSL proposes construction of a 36" steel gas pipeline from the North Spit of Coos Bay, Oregon (229 miles) to Malin, OR in order to connect the JCEP export facility to the Ruby LNG pipeline carrying gas primarily from the Rocky Mountain region. The PCGP would affect multiple perennial and/or intermittent waterways along the pipeline route. The applicant proposes to utilize horizontal directional drilling (HDD) for the crossing of the Coos Bay estuary, Coos River, Rogue River, and Klamath River. The applicant would use dry open-cut crossing methods where HDD methods are not planned. These actions will have temporary and permanent impacts to aquatic fish and wildlife which ODFW recommends be addressed consistent with the ODFW Fish and Wildlife Habitat Mitigation Policy, be performed consistent with ODFW In-Water Work Windows, and be permitted where applicable via ODFW In-Water Blasting and ODFW Fish Passage Authorizations.

ODFW recommends careful review be performed by DSL to consider the potential direct impacts to fish and wildlife habitat, as well as the indirect impacts to water quality associated with an increase in watershed runoff caused by this project, particularly in areas where the pipeline is proposed on slopes exceeding 50%, and where vegetation will be removed from riparian corridors. PCGP has the potential to cause negative direct impacts to fish and wildlife, and negative indirect impacts to water quality, within the Coos, Coquille, South Umpqua, Upper Rogue, Upper Klamath, and Lost River watersheds.

Please see the above discussions for Oregon Fish Passage Laws, In-Water Blasting, and ODFW Fish and Wildlife Habitat Mitigation Policy because they are all particularly relevant to the PCGP portion of the project and have yet to be formally addressed by the applicant.

Aquatic Discussion

The aquatic habitats in Coos Bay have been impacted historically from dredging, rip-rap installation, upland and tidal mudflat leveling, filling of tidal wetlands/saltmarsh, and other development/utilization impacts, However, substantial recovery of ecological potential has occurred due to improvements in forest management (reducing sediment inputs) and regulations conserving wetlands and waterways. The current and desired future condition of the waterbodies that will be affected by the pipeline is predominantly linked to management actions in the riparian habitats and adjacent uplands. Many of the streams that will be impacted by the pipeline have been ecologically degraded historically by a number of human impacts including: removal of native coastal riparian forest, road construction with subsequent chronic sediment contribution, and debris torrent/mass-wasting events related to forestry activities. The majority of these streams, many of which are critical for native salmon, trout, sculpin, lamprey, and other aquatic species production, are in a gradual trend of recovery following management guidelines and Best Management Practices implemented from 1970-1992 through agency and private ownership coordinated efforts (Oregon Coast Coho Conservation Plan; ODFW 2007). Actions such as pipeline construction and maintenance with associated long-term disturbance introduce an added burden inhibiting ecological recovery. Pipeline stream crossings have the potential to negatively affect watercourse ecosystems through alteration of channel beds and banks, increasing total suspended solids (TSS), alteration of substrate size and quantity in the reach and changes to the immediate area benthic community. These changes could have negative impacts for fish due to decreased food availability, changes in foraging range increasing predation, aquatic habitat simplification, and decrease in overall health.

Please see the estuarine aquatic impacts discussion in the JCEP section above, as those species and habitats listed therein are also relevant to the proposed pipeline sections of the Coos Bay estuary not included in the areas planned for horizontal directional drilling.

ODFW recommends careful evaluation of the risks of long-distance horizontal directional drilling (HDD) across the Coos Bay estuary, the Coos River, Rogue River, and Klamath River as well as the direct pipe crossing proposed for the South Umpqua River. ODFW recommends emergency preparedness plans be developed to address unforeseen failures (see the table below for further discussion of risk).

Outside of the estuary, there are numerous critical concerns with placement of the pipeline on steep slopes and direct routing parallel to the slope. Coastal sandstone soils are highly susceptible to mass-wasting when undercut and generally disturbed. A relatively extensive access road network will be created to access the pipeline installation and facilitate pipeline maintenance, which will further create potential for mass-wasting slope failures and general sediment production over the current condition. Stream health related to anadromous fish production has largely been assessed to be predominantly "Poor" (Scale: "Very Poor"; "Poor; Fair"; "Good"; "Excellent") in the Coos and Coquille River basins, with similar stream health conditions in the South Umpqua River basin. This "Poor" condition rating is largely related to upland disturbance increasing sediment loading and loss of riparian forest since 1900. Additionally, the proposed access road networks will likely have long-term chronic effects to fish and wildlife unless seeded, mulched, and closed. Sediment transport to streams is considered a substantial factor currently suppressing recovery of OC Endangered Species Act (ESA) threatened Coho salmon. Extensive research has documented the impacts of sediments to salmonids. Work to reduce sediment input into coastal and inland streams that will be impacted by the pipeline is foundationally critical for

enhancing spawning and rearing habitat for fall Chinook salmon, Oregon Coast (OC) threatened Coho salmon, Pacific lamprey (*Entosphenus tridentata*), winter steelhead (*O. mykiss irrideus)* and coastal cutthroat trout (*O. clarki clarki)* as water quality is directly linked to hatch rates and food available for these species. Sediment loading above natural background levels contributes to embedding of substrates, which often results in reduced hatch rates for eggs in redds, inability of fry to emerge from redds, inhibited production of macroinvertebrates (invertebrates largely live in the interstitial spaces of gravels), and impacts on the ability of fish to obtain food due to the nature of salmonids to feed predominantly by using their sight (Burns 1970; Hall and Lanz 1969; Weiser and Wright 1988; Suttle et al. 2004; Tripp and Poulin 1992; Waters 1995).

The applicant should be aware that Oregon Department of Forestry (ODF) fish presence/absence surveys represent "present conditions", and although highly useful do not completely represent historical fish usage as some watersheds have culvert barriers, man-made dams, etc. that are as of yet undocumented. The State of Oregon Fish Passage Rules (OAR 635-412-0005 through 0040) are based on maintaining fish passage throughout historical and currently accessible habitat.

Upland Discussion

To the extent that DSL can consider how impacts to uplands affect waterways and water quality, ODFW encourages efforts to understand, protect, and restore/mitigate for impacts to the bay, upslope habitats, riparian corridors, and streams with the goal of minimizing reductions to the capacity of upland an aquatic habitats to produce fish and wildlife. In that context ODFW has the following desired outcomes for the DSL processes:

- Documentation and categorization of aquatic and upland habitats (consistent with OAR 635-415-0000 through 0025) that will be disturbed through the PCGP project in collaboration with ODFW staff including:
  - Numerical habitat quantity and quality assessments (acreage assessments, streams crossed, upland) by habitat category.
  - Identification of the avian, mammalian, and amphibian wildlife that will be affected by the project.
  - Identification of the aquatic vertebrate species that will primarily be impacted by the project.
- Development of an upland habitat mitigation plan in collaboration with ODFW, the U.S. Fish and Wildlife Service (USFWS), NOAA Fisheries, US Forest Service, and US Bureau of Land Management with the goal of avoiding, minimizing, and fully mitigating any residual impacts of the project to fish and wildlife resources and their habitats.
- Development of permit conditions that call for protection of fish and wildlife and the habitat they depend on during all construction, operation, maintenance, and decommissioning phases off project implementation.
- Development of a monitoring plan that would guide assessment of the benefits or lack thereof for all restorative actions and mitigation.

In the attachment below you will find a comprehensive review and comment from a number of ODFW Fish and Wildlife District Biologists whose districts would be occupied by the JCEP and PCGP projects. A list of references used in the development of this comment letter is also included in the attachment. Again, ODFW thanks the Oregon Department of State Lands for the opportunity to provide comment. We

recognize the length and complexity of these comments, and we stand ready for any follow-up discussion or additional site-specific review you may require.

Sincerely,

Sarah Reif

Sarah Reif
Energy Coordinator, Wildlife Division

ATTACHMENT TO THE ODFW FEBRUARY 2, 2019 COMMENT LETTER TO OREGON DEPARTMENT OF STATE LANDS REMOVAL-FILL APPLICATION #APP0060697

SPECIFIC COMMENTS FROM OFDW FISH AND WILDLIFE DISTRICTS

The tables below provide additional comments from ODFW fish and wildlife district staff, with an attempt not to repeat comments provided elsewhere in this letter. These comments have been accumulating over the years of Jordan Cove applications, and are based on this DSL removal-fill application #APP0060697, the US Army Corps of Engineers Public Notice NWP-2017-41, the Oregon DEQ Public Notice for Section 401 Water Quality Certification, JCEP's Resource Reports 1, 2, 3, 8, and 10, and PCGP's Resource Reports 1, 2, 3, 6, and 8. Some references to the FERC 2014 Environmental Impact Statement may also be found in these comments, as some comments have been carried forward from previous reviews given their continued relevance. For each issue identified (left column), ODFW attempted to provide a suggested resolution (right column).

JCEP – Estuarine Aquatic Concerns from ODFW Fish and Wildlife Districts

(see following page)

Issue Identification	Recommended Resolution
Port will maintain access channel depth. Will this become part of the Port's Unified Dredging Permit, which maintains the depth of several access channels and vessel berths connected to, but outside of, the navigational channel?	**Port will maintain access channel depth.** ODFW recommends clarification of whether the access channel dredging and maintenance dredging will be part of Unified Permit or not. ODFW recommends all dredging of the portions of the project outside of the footprint of the current Federal Navigation channel or within the current upland and fully isolated from the bay by the proposed soil berm occur only with in the ODFW' in-water work window: http://www.dfw.state.or.us/lands/inwater/ Minor exception: At this particular site there is some potential that Pacific smelt (eulachon) may be in this reach of the bay from January 15 until April annually. Although the presence of eulachon is considered highly unlikely, as a precautionary measure ODFW recommends adjusting the normal In-Water Work window to October 1 to January 31.
Direct Construction and Maintenance Dredging Impacts: Lethal and non-lethal impacts to marine fish, crab, shrimp, bivalves, juvenile Chinook salmon, white sturgeon; ESA listed coho salmon, green sturgeon, and Pacific eulachon; as well as non-listed Pacific lamprey, and other species may occur: • Through entrainment in the hydraulic dredge at the time of the initial construction. • Be impacted by entrainment during future maintenance dredging required to keep the berth and access to the berth serviceable. • Become attracted to the alcove and away from natural habitats, introducing risk of industrial impacts to these species (e.g. metabolic expenditure from disturbance; entrainment into cooling intakes, entrainment into ship ballast water intakes). • The access channel from navigational channel to terminal is approx. 30 acres; with the proposed dredging turbidity will likely last for 4-6 months. Four to six months could affect the life history of several estuarine species (fish	**Direct Construction and Maintenance Dredging Impacts:** During the initial dredging and excavation, monitoring of the dredge output at the storage site, ODFW recommends the applicant access/estimate the magnitude (quantification of organisms in the dredge spoils) of impact to shellfish and non-game/game fishes. **Conduct biological recovery assessments:** ODFW recommends a biological assessment of the JCEP deepwater access and slips be completed following construction to determine the degree that production of shellfish/gamefish will recover and stabilize. ODFW recommends this recovery assessment be scaled based on to productivity in undisturbed regions in the Bay (reference sites). ODFW recommends this information be provided to ODFW, other natural resource agencies, local tribes, and other interested parties within one calendar year after construction of the slip and berth is completed and annually thereafter for a period of 10 years. **Mitigation/Monitoring/Adaptive Management:** While the direct impacts of initial construction are clearly identifiable, post-project indirect impacts are likely not. ODFW recommends the Applicant address appropriate monitoring/study plans for the

and invertebrates), depending on timing. ODFW IWWW is shorter than six months long. • Port of Coos Bay channel access improvement project will dredge another 18 MCY from channel with annual maintenance dredging. Actions will produce nearly year-long need for dredging actions in various reaches of the bay. • Risk of direct collision with marine mammals, or indirect disturbance in whale communication from dredging activities and ship engine noise	project area and mitigation sites be developed by and formally agreed upon by the Applicant and pertinent stakeholders. The expected hydrological changes at the site due to the project development will potentially result in a number of changes to the biological communities at those locations (e.g. densities, species composition, predatory interactions, etc.). These changes may occur in areas adjacent to or a considerable distance from the project area where there is little or no construction activity (see Deepwater Zone recommendations below). Long-term monitoring/study (i.e. majority of the FERC certificate duration) is appropriate to understand/mitigate for ecological and biological changes associated with the project. Clarify whether or not extension of IWWW would be requested. Issue is similar to Port's Unified Dredging Permit extension request, which ended with DSL issuing extension despite ODFW's recommendation of dredging only within the recommended IWWW.
Invasive Species: Invasive species are expected to flourish within the slip as with a result of disturbance. Throughout the world, aquatic invasive species are found most prominently in locations with low velocity or no current where transient ships dock. ODFW has some concern that this slip will be an invasive species vector within the bay (given it will have low current, stable salinity, and hard substrate – sheet pile walls), and will continue over time to have the potential to vector new species into the Bay (e.g. fouling from ships).	**Invasive Species:** Invasive species can be transported in ballast water and/or through attachment to the hulls of vessels. Ballast water management guidelines are a first line defense to prevent vectoring of invasives to Coos Bay. Adherence to these guidelines is of utmost importance in order to maintain the integrity of the Coos Bay ecosystem. ODFW recommends the Applicant address how the slip and berth will be monitored for colonization by invasives. ODFW recommends that if invasives are detected, the natural resource agencies be consulted on ecological risk and recommend measures that will be taken for elimination or control and changes to operations necessary to prevent future colonization should be implemented.
Ballast/Cooling Water Uptake/Discharge: ODFW understands	**Ballast Water Management Plan:** ODFW recommends that JCEP be required to develop a site-

that primarily ballast water will be discharged at the site as a result of the conversion of the project to an LNG export facility. However, if ballast water is be pumped onto vessels for any reason, potential for entrainment of fish and shellfish species (particularly during a planktonic larval life history stage) remains a Department concern. Additionally, engine cooling water will also be taken up and released in the berth. There is concern that uptake of water at the site will result in entrainment of fish into the ballast water intake system or ship engine intakes and ultimately cause mortality (take) of these individuals. Take of plankton will occur at the site, but has been discarded by the Applicant as not of significant importance. ODFW notes information collected by the Applicant-initiated plankton study (Shanks et al. 2010); indicating that uptake of plankton will have little impact on the Bay. However, ODFW continues to encourage efforts to address concerns for potential entrainment of organisms. Describes treatment of ballast water to be discharged while in berth, but does not specify what that treatment consists of. Cooling water uptake for ships in berth is est. 6.1 million gallons per visit; screen size is 24 mm (approx. 1"); this is not ODFW/NMFS criteria; juvenile fish are likely to be entrained.	specific ballast water management plan for all vessels servicing the JCEP LNG plant prior to issuance a removal/fill permit. ODFW recommends that the plan include effective methods for preventing, controlling, and eliminating recognized invasive species. **Ballast/Cooling Water Uptake:** Given that: 1) take of plankton has been identified as significant and 2) ODFW's most critical concerns on this subject relate to nekton such as juvenile fish, crab megalope, and uptake of salmonids, ODFW recommends the following actions to address direct and indirect effects: • Clarify treatment methodology for discharged ballast water while in berth. • Clarify minimization measures to prevent uptake of nekton should ballast water intake occur. **Screening of Water During Uptake:** The water that is taken in by vessels for cooling and released or taken up as ballast must be screened consistent with Oregon Department of Fish and Wildlife fish screening criteria. Development of screening methodologies can be coordinated with department Screening Coordinator Alan Ritchey (541) 947-6229; Alan.D.Ritchey@state.or.us. There are important concerns for managing ballast water as release of ballast water at the site is considered as highly negative. Screening Criteria is included in the NOAA Passage Facility Design Criteria under section 11 starting on page 86 of http://www.nwr.noaa.gov/Salmon-Hydropower/FERC/upload/Fish-Passage-Design.pdf**.** The ODFW screening criteria is available from the following website: http://www.dfw.state.or.us/fish/screening/index.asp **Stakeholder Involvement:** ODFW recommends the applicant reconvene stakeholders to provide the input necessary to assess if the original goals of the plankton study (Shanks et al. 2010 already completed) have been met and if new direction would better address the concerns.

Hydrological/Water Quality Changes: ODFW points to three anticipated changes in the hydrology/water quality of the site that will impact fish and wildlife due to project development: A) Turbidity; B) Salinity intrusion; and C) Water temperature changes. **Turbidity:** Mobilization of substrates will occur during the initial dredging and with continued regular disturbance associated with maintenance dredging (estimated 360,000 CY in the first 10yrs.; 36,000/yr.) within the project area. Turbidity will increase over an unknown portion of the Coos Bay during construction and when maintenance dredging is conducted. It is ODFW's understanding from previous project materials that dredging will occur on the regular two year interval when the remainder of the shipping channel is dredged. However, the slip and berth represent additional acreage that will be impacted over current levels and may require an increased dredging frequency. Additionally, the hydrodynamic modeling indicates the slip will become an alcove, likely collecting sediments at a greater rate than the main shipping channel. Increased turbidity levels can result in suppression of primary production, affecting a number of ecological factors: • Survival and growth of estuarine plankton (Cloern 1987; Irwin and Claffey 1966). • Potential effects to feeding capability and subsequent reduction in planktivorous organisms (Carter et al. 2009; Horppila et al. 2004; Bash et al. 2001). • Survival and growth of species such as eelgrass are affected by factors that decrease total solar input and	**Hydrological/Water Quality Changes:** **Turbidity:** Further information is needed to determine if increased salinity intrusion has the potential to change the ecological conditions in Coos Bay to a notable degree. Further information is needed to determine if discharged cooling water will impact aquatic resources in the slip due to temperature changes. **Long-Term Biological and Hydrological Monitoring:** ODFW recommends a monitoring/study plan be developed. This plan should include: • Biological information (e.g. abundance, species composition, behavior; for both native and invasive species) project in the bay. • Hydrological information (turbidity, salinity intrusion, water temperature changes) and specifically address ecological impacts related to the deepening of the site due to dredge activities. • Modeling that has been conducted by the Applicant to date has been informative. However, it may not accurately and precisely predict what actual post-construction hydrologic and ecological condition will be. The study should use an experimental design that includes before and After Controlled Impact techniques aimed at elucidating changes in shallow and deepwater communities, correlations between biological indices, and hydrological changes. ODFW recommends that all three factors A) Turbidity; B) Salinity intrusion; and C) Water temperature changes are monitored and addressed in the following ways: **Predictive Hydrologic Model:** ODFW recommends the Applicant(s) consultant(s) develop of a predictive hydrologic model to estimate how creation of the slip and maintenance dredging of the main Coos River channel will affect salinity intrusion into the bay *(ODFW recognizes the efforts of the Applicant that have been completed to date, however, these focus primarily on hydraulic flow*

depth to which light penetrates into the water column.

- Potential reduction in production of mollusks, Dungeness crab, juvenile coho, Chinook salmon and other species.

Salinity Intrusion: The current proposal may require elevated levels of maintenance dredging to the slip and berth. The Port of Coos Bay project to improve the Navigation Channel will likely have the largest impact on Salinity Intrusion since Coos Bay was originally dredged in the early 1900's. Applicant noted that hydrologic modeling has indicated sediments will likely accumulate at an accelerated rate in the berth area. To date, ODFW is not aware of any modeling of salinity intrusion into Coos Bay and the effects to residence time of highly saline waters.

Increased salinity intrusion likely would affect Category 2 habitats in the project area, but also in an unknown portion of the remainder of the bay. Effects may include:

- Ecotone boundary changes altering aquatic plant growth patterns and distribution.
- Distribution changes for plant and animal organisms vulnerable to salinity levels.
- Changes to the available zones for reproductive success (e.g. Dungeness crab, striped bass Morone saxatilis).
- Phytoplankton community productivity change related to nutrient regime shifts (i.e. the time of year freshwater dominates for a given reach of the Bay).

Saline intrusion associated with increased dredging in the 1980's was thought to have had an impact on several species in the *rather than salinity patterns).* This model should be developed and distributed for review to the natural resource agencies prior to initiation of construction at the site.

Inclusion of Hydrologic Factors in the Monitoring Plan: ODFW recommends the Applicant develop a monitoring plan (in combination with the biological monitoring plan as described above) in collaboration with ODFW and natural resource agencies to study/quantify/qualify: Turbidity effects;

- Salinity intrusion effects;
- Water temperature issues at the site.

Studies outlined in the plan should be completed for a time period necessary to meet the goals.

Data Sonde Network: As part of the monitoring plan, ODFW recommends:

- A network of data sondes be deployed to collect data on A) Turbidity; B) Salinities; C) Water temperature both at the surface and depth.
- If salinity intrusion, thermal changes, or turbidity are determined to impact fish and wildlife resources, mitigation should be appropriately identified by the applicant, ODFW, and other relevant natural resource agencies as consistent with OAR 635-415-0000 through 0025.

Bay including striped bass and American shad (*Alosa sapidissima*), although study results were inconclusive. The impacts that this intrusion would have on native shellfish and finfish species such as fall Chinook, coho salmon, Dungeness crab, and native oysters cannot be modeled and would only be detectable through real-time monitoring. Productive commercial oyster farms, which occur in euryhaline waters upstream of the project site, are currently protected from many fouling organisms and predators that occur in more stable salinities. Further intrusion of salt water will contribute to more stenohaline waters thus presenting new risk to a currently economically viable industry. Water Temperature: Ships loading at the facility will discharge heated engine cooling water that may be as much as 3°C warmer than the surrounding water. Fish that come in direct contact with this plume will experience stress. ODFW recognizes that significant cooling of this water will occur soon after it is released from the vessel and sees this issue as less concerning, however, remains interested in potential for deleterious effects.	
Species Omissions: Previous documentation has omitted Northern Anchovy (Engraulis mordaxas) species present in Coos Bay. For marine mammals, California sea lions (*Zalophus californianus*) are also present near Jordan Cove.	**Species Omissions:** Include Northern Anchovy as species present in Coos Bay and add California Sea lions to list of marine mammals near the project.
Deepwater Zone Biological Communities: Construction of the LNG slip and offloading site will create a new deepwater zone that is 25+ft in depth:	**Deepwater Zone:** It is critically important to understand what impacts the development of a large "alcove" deepwater zone at the project site will have on finfish and shellfish populations. Changes may occur to life-history patterns, movements, concentrations, overall abundance, and perhaps

This new deepwater zone will be constructed at 90˚ to the axis of the river channel forming a type of alcove morphologic feature that currently does not exist in Coos Bay. Deepwater zones that exist in Coos Bay tend to attract specific species compositions (e.g. white sturgeon, Dungeness crab, California halibut). However, these deepwater zones are in line with the main flow of the channel. Due to the location and hydrologic patterns associated with this new alcove, there needs to be monitoring to determine the species benefitted and or detrimental effects. The slip area will be highly disturbed during dredging and recover slowly, with re-disturbance at regular intervals associated with maintenance dredging. Installation of rip-rap and sheet-pile in the berth are expected to maximize the simplicity of the zone inhibiting the productive capacity for fish and wildlife. Consequently, there is concern with how construction of this site will affect life cycle patterns, population concentrations, overall abundance, and movements of certain affected species in Coos Bay. Specifically, e.g. will additional deepwater zone in this region of the bay affect the following: • Finfish/shellfish species densities in the area and other regions of the bay. If change occurs, how will this affect production of affected species in relation to current levels (e.g. predator-prey relationships with avian predation of salmonids, seal and sea lion predation to salmonids; avian predation to finfish)? • Competitive interactions associated with the value or lack of value of the slip. Additionally, it is of concern if the slip will become a zone of higher density of predatory fishes.	reproductive aspects of affected organisms in the Bay. Identifying these changes will be essential to development of a mitigation plan to compensate for negative impacts as they occur and are detected. ODFW recommends that specific studies be designed through coordination with ODFW and other natural resource agencies to determine these changes or lack thereof. **Include created "Deepwater Zones" as a Main Factor in Monitoring Study:** As described above long-term monitoring is critical to define the effects of this substantial proposed change to habitats in Coos Bay. ODFW recommends study of the effects be conducted on an on-going basis through the majority of the permit period. ODFW recommends this study attempt to document changes to populations including, but not limited to: change in species diversity, abundance, behavior, distribution, and species composition caused by the project. ODFW recommends Before and After Control Impact (BACI) study methods be used to provide before, after, and control structure for the investigations. ODFW recommends the Applicant receive guidance from ODFW and other natural resource agencies for methods and timing (beginning, sampling frequency, and ending) for these studies. Study results should be distributed annually to natural resource agencies, other interested agencies/parties. **Biological recovery assessments:** ODFW recommends a biological assessment of the deepwater access and slips be completed following construction to determine the degree that production of shellfish/finfish will recover and stabilize.

• Recreational opportunities related to current finfish/shellfish distributions (e.g. alteration of the distribution of Dungeness crab; salmon movement changes; influx of larger rockfish; etc.). • Incorrect Ecology: • Juvenile salmonids migrating would will likely be in main channel, not off-channel slip. Juvenile salmonid use of estuary includes feeding, rearing, foraging, in off-channel wetlands, sloughs, and other slow water areas. These fish may seek out low-velocity areas, including the terminal slip. • Previous documents have incorrectly not made note that killer whales, porpoises, and pinnipeds could be found in Coos Bay. They are present…pinnipeds frequently, cetaceans occasionally but commonly. Other species of whale have been rare visitors to Coos Bay, a few even travelling up-bay to the City of Coos Bay and beyond.	This recovery assessment should be scaled on a percentage basis compared to productivity in undisturbed regions in the Bay. ODFW recommends reports be completed annually and information provided to ODFW, natural resource agencies, local tribes, and other interested parties within one calendar year after construction of the slip and berth is completed and annually thereafter for a period of 10 years. **Incorrect Ecology:** • Previous documents have not noted the potential for use of the slip by juvenile salmonids and other fish or invertebrate species and monitor, and mitigate for use of terminal slip impacts to these species. • Acknowledge and consider presence of Killer Whales and other whales to be confirmed and consider potential impacts to marine mammals in the analysis and environmental protection measures
Recreational Users: It is ODFWs understanding that the U.S. Coast Guard typically requires exclusion zones of up to 500 yards surrounding LNG tankers that would transit the bay and potentially while at dock for safety and national security purposes. The application does not address this very serious potential impact to recreational and commercial boat and/or bank use of Jordan Cove and the surrounding bay areas. Any such actions by the US Coast Guard would likely result in a severe impact to public recreation for fishing, shellfish, or hunting which should be analyzed as part of the cumulative impacts of the project and fully mitigated for should they occur: Increased LNG ship traffic in Coos Bay has the potential to negatively impact public recreation because:	**Recreational Users:** ODFW recommends the Applicant clarify safety/security requirements for recreational boaters when LNG ships are in transit within the K Buoy to terminal zone, specifically including any such future safety or national security exclusion zones likely to be implemented by the U.S. Coast Guard or any other state of federal enforcement agency. ODFW recommends the DSL and Applicant consider recreational value of the Jordan Cove and Coos Bay estuary; specifically consider impacts to salmon fishery, crabbing, and other boating during construction, dredging, and LNG ship transit, specifically within the context of the above described U.S. Coast Guard restrictions likely to occur. ODFW recommends that the DSL direct the Applicant to complete an economic analysis of the shellfish (crabbing/clamming) and finfish (rockfish, salmon, steelhead) fisheries in Coos Bay, their

• Recreational use of the Bay has increased, with greater numbers of crabbers, clammers, and anglers participating. • The area from the jetties to Jordan Cove is a high-use area for crabbing and salmon angling from boats. • It is uncertain whether or not USCG security/safety measures will require boats to completely leave the area, or simply require boats to clear the navigational channel to allow the ship to pass. Applicant and DSL need to recognize Coos Bay as an important recreation area (hunting, fishing, clamming, crabbing, boating, paddle surfing, surfing, etc.). According to OSMB 2008 report, most recreational boating in Coos Bay occurs in summer--possibly more boating now in fall (salmon angling/crabbing). **Socioeconomics—**The LNG ships will be passing within 500 yards of Charleston Marina/Boat Ramp, Empire Boat Ramp, BLM North Spit Boat Ramp, and the entire Coos Bay is a recreational area. Construction, dredging, and LNG vessel transit will have impacts on recreational areas and facilities. Overcrowding currently occurs at lower Bay boat ramps during peak of salmon fishery. Displacement of boating/launches during LNG vessel transit or construction could exacerbate boat launch overcrowding.	contribution to the economics of Coos County and Southwest Oregon and address the potential impacts of the project. The economic impact to these recreational opportunities and the local businesses that depend on them is directly related to this environmental concern. ODFW recommends DSL require that any such loss of recreational access and associated economic impact to local business and the local economy from the resulting lost recreational opportunity be fully mitigated by the Applicant. ODFW recommends that JCEP allow safe harbor access to recreational boaters using Coos Bay in the event weather conditions require a boater to leave the ocean.
Kentuck Mitigation Site: The former Kentuck golf course lands have been identified by the Applicant for restoration. These lands would be reestablished as estuary in order to provide mitigation for the dredging impacts that will occur at the slip and access channel. The Kentuck golf course lands currently are degraded wetlands that were historically de-watered through diking and tidegate management,	**Kentuck Mitigation Site:** In order to maximize the ability of the Kentuck mitigation site to provide compensation for ecological and recreational resources impacted at the JCEP project area location, ODFW offers the following guidance: **Public Access:** ODFW recommends public access be made available and encouraged at the Kentuck mitigation site in order to attempt to provide

eliminating the connection with the estuary. Although there may be sufficient acreage at this site to meet the DSL 3:1 restoration ratio for dredging impacts at the site, a number of potential impacts (e.g. salinity gradient issues, changes in bay turbidity, creation of a deepwater zone) that will occur at the will not be compensated In-kind as the salinity gradients are out of the range that is present at the project location. **Public Access:** Is currently allowed at the Kentuck Mitigation site and on the water at the JCEP project area of the bay. Recreational access to the estuary and shoreline habitats of the bay is an important component of the local economy. It is expected that the security zone in the JCEP project area following construction will significantly reduce public use of the bay and adjacent uplands. The mitigation site will need to accommodate the elimination of public access at the JCEP site through allowing open public access. Saline waters will move upstream into the Kentuck mitigation site via restoration actions allowing more viability of mariculture (i.e. Pacific oyster farming). The effective area available for expansion of mariculture will not only be within the new mitigation site, but there will also be an increase in the particle range (i.e. drift of Oyster spat) of these operations up bay. Although it will likely be practical for oyster cultivation on the mitigation site, this would be counter-productive to the intended goals of mitigating for fish and wildlife.	compensatory opportunities in replacement for loss or reduction of access at the JCEP project site. ODFW recommends construction of a public parking area off of East Bay Drive as part of the mitigation site development. There is opportunity to develop parking without filling wetlands at the site. Provision for recreational opportunities at the Kentuck golf course site, although not precisely In-Kind, may partially compensate for losses at the JCEP site and should be fully investigated. ODFW recommends, specifically, that opportunities for hunting, recreational shellfish harvest and wildlife viewing be identified and implemented in collaboration with local constituents. **Restrict Commercial Oyster Cultivation:** ODFW recommends careful consideration of restricting commercial oyster cultivation from the Kentuck mitigation site as a condition of the DSL permit. The spread of the footprint of mariculture operations just down Bay (defined as within ¼ mile) from the mitigation site may retard the creation of this restored estuarine habitat in Kentuck Slough. These types of mitigation may not be effective in the context of future expansion of mariculture which would likely defeat mitigation goals. **Additional Coordination:** ODFW requests that the Applicant/affiliate coordinate during the development/construction of the Kentuck Mitigation site, so that ODFW will be able to provide the Applicant with recommendations for specific on-site adjustments and actions to maximize ecological function.

JCEP – Upland and Freshwater Concerns from ODFW Fish and Wildlife Districts

Issue Identification	Recommended Resolution
Capping Piling to Prevent Perching: Predatory piscivorous birds strategically perch around industrial facilities on piling that do not have measures to eliminate the ability of these birds to perch/roost. Ecologically the relevance is related to an increased capacity to feed within the area and impact species such as fall Chinook, coho salmon, and steelhead juveniles. If additional perch locations are created for piscivorous birds as a result of the proposed project, predation on resident and juvenile fish will likely increase along the project, and would be of particular concern in the vicinity of the project terminus at Coos Bay and near larger rivers such as the South Coos River, South Umpqua, and Rogue.	**Capping Piling to Prevent Perching:** For both the JCEP and PCGP project ODFW recommends fitting any new pilings with devices to prevent perching of piscivorous birds. This is a standard request from ODFW to Applicants on Fill/Removal permits when the Applicant installs pilings. These caps are readily available.

PCGP - Aquatic and Upland Concerns from ODFW Fish and Wildlife Districts

Issue Identification	Recommended Resolution
Subsurface Boring and Drilling Stream Crossing Methodologies: ODFW's experience with other pipeline construction projects has shown that stream crossings and overland disturbance can be damaging to watercourses if not carried out with extreme diligence. During construction of the Coos County Gas Pipeline horizontal directional drilling (HDD) was stated as being "clean and not impacting streambeds", however, "frac-outs" occurred and incurred environmental damage caused by drilling fluids leaking into fish-bearing streams.	**Recommendations Specific to Subsurface Boring and Drilling Stream Crossing Methodologies:** Pipeline crossings using HDD or other subsurface methodologies may cause frac-outs in Coos County geology and possibly throughout the project. The Applicant should be prepared for construction stoppages, cleanup, and remediation of damages caused by frac-outs. For that reason, crossings construction timing should occur during ODFW's recommended in-water timing guidance or as otherwise approved by ODFW in writing. HDD and other subsurface boring or drilling crossing design locations should pro-actively address the risks associated with the potential for a "Frac out" or inadvertent loss of drilling fluid to the extent practicable:

Drilling fluids can be water or oil-based and can include other additives. Although the bentonite base is claimed to be a benign ingredient, ODFW is unaware of what the other additives are and how harmful they can be to fish and aquatic wildlife. Between August and October of 2003 MasTec North America, Inc. was cited by DEQ for a series of water quality violations. The violations were a result of frac-outs during the horizontal drilling work for the construction of a natural gas pipeline under the North Fork of the Coquille River in Coos County. If similar frac-out related turbidity discharge impacts were to occur at the proposed Rogue River crossing, they would likely impact the significant spawning habitat for spring-run Chinook salmon in the Rogue River Basin. It is known that ESA-listed fish species and or State Sensitive species will be present at the South Coos, North Fork Coquille, and East Fork Coquille river crossings include OC Coho salmon. State Sensitive-Vulnerable species include Coho salmon (coastal coho salmon SMU/Oregon Coast ESU). Winter steelhead (Oregon Coast ESU/coastal winter steelhead SMU) are considered Sensitive-Vulnerable in the Coquille River basin, however, not in the Coos River basin. Pacific lamprey (*Entosphenus tridentata*) are considered Sensitive-Vulnerable in the Coos River, Coquille River, and Umpqua River basins making turbidity concerns heightened throughout in these watersheds, in addition to the concern within the Rouge River watershed.	ODFW recommends DSL condition the project certificate such that the Applicant is required to complete consultation with ODFW including submittal of any risk assessment and geotechnical documentation for any stream crossing which are proposed as subsurface boring or drilling stream crossing actions. Submittals should also include descriptions of alternate or contingency crossing methods should the primary method result in an inadvertent loss of drilling fluid, otherwise known as a ”frac-out” or otherwise fail as a successful crossing action. ODFW further recommends DSL condition the project certificate such that the Applicant is required to: • Conduct adequate geotechnical analysis to ensure frac-outs will not occur (e.g. identify vulnerable geologic issues, adjust the depth of drilling, etc.). • Provide a list of the additives used in drilling fluids and their potential effects on the aquatic environment. • Implement specific drilling BMPs to ensure constant monitoring of drilling fluid return volume so that drilling can cease immediately if drilling fluid is not returning at the expected/standard volume for a successful HDD attempt. • Identify measures that will be taken to minimize impacts of a frac-out if a frac-out occurs and mitigation that will be implemented if a frac-out occurs as cleanup is not feasible and attempts will create additional damage. Mitigation could include: Placement of LWD; placement of clean washed spawning gravel; road drainage improvements (cross drains, improved surfacing); road decommissioning. • Establish performance bonds and/or require performance bonds of drilling subcontractor to ensure adequate funding is immediately available to address/mitigate a frac-out or other drilling failure which

	results in damage to fish, wildlife, or the habitats they depend on. HDD Actions in the Lost River Drainage. The Klamath Fish District of ODFW requests that drilling any HDD activities are implemented between July 1, and October 31, or as soon as water conditions are deemed uninhabitable by fish due to poor water quality. Shortnose suckers (*Chasmistes brevirostris*), Lost River sucker (*Deltistes luxatus*) and redband trout (*Oncorhynchus mykiss*) inhabit this stretch of river from November to July; poor water quality triggers migration to upstream refuge habitats. Fish are highly sensitive to sound waves that could be caused by drilling disturbances and sound waves could act as a migration barrier.
Non-fish Bearing Stream Crossings and Other Storm Water Drainage Conveyance Structures: Although non-fish bearing stream crossings and stormwater conveyance infrastructure are not subject to the same design criteria identified above for fish bearing stream, ODFW remains concern with regard to sizing and instillation of these types of infrastructure. Culverts or other crossing infrastructure should be sized in excess of hydraulic capacity need to help facilitate wildlife connectivity between habitats and minimize potential downstream water quality impacts such as turbidity sedimentation transport resulting from scour at undersize infrastructure.	**Non-fish Bearing Stream Crossings and Other Storm Water Drainage Conveyance Structures:** ODFW recommends that all streams be considered fish bearing unless documented to be absent of fish. If a stream crossing or storm water conveyance structure is determined to be non-fish bearing, ODFW still recommends the work be completed according to the standard In-Water Work timing guidance document or if the stream or storm water conveyance structure is dry. ODFW recommends the Applicant consider oversizing the infrastructure and installing it in such a manner to maximize its performance as a suitable wildlife crossing structure and to minimize potential for downstream water quality impacts such as turbidity sedimentation transport resulting from scour at undersize infrastructure.
Site Specific River/Stream Crossing Concerns: The resource plans do not address or mitigate for all impacts associated with stream crossings under ODFW's Fish and Wildlife Habitat Mitigation Policy. ODFW encourages both the Applicant and DSL to acknowledge the potential	**Site Specific River/Stream Crossing Concerns**: ODFW recommends site specific coordination and consultation between the Applicant and ODFW staff to fully identify unique site specific resource concerns at these crossing locations. ODFW anticipates that significant resource impact avoidance and minimization can be realized through collaboration with local Department staff

for severe impacts to fish, aquatic wildlife, and the habitats they depend on by ensuring the above recommendations become conditions of any permits for the PCGP project.	throughout the crossing design, construction, and restoration/mitigation recovery phases at these river crossing locations. Lost River Crossing- See above specific timing recommendation Klamath River Crossing - ODFW does not support open trench methods at this location. In the event of a catastrophic spill or release, a contingency plan should include an evaluation of needs for dilution flows and dewatering. Flows from upstream can be manipulated by the Bureau of Reclamation and downstream irrigation canals can be manipulated by irrigation districts for dewatering. Rogue River Stream Crossing- Pacific Connector states that if HDD of the Rogue River is unsuccessful Direct Pipe (DP) methods would be a potential option. Previously wet, open-cut crossing were also proposed. ODFW does not consider a wet, open-cut to be an acceptable contingency method. South Umpqua Direct Pipe Technique Site #1 at MP 71.3), and South Umpqua Open Cut Site #2 at MP 94.73 - This proposed crossing occurs at an ecologically important site. A gravel bar is located approximately 300 m downstream. There is no information provided in resource reports for Fate Creek. The gravel bar at this site provides river complexity, high flow refugia and summer slow water habitats which are considered to provide both essential and limited habitat function for a variety ESA-listed fish, state-sensitive listed fish and aquatic wildlife.
Herbicide Use Near Streams/Wetlands: The current public notices do not address herbicide use, if applicable.	**Herbicide Use Near Streams/Wetlands:** ODFW recommends against general use of herbicides and pesticides in wetlands. ODFW recommends any use be judicious and meet federal, state, and local, regulatory requirements.

Small Stream Temperature Issues: It is unclear how the PCGP project intends to classify streams and address water temperature fluctuations associated with project work.	**Small Stream Temperature Issues:** ODFW recommends DSL condition the certificate to direct the Applicant to treat all intermittent waterbodies within the Coast, Umpqua, and Rogue basins the same as perennial streams and provide these streams the same level of protection as streams on Federally managed lands.
Large Woody Debris (LWD) as Mitigation: The public notices do not adequately describe the impacts of the project on water quality factors such as shade and nutrients or habitat factors such as predatory cover.	**Large Woody Debris (LWD) as Mitigation:** ODFW recommends a stream habitat mitigation plan be developed for every fifth field watershed crossed in order to effectively mitigate for the life-long impacts of the project. In addition the Applicant should fully mitigate for the multiple impacts at stream crossing sites including, but not limited to: • Access roads and associated sediment production to streams. • Loss of riparian canopy that increases solar input. • Elimination of much of the filtering capacity of the RMA due to removal most other lost habitat values/benefits of riparian habitat as well. • Destabilization of stream channels and streambanks. ODFW recommends that in addition to placement of LWD at stream crossing sites the following restoration and mitigation actions may greatly complement the functional habitat benefits provide by LWD placement : • Placement of forest vegetation (limbs, small woody debris, etc.) scattered on bare soils following disturbance within 50ft. of each pipeline approach to streams. This material will be readily available due to land clearing efforts • Conservation of riparian areas within the HUC 6 watershed. ODFW has a compiled list of a number of mitigation options, and welcomes the opportunity to provide those suggestions to DSL and the applicant. • Placement of washed spawning gravel at all stream crossing impact sites in the Coastal Zone and considered on a site by site basis for all other stream locations.

	Spawning gravel is often a limited quantity habitat feature in the Coastal Zone and placement will augment productive capacity of reach impacted for salmonids. • Gravels should consist of washed drain rock from an upland source (such as the Elk River Pit in Langlois, OR) • Gravels should consist of 1.5 inch diameter washed drain rock for Coho and steelhead spawning streams; 0.75 inch washed drain rock for streams where only cutthroat trout are present. • Gravels should be applied at the rate of 8.0 inch depth over the reach impacted to the width of the ACW and up the banks 2.0 feet (which will reduce bank instability). Thus if a 40 foot reach of stream channel is disturbed and the ACW is 8 feet wide, then the quantity needed would be 40.0 feet x (8.0 feet ACW+ (2x2 banks)) x 0.67 ft. (8.0 inches) or a total of 321 cubic feet or roughly 12.0 cubic yard (CY).
Sedimentation Impacts from Clearing and Grubbing Large sections of ROW: The application does not describe how vegetation adjacent to waterways would be cleared and grubbed. Lessons learned from the ODOT's Pioneer to Eddyville project (in the Coast Range Mountains) include the need to limit the amount of ground cleared of vegetation at any one time. The pipeline will cross the Coast Range, so special care should be taken to limit erosion and sediment loss in this section as well as any other areas of significant rainfall with steep slopes	**Sedimentation Impacts from Clearing and Grubbing Large sections of ROW:** Given the known instability and potential precipitation levels in the Coast Range Mountains ODFW recommends: ODFW recommends that the Applicant develop a detailed written plan that identifies the maximum amount of land cleared and grubbed at one time. The plan should also identify (1) areas of high, medium, and low levels of risk for sediment escape and impacts to water bodies. Based on slope and proximity to water bodies, and (2) include a re-vegetation section that ensures re-establishment of vegetation in high and medium risk areas prior to the fall rains. The timing of the pipeline construction should allow for ground clearing to occur after the spring rainy season and any areas opened up should be seeded and vegetation established before the fall rains. Distance and slope can be taken into account regarding the amount of land cleared and grubbed, i.e. the greater the distance from a creek and the flatter slope, the less concern for down slope

	sediment escape and erosion that can ultimately impact water bodies.
.**Pipeline Steep Slope Concerns and Roads (implications for Water Quality – turbidity, sedimentation):** A number of miles of the pipeline will be constructed on slopes that exceed 50%. Tyee sandstone geology in the Coos and Coquille River basins and the geology of the Rogue Basin to a lesser degree are highly prone to landslides if the supporting matrix is disturbed. Additionally numerous access roads will be built to harvest timber and access construction of the PCGP. Mass wasting debris torrents and general erosion are considered substantial threat to water quality and to habitat quality in waterways for ESA listed and non-ESA listed salmonids as well as amphibians. Extensive research has documented the impacts of sediments to salmonids. Work to reduce sediment input into coastal and inland streams that will be impacted by the pipeline is foundationally critical for enhancing spawning and rearing habitat for fall Chinook salmon, Oregon Coast (OC) threatened Coho salmon, Pacific lamprey (*Entosphenus tridentata*), winter steelhead (*O. mykiss irrideus)* and coastal cutthroat trout (*O. clarki clarki)* as water quality is directly linked to hatch rates and food available for these species. Sediment loading above natural background levels contributes to embedding of substrates which often results in reduced hatch rates for eggs in redds, inability of fry to emerge from redds, inhibited production of macroinvertebrates (invertebrates largely live in the interstitial spaces of gravels), and impacts on the ability of fish to obtain food due to the nature of salmonids to feed predominantly by using their sight	**Pipeline Steep Slope Concerns and Roads:** Pipeline Steep Slope Concerns: Stabilization/erosion control of upland slopes following pipeline construction will be nearly as important as stabilization/erosion control in riparian areas adjacent to streams. Some extremely steep slopes will be encountered in the Coos County portion of the pipeline. ODFW recommends the following for locations where the pipeline will traverse or the route will be placed on slopes which qualify as High Landslide Hazard Locations (HLHL as defined in *Oregon Dept. of Forestry Technical note 2.0 vers 2.0; (ODF Jan 1, 2003)*; in Tyee Sandstone over 65% slope on headwall locations and 75% ridges): ODFW recommends the pipeline construction route incorporate cross slope trenching as opposed to routing parallel to the slope whenever possible to reduce the risk of soils moving laterally in the trench downslope (mass wasting slides). Placement of erosion control matting has been outlined as an upland soil disturbance control measure. This, in combination with cross slope placed large wood, stumps, and other wood material, is considered a modestly reasonable attempt for erosion control. ODFW recognizes that pipeline corridor management strategies are not likely to allow for placement of large wood in pipeline corridors. ODFW recommends rock or other structures be placed across the pipeline trench at a 90˚ angle and be embedded in the undisturbed walls of the trench a minimum of 4ft. to prevent free movement of soil in the disturbed pipeline trench. These structures should be placed at 100ft. intervals. Steep slope pipeline locations should receive additional efforts with seeding and mulching. Additionally these segments of the pipeline route

(Burns 1970; Hall and Lanz 1969; Weiser and Wright 1988; Suttle et al. 2004; Tripp and Poulin 1992; Waters 1995).	should have cross slope structures and drainage networks to reduce failure risk. ODFW recommends the road network: • Have surfacing that is sufficient to accommodate travel loading and prevent erosion of the road surface through all months. • Have cross drains installed at a density/spacing that is equivalent or exceeds to recommendations in the ODF Forest Practices Technical Note Number 8 vers.1 (ODF Jan 2003). • Have mitigation for sedimentation/mass wasting issues clearly identified in-proximity regardless of ownership (federal or non-federal) as these locations have the greatest potential for measurable improvements in reducing sediment loading to streams impacted.
Emergency Response: Emergency plans, including immediate notification of turbidity exceedances, frac-outs, spills, and pipeline leaks for both the JCEP facility and PCGP, are considered critically important. Sensitive fish and wildlife habitats can be severely impacted by these types of occurrences. However, impacts can be greatly minimized if remediation actions are initiated quickly upon discovery of an incident.	**Emergency Response:** ODFW recommends that emergency plans include immediate notification of: • Turbidity exceedances, frac-outs, and spills and pipeline leaks for both the JCEP facility and PCGP. • ODFW recommends that emergency plans include surveys for fish and wildlife kills immediately following a frac-out, spill, or gas release. Should an incident like those described above occur, the project must contact Oregon Emergency Response System immediately (1-800-452-0311) in the case of leaks during pipeline operation or offloading or loading at the JCEP facility or along the PCGP route. **Natural Gas Pipeline Shut-Off Valves-LNG Control at Large Rivers:** ODFW recommends that options to have shut-off valves on each side of large stream crossings such as the Coos, South Umpqua, Rogue, and Klamath Rivers be evaluated.
Hydrostatic Testing:	**Hydrostatic Testing:**

ODFW understands that hydrostatic testing will be performed along the pipeline. Hydrostatic testing will have substantial impact on fish and wildlife resources, especially during periods of low flow and poor water quality. Transport of invasive species is a substantial concern with transport of water from a source basin and release at another point in an adjacent watershed. Damage and control costs of invasive species in the United States are estimated to be more than $138 billion annually and 80% of endangered species are deleteriously impacted by these species through predation or competition (Pimental et. al). Impacts from invasive fish species alone cost $6.03 billion annually (Cusack et. al.). It is ODFW's understanding that testing will immediately follow pipeline construction in late summer and early fall. Potential adult anadromous migration during these times includes fall Chinook, coho, winter steelhead, coastal cutthroat trout and Pacific lamprey. Also, this can be the period of lowest stream flow, and water for hydrostatic testing may be unavailable unless purchased from existing available water sources such as reservoirs. Inter-basin mixing of water could adversely affect migration of adult anadromous fish (salmon, steelhead and lamprey) to their natal streams through a phenomenon known as false attraction. Supplying water from an Oregon Department of Environmental Equality 303(d) TMDL Water Quality limited waterbody to a basin of higher water	ODFW recommends: • ODFW recommends an erosion control plan • In addition, the project proponents need to continue to incorporate methods to eliminate the possibility of spreading invasive species (such as New Zealand mud snails, smallmouth bass fry) especially given that the pipeline will convey water between non-hydraulically connected basins and in some instances, be "cascaded" across the landscape to be used for the next segment. Minimizing the risk, as discussed in the plan, is not adequate. Water diverted will need to be tested along with water at the nearest discharge waterbody to see if stream pathologies are similar or measures taken to ensure water released is sterilized. • NMFS-approved screening on diversions is required and fish passage at these locations must be maintained. • In addition, test water should not be allowed to drain into waters of the State and chlorinated water should not be used for the testing unless the release location will not enter a stream, wetland, or waterway. • ODFW recommends continued efforts to develop the Hydrostatic Testing Plan as well as a Hydrostatic Monitoring protocol with the intent of approval of the plan by ODFW, other state and federal agencies. The survey will monitor ramping, fish stranding, and water temperature at pumping and release sites, salvage fish, and document fish losses. The project proponents should conduct the surveys with competent biological staff. • A summary report of monitoring would be submitted to the agencies, along with compensation for losses to fish and wildlife resources.

quality may result in reduced water quality in the source watershed. Hydrostatic testing will require additional staff and noise disturbance on the pipeline route. It is uncertain if and how noises associated with this activity will impact nesting Northern Spotted Owls and other sensitive species.	
Impacts to Water Quality and Habitat Quality in Wetlands and Waterways: The project is anticipated to produce substantial turbidity to wetlands adjacent to the pipeline channel and road networks associated with the project. Major wetland functions include water storage, carbon sequestration, slow water release, maintenance of high water tables, temperature regulation, nutrient cycling, sediment retention, accumulation of organic matter, filtration, and maintenance of plant (by provision of substrate for plant colonization) and animal communities. Measures need to be taken to eliminate the risk of spreading invasive plants and noxious weeds.	**Impacts to Water Quality and Habitat Quality in Wetlands and Waterways:** ODFW recommends more detailed plans be described for addressing turbidity risk, non-native species invasion risk, and monitoring plans for mitigation sites that include contingency plans if restoration attempts are not successful.
Amphibian Direct Mortality and Long-Term Passage: The PCGP project is anticipated to incur notable mortality to amphibians resulting from proposed construction methods in riparian areas, stream adjacent wetlands, and perched wetlands. Amphibians range in mobility from highly mobile to extremely limited. Installation of crossings where there is currently stream/wetland connectivity can result in increased predation and reduced capacity of amphibians to	**Amphibian Direct Mortality and Long-Term Passage:** ODFW recommends that surveys are completed for both amphibians and reptiles. Additionally: • ODFW recommends that final constructed designs provide for amphibian passage along the pipeline route (i.e. installing cross drains under access roads that connect wetlands). Installation of culverts with stream simulation design is considered to fully provide for amphibian passage. There will be a number of locations where fish are not present that passage for amphibians may need to be provided on a case by case basis.

access needed habitats. This is critical where wetland are ephemeral. Additionally, noise from hydrostatic testing will likely impact amphibian populations, potentially disrupting breeding cycles.	• ODFW recommends the PCGP project staff consult for all wetland locations >0.1 acre in size with Department staff at least 1.0 months prior to disturbance to determine methodologies to reduce impacts to amphibians and identify if salvage is necessary.
ODFW's Scientific Take Permits: Scientific take permits are relevant to coordinate salvage and movement of fish and wildlife species impacted during a project.	**ODFW's Scientific Take Permits:** ODFW recommends a condition be included for the Applicant to apply for and comply with state scientific taking permits. • ODFW recommends that the pipeline staff report quantified known injuries and mortalities by species during construction of the project. • ODFW recommends that the PCGP staff report injuries and mortalities of fish and wildlife by species associated with operation of the pipeline or in an emergent condition.
Riparian Habitat Impact/Mitigation Concerns: Riparian vegetation within the Riparian Management Area (RMA) zone near streams, wetlands, and waterways is critically important for the health of Oregon's native fish populations, especially in the drier parts of the pipeline corridor such as the Rogue and Klamath watersheds. Fish in the state are predominantly cold water species that evolved in stream conditions that were in most cases related to climax or second growth hardwood and conifer forest, thus near maximum shade that the stand would produce. The Oregon Dept. of Environmental Quality has identified 303d temperature listed streams including numerous streams through the pipeline route. These listings relate directly to removal of riparian vegetation since the 1800's.	**Riparian Habitat Impact/Mitigation Concerns:** ODFW recommends that riparian vegetation buffers that meet or exceed State and local government requirements be implemented on non-federal lands. All disturbed areas need to be replanted with native vegetation. ODFW recognizes that the proposed crossing locations may be on lands where private landowners may not allow the full setback to be replanted. In these situations, ODFW does not object if mitigation for permanent riparian impacts occurs off-site provided that it occurs within proximity within the same HUC 6 watershed and on private lands. Thinning as Mitigation: ODFW recommends this treatment should be used only on a very limited basis with clearly defined objectives that address location specific limiting factors.
Forest and Vegetation Impacts: In the context of described limits to revegetation of the ROW, the currently	**Forest and Vegetation Impacts:** To adequately evaluate watershed activities that impact wetlands and waterways associated with

proposed impacts to riparian areas may result in net loss of habitat function. ODFW assumes some percentage of riparian stream crossings will remain in an unvegetated or low-vegetation state requiring moving/cutting maintenance.	this project, ODFW recommends DSL consider the risks of erosion along pipeline corridors associated with vegetation removal and ground construction. ODFW also recommends: • Additional development of BMP's and a robust revegetation plan be developed for pipeline disturbance areas • Encourage use of native herbaceous (grass/forb), shrub, and tree species for revegation of disturbed sites unless natives will be unsuitable for site stabilization or specific species of non-natives are recommended to wildlife forage value. The establishment of vegetation using native grasses, trees and shrubs (although preferable in most instances) may prove ineffective if there is a lack of understanding of local conditions and their influence on vegetation growth, poor plant/seed selection, inappropriate soil management practices and inadequate vegetation management plans. • Work collaboratively with ODFW and other natural resource agencies to develop a revegetation plan with robust success criteria and clearly identified remedial actions if success criteria are not met
Species Occurrence/Status Species Corrections: The application does not discuss how state listed and state sensitive species will be addressed by this project.	**Species Occurrence/Status Species Corrections:** ODFW recommends the Applicant consult with ODFW to receive best available information regarding locations of sensitive/listed species, and that plans be developed to avoid, minimize, and mitigate impacts to those species. Species of particular relevance in the wetland and waterway environment will include (but are not limited to) western pond turtle, Oregon spotted frog, bald eagle nests, great blue heron rookeries, etc..
Noxious Weeds/Invasive Plants: Invasive species (e.g. noxious weeds) have been identified as one of the seven key conservation issues (threats to conservation) in Oregon in the Oregon Conservation Strategy (ODFW 2016). Hundreds of thousands of	**Noxious Weeds/Invasive Plants:** ODFW recommends that the Applicant complete a more comprehensive noxious weed control plan to prevent spread in aquatic environments or uplands associated with waterways.

dollars are expended annually on both public and private lands to combat invasion and expansion of noxious weeds and their negative effects on fish, wildlife, and their habitats. Specific invasive concerns include: • Gorse in the Coos Bay region has had substantial negative impacts on elk production in the Coastal frontal zone. • Scotch broom is considered a substantial factor decreasing production of elk and deer forage across the Coast range and some of the interior locations of Oregon. • Himalayan blackberry will likely be a factor within the right of way • Cheatgrass and medusahead are invasive species of concern for the eastern more arid portions of the project	ODFW recommends broad scale monitoring for noxious weeds, for the life of the project. ODFW recommends that performance metrics be included in a weed control plan, and that additional mitigation be undertaken if the final state of the pipeline is not satisfactory regarding avoidance, prevention, and minimization of noxious weeds. ODFW recommends wash stations for equipment be set up to handle aquatic invasive species as well. Equipment should be cleaned between individual subbasins at the HUC 6 level or if the machinery has been in a known area with invasive/noxious weeds. ODFW recommends that DSL include conditions outlining that the noxious weed plan have specific strategies (i.e. cleaning of equipment, monitoring, and control measures) for the JCEP project and individual reaches of the PCGP project. Mowing is considered a preferential treatment to herbicides when effective. ODFW recommends the Applicant acknowledge that the risk of invasion of noxious weeds on the pipeline route and mitigation sites is likely high and ensure the following: • ODFW recommends the Applicant fund an Oregon Dept. of Agriculture (ODA) weed extraction teams within the affected counties • ODFW recommends the PCGP project include ODFW in the list of agencies consulted and include our comments for noxious weed management. • ODFW recommends the Applicant describe the experience/qualifications of the staff used to conduct noxious weed surveys. • ODFW recommends the PCGP project should provide some level of assurance that environmental inspectors will have the capacity in their schedule to ensure

	noxious weed management concerns are addressed. • ODFW recommends that EI's should inspect new equipment arriving on site. Any protections given to federal lands should also be given to non-federal lands • ODFW recommends the PCGP project develop an incentive/dis-incentive program to greatly increase the likelihood the potential for a contractor driven inspection system (with random EI investigations) to function effectively. • ODFW recommends a buffer should be applied to known noxious weed infestation areas. Accordingly soil should not be moved out of these sites. These sites should be treated to prevent spread of noxious weeds to uninfested areas. • ODFW recommends that protection measures for federal lands should also be applied to non-federal lands. • ODFW recommends the PCGP project needs to provide extended monitoring at known infestation sites, dewatering stations, and all other high-risk sites on private lands as well. Monitoring the ROW only likely inadequate. ODFW recommends that PCGP employ independent consultant noxious weed specialists to conduct periodic on-going monitoring to maintain a sufficient level of certainty that noxious weed issues are addressed. Periodic monitoring needs to be completed for the life of the project on all disturbed ground with special emphasis at known infestation, dewatering stations, and equipment cleaning locations.
Capping Piling to Prevent Perching: Predatory piscivorous birds strategically perch around industrial facilities on piling that do not have measures to eliminate the ability of these birds to perch/roost. Ecologically the relevance is related to an increased capacity to feed within the area and	**Capping Piling to Prevent Perching:** For both the JCEP and PCGP project ODFW recommends fitting any new pilings with devices to prevent perching of piscivorous birds. This is a standard request from ODFW to Applicants on Fill/Removal permits when the Applicant installs pilings. These caps are readily available.

impact species such as fall Chinook, coho salmon, and steelhead juveniles. If additional perch locations are created for piscivorous birds as a result of the proposed project, predation on resident and juvenile fish will likely increase along the project, and would be of particular concern in the vicinity of the project terminus at Coos Bay and near larger rivers such as the South Coos River, South Umpqua, and Rogue.	
Environmental Inspectors: Properly trained environmental inspectors are able to greatly increase the potential for maximizing habitat conservation measures.	**Environmental Inspectors:** ODFW recommends that the PCGP project have environmental inspectors on all active construction segments of the pipeline project.
Public Communications: There is currently a significant need for a representative of the JCEP/PCGP project to serve as a public communications specialist to the project area constituents. Additionally there is a need for planning regarding how recreational users of fish and wildlife resources in Coos Bay and along the pipeline route will obtain information concerning the project: e.g. will recreation be restricted at the JCEP site, mitigation site access, pipeline route access; access to the PCGP corridor during construction, etc.) Restrictions to recreational accessibility can result in substantial impacts to the local economic conditions of affected communities.	**Public Communications:** The JCEP/PCGP project needs to develop a project communication plan in collaboration with ODFW to consult with and inform fishing groups and other recreational users on construction actions on a real time basis. Including but not limited to: • Will recreation (clamming, crabbing, and duck hunting) be restricted at the JCEP site during construction/following construction? • Will mitigation sites be open to public recreation, hunting, and fishing access during construction/following construction? • Will the pipeline route be open to access for fishing and hunting (the route will cross major salmon and steelhead fishing streams as well as historical hunting locations) during construction/following construction? • How and where will any residual impact to public access or recreational opportunities be fully mitigated?

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Oregon
Kate Brown, Governor

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May 6, 2019

VIA EMAIL, CERTIFIED MAIL, AND U.S. FIRST CLASS MAIL

Derik Vowels
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and

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Tyler Krug, Regulatory Project Manager
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Ms. Kimberly D. Bose,
Secretary
Federal Energy Regulatory Commission
888 First St., N.E., Room 1A
Washington, D.C. 20426
FERC Dockets No. CP17-494, CP17-495

Dear Mr.Vowels, Mr. Krug and Ms. Bose:

On October 24, 2017, the U.S. Army Corps of Engineers (Corps) notified the Oregon Department of Environmental Quality (DEQ) that it had received an application from Jordan Cove LNG LLC and Pacific Connector Gas Pipeline LP, (herein collectively referred to as "Jordan Cove" or the "Applicant") for Section 404 (Clean Water Act, or CWA) and Section 10 and 14 (Rivers and Harbors Act) permits related to construction and operation of LNG facilities and an associated pipeline (collectively, the "Project"). Consistent with its regulations, the Corps

determined that the initial application of October 24, 2017 was incomplete on November 3, 2017. Consistent with Corps regulations, the Corps requested additional information from November 2017 through May 2018 before the Corps determined it had received a complete application and issued a public notice on May 22, 2018, which commenced DEQ's water quality certification (401 WQC) review pursuant to CWA Section 401.

The proposed Project consists of two interconnected parts. The 200-acre Jordan Cove LNG Export Terminal would be located in Coos County, Oregon on the North Spit of Coos Bay. The facility would include a slip and access channel, modifications to the federal navigational channel, a marine terminal, a natural gas conditioning and liquefaction facility, temporary workforce housing, security and safety buildings, and wetland mitigation sites. The Pacific Connector gas pipeline is the second part of the Project, consisting of a 229-mile 36-inch diameter pipeline and associated roadways and work areas, extending from the terminal to interconnections with existing pipelines near Malin, Oregon. The Jordan Cove terminal would receive up to 1.2 billion cubic feet per day of natural gas from the Pacific Connector gas pipeline.

DEQ has evaluated the Project application pursuant to Section 401 of the Clean Water Act, 33 USC §1341, ORS 468B.035 through 468B.047, and DEQ's certification rules found in Oregon Administrative Rules 340, Division 048. To certify the Project, DEQ must have reasonable assurance that the proposed activities will be conducted in a manner that will not violate the applicable provisions of Sections 301, 302, 303, 306, and 307 of the Clean Water Act, and Oregon water quality standards in Oregon Administrative Rules 340, Division 041, adopted to implement these sections.

Following a preliminary review of the Project, DEQ filed a request for additional information with Jordan Cove on September 7, 2018. Jordan Cove filed responses on October 8, 2018. However, because many of the responses were incomplete or inadequate, the Department filed a supplemental information request with Jordan Cove on December 20, 2018. That request included examples of the information sought. Jordan Cove responded, in part, on January 22, February 20, and April 16, 2019, and committed to filing complete responses by the end of April 2019. DEQ filed additional requests for project information on September 25, 2018, and March 11 and 13, 2019. Jordan Cove filed a response to these requests on April 30, 2019; however, the late date of Jordan Cove's filing prevented any significant review of the material for this decision. OAR 340-048-0020(3).

On March 29, 2019, DEQ reviewed the FAST-41 Coordinated Project Plan for the Project. DEQ notes that the Corps has indicated that JCEP is considering pipeline route changes, and that the Corps intends to issue a revised public notice once it receives sufficient information regarding the changes. DEQ has not yet received information from Jordan Cove regarding these changes to the proposed Project.

DEQ denies Jordan Cove's request for 401 WQC for the Project. DEQ does not have a reasonable assurance that the construction and operation of the Project will comply with applicable Oregon water quality standards, as described in the attached Evaluation and Findings Report, which is incorporated in its entirety by this reference. DEQ's decision, however, is made without prejudice. Jordan Cove may reapply for 401 WQC for the Project, and DEQ will consider additional information that is responsive to the bases for denial in this decision.

In accordance with the Oregon Administrative Procedures Act (Oregon Revised Statute, chapter 183) and OAR 340-048-0045(2), Jordan Cove may request a contested case hearing if dissatisfied with the certification decision. Your request for a hearing must be made in writing to and received by the Department of Environmental Quality within 20 days of the date of mailing of this certification decision, and such request must comply with OAR 340-011-0530(2) and OAR 340-048-0045(2).

A request for a hearing must be mailed to:

Oregon Department of Environmental Quality
Attn: Chris Stine
165 East Seventh Avenue, Suite 100
Eugene, Oregon 97401

If a request for hearing is not received within this 20-day period, your right to a hearing will be considered waived. If you request a hearing, you will be notified of the time and place of the hearing and provided information on the procedures by which contested cases are heard, your rights, the import and effect of such a hearing, and your rights and remedies.

Contested cases are governed by the rules of the Office of Administrative Hearings, specifically OAR 137-003-0501 through -0700. As a corporation, you must be represented by legal counsel at this hearing, if any.

In accordance with OAR 340-048-0045(3), this certification decision is effective upon issuance of this decision, notwithstanding a request for a contested case or other judicial review, if any.

As noted above, this decision is being made without prejudice. Jordan Cove may resubmit an application for 401 WQC with DEQ. If Jordan Cove does so, DEQ strongly recommends that Jordan Cove, the Corps and DEQ hold a pre-application conference to ensure a shared understanding of the information and actions required to complete a subsequent review of an application in a timely manner that would avoid delays in consideration of the application by DEQ, and that is coordinated with both the Corps and the FAST-41 Project Plan being managed by the Federal Energy Regulatory Commission. DEQ also requests that if it does resubmit an application, Jordan Cove clearly indicate in such a submittal whether the applicant is seeking certification for purposes of the permits and licenses for the Project pending before both FERC and the Corps.

If you have any questions, please contact Chris Stine at stine.chris@deq.state,or.us or at (541) 686-7810 or at the address on this letterhead.

Sincerely,

Richard Whitman
Director
Oregon Department of Environmental Quality

Attachment: Evaluation and Findings Report

cc: Ms. Natalie Eades, Jordan Cove LNG
Mr. Mike Koski, Jordan Cove LNG,
Ms. Rose Haddon, Jordan Cove LNG
Mr. Bill Abadie, US Army Corp of Engineers
Mr. Sean Mole, Oregon Department of Energy
Mr. Jim Rue, Oregon Department of Land Conservation and Development
Mr. Keith Andersen, DEQ
Mr. David Belyea, DEQ
Mr. Chris Stine, DEQ
FERC Dockets No. CP17-494, CP17-495
DEQ (file)

NOTICE TO ACTIVE DUTY SERVICEMEMBERS

Active duty Service members have a right to stay these proceedings under the federal Servicemembers Civil Relief Act. For more information contact the Oregon State Bar at 800-452-8260, the Oregon Military Department at 503-584-3571 or the nearest United States Armed Forces Legal Assistance Office through http://legalassistance.law.af.mil. The Oregon Military Department does not have a toll free telephone number.