

## Ministry of Environment Comments on Enbridge Northern Gateway Pipelines

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*The Ministry of Environment undertook a review of the Enbridge Northern Gateway Pipelines proposal in September 2010. What follows is the Ministry discussion paper based on the review.*

*The main resource for this review was the Enbridge proposal<sup>1</sup>; other resources included Ministry staff, academic and non-academic reports, and government, newspapers, ENGO and international organization websites. As this was an internal review, individuals outside the Ministry were not consulted.*

*Please note that endnotes contain both additional information and references.*

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### MINISTRY OF ENVIRONMENT DISCUSSION PAPER

#### IMPACT OF ENBRIDGE NORTHERN GATEWAY PIPELINE PROJECT IN BC

##### ISSUE

Enbridge is seeking approval for its \$5.54 billion Northern Gateway twin pipeline project to meet growing demands for Alberta oil sands oil in Asian and US markets. Built in the same right of way, one pipeline would flow west and move over 500,000 barrels of crude oil per day out of Alberta's oil sands to tankers in Kitimat, and another would flow east and move 193,000 barrels of condensate from tankers in Kitimat to Alberta.<sup>2</sup> 670 kilometres of the 1,172 kilometre route would traverse across the middle latitudes of BC and open the province's coastal waters to an additional 220 tankers annually.

In reviewing these materials one assessment could be:

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***Should the Province be actively making recommendations that ensure this project is: (A) minimizing environmental impacts with the best mitigation strategies; and, (B) delivering a fair share of economic benefits to BC?***

##### INTRODUCTION

Approvals of pipelines that traverse across provinces require assessments by the National Energy Board and Canadian Environmental Assessment Agency; Enbridge filed its application on May 27, 2010. For this project, a three-member joint review panel will address both assessments. BC has agreed to accept this process as equivalent.

The Province is still active in regards to this project, specifically by: applying for official intervenor status in the assessment process; providing expert environmental advice for

incorporation into the application; and, monitoring the process, as well as local government, First Nation, and stakeholder concerns. Further, pipeline construction and operation would still be subject to the Province's environmental regulations.

If approved, construction would likely take place between 2014 and 2016 and take approximately 42 months. In addition to two pipelines, the proposed project includes: a permanent 25 meter right of way zone along the entire route (55 meters during construction); 10 electric-powered pump stations; two tunnels near Kitimat (each 6.5 kilometers long); a marine terminal with two mooring berths at Kitimat Arm; and the passage of approximately 220 oil and condensate tankers into and out of BC's coastal waters every year. The estimated maximum size of this project in BC is 48 km<sup>2</sup>. The project is assessed over 30 years, but could continue if the demand is there.

## **ECONOMIC IMPACT IN BC**

The Northern Gateway Alliance – a coalition of community leaders, including the chair of the BC Chamber of Commerce, and the mayors of Kitimat, Mackenzie and Prince George – believes this project can serve as a catalyst for economic growth across northern BC.<sup>3</sup> However, the Central Coast Chamber of Commerce and Tofino-Long Beach Chamber of Commerce are both opposed, particularly due to the threat an accident could pose to the environment and ultimately business.<sup>4</sup> Coastal First Nations – an alliance of north and central coast First Nations – also oppose the project and believe it represents a threat to their culture and way of life.<sup>5</sup> An August 2010 Angus Reid poll of BC residents found that 48% of respondents oppose this pipeline proposal, while 35% support it.<sup>6</sup>

### *Enbridge's Proposed benefits to BC during construction:*

- \$4 billion in construction spending in BC (out of \$5.5 billion total);
- Third largest of all proposed and on-hold projects in the province;
- \$2.5 billion in labour income from 4,095 person-years of direct employment and 31,348 person-years of indirect and induced employment (multiplier effect);
- \$165 million in tax revenue to the Government of BC (out of \$912 million total); and,
- Canada's GDP increases by \$6.5 billion, 55% of which would be in BC.

### *Enbridge's Proposed benefits to BC during operations:*

- 78 direct long term person-years of employment (58 in Kitimat/26 elsewhere) and 483 indirect/induced person-years, providing \$32 million a year in labour income;
- \$94 million in annual spending, including: \$7.7 million in operating wages/benefits; \$51.3 million in power, operations and maintenance; \$28.5 to local governments in property taxes; and, \$7.3 million in corporate income taxes.
- Approximately \$3 million for a one time-only rent payment for use of crown land.
- Project impact on GDP, employment and labour income would be less than 0.1%.

## **OTHER JURISDICTIONS**

The federal government and Alberta have interests and responsibilities in regards to this project that serve as important context.

### *Federal government:*

- Regulating project-related tanker traffic would be largely a federal responsibility; any related environmental issues would fall under shared jurisdictions (BC and federal).
- According to a 2009 statement, there is no moratorium on tanker traffic in coastal waters north of Vancouver Island.<sup>7</sup> The only restriction is a voluntary tanker routing measure that US traffic between California/Alaska remains away from the coast.<sup>8</sup>
- Oil tankers have been moving through southern coastal waters in BC for half a century. For example, in 2009, 65 oil tankers moved over 25 million barrels of oil out of the province from a Kinder Morgan pipeline terminal in Burnaby.<sup>9</sup>

#### *Province of Alberta:*

- The 2004 BC/Alberta Environmental Cooperation Agreement recognizes that due to the shared border there are mutual interests, and that the provinces could benefit from working together in common areas of environmental management.<sup>10</sup>
- A key aspect of the Agreement is to provide an increasingly seamless situation for companies doing business in the two provinces.
- The difficulty in regards to this project is that its impacts would stretch across BC, well beyond its shared border with Alberta to the Coastal Mountains and out into the Pacific Ocean.
- Assuming similar royalty rates into the future and all pipelines are operating at full capacity, the 500,000 barrels exported per day through the proposed Enbridge pipeline would be worth \$1.1 billion a year to the Alberta government.<sup>11</sup>
- Benefits to Alberta would likely also include oil sands construction and operation and the associated multiplier effect, capital investment, as well as labour income and income tax revenue.

## **ENVIRONMENTAL CONSIDERATIONS**

If approved the pipelines would cross: lowland river systems, rolling plateaus, flat plains, large lakes, forest, and mountain ranges; into key habitats for woodland caribou and grizzly bears, as well as fish habitats; near to provincial parks and protected areas; and, over hundreds of streams and rivers. The pipeline would alter a strip of land across the width of the entire province and lead to an additional 220 oil tankers crossing through BC's northern coastline.

#### *Pipeline impact on land and wildlife*

- During construction a total of 48 km<sup>2</sup> will be cleared of vegetation across the width of the province. This will impact plant species diversity, old growth forest, rare plant species, and First Nations' traditional collection sites (Project size reduces by half after construction).
- Enbridge has indicated that the pipeline's regional effects assessment area – a 15 km zone on both sides of the pipeline where wildlife may be impacted by construction noise and increased human/predator access – would cross 8 provincial parks.<sup>12</sup> See appendix 1 for a map showing how provincial parks are impacted.
- The pipeline would cross through the recently established Burnie River Protected Area extension. This Area abuts the southern end of the Burnie-Shea provincial park and was established to protect important grizzly bear, mountain goat, and caribou

habitat. The order in council establishing this Area provides the authority to the minister responsible for the *Park Act* to approve construction, use or operation of pipelines for the transfer of natural gas or petroleum products through the protected area.

- The physical pipeline also crosses through the Herd Dome Special Resource Management area (ILMB project near Burnie-Shea Provincial Park), and the Greg Duke Memorial Reaction Area (directly north of Monkman Provincial Park).
- Potential disturbances to the Coastal Mountain region's old growth forests and red-listed rare ecological communities were rated as high by Enbridge.
- According to Enbridge, habitat loss – caused by clearing a 55 meter-wide path across the province – and construction noise could impact up to 30 wildlife species. In BC, 13 of these species are of special concern (blue-listed) and six are endangered or threatened (red-listed), including Caribou herds and grizzly bears.<sup>13</sup>
- Along the route, the pipeline's corridor will bisect animal ranges creating a physical/sensory barrier; and, may increase human/predator access to areas that had been difficult to access.

#### *Pipeline impact on streams, rivers and fish*

- 801 streams and rivers are crossed in four of BC's major watersheds (Peace, Fraser, Skeena, and Kitimat). Many flows in these watercourses are already impacted by agricultural activity, logging, and mountain pine beetle infestations.
- Enbridge has identified 102 high and 145 moderate sensitivity watercourses along the BC portion of the proposed pipeline route (43% in Skeena River watershed).<sup>14</sup>
- The Pembina Institute notes that the health of salmon in the Upper Fraser, Skeena and Kitimat watersheds already suffer due to the cumulative effects of industry, climate change and other impacts.<sup>15</sup>
- Land alterations could change watercourses thereby disrupting fish movements or cause sedimentation, turbidity and temperature increases that decrease fish health.

#### *Pipeline Rupture*

- Since 1973, 38 catastrophic landslides with runs over a 1 km have occurred in northern BC's remote and mountainous terrain, many in proximity to proposed route.<sup>16</sup>
- Enbridge currently operates 13,500 kilometres of pipelines in North America. Over the last six years its average pipeline spill rate was nearly 6,900 barrels of oil per year, which is equivalent to 510 barrels per 1,000 kilometres.<sup>17</sup>
- Enbridge has had several major spills. The most recent example being the 19,500 barrels spilled in July 2010 in Michigan's Kalamzoo River and nearby creek (See Appendix 5 on spill history). The estimated clean-up cost for this spill is \$400 million.<sup>18</sup>
- The severity of a spill from the Northern Gateway pipelines would depend on the spill location and size. At a rate of 500,000 barrels of crude oil per day, an unnoticed spill lasting an hour could lead to 21,000 barrels spilling into BC's wilderness.<sup>19</sup>
- Sensitive habitats, local economies (fisheries and tourism, for example), and First Nations along the route could be affected, and require compensation.

- Weather conditions and the remoteness of the pipeline's route in BC could cause cleanup delays, leading to broader water, land, and wildlife contamination.

#### *Tanker and terminal impact on Marine environment*

- 220 tankers per year would arrive and depart from north and south of Haida Gwaii.<sup>20</sup> Once in BC's coastal waters, they would travel up Douglas Channel before reaching the proposed terminal in Kitimat Arm. Monthly tanker traffic in the Douglas Channel would increase from 7 to 18.3 tankers, or 161%.<sup>21</sup>
- 38 marine species were identified by Enbridge as active along this route; among them are 11 blue-listed and 13 red-listed species, including ten species of whales, the Steller sea lion, Marbled Murrelet, Northern fur seal, and leatherback sea turtle.
- Enbridge has indicated that elevated sound levels can cause irreversible and temporary hearing loss in whales and may hamper their ability to hear natural sounds important for life functions or to detect approaching vessels, which could lead to an elevated risk of collisions with boats. The affects of noise from tankers at berth and in transit, as well as collisions with tankers, could create risks for marine mammals.
- The Enbridge proposal notes that noise in excess of 120 decibels may elicit behavioural responses in marine mammals. Enbridge maps outlining predicted sound levels reveal that as tankers approach the inside passage close vessel volumes may exceed 145 decibels and remain in excess of 120 decibels at least 6 kilometres out. Once tankers are in the inside passage and berthed in Kitimat Arm they would operate at lower levels of volume (due to speed reductions).
- While berthed tankers are quieter, each tanker is expected to be in Kitimat Arm for 24 hours. Given whale hearing ranges, when whales and tankers are in Kitimat Arm together, at the very least the whales will hear noise from tankers.<sup>22</sup>
- Kitimat Arm may be an important feeding habitat for 244 Northern resident killer whales as two large salmon migration rivers are upstream from the terminal site.
- Berthed marine vessels and tank fugitives at the Kitimat terminal are expected to add 82,000 tonnes of CO2 equivalent a year to the atmosphere, or 0.2% of BC's 2020 emissions (based on BC's Climate Action Plan 45 megatonnes target).
- Traffic from 220 tankers would increase sulphur dioxide emissions by 10% in the Kitimat Arm area.<sup>23</sup> At ground-levels in the immediate region around the proposed terminal, this gas – a contributor to acid rain, upper ozone depletion, and vegetation damage – already exceeds acceptable amounts for forests and natural vegetation.<sup>24</sup>

#### *Tanker Spill*

- In 1989, the Exxon Valdez tanker ran aground in Alaska leaking at least 262,000 barrels of oil across 3,400 km<sup>2</sup> of ocean and 1,990 km of shoreline.<sup>25</sup> The effects of this spill are still felt today and the final settlement of \$5 billion is still held up in court, over 20 years since it occurred. Exxon has paid \$3.4 billion so far (some estimates put costs as high as \$7 billion).<sup>26</sup>
- Since the 1970s the rate of spills and quantity of oil spilled from tanker incidents has steadily declined.<sup>27</sup> It is likely that improvements in mitigation technology and safety measures have contributed to this decline (e.g., double-hull requirements under international law).

- The potential of a spill can never be completely eliminated. Using a Transport Canada formula designed to measure spill risks Enbridge estimates a major spill of 250,000 barrels of oil could occur once in 1,500 years – a rate that Enbridge states is comparable to other similar operations around the world.<sup>28</sup>
- However, the extent of the risk from tankers on BC's northern coast is divisive, and at the center of most opposition to the proposal.
- Specific risks related to this project area are the rate and strength of storms along BC's north coast and the narrow and shallow shorelines along BC's Inside Passage (1.5 km at its narrowest and 42 m at its shallowest). Accidental spills could occur from: terminal operations, tanker collisions, hull failures, and fires and explosions, for example.
- If the Northern Gateway project is approved, 183 million barrels of crude oil would pass through Kitimat each year, requiring 150 oil tankers to carry an average of 1.3 million barrels each.<sup>29</sup>
- Once the oil is in a tanker responsibility for a spill transfers from Enbridge to the shipper. In Canada, shipper liability for spills is capped at \$169 million. After the shipper's liability is exhausted, industry-funded compensation funds top the coverage up to a total of \$1.5 billion. Shippers are not required to pay for spill response and cleanups that exceed \$1.5 billion, meaning that additional costs could be left to the BC and federal governments, as well as local residents. Companies often pay beyond this limit, but are not required to by law (although lawsuits can help).<sup>30</sup>
- Limitations of the above funding scheme include: shippers are only required to carry insurance for spill response up to \$169 million; company legal costs can be drawn from the \$169 million fund, thus reducing the true amount available for compensation; and, there are restrictions on coverage in terms of environmental damage and what industries can claim for loss of income.
- Tanker traffic would occur through the Pacific North Coast Integrated Management Area (PNCIMA), an area known for a wide range of ecological niches and diverse array of species. Its contains:
  - A significant variety of marine mammals, including 27 different types of whales, dolphins, porpoises and pinnipeds;
  - 400 known species of marine fish (including the more than 25 million adult salmon that pass through each year);
  - An enormous proportion of BC's fishing industry (e.g., 85% of salmon catch);<sup>31</sup> and,
  - 650 major salmon spawning streams along its coastline.<sup>32</sup>
- A complete understanding of the impacts associated with a major spill is difficult to determine. However, concerns raised have centered on impacts to marine animals, ocean and coastline health, and oceans-related fisheries and tourism industries.

## MITIGATION OFFERED

Enbridge is aware that this project would have impacts on the environment. Its application outlines a number of mitigation activities – some required by law and others as industry best practices – that will help minimize those impacts.

- Reclaim post-construction areas to reflect pre-construction conditions as closely as possible, including drainage patterns, bank slopes, native vegetation cover, erosion control, and soil configuration.
- Alterations to pipeline route/design to avoid geohazards (rock slides, etc.), sensitive habitats,<sup>33</sup> and water crossings (changes made to 40% of proposed crossings).
- Construction and operation windows that respects sensitive land/marine wildlife periods<sup>34</sup> and commercial/traditional fisheries harvesting.
- Construction and operation activities will be adjusted or stop to respect land/marine wildlife movements and activities (including nesting, denning, and feeding).
- Work with government, First Nations, and other stakeholders to control/minimize access to pipeline right-of-way passage (berms, monitoring and vegetation screens).
- Conduct baseline pre-disturbance studies to fish habitats, and local wildlife features and prevalence along proposed pipeline and tanker routes.
- Work with government, First Nations, other stakeholders and the research community to conduct ongoing post-construction research/surveys on ecosystem health, population/health impacts for land/marine wildlife, impacts associated with increased human/predator access, and the effectiveness of mitigation measures.
- Consider compensation if it is not possible to maintain existing fisheries capacity, including improving fishing opportunities in areas outside of the active project area.
- Actively engage with and communicate to Aboriginal, commercial and local fisheries representatives to reduce the effects of terminal operations on marine fisheries.
- Tanker safety to be achieved by meeting all Canadian and international regulatory requirements, as well as project-specific requirements. Safety for project tankers to include: double hulls, escorts/tethers by 1-2 tugboats; and, travel speeds ranging from 8 to 12 knots while in the inside passage. Also, local pilots will be stationed onboard while travelling the inside passage and radars and first response stations (with locally-based personnel) will be installed along important sections of the North and South Approaches.<sup>35</sup>
- Tankers docked at the terminal will be surrounded by booms.
- Whales will be protected by the reduced travel speeds, as well as a professionally staffed marine monitoring boat that will identify whale activity and alert tankers.

## DISCUSSION

s.13 The Northern Gateway application points to a number of economic benefits of this project to BC. These benefits are derived from the BC portion of the pipelines and terminal, and include: construction spending (\$4 billion) and thousands of construction jobs; and, less than 80 direct and nearly 500 indirect long term jobs associated with project operations (primarily focused at the terminal in Kitimat Arm) s.13

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However, the benefits associated with this project are far more pronounced in Alberta, where the pipeline would help facilitate the expansion of oil sands development by increasing export capacity from 1.35 to 1.85 million barrels of oil per day. In addition to the new jobs and investment the pipeline would bring to Alberta,<sup>36</sup> this increase in export capacity would pay the Alberta government \$1.1 billion a year in royalty revenue (based on 2009 figures). To facilitate Alberta oil sands access to international markets, BC would have to bear significant environmental impacts and risk by hosting 57% of the pipeline route and 220 tanker visits per year. BC's economic benefits would be limited to the modest benefits associated with pipeline construction and operation, and does not include any royalty or signification rent revenue (see page 2 for economic benefits).<sup>37</sup>

BC already hosts a pipeline that facilitates the export of Alberta oil sands; the Kinder Morgan Edmonton-Burnaby Trans Mountain Pipeline, which moves 300,000 barrels of oil per day. Kinder Morgan has proposed expanding this pipeline's capacity up to 700,000 barrels per day. s.13

s.13 ; industry forecasts suggest a doubling of oil sands production to over 3 million barrels per day by 2019.<sup>38</sup> Further, as concerns increase in the US about the environmental impact of the Alberta oil sands, producers in Alberta will increasingly turn their attention west – and through BC – to Asia Pacific markets. s.13

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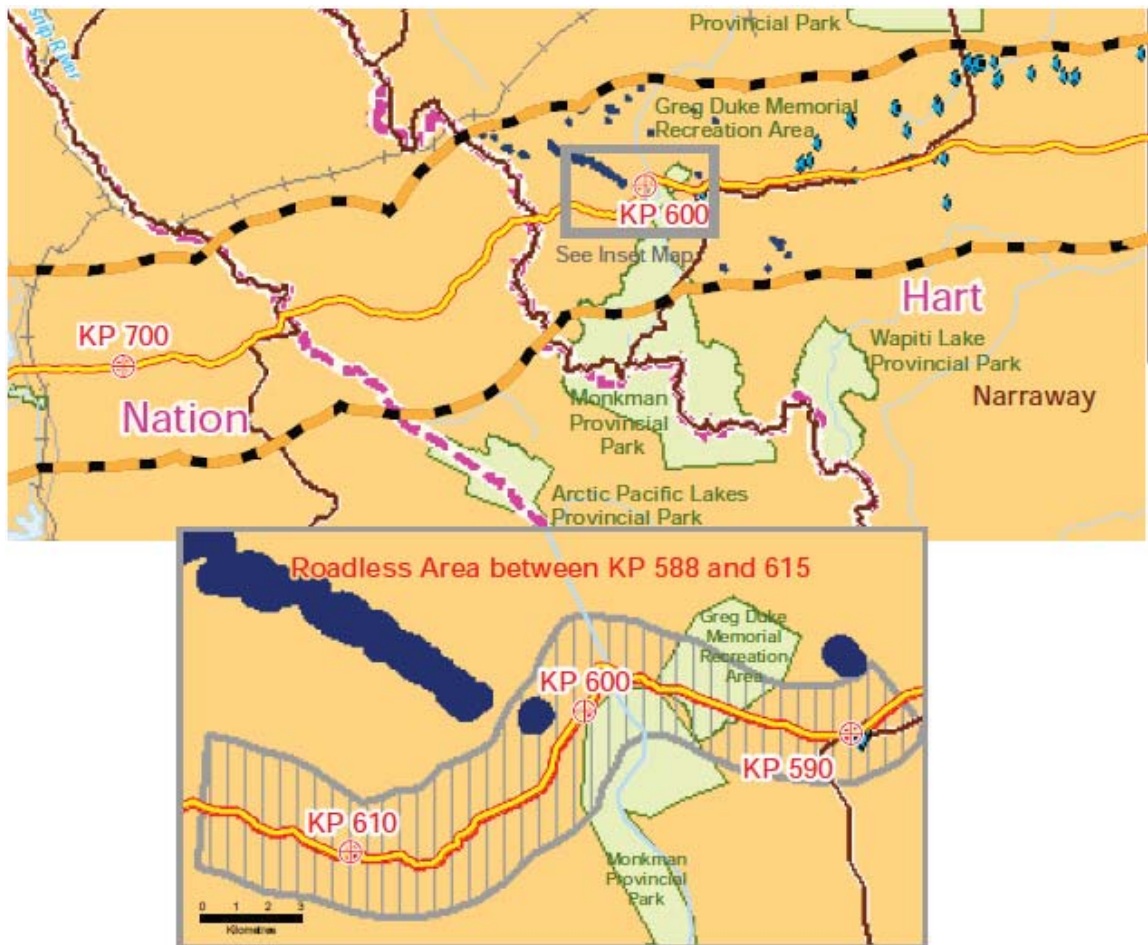
**Suggested ideas for ensuring the Northern Gateway Pipelines Project: (A) minimizes environmental impacts with the best mitigation strategies; and, (B) delivers a fair share of its economic benefits to BC:**

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## Appendix 1: Maps Showing How BC Provincial Parks are Impacted

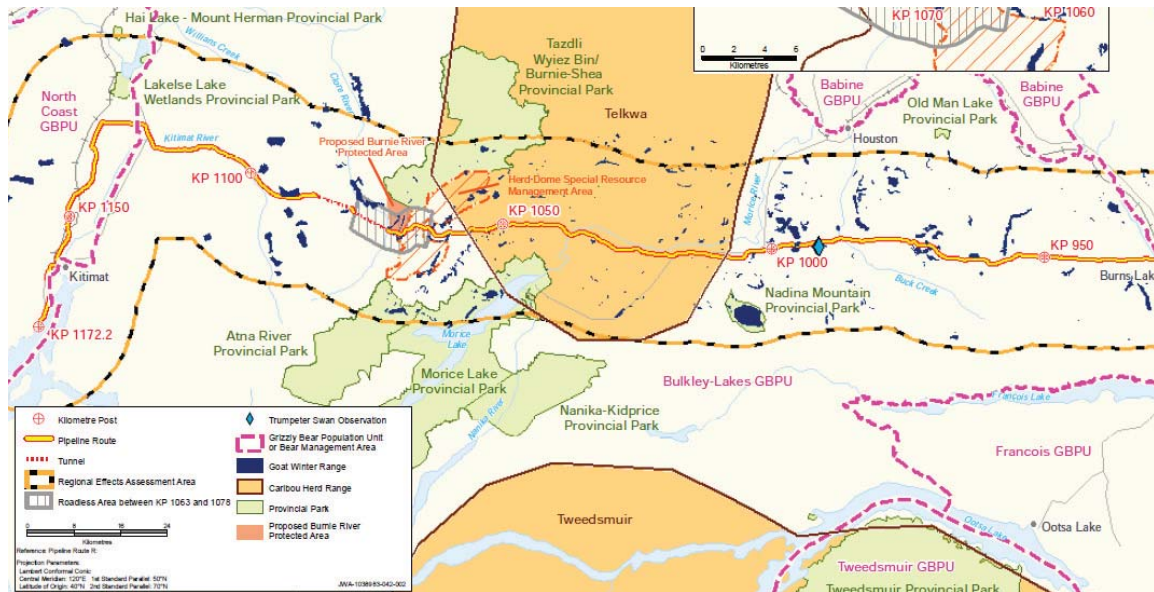
Excerpt from Enbridge project proposal *Figure 9-2 Sensitive Areas for Wildlife in Western Alberta and Eastern British Columbia.*



**Note:** Two parks fall within the 15 km Regional Effects Assessment Area in the area included in Enbridge's map of eastern BC.

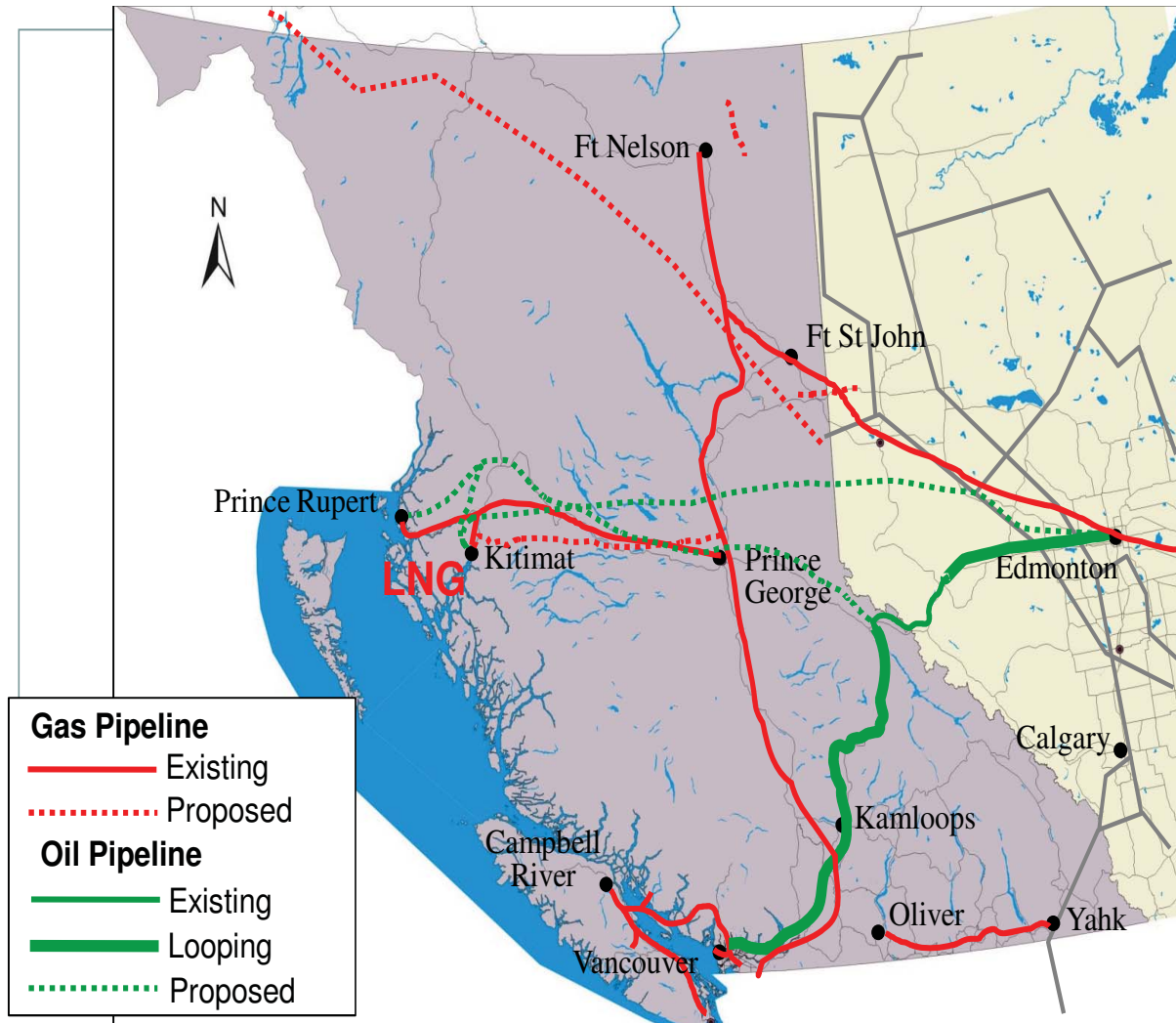
**Note:** Note that the pipeline would not physically cross into Monkman Provincial Park, but along this Park's northern boundary is the area where the pipeline would come closest to a BC provincial park. The area directly north of Monkman (and the proposed pipeline) is not a provincial park; it is the Greg Duke Memorial Recreation Area. The Pipeline does cross this Reaction Area.

Excerpt from Enbridge project proposal *Figure 9-3 Sensitive Areas for Wildlife in Western British Columbia*.



**Note:** These maps do not show all the provincial maps crossed. For a more comprehensive account of the land crossed please refer to the AMEC Earth and Environmental [\*Technical Data Report: Non-Traditional Land Use\*](#) pages 27-39 (prepared for Enbridge).

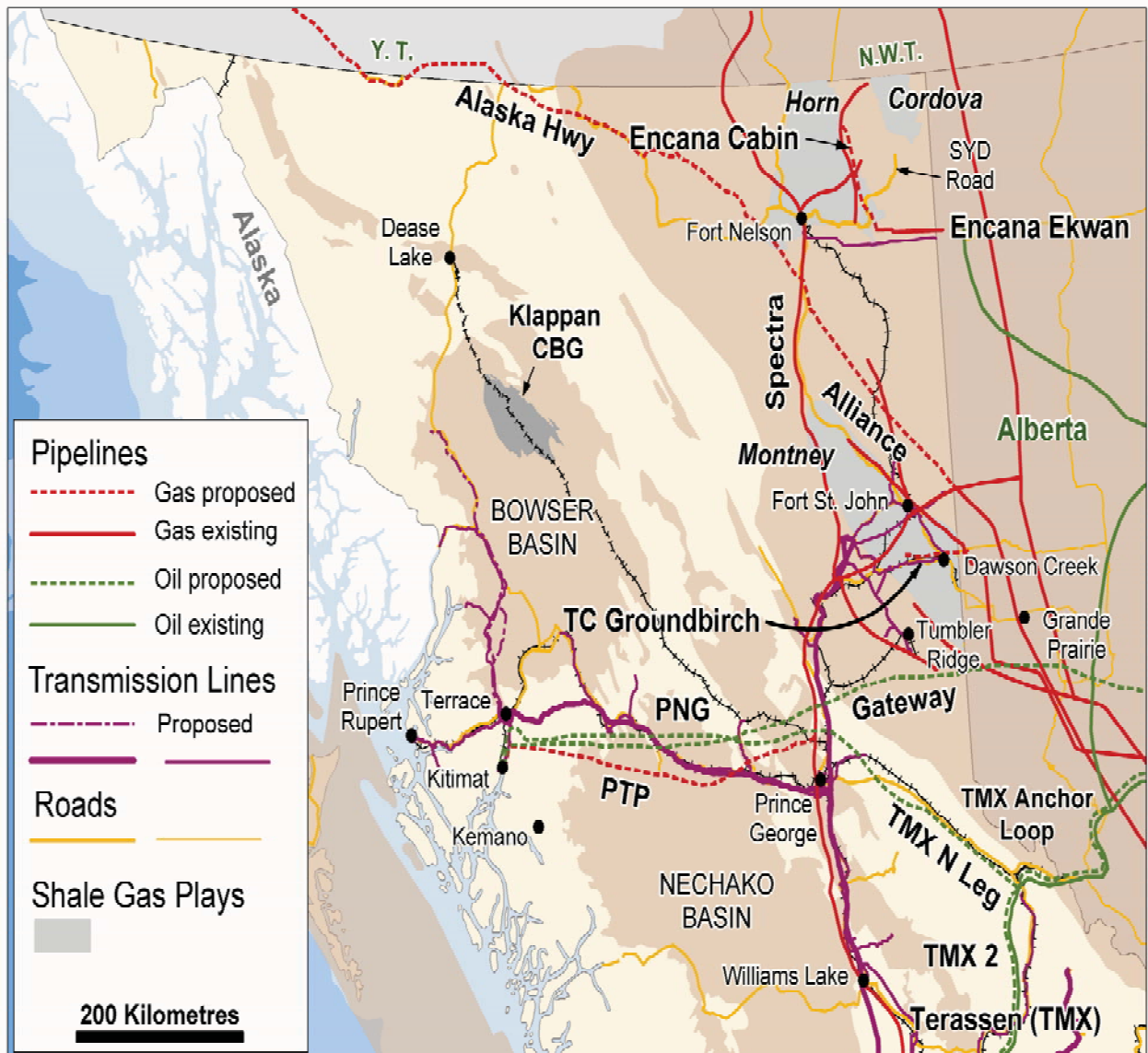
## Appendix 2: Existing and Proposed Gas and Oil Pipelines



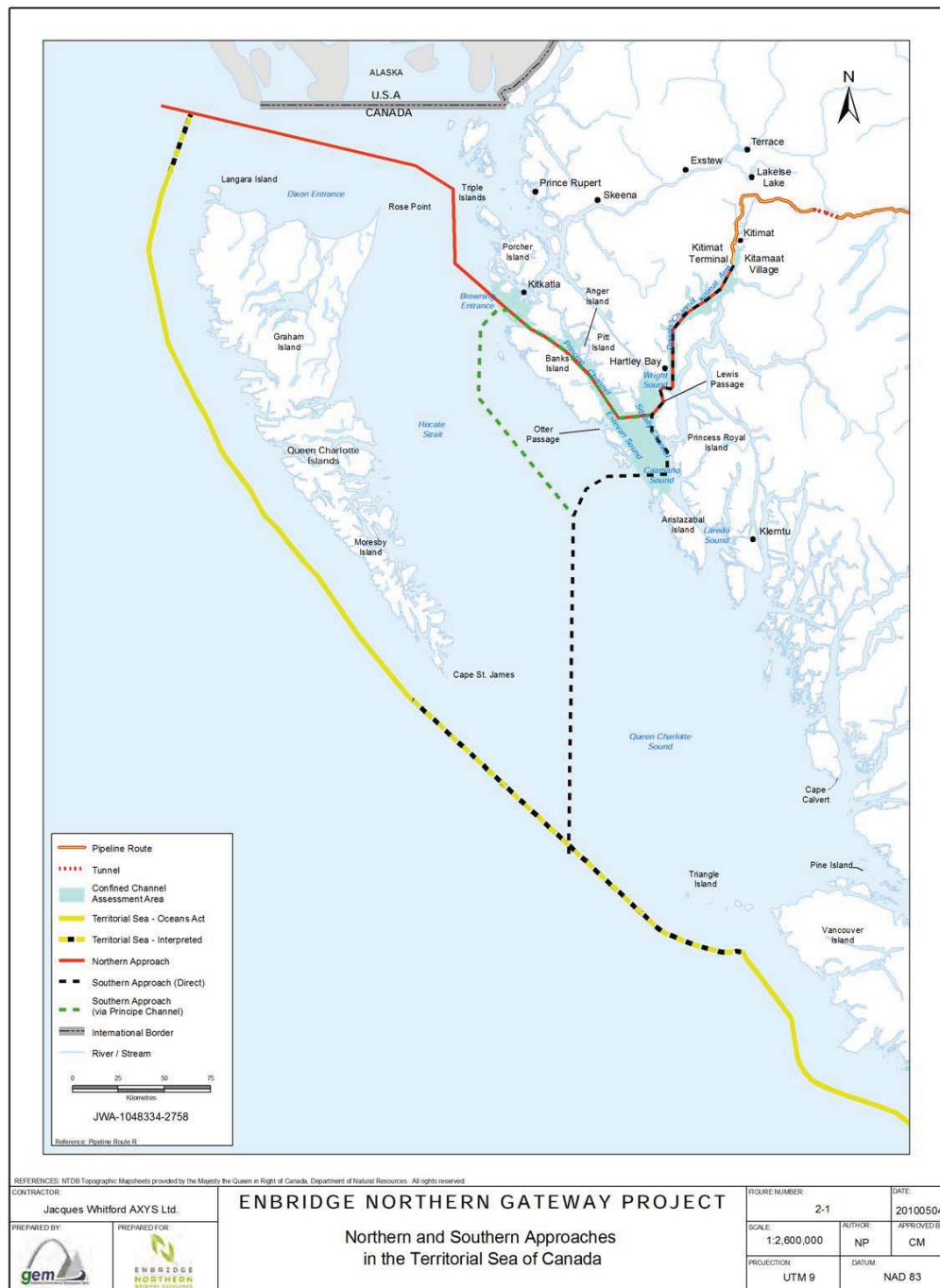
**Note:** The proposed Enbridge Northern Gateway pipelines project (GREEN dotted line) would move crude oil from Burdett (60 km north of Edmonton) to tankers in a Kitimat terminal, as well as move condensate from tankers at Kitimat to Alberta.

**Note:** The Existing Kinder Morgan Trans Mountain pipeline (GREEN solid line) transports crude oil from Alberta to Burnaby. The green dotted line moving in a northwest direction from it at the BC-Alberta border is a proposed extension of the Trans Mountain pipeline to Kitimat and Prince George. Kinder Morgan is also considering an expansion of the original Edmonton-Burnaby line.

### Appendix 3: Existing and Proposed Pipelines, Transmission Lines, Roads in Northern BC



## Appendix 4: Northern Gateway tanker traffic through BC's Coastal Waters



## **Appendix 5: Examples Enbridge pipeline ruptures**

Enbridge currently operates 13,500 kilometres of pipelines in North America and safely delivers over 2 million barrels of crude oil and liquids. Over the last six years the annual average pipeline spill rate was nearly 6,900 barrels of oil, which is approximately 510 barrels per 1000 kilometres of pipeline. Between 2006 and 2007 Enbridge reported 132 reportable spills. Even small spills can have significant impacts on the environment. Below are some examples of Enbridge spills over the last 16 years:

- |                        |  |
|------------------------|--|
| <b>September 2010:</b> | An Enbridge pipeline burst in Romeoville, Illinois leaking 6,100 barrels of oil in an industrial park.   |
| <b>June 2010:</b>      | Enbridge pipeline leaked 19,500 barrels of oil into a creek in southwestern Michigan. The spill spread to the Kalamazoo River and impacted a 40 km stretch of riverbank. Cleanup costs are estimated at \$400 million. Enbridge had been warned about potential problems with the pipeline in January. |
| <b>April 2010:</b>     | Enbridge pipeline ruptures spilling more than 1,500 litres of oil in Manitoba's Boghill Creek, which connects with the Assiniboine, a major Manitoba-Saskatchewan river.   |
| <b>January 2009:</b>   | A valve blew on an Enbridge pipeline in Fort McMurray, Alberta, spraying nearly 4,000 barrels of oil 30 to 40 metres into the air. Oil blanketed the facility and covered nearby trees. The detection system failed to notice the leak for between two and three hours.                                |
| <b>November 2007:</b>  | Two workers are killed after an Enbridge pipeline caught fire in Northern Minnesota. Enbridge was fined for allowing pipeline pressure to exceed recommended limit.  |
| <b>July 2002:</b>      | 6,000 barrels of oil were released when an Enbridge pipeline cracked in a marsh in Minnesota. To prevent oil from reaching the Mississippi River the oil was set ablaze, creating a smoke plume 1.6 km high and 8 km long.   |
| <b>1994:</b>           | Enbridge spills 22,000 barrels of oil across 27 acres of agricultural land in St. Leon, Manitoba. Heavy rain made it difficult to recover the oil; contamination was reported in the soil and ground water at varying depths.  |

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<sup>1</sup> A majority of un-sourced bullets can be attributed to the Enbridge Northern Gateway Pipelines Proposal. Available at: <http://gatewaypanel.review-examen.gc.ca/clf-nsi/hm-eng.html>

<sup>2</sup> Condensate is a petroleum by-product that is used to thin petroleum products for pipeline transport.

<sup>3</sup> Enbridge Northern Gateway Alliance website. Available at: <http://northerngatewayalliance.ca/>

<sup>4</sup> Letter to the Canadian Environmental Assessment Agency, August 2010. Tofino-Long Beach Chamber of Commerce. Available at: <http://www.ceaa.gc.ca/050/documents/44911/44911E.pdf>

<sup>5</sup> Coastal First Nations website, March 2010. Coastal First Nations Great Bear Initiative. Available at: <http://coastalfirstnations.ca/files/PDF/C35010032215240.pdf>

<sup>6</sup> Angus Reid, August 2010. British Columbians Troubled by Competing Pipeline Projects. Available at: [http://www.visioncritical.com/wp-content/uploads/2010/08/2010.08.30\\_Environment\\_BC.pdf](http://www.visioncritical.com/wp-content/uploads/2010/08/2010.08.30_Environment_BC.pdf)

Opposition is highest in the North. 17% of respondents were not sure how they felt regarding the proposal.

<sup>7</sup> National Energy Board, December 2010. Northern Gateway Pipeline Project – Joint Review Panel Agreement and Terms of Reference. Available at:

<http://www.neb.gc.ca/clf-nsi/rthnb/nwsrls/2009/nrthrngtwjprgrmntbckgrndr-eng.html>

<sup>8</sup> Natural Resources Canada, February 2009. Energy Sources: Offshore British Columbia. Available at: <http://www.nrcan.gc.ca/eneene/sources/offext/offcbextcb-eng.php>

<sup>9</sup> CBC News, May 2010. Concern rising over oil tankers in Vancouver waters. Available at: <http://www.cbc.ca/news/canada/british-columbia/story/2010/05/07/bc-vancouver-tankers-oil-spill.html>

<sup>10</sup> Memorandum available at:

[http://www.international.alberta.ca/documents/Trade/Environmental\\_Cooperation\\_MOU\\_2004.pdf](http://www.international.alberta.ca/documents/Trade/Environmental_Cooperation_MOU_2004.pdf)

<sup>11</sup> Alberta Energy, 2010. About the Oil Sands: Facts and Statistics. Available at:

<http://www.energy.alberta.ca/OilSands/791.asp>

Alberta Energy, October 2010. Alberta's Energy Industry: An Overview 2009. Available at:

[http://www.energy.alberta.ca/Org/pdfs/Alberta\\_Energy\\_Overview.pdf](http://www.energy.alberta.ca/Org/pdfs/Alberta_Energy_Overview.pdf)

<sup>12</sup> AMEC Earth and Environmental, A division of AMEC Americas Limited, 2010. Technical Data Report: Non-Traditional Land Use. Prepared for Enbridge. Available at:

[http://www.ceaa.gc.ca/050/documents\\_staticpost/cearef\\_21799/2427/Non-Traditional\\_Land\\_Use.pdf](http://www.ceaa.gc.ca/050/documents_staticpost/cearef_21799/2427/Non-Traditional_Land_Use.pdf)

Provincial parks impacted: Hai Lake – Mount Herman, Lakelse Lake Wetlands, Burnie-Shea, Atna River, Morice Lake, Nadina Mountain, Monkman, and Crooked River

<sup>13</sup> Impacted species include: one red-listed and three blue-listed Woodland Caribou herds (two of which are in decline); three borderline threatened grizzly bear population units; blue-listed coastal tailed frog, wolverine, short eared owl, and pacific blue heron; and, red-listed northern goshawk and cape mary warbler.

<sup>14</sup> Sensitive watercourses are those that either provide quality habitat for species of conservation concern or contain fish of importance to Aboriginal peoples.

<sup>15</sup> Pembina Institute, October 2009. Pipelines and Salmon in Northern British Columbia. Available at:

<http://pubs.pembina.org/reports/pipelines-and-salmon-in-northern-bc-report.pdf>

<sup>16</sup> Pembina Institute, October 2009. Pipelines and Salmon in Northern British Columbia. Available at:

<http://pubs.pembina.org/reports/pipelines-and-salmon-in-northern-bc-report.pdf>

<sup>17</sup> Enbridge Website, September 2010. Corporate Social Responsibility reports 2003-2009. Available at:

<http://www.enbridge.com/AboutEnbridge/CorporateSocialResponsibility/CSRReports.aspx>

Previous years' spill rates are adjusted upwards and downwards in subsequent Enbridge Corporate Social Responsibility reports based on new information. Further, the average provided does not include 2010, the year that Enbridge had a 19,500 barrel spill in Michigan's Kalamazoo River.

<sup>18</sup> Globe and Mail, September 2010. Enbridge denies allegations of coercion. Available at:

<http://m.theglobeandmail.com/globe-investor/enbridge-denies-allegations-of-coercion/article1693191/?service=mobile>

<sup>19</sup> 500,000 barrels divided by 24 hours is 20,833.33 barrels an hour.

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<sup>20</sup> Dixon Entrance in the north, Queen Charlotte Sound in the south, and Hecate Strait on east side of Haida Gwaii.

<sup>21</sup> Entering through either the Browning Entrance or Caamano Sound.

<sup>22</sup> Assuming half of the tankers berth at the same time and spend an average of 24 hours at port, noise could be a factor in Kitimat Arm 45% of the year.

<sup>23</sup> Existing heavy industry in Kitimat Arm: aluminum smelter (undergoing technological improvements to reduce emissions), asphalt plant, and cement plant. Tankers will also add 22% more oxides of nitrogen to the region.

<sup>24</sup> Enbridge has identified marine fuel standard changes, expected to take effect in 2015, that would greatly reduce this potential impact (97% sulphur content reduction).

<sup>25</sup> Anchorage Daily News, June 2010. Size of Exxon Spill Remains disputed. Available at:

<http://www.adn.com/2010/06/05/1309722/size-of-exxon-spill-remains-disputed.html>

Raincoast Conservation Foundation, 2010. What's at Stake? The Cost of Oil on British Columbia's Priceless Coast. Available at: [http://www.raincoast.org/files/WAS\\_report/whatsatstake\\_vers.04-10.pdf](http://www.raincoast.org/files/WAS_report/whatsatstake_vers.04-10.pdf)

Note: The size of the *Exxon Valdez* spills remains unclear. Exxon estimate of 262,000 barrels was never verified, and other more recent estimates place the figure at a much higher quantity.

<sup>26</sup> Raincoast Conservation Foundation, 2010. What's at Stake? The Cost of Oil on British Columbia's Priceless Coast. Available at: [http://www.raincoast.org/files/WAS\\_report/whatsatstake\\_vers.04-10.pdf](http://www.raincoast.org/files/WAS_report/whatsatstake_vers.04-10.pdf)

<sup>27</sup> The International Tanker Owners Pollution Federation Limited, 2010. Background. Available at:

<http://www.itopf.com/information-services/data-and-statistics/statistics/>

<sup>28</sup> Vancouver Sun, June 2010. No Spill risk from proposed pipeline: Enbridge. Available at:

[http://www.canada.com/vancouver/news/business/story.html?id=98675f95-4f5a-41f3-8240-eb0c6a9ae6d7&k=14794&utm\\_source=feedburner&utm\\_medium=feed&utm\\_campaign=Feed%3A+canwest%2F261+\(Vancouver+Sun+-+BusinessBC\)](http://www.canada.com/vancouver/news/business/story.html?id=98675f95-4f5a-41f3-8240-eb0c6a9ae6d7&k=14794&utm_source=feedburner&utm_medium=feed&utm_campaign=Feed%3A+canwest%2F261+(Vancouver+Sun+-+BusinessBC))

<sup>29</sup> 220 tankers are expected to call on Kitimat. 150 would collect oil while 70 would drop off condensate.

<sup>30</sup> Living Oceans Society, January 2010. Canadian taxpayers on the hook for catastrophic oil spills from Enbridge Northern Gateway. Available at:

<http://www.livingoceans.org/sites/default/files/media/uploads/FVFactSheet.pdf>

Available funds for cleanup: shippers Civil Liberties Convention (CLC) funding up to \$169 million, the International Oil Pollution Compensation fund (IOPC) tops CLC up to \$382.8 million, the Supplementary Fund Protocol (SFP) tops the IOPC up to US\$1.15 billion, and Canada's Ship-Source Oil Pollution Fund would top SFP up to nearly \$1.5 billion. Shippers are only required to carry liability insurance on initial \$169 million.

<sup>31</sup> Living Society Society. BC's Bountiful Sea – Heritage worth Preserving. Available at:

[http://www.livingoceans.org/sites/default/files/reports/PNCIMA\\_BC\\_bountiful\\_sea.pdf](http://www.livingoceans.org/sites/default/files/reports/PNCIMA_BC_bountiful_sea.pdf)

<sup>32</sup> Royal Society of Canada (at the request of Natural Resources Canada), February 2004. Report of the Expert Panel on Science Issues Related to Oil and Gas Activities, Offshore British Columbia. Available at:

<http://www.rsc.ca/documents/fullreportEN.pdf>

<sup>33</sup> Sensitive areas include: non-pine forests, large contiguous blocks of natural habitat, mature and old-growth forests, wetlands and riparian areas. Less sensitive areas include beetle-killed and pine-leading stands.

<sup>34</sup> In specific, sensitive wildlife periods for birds, marine mammals, fish species (salmon and eulachon, etc.), bears, woodland caribou, moose, mountain goat, furbearers and amphibians.

<sup>35</sup> It is important to note that while Enbridge will be requiring all these safety mechanisms, if a spill were to occur from a tanker the shipper, and not Enbridge, would be responsible for clean-up activities and associated costs. Enbridge would only be responsible for a spill from the terminal/pipeline.

<sup>36</sup> In September 2009, Alberta Energy reported that between 2000 and 2020 oil sands activity would have a total effect on employment of 174,000 full-time positions earning an estimated \$187 billion, and that there was \$170 billion in planned/proposed oil sands investments in the province. This pipeline helps facilitate that growth. Note: *Alberta Energy, September 2009. Talk about Oil sands* PDF is no longer available

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online. See the same title, but from April 2011 for update that contains same information:

[http://www.energy.alberta.ca/OilSands/pdfs/FactSheet\\_OilSands.pdf](http://www.energy.alberta.ca/OilSands/pdfs/FactSheet_OilSands.pdf)

Note: Sources under endnote 11 were also used for the royalty calculations in this paragraph.

<sup>37</sup> As this in an internal document, this economic analysis was not fact checked through the Ministry of Energy and Mines.

<sup>38</sup> Note: *Alberta Energy, September 2009. Talk about Oil sands* PDF is no longer available online. See the same title, but from April 2011 for update that contains same information:

[http://www.energy.alberta.ca/OilSands/pdfs/FactSheet\\_OilSands.pdf](http://www.energy.alberta.ca/OilSands/pdfs/FactSheet_OilSands.pdf)

<sup>39</sup> The project is 48 km<sup>2</sup> during construction, due to the 55 metre construction right of way. Post-construction, the right of way is reduced to 25 metres, which would reduce the total project size by approximately half.

<sup>40</sup> Project tankers are by far the largest source of project-related GHG emissions (82,000 tonnes).