

PACIFIC NORTHWEST LNG - ADDENDUM TO THE ENVIRONMENTAL IMPACT STATEMENT

Community Health and Well-Being
December 12, 2014

18.0 COMMUNITY HEALTH AND WELL-BEING

The assessment of potential effects of the Project on community health and well-being was provided in Section 18 of the EIS. This section of the EIS Addendum provides:

- An update to the potential project and cumulative effects on the Community Health and Well-Being VC as a result of the project changes
- An updated list of all mitigation measures for the Community Health and Well-Being VC
- Conclusions on the assessment of effects on the Community Health and Well-Being VC, taking into account project changes and the requested additional information.

Table 18-1 lists the documents applicable to community health and well-being previously submitted by PNW LNG as part of the environmental assessment process to date and identifies if information is either *updated by EIS Addendum*, *superseded*, *not relevant*, or *not affected* by information in the EIS Addendum. The following sections of the EIS Addendum contain information that updates the documents classified as *updated by EIS Addendum* in Table 18-1. Figure 18-1 has been updated from the one provided in the EIS to reflect the project changes and any other applicable updates.

Table 18-1 Status of Previously Submitted Documents

Document Name	Status
Section 18 of the EIS (February 2014)	Updated by EIS Addendum
Technical Memorandum: Case Studies: Effects of Worker Camp Populations on Local Health Care (June 2014)	Not affected
Technical Memorandum: Mental Health and Well-Being (June 2014)	Not affected
Technical Memorandum: On-Site Medical Infrastructure and Services (June 2014)	Updated by EIS Addendum
Technical Memorandum: Responses to Northern Health's Substantive Comments (June 2014)	Not affected
Responses to the Working Group (June 2014)	Not affected

18.1 PROJECT EFFECTS ASSESSMENT UPDATE

18.1.1 Baseline Conditions

The baseline conditions described in the EIS and other previously submitted documents (see Table 18-1) apply to the marine terminal design mitigation. The marine terminal design mitigation results in the relocation of the marine terminal berth by about 510 m from the location described in the EIS. The marine terminal design mitigation is within the local assessment area (LAA) and regional assessment area (RAA) boundaries used to describe baseline conditions in the EIS and other previously submitted documents. The Community Health and

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Well-Being baseline conditions at the new marine terminal berth location are similar to those originally presented in the EIS.

18.1.2 Effects Assessment

Potential effects of the Project on Community Health and Well-Being have been re-evaluated with the project changes, following the methods described in Section 18 of the EIS. The effects assessment considers: change in social determinants of health and change in diet and nutrition and focuses on elements that have changed compared with the EIS.

18.1.2.1 Change in Social Determinants of Health

The marine terminal design mitigation will not affect conclusions presented in Section 18.5.2 of the EIS regarding project effects on education, employment and income, housing, community cohesion, physical and mental health conditions, recreational opportunities, and health infrastructure and services.

The primary mechanism by which the Project can affect social determinants of health relates to the number of project workers and the interactions between workers and local populations. The marine terminal design mitigation will not affect the estimated number of workers required to construct or operate the Project. The Project is still expected to require 3,500 to 4,500 workers at peak construction, creating jobs for 340 residents of the RAA (200 direct, 100 indirect and 40 induced), with operations providing 680 jobs for residents of the RAA (260 direct, 140 direct-contract, 120 indirect and 160 induced). The marine terminal design mitigation does not introduce new pathways to affect interactions between project workers and local populations.

18.1.2.2 Change in Diet and Nutrition

The marine terminal design mitigation will not affect the conclusion of Section 18.5.3 of the EIS that, with mitigation, project construction and operations will not cause a significant residual adverse effect on diet and nutrition. It is expected that the marine terminal design mitigation will address some issues related to potential project effects on the availability, accessibility or quality of country foods, which are the primary mechanisms affecting change in diet and nutrition. Specifically, the marine terminal design mitigation will mean that:

- No project infrastructure will be constructed on Flora Bank, an area of marine environmental importance
- There will be no dredging at the marine terminal, resulting in less interference with marine traffic and fishing; reduced potential effects on marine country foods, social and ceremonial (FSC) fishing and gathering; and reductions in perceived health risk from sediment mobilization.

The changes are therefore not expected to affect the composition of diets (i.e., proportion of country foods to market foods) and may reduce potential effects on accessibility to marine food sources. The marine terminal design mitigation may not, however, change concerns regarding perceived changes in the quality of marine resources. The potential remains that mistrust in information and perceptions of 'marine contamination' could result in decisions to forego the consumption of marine country foods near the project development area (PDA).

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18.1.2.3 Summary of Residual Project Effects

Project residual effects to community health and well-being related to the marine design mitigation are summarized in the following section and in Table 18-3.

18.1.2.3.1 Change in Social Determinants of Health

The marine terminal design mitigation is not expected to result in a material change to the assessment of residual effects on social determinants of health for the construction, operations, and decommissioning phases of the Project. The characterization of project residual effects on social determinants of health presented in the EIS is unaffected by the marine terminal design mitigation.

Project residual effects on education, employment and income, housing, community cohesion, physical and mental health conditions, recreational opportunities, and health infrastructure and services with mitigation (see Table 18-3) are expected to be moderate in magnitude, long-term in duration, to occur continuously, and to be reversible. There is high likelihood that adverse effects will occur as predicted. There is no change to the significance determination provided in the EIS. Due to limited primary data on community cohesion, there is moderate degree of confidence in the prediction of project effects on social determinants of health.

18.1.2.3.2 Change in Diet and Nutrition

The marine terminal design mitigation is not expected to result in a material change to the assessment of residual effects for the construction, operations, and decommissioning phases of the Project. The characterization of project residual effects on diet and nutrition presented in the EIS is unaffected by the marine terminal design mitigation.

Project residual effects on the composition of diets (i.e., proportion of country foods to market foods) with mitigation (see Table 18-3) are expected to be moderate in magnitude, long-term in duration, to occur continuously, and to be irreversible. There is high likelihood that adverse effects will occur as predicted. There is no change to the significance determination provided in the EIS. Due to limited information on FSC fisheries and recreational fisheries occurring near Lelu Island and the Flora Bank as well as limited information on Aboriginal, fishing, hunting, and plant gathering around Lelu Island, there is a moderate degree of confidence in the prediction of project effects on diet and nutrition.

Changes to the information presented in Table 18-3 (compared to Table 18-12 of the EIS) are identified with underlined text.

18.2 CUMULATIVE EFFECTS ASSESSMENT UPDATE

The cumulative effects assessment provided in the EIS (Section 18.6 of the EIS) was reviewed with respect to the marine terminal design mitigation, the potential cumulative effects from the change in location of the accommodation camp, and additional information requests related specifically to the cumulative effects assessment.

The assessment of cumulative project effects on community health and well-being was conducted by examining project pathways that influence social determinants of health and diet and nutrition in the context of baseline conditions within the RAA as well as interacting pathways associated with other projects proposed in the region.

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18.2.1 Cumulative Effects Assessment

The accommodation camp will no longer be developed, owned or operated by PNW LNG or be for the exclusive use of PNW LNG. At the direction of the Canadian Environmental Assessment (CEA) Agency, the accommodation camp has been determined not to be a component of the Project for the purpose of the federal environmental assessment. However, the primary mechanism by which the Project can affect social determinants of health relates to the number of project workers and the interactions between workers and local populations. The relocation of the camp will not affect the estimated number of workers required to construct or operate the Project. The Project is still expected to require 3,500 to 4,500 workers at peak construction, creating jobs for 340 residents of the RAA (200 direct, 100 indirect and 40 induced), with operations providing 680 jobs for residents of the RAA (260 direct, 140 direct-contract, 120 indirect and 160 induced). However, the relocation of the camp will result in increased cumulative effects on roadways that are used to transport workers between the camp and the work site.

18.2.1.1 Change in Social Determinants of Health

The relocation of the accommodation camp will not affect conclusions presented in Section 18.5.2 of the EIS regarding cumulative effects on education, employment and income, housing, community cohesion, physical and mental health conditions or recreational opportunities.

Relocating the accommodation camp will require shuttling of workers from the accommodation camp to the Lelu Island worksite. This activity has the potential to interact cumulatively with other road uses resulting in increased collisions and potential demand on health care infrastructure and services. Table 18-2 provides an estimate of peak and average traffic associated with the transportation of workers assuming two shift changes per day and an average of 45 passengers per shuttle.

Table 18-2 Peak and Average Estimated Vehicle Movements – Daily Workforce Transportation

Peak Construction Workforce			Average Construction Workforce		
Workers/day	Estimated daily vehicle movements	Timeframe	Workers/day	Estimated daily vehicle movements	Timeframe
4,500	200	6 months	2,560	114	46 months

NOTES: The total distance travelled per trip is assumed to be 20 kilometers with an average speed of 50 kilometers per hour.

Skeena Drive (Highway 599R) has been identified through consultation with city planners and emergency responders as an area of concern for traffic safety. The highway has limited sight distance, shoulders, and passing zones, making passing manoeuvres inherently risky. However, the average annual daily traffic (AADT) on this road has declined from 3,305 vehicles per day in 1995 to 1,498 in 2012 (MOTI 2013). In the last 5 years (2009 to 2013) there has only been one single vehicle collision reported along this road segment (ICBC 2014) which involved property damage only (i.e., no injuries or fatalities).

It is possible to apply a simple collision prediction model (de Leur and Sayed 2008) to this road segment to gain an understanding of the potential increase in collisions that may result from the additional workforce transportation volumes. The model assumes the following inputs:

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- The baseline traffic volume is 1,498 vehicles/day
- The project traffic volume is 200 vehicles/day (a conservative estimate since this peak volume will only occur for a short period of time)
- The highway is a typical rural, arterial, undivided, and has two lanes throughout its (approx.) 5 km length.

Given these inputs, it is estimated that the additional workforce transportation volumes could result in 0.15 collisions per year.

While only one single vehicle collision has been reported along Skeena Drive (Highway 599R) from 2009-2013 involving property damage (i.e., no injuries or fatalities), it is conservatively assumed that the Project's contribution of 0.15 collisions per year would require attendance by emergency medical services (EMS) and use of Northern Health's infrastructure and services. Increased traffic along Skeena Drive (Highway 599R) could therefore increase demand for EMS and health care infrastructure and services in the RAA.

To effectively manage cumulative effects associated with the transportation of workers from the accommodation camp to Lelu Island, PNW LNG will further assess and mitigate [through a Transportation Impact Assessment (TIA), Traffic Management Plan (TMP) and Traffic Safety Assessment (TSA)] effects of PNW LNG's contracted workforce on transportation infrastructure and services as per condition 6 of Schedule B of the BC EAO Environmental Assessment Certificate #E14-04. PNW LNG will require engineering, procurement and construction contractor(s) to adhere to applicable EIS commitments (see Section 18.4) and to work with the camp operator and the community to develop and implement a socio-economic effects management plan (SEEMP) with respect to the workforce in the camp and to engage in a Joint Camp Management Committee. Preliminary information on the SEEMP and Joint Camp Management Committee are as follows:

- The SEEMP will be designed as a framework from which targeted component management plans (e.g., the Accommodation Management Plan (see Appendix J.14) and Transportation Management Plan (see Appendix J.7) will be developed, implemented, monitored and reported
 - The SEEMP will be established on the basis of adaptive management principles, and each component management plan will be updated as necessary in accordance with ongoing consultation, engagement and changing social conditions
 - For more details on the SEEMP see condition number 2 in Schedule B of the BC EAO Environmental Assessment Certificate #E14-04
 - Through an adaptive management process, project related socio-economic effects will be identified and managed. Where unforeseen adverse social effects occur, management plans will be adapted to address such circumstances
- Through the Joint Camp Management Committee comprised of workers, camp managers and owners, PNW LNG will meet regularly to discuss and develop strategies to adaptively manage worker behaviour and camp policies including those related to transportation management and health. The EPCC contractor(s) will be required to extend health services to include the camp and PNW LNG facilities to promote access and availability of preventive health services (e.g., flu immunization program).

Following mitigation (see Section 18.4.2), the cumulative increase of 0.15 collisions per year is not anticipated to increase demand for EMS or health care infrastructure and services such that access or availability of services are

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affected. The transportation of workers from the relocated accommodation camp to Lelu Island is therefore not expected to result in a material change to the assessment of cumulative effects on social determinants of health.

18.2.1.2 Change in Diet and Nutrition

The transportation of workers associated with the change in the location of the accommodation camp is unlikely to affect the availability, accessibility or quality of country foods, which are the primary mechanisms that could cause a change in diet and nutrition. The transportation of workers from the relocated accommodation camp to Lelu Island is not expected to result in a material change to the assessment of cumulative effects on diet and nutrition.

18.2.1.3 Summary of Cumulative Effects – Relocation of the Accommodation Camp

Changes in the construction schedule for the Project have not affected the outcomes of the cumulative effects assessment for Community Health and Well-Being. Conclusions on significance of cumulative effects are based primarily on spatial overlaps, rather than temporal overlaps; therefore, changes in the construction schedule do not affect these conclusions. Cumulative effects to community health and well-being related to the transportation of workers from the relocated accommodation camp to Lelu Island are summarized in the following section and in Table 18-4.

18.2.1.3.1 Change in Social Determinants of Health

With revised mitigation (see Section 18.4.1), the relocation of the accommodation camp is not expected to result in a material change to the assessment of cumulative effects on social determinants of health for the construction, operations, and decommissioning phases of the Project. The characterization of cumulative effects on social determinants of health presented in the EIS is unaffected by the relocation of the accommodation camp.

Cumulative adverse effects on social determinants of health during construction and operations, even with the relocation of the accommodation camp, are expected to be moderate in magnitude, long-term in duration, to occur continuously, and to be reversible. There is high likelihood that adverse effects will occur as predicted. There is no change to the significance determination provided in the EIS. Due to limited primary data on existing community cohesion there is a moderate degree of confidence in the prediction of cumulative effects on social determinants of health.

18.2.1.3.2 Change in Diet and Nutrition

Mitigation measures provided in Section 18.4 are anticipated to address any adverse project effects on the composition of diets (i.e., proportion of country foods to market foods) such that the contribution of the Project to cumulative effects on diet and nutrition during construction and operations, even with the relocation of the accommodation camp, are expected to be moderate in magnitude, long-term in duration, to occur continuously, and to be irreversible. The relocation of the accommodation camp is not expected to result in a material change. There is high likelihood that adverse effects will occur as predicted. Since there is no material change in the characterization of residual effects there is no change to the significance determination provided in the EIS. Due to limited information on food, social and ceremonial (FSC) fisheries and recreational fisheries occurring near Lelu Island and the Flora Bank, as well as limited information on Aboriginal, fishing, hunting, and plant-gathering around Lelu Island, there is a moderate degree of confidence in the prediction of project effects on diet and nutrition.

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18.3 RESPONSES TO THE OUTSTANDING INFORMATION REQUESTS

There are no outstanding information requests for Community Health and Well-Being.

18.4 MITIGATION

18.4.1 Changes to Mitigation Measures Presented in the EIS

Based on design changes to the Project and the feedback received during the environmental assessment process, the set of mitigation measures originally presented in the EIS to address potential effects to Community Health and Well-Being has been updated. The mitigation measures that have been refined, added to, or removed from mitigation measures initially included in the EIS are provided below:

PNW LNG Commits to:

- Working with the camp operator, the EPCC contractor, and community to develop and implement a **Social and Economic Effects Management Plan (SEEMP)** so that PNW LNG is responsible for monitoring, reporting and managing the effects of the construction workforce on local communities as it relates to the Project. The SEEMP will be designed as a framework from which targeted sub-component management plans will be developed, implemented, monitored and reported on
- Participate in a **Joint Camp Management Committee** that will be established by the EPCC contractor and will be comprised of workers, camp managers and owners that will meet regularly to discuss and develop strategies to adaptively manage worker behaviour and camp policies including those related to transportation management and health. The EPCC contractor(s) will be required to extend health services to include the camp and PNW LNG facilities to promote access and availability of preventive health services (e.g., flu immunization program)
- Develop and implement a **Cultural Awareness Programs** to be included in employee training manuals and programs. The program will be informed through collaboration with local First Nations and offered to all project workers and will include information about traditional harvest practices and importance to local First Nations.

PNW LNG commits to the following mitigation measures that will be implemented through obligations with EPCC contractor(s):

- Provide **On-Site Medical Infrastructure and Services**. EPCC contractor(s) have been directed to provide the following:
 - Occupational Health and Medical Program
 - Disability management program to facilitate effective “stay at work” and “return to work” strategies
 - Occupation first aid and medical requirements for the worksite to ensure the prompt attention to injured workers and occupational health including:
 - o On-site medical facility requirements
 - o First aid equipment, supplies, and location requirements

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- o Anticipated demand and use of off-site supporting medical infrastructure and services (such as EMS and medical air evacuations)
 - o Certified first aid attendant requirements
 - o Certified medical professional requirements (i.e., medical doctor, registered professional nurse)
 - o Coordination of transportation services including ambulatory services and air evacuation
 - o Cascading medical services
- Undertake a **Health Risk Assessment** (HRA) that includes mitigation measures to prevent or minimize health risks (see Appendix J.14 Accommodation Management Plan)
- Through joint responsibility with the camp owner, provide **On-Site Security Measures** to provide for the safeguarding of personnel and property (see Appendix J.14 Accommodation Management Plan)
- Adhere to PNW LNG's **Environmental Emergency Preparedness Response Plan** to respond effectively to emergency situations, especially when their (PNW LNG, EPCC contractor) participation and collaboration are necessary to respond to such emergency situations (see Appendix J.6 Environmental Emergency Response Plan)
- Establish a **Joint Camp Management Committee** comprised of workers, camp managers and owners that will meet regularly to discuss and develop strategies to adaptively manage worker behaviour and camp policies including those related to transportation management and health. The EPCC contractor(s) is required to extend health services to include the camp and PNW LNG facilities to promote access and availability of preventive health services (e.g., flu immunization program).
- (see Appendix J.14 Accommodation Management Plan)
- Develop and implement accommodation **Camp Code of Conduct** (see Appendix J.14 Accommodation Management Plan).

18.4.2 Complete List of Current Mitigation Measures

All of the technically and economically-feasible mitigation measures currently being presented by PNW LNG to address potential effects to Community Health and Well-Being are listed below. This includes those originally presented in the EIS that remain relevant, as well as those that have been revised or added as a result of feedback received during the environmental assessment process or as a result of the project changes (see Section 11.4.1). By implementing this full set of mitigation measures, PNW LNG is confident that the Project will not result in significant adverse effects to Community Health and Well-Being.

- Develop and implement **Drug and Alcohol Policies**
- Develop and implement a **Vaccination Policy** - PNW LNG will make available, where possible, resources to seasonal influenza vaccines
- Develop and implement **Workplace Hygiene Policies** - PNW LNG will implement a project-wide hygiene policy to lessen the spread of influenza and enteric disease
- Provide an Employee Assistance Program where:
 - Mental health support programs will be provided
 - Health and exercise programs are accessible by workers and their families
- Substance misuse informational sessions and support programs are included
- Develop and implement **Public Awareness and Informational Sessions**. Public Awareness and Informational Sessions will be associated with the Country Foods Follow-up Program; this association will facilitate the

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distribution of information on the quality of country foods in the Porpoise Channel area (see Section 30 of the EIS Addendum). The Public Awareness and Informational Sessions will be specifically tailored to individual Aboriginal Groups, communities and other interest groups as informed through on-going collaboration with local Aboriginal Groups and concerned stakeholders. Public Awareness and Informational Sessions will:

- o Inform local Aboriginal Groups and the public of changes in access to the PDA potentially affecting access to country foods
- o Inform Aboriginal Groups and the public of project activities that could potentially displace wildlife (providing locations, durations etc.)
- o Provide information and data on actual risks of contamination to soils, waterways, vegetation and wildlife and risks associated with the consumption of contaminated country foods
- Provide training, employment and business opportunities to community members
- Develop and implement **Contractor Boot Camps** - contractor boot camps will be provided for local businesses on how to secure project work
- Develop and implement a **Cultural Awareness Programs** to be included in employee training manuals and programs. The program will be informed through collaboration with local First Nations and offered to all project workers and will include information about traditional harvest practices and importance to local First Nations
- Implement mitigation measures as presented in biophysical, land and marine use and human health sections of the EIS that serve as mitigation measures to reduce residual effects on change in diet and nutrition.

PNW LNG commits to the following mitigation measures that will be implemented through obligations with EPCC contractor(s):

- Provide **On-Site Medical Infrastructure and Services**. EPCC contractor(s) have been directed to provide the following:
 - Occupational Health and Medical Program
 - Disability management program to facilitate effective “stay at work” and “return to work” strategies
 - Occupation first aid and medical requirements for the worksite to ensure the prompt attention to injured workers and occupational health including:
 - o On-site medical facility requirements
 - o First aid equipment, supplies, and location requirements
 - o Anticipated demand and use of off-site supporting medical infrastructure and services (such as EMS and medical air evacuations)
 - o Certified first aid attendant requirements
 - o Certified medical professional requirements (i.e., medical doctor, registered professional nurse)
 - o Transportation services including ambulatory services and air evacuation
 - o Cascading medical services, for local, regional, provincial and inter-provincial
- Undertake a **Health Risk Assessment** (HRA) that includes mitigation measures to prevent or minimize health risks (see Appendix J.14 Accommodation Management Plan)
- Through joint responsibility with the camp owner, provide **On-Site Security Measures** to provide for the safeguarding of personnel and property (see Appendix J.14 Accommodation Management Plan)

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- Adhere to PNW LNG's **Environmental Emergency Preparedness Response Plan** to respond effectively to emergency situations, especially when their participation and collaboration are necessary to respond to such emergency situations (see Appendix J.6 Environmental Emergency Response Plan)
- Establish a **Joint Camp Management Committee** comprised of workers, camp managers and owners that will meet regularly to discuss and develop strategies to adaptively manage worker behaviour and camp policies including those related to transportation management and health. A requirement of the EPCC contractors is to extend health services to include the camp and PNW LNG facilities to promote access and availability of preventive health services (e.g., flu immunization program) (see Appendix J.14 Accommodation Management Plan).

18.5 CONCLUSION

Project changes were assessed for potential effects, including cumulative effects, on community health and well-being. Based on this assessment, the potential effects of project changes and cumulative effects on Community Health and Well-being that were identified in the EIS remain valid.

The characterization of project residual adverse effects on community health and well-being remains the same as presented in the EIS (Table 18-3). The characterization of cumulative effects associated with social determinants of health remains the same as presented in the EIS. The characterization of cumulative effects associated with diet and nutrition remains the same as presented in the EIS (Table 18-4).

The conclusions of the assessment of effects on community health and well-being do not change from those presented in the EIS. Because there is not expected to be a material change in social determinants of health or diet and nutrition, the effects are expected to remain not significant.

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Table 18-3 Characterization of Residual Effects for Community Health and Well-Being

Project Phase	Mitigation Measures	Residual Effects Characterization						Likelihood	Significance	Confidence	Follow-up and Monitoring
		Context	Magnitude	Extent	Duration	Reversibility	Frequency				
Change in Social Determinants of Health											
Construction	<p><u>PNW LNG:</u></p> <ul style="list-style-type: none"> • Training, employment and business opportunities • An employee assistance program • A vaccination policy • Workplace hygiene policies • Contractor boot camps • <u>Joint Camp Management Committee</u> • <u>Accommodation plan</u> • <u>Drug and alcohol policies</u> • <u>Cultural awareness programs.</u> <p><u>Mitigation measures implemented through obligations with EPCC contractor(s):</u></p> <ul style="list-style-type: none"> • <u>HRA</u> • <u>Joint Camp Management Committee</u> • <u>On-Site Security Measures - jointly provided by EPCC contractor(s) and camp owner</u> • <u>Camp Code of Conduct.</u> 	R	M	RAA	L	R	C	H	N	M	<p>Follow-up: None</p> <p>Monitoring: SEEMP</p>
Operations		R	M	RAA	L	R	C				
Decommissioning		R	M	RAA	L	R	C				
Residual effects for all phases		R	M	RAA	L	R	C				
Change in Diet and Nutrition											
Construction	<ul style="list-style-type: none"> • Mitigation measures presented in biophysical, land and marine use and human health sections of the EIS serve as mitigation measures reducing residual effects on change in diet and nutrition. • Public awareness and informational sessions will be available. 	R	M	LAA	L	I	C	H	N	M	<p>Follow-up: <u>Marine Country Foods</u></p> <p>Monitoring: SSEMP</p>
Operations		R	M	LAA	L	I	C				
Decommissioning		R	M	LAA	S	I	MR				
Residual effects for all phases		R	M	LAA	L	I	C				

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Project Phase	Mitigation Measures	Residual Effects Characterization						Likelihood	Significance	Confidence	Follow-up and Monitoring
		Context	Magnitude	Extent	Duration	Reversibility	Frequency				
<p>KEY</p> <p>CONTEXT: L = Low resilience: occurs in a fragile ecosystem and/or highly disturbed environment M = Moderate resilience: occurs in a stable ecosystem and/or moderately disturbed environment H = High resilience: occurs in viable ecosystem and/or undisturbed environment</p>	<p>MAGNITUDE: N = Negligible: No measurable adverse effect anticipated L = Low: Residual effect is detectable but within normal variability of baseline M = Moderate: Residual effect will cause an increase relative to baseline but is within regulatory limits and objectives. H = High: Residual effect occurs that would singly or as a substantial contribution in combination with other sources cause exceedances of objectives or standards beyond the project boundaries.</p> <p>EXTENT: LAA—residual effects extend beyond the activity area but remain within the LAA RAA—residual effects extend to RAA (watershed/sub-regional level)</p>	<p>DURATION: ST Short term: Residual effects are measurable for less than 4 years. MT Medium term: Residual effects are measurable for 4 to 30 years. LT Long term: Residual effects are measurable for greater than 30 years.</p> <p>FREQUENCY: O Occurs once. S Occurs sporadically at irregular intervals. R Occurs on a regular basis and at regular intervals. C Continuous.</p> <p>REVERSIBILITY: R = Reversible I = Irreversible</p>	<p>LIKELIHOOD OF RESIDUAL EFFECT: <i>Based on professional judgment.</i> L = Low probability of occurrence M = Medium probability of occurrence H = High probability of occurrence</p> <p>SIGNIFICANCE: S = Significant - A significant adverse effect on community health and well-being is one that results in changes to social determinants or diet and nutrition that will directly and indirectly, place increased demands on community and health services or infrastructure that exceeds current capacity, such that standards of service are routinely and persistently reduced below current levels for an extended period of time, potentially resulting in adverse health outcomes. N = Not Significant</p> <p>CONFIDENCE AND RISK <i>Based on scientific information and statistical analysis, professional judgment and effectiveness of mitigation, and assumptions made.</i> L = Low level of confidence M = Moderate level of confidence H = High level of confidence</p>								

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Table 18-4 Summary of Cumulative Residual Environmental Effects on Community Health and Well-Being

Cumulative Environmental Effect and Project Contribution	Other Projects, Activities and Actions	Mitigation and Compensation Measures	Residual Cumulative Effects Characterization						Likelihood	Significance	Prediction Confidence	Follow-up and Monitoring Programs
			Context	Magnitude	Extent	Duration	Reversibility	Frequency				
<p>Change in social determinants of health</p> <ul style="list-style-type: none"> Project may directly and indirectly increase demand on EMS and healthcare infrastructure and services due to increased collisions. 	<p>Cumulative Effect with Project (future case)</p> <ul style="list-style-type: none"> Increased demand for Northern Health's infrastructure and services and EMS in Port Edward and Prince Rupert. 	<ul style="list-style-type: none"> SEEMP Accommodation Management Plan Transportation Management Plan Joint Camp Management Committee. 	R	M	R	L	R	C	H	N	L-M	None
	<p>Project Contribution to Cumulative Effect (in RAA)</p> <ul style="list-style-type: none"> The Project is also anticipated to result in the creation of <u>400 direct/direct-contract</u> jobs over a 30 year (minimum) operating life. 	<p>See Table 18-3 Summary of Residual Effects on Community Health and Well-Being</p>	R	M	R	L	R	C	H	N	L-M	None

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Cumulative Environmental Effect and Project Contribution	Other Projects, Activities and Actions	Mitigation and Compensation Measures	Residual Cumulative Effects Characterization						Likelihood	Significance	Prediction Confidence	Follow-up and Monitoring Programs	
			Context	Magnitude	Extent	Duration	Reversibility	Frequency					
<p>Change in diet and nutrition</p> <ul style="list-style-type: none"> Project may affect country foods availability and quality. 	<p>Cumulative Effect with Project (future case)</p> <ul style="list-style-type: none"> Access to marine areas used for fishing and harvesting could result in increased restricted access to FMA 4 affecting salmon and crab recreational landings. 	<ul style="list-style-type: none"> Atlin Terminal Canpotex Potash Export Terminal Fairview Container Terminal Phase I Fairview Container Terminal Phase II Mount McDonald Wind Power Project NaiKun Wind Energy Project Northland Cruise Terminal Prince Rupert LNG Facility Prince Rupert Gas Transmission Project Prince Rupert Ferry Terminal Ridley Island Log Sort Ridley Terminals Inc. WatCo Pulp Mill Proposed Westcoast Connector Gas Transmission Project Transportation of workers between the accommodation camp and Lelu Island. 	None	R	M	R	L	I	C	H	N	M	<p>Follow-up Program: <u>Marine Country Foods</u></p>
	<p>Project Contribution to Cumulative Effect (in RAA)</p> <ul style="list-style-type: none"> <u>Potential changes in navigation around marine infrastructure.</u> 	<p>Construction:</p> <ul style="list-style-type: none"> Site preparation (land-based) Onshore construction Dredging Marine construction Operational testing and commissioning Site clean-up and reclamation. <p>Operations:</p> <ul style="list-style-type: none"> LNG facility and supporting infrastructure on Lelu Island Marine terminal use Shipping. <p>Decommissioning:</p> <ul style="list-style-type: none"> Dismantling facility and supporting Infrastructure Dismantling of marine terminal Waste disposal Site clean-up and reclamation. 	See Table 18-3 Summary of Residual Effects on Community Health and Well-Being	R	M	L	L	I	C	H	N	M	

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Cumulative Environmental Effect and Project Contribution	Other Projects, Activities and Actions	Mitigation and Compensation Measures	Residual Cumulative Effects Characterization						Likelihood	Significance	Prediction Confidence	Follow-up and Monitoring Programs
			Context	Magnitude	Extent	Duration	Reversibility	Frequency				
<p>KEY</p> <p>CONTEXT: R = Resilient V = Vulnerable</p> <p>MAGNITUDE: N (Negligible) - no measurable change from baseline conditions L (Low) - a measurable change but effect cannot be distinguished from baseline conditions M (Moderate) - a measurable change in determinates of community health and well-being of which will not affect quality of life in the LAA H (High) - a measurable change in determinates of community health and well-being of which will affect quality of life in the LAA</p>	<p>EXTENT: P – Effects are restricted to the PDA. L – Effects extend into the LAA. R – Effects extend into the RAA.</p> <p>DURATION: S (Short term) – effect restricted to the duration of the construction period or less. M (Medium term) – effect extends through more than the duration of the construction period but less than the life of the Project. L (Long term) – effect extends through the life of the Project. P (Permanent) – effect is permanently measurable.</p>	<p>REVERSIBILITY: (R) Reversible – effects will cease or recover after project closure and reclamation. (I) IRREVERSIBLE – effects will persist after the life of the Project.</p> <p>FREQUENCY: SE (Single event) – effect occurs once. MI (Multiple irregular event) – effect reoccurs with no set schedule. MR (Multiple regular event) – effect reoccurs on a set schedule. Continuous – effect occurs continuously.</p>							<p>LIKELIHOOD: Based on professional judgment L (Low) - well understood and there is a low likelihood of effects on community health and well-being, as predicted M (Medium) - well understood and there is a moderate likelihood of effects on community health and well-being, as predicted H (High) - well understood and there is a high likelihood of effects on community health and well-being, as predicted</p> <p>SIGNIFICANCE: S (Significant) – can be positive (S+) or negative direction N (Not significant) – can be positive or negative</p> <p>CONFIDENCE: Based on scientific information and statistical analysis, professional judgment and effectiveness of mitigation, and assumptions made L (Low) - well understood and there is a low likelihood of effects on community health and well-being, as predicted M (Medium) - well understood and there is a moderate likelihood of effects on community health and well-being, as predicted H (High) - well understood and there is a high likelihood of effects on community health and well-being, as predicted</p>			

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18.6 REFERENCES

De Leur, Paul and Tarek Sayed. 2008. Collision Prediction Models for British Columbia. Prepared for: Engineering Branch, BC Ministry of Transportation & Infrastructure.

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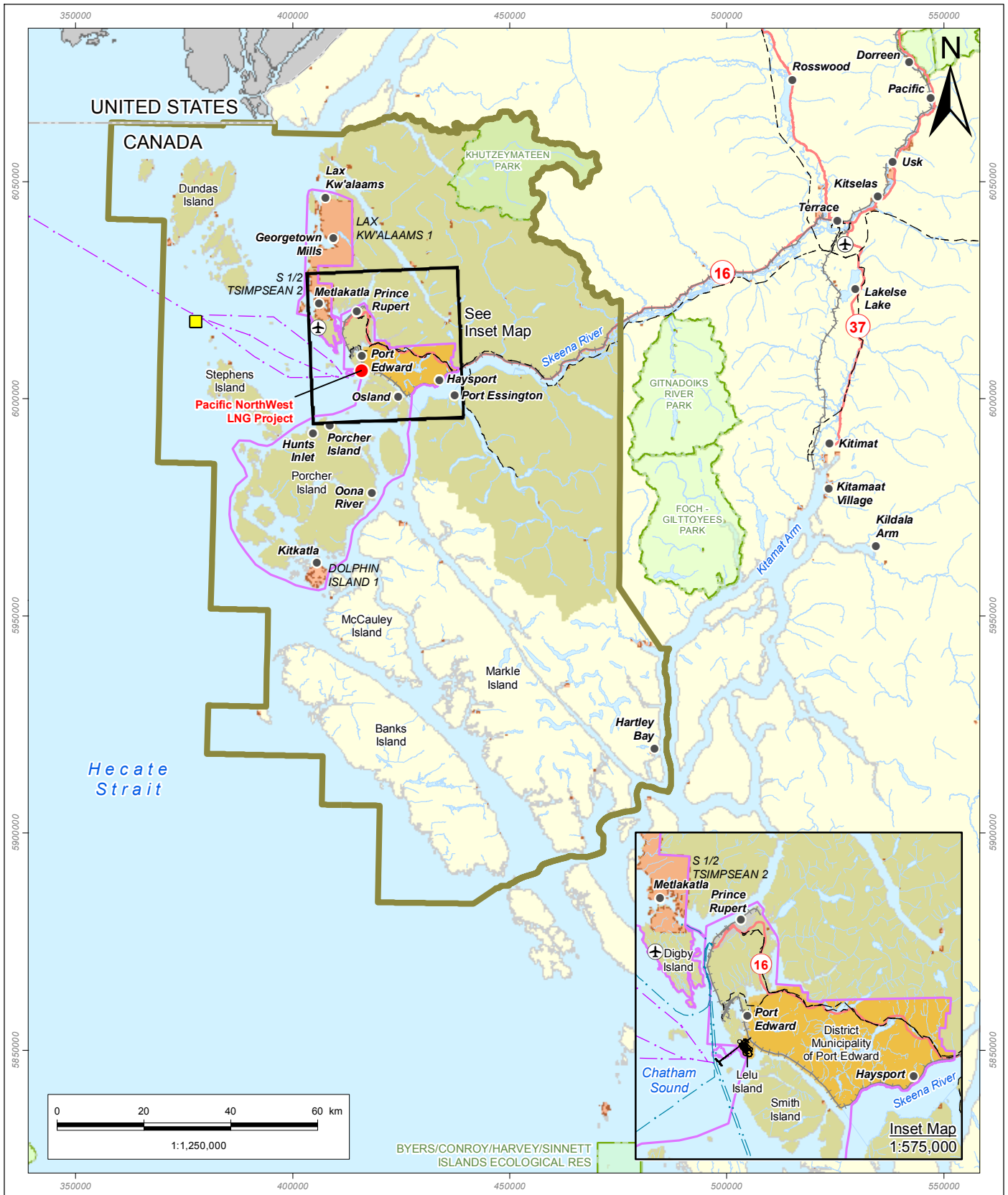
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18.7 FIGURES

Please see the following pages.



<ul style="list-style-type: none"> Local Assessment Area Regional Assessment Area ● Project Location Project Component Potential Shipping Route Airport ● City or Town Pilotage Station Electrical Power Transmission Line Highway International Boundary Railway Watercourse Indian Reserve Local Health Area 52 Municipal Boundary Protected Area United States of America Waterbody 	<p>Pacific NorthWest LNG Community Health and Well-Being Local Assessment Area and Regional Assessment Area EIS ADDENDUM</p> <p><small>Sources: Government of British Columbia; Prince Rupert Port Authority; Government of Canada, Natural Resources Canada, Centre for Topographic Information; Progress Energy Canada Ltd.</small></p> <p><small>Although there is no reason to believe that there are any errors associated with the data used to generate this product or in the product itself, users of these data are advised that errors in the data may be present.</small></p>	<p>PREPARED BY:</p> <p style="text-align: center;"></p> <p>PREPARED FOR:</p> <p style="text-align: center;"></p> <p>FIGURE NO:</p> <p style="text-align: center; font-size: 1.5em; font-weight: bold;">18-1</p>
	<p>DATE: 21-NOV-14 FIGURE ID: 123110537-425 DRAWN BY: K. POLL</p>	<p>PROJECTION: UTM - ZONE 9 DATUM: NAD 83 CHECKED BY: S. ROBERTS</p>

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