7.3 Visual Quality

7.3.1 Introduction

Visual quality is a valued component because construction and operation of the LNG facility and operation of LNG carriers on the marine access route may alter visual quality from a number of identified terrestrial and marine viewpoints, including those identified by potentially affected Aboriginal Groups and stakeholders. Visual quality is "the potential for a landscape to produce varying degrees of satisfaction among viewers" (USDA Forest Service 1994). Visual quality is influenced, negatively or positively, by human modifications including land uses such as industrial development (McCool et al. 1986; Garre 2009; Germond 2009; Jallouli and Moreau 2009; MOFR 2010).

Haisla Nation's largest settlement, Kitamaat Village, is across the harbour from the Project site and will have a direct view of the LNG facility and a view along the marine access route. Haisla Nation discusses the importance of the 'beauty of the unspoiled wilderness', and notes the development of ecotourism as a key category in its Community Development Plan, although no concerns were expressed regarding the proposed Project affecting Haisla commercial tourism prospects (Powell 2013). Haisla Nation, Gitga'at First Nation, and Gitxaala Nation have communities and traditional territory along the marine access route and will have views of LNG carriers; Metlakatla First Nation, Kitselas First Nation, Kitsumkalum First Nation, and Lax Kw'alaams First Nation also have traditional territory and current use areas along the marine access route. Gitga'at First Nation reports a high level of concern over the increase in vessel traffic associated with the Project, as well as anticipating "some loss" or "high loss" in the areas of tourism activities and quality of scenery (Ritchie and Gill 2014). Gitxaala Nation states that changes in visual quality affect sacred places, cultural identity, and harvesting, and that they are concerned about changes to visual quality as a result of LNG carriers (Gitxaala Nation and Calliou Group 2014a, 2014b). A traditional land use study of the Kitsumkalum First Nation discusses how the landscape possesses a high degree of authenticity, leading to a strong 'sense of place' for community members (Crossroads 2014). Lax Kw'alaams First Nation identifies visual quality as important for commercial and recreational hunters, water-based recreation and tourism opportunities, and quality of life (Allied Tsimshian Tribes of Lax Kw'alaams 2004). Metlakatla First Nation identifies ecotourism and recreation as the only use allowable throughout all of their marine spatial zones (Metlakatla Marine Use Planning Committee, no date). Potential adverse effects of the Project on Aboriginal Groups' specific Aboriginal Interests and other concerns, including with respect to traditional use and cultural activities, recreation opportunities, sacred sites and locations for spiritual rituals and non-consumptive enjoyment of the LSA are addressed in Section 14 and Section 16.

7.3.2 Scope of Assessment

7.3.2.1 Regulatory and Policy Setting

Land use in the LSA and RSA (Section 7.3.2.6 defines these areas) is managed according to federal, provincial, regional, and local land use plans. Policy direction or statements related to the management of the scenic landscape to support tourism and recreation activities and to benefit local residents' quality of life are provided in the following:

- *District of Kitimat Official Community Plan* (District of Kitimat 2013)
- *Kalum Land and Resource Management Plan* (KLRMP) (MLFNRO 2002)
- The Province of BC's Visual Landscape Inventory (VLI) (MLFNRO 2004)
- Central and North Coast Land Use Decision (CLUDI) through the *Central and North Coast Ecosystem Based Management Plan*
- *National Framework for Canada's Network of Marine Protected Areas*
- Draft *Pacific North Coast Integrated Management Area Plan* (PNCIMA) (PNCIMA Initiative 2013)
- Marine Planning Partnership's (MaPP) draft *North Coast Marine Plan* (MaPP 2013)
- *Interim Land and Marine Resources Plan of the Allied Tsimshian Tribes of Lax Kw'alaams* (also known as Laxyuup) (2004), and
- *Metlakatla Draft Marine Use Plan* Executive Summary (no date).

7.3.2.1.1 Land Management Policy Direction

Policy and planning documents relevant to the LSA, such as the Kitimat OCP, KLRMP, the draft *North Coast Marine Plan* and the Lax Kw'alaams First Nation Laxyuup, as well as other literature, indicate that visual quality is important to Aboriginal Groups and Kitimat residents' quality of life, sense of place, and cultural identity. While industrial development in the Kitimat area is a priority of the District, the Kitimat OCP also recognizes the importance of visual quality to the quality and viability of the recreation and tourism sectors in the LSA. While the Project will be located on industrial zoned lands, will partially overlay an existing industrial site and will make use of an existing wharf, the Kitimat OCP directs that potential industrial projects in Kitimat "must be sensitively designed to maintain environmental values that provide a high quality of life for residents and that attract tourists." Maintaining visual quality as the community continues its industrial growth will contribute to the Kitimat OCP's core theme of "cultivating diversified economic growth" by supporting the growing tourism sector and promoting Kitimat as a place to retire.

The KLRMP provides direction for the management of all Crown land and resources in the planning area. The Project will be located in an area proposed as an industrial development zone in the KLRMP. The

general management directive in the KLRMP is to maintain visual quality and other tourism resources to a high standard in areas important to tourism. Managing industrial development effects on visual quality include using appropriate landscape design to maintain aesthetic values and reduce visual effects. The KLRMP discusses the importance of visual quality to the region and states that most viewers will have a high level of expectation for visual quality.

7.3.2.1.2 Visual Quality Objectives

The Province of BC establishes visual quality objectives (VQOs) to describe the expected visual conditions that should be achieved on a particular land base. Because the Project site will be located on private lands and will be regulated by the OGC, these VQOs established by the province are not binding on the Project (OGC 2014a). However, established VQOs are an indicator of public expectations and acceptance for changes to visual quality, regardless of which industry causes the visual change. The established VQOs provide a sound basis for evaluating baseline conditions and effects on visual quality from the Project (Marc 2013, pers. comm.). The Project site will intersect areas with established VQOs of modification and partial retention. Modification is human-caused alteration to the landscape that is 1) easy to see and 2) large in scale and natural in its appearance or, is small to medium in scale but with some angular characteristics (7% to 20% modification). Partial retention is human-caused alteration to the landscape that is 1) easy to see, 2) small to medium in scale, and 3) natural and not rectilinear or geometric in shape (1.5% to 7% modification). The percent modification is calculated by delineating disturbances on the photographs of each visually sensitive unit (VSU) and dividing that by the total area of the unit.

7.3.2.1.3 Marine Management Policy Direction

Policy direction related to visual quality along the marine access route is established in the CLUDI, the draft PNCIMA plan and MaPP's draft *North Coast Marine Plan*. Each plan notes recreation, wildlife viewing, or aesthetic values as desired management objectives.

Although not expressly stated in the Biodiversity, Mining, and Tourism Area (BMTA) objectives of CLUDI, retaining the quality of views to and from conservancies and BMTAs is important to the regional competitiveness and potential to develop and retain successful tourism operations and recreation experiences, which are key objectives of CLUDI.

The *North Coast Marine Plan* is being developed by the Province of BC and the North Coast-Skeena First Nations Stewardship Society, which represents Metlakatla First Nation, Kitsumkalum First Nation, Kitselas First Nation, Haisla Nation, Gitga'at First Nation, and Gitxaala Nation, and includes a recreation and tourism sub-zone. The sub-zone's primary objectives are to maintain visual quality and eco-tourism

opportunities because the area has both high existing and planned public marine recreational use and activity.

The Lax Kw'alaams First Nation (Allied Tsimshian Tribes of Lax Kw'alaams 2004) identifies visual quality as "part of the wilderness experience that is highly valued for commercial and recreational hunters," and discusses how the "spectacular and diverse scenery" in their traditional territory provides "an abundance of water-based recreation and tourism opportunities" and results in popular cruise ship routes that capitalize on the "spectacular coastal scenery." Furthermore, "attractive scenery within their traditional territory is important for quality of life" and "has much to offer as a foundation for ecotourism if the high quality of the environment is maintained."

The *Metlakatla Draft Marine Use Plan* Executive Summary (Metlakatla Marine Use Planning Committee no date) states that Metlakatla First Nation support the moratorium on tanker shipping through its territory. Also, ecotourism and recreation are the only allowable uses identified in its marine use spatial zones, of which visual quality is an important component.

7.3.2.2 Consultations' Influence on the Identification of Issues and the Assessment Process

Consultation with potentially affected Aboriginal Groups, local governments, stakeholders, and the public identified the potential for adverse visual effects from the Project as a concern. Concerns were expressed that changes to visual quality from the LNG facility and LNG carriers travelling along the marine access route may affect tourism, recreation, quality of life, and cultural identity. Most recreation and tourism businesses in the LSA report that their clientele is interested in a "quiet outdoor wilderness recreation experience in an unspoiled, pristine setting," and the associated ecotourism and wildlife viewing opportunities (Quinless 2013). These business owners stated that effects from increased shipping traffic will be negative as a result of altering the aesthetic quality of the local area (Quinless 2013). Haisla Nation also identified concerns regarding the light from the facility and flaring. The Project has the potential to interact with other existing and proposed developments, thereby increasing the potential cumulative changes to visual quality throughout the LSA and RSA.

Potential viewpoints of the LNG facility and marine access route were identified through consultation with potentially affected Aboriginal Groups and communities, including input from the District of Kitimat. Inclusion of the marine access route in the assessment is a direct result of concerns raised by Aboriginal Groups during consultation activities. Consultation also influenced the importance ratings assigned to each viewpoint (as described in Section 7.3.3.1).

In addition, through LNG Canada's consultation program, potentially affected Aboriginal Groups have identified issues and concerns with respect to visual quality that relate to Aboriginal Interests, which are assessed in Section 14 and Section 16.

7.3.2.3 Traditional Knowledge and Traditional Use Incorporation

Available public documents, academic reports, and material submitted by Aboriginal Groups to LNG Canada were reviewed to help understand the effects of large shipping traffic and to identify potential viewpoints of importance to Aboriginal Groups that may be affected by the Project. Haisla Nation identified concerns regarding the potential for light from the facility and flaring to cause anxiety among community members and result in light pollution that could affect the community (Section 13, Table 13.2-3). Gitga'at First Nation reports concerns over the increase in vessel traffic associated with the Project and its subsequent effect on tourism activities and visual quality (Ritchie and Gill 2014). Gitxaala Nation reports sensory disturbance from lights on existing large shipping traffic and "loss of opportunities for peaceful enjoyment and spiritual practice in preferred areas as a result of large vessel traffic" (Gitxaala Nation and the Firelight Group 2014). Gitxaala Nation also notes how changes to visual quality as a result of passing LNG carriers can affect sacred places and cultural identity through an increased disconnect with and disruption of the "sense of place"; further, that the experience of harvesting is also altered by changes in visual quality (Gitxaala Nation and Calliou Group 2014a, 2014b). Direct discussions took place with Haisla Nation, Gitga'at First Nation, and Gitxaala Nation to determine relevant viewpoints, and each was provided with a blank mapbook on which they could denote viewpoints related to the LNG facility or the marine access route. Haisla Nation suggested that a viewpoint from Kitamaat Village be included in the study; however, due to the timing of the inclusion, it was determined that a previously identified viewpoint from the marina near Kitamaat Village would be used instead because it offers a representative and equivalent view. Gitga'at First Nation identified 11 viewpoints for the assessment, and 9 viewpoints were identified by Gitxaala Nation. Of the 20 candidate viewpoints identified along the marine access route through direct consultation, 17 were determined to be priority viewpoints warranting field assessments and photo-documentation (process for priority viewpoint determination is described in Section 7.3.3.1). The other three viewpoints were screened out because of their distance from and lack of view of the marine access route. These 17 identified viewpoints included burial sites, camping locations, areas for subsistence activities and harvesting, goose and duck hunting locations, or historical settlements or lookout sites.

Metlakatla First Nation, Kitselas First Nation, Kitsumkalum First Nation, and Lax Kw'alaams First Nation had the opportunity to comment on the viewpoints identified by Gitga'at First Nation and Gitxaala Nation, which also covered their traditional territory and current use areas along the marine access route. The Lax Kw'alaams *Land and Marine Resources Plan* (also known as Laxyuup) (Allied Tsimshian Tribes of Lax Kw'alaams 2004) confirmed the importance of visual quality along the marine access route for quality of life and for recreation and tourism.

7.3.2.4 Selection of Effects

The Project may alter visual quality from a number of important terrestrial and marine viewpoints with views of the LNG facility and LNG carriers travelling along the marine access route. Aboriginal Groups and stakeholders identified concerns about the effects of the LNG facility and related shipping activities on visual quality from marine- and shore-based viewpoints, which may affect tourism, recreation, quality of life and cultural identity. To respond to these concerns, effects on visual quality at the facility and along the marine access route resulting from Project infrastructure and activities are assessed. Refer to Section 7.4 for Project effects related to marine transportation and use, and to the Air Quality TDR, where the vapour plume is assessed.

7.3.2.5 Selection of Measurable Parameters

Table 7.3-1 lists the measurable parameters used to assess the effects on visual quality.

Existing visual condition (EVC), the degree of human-caused alteration in a VSU, is the quantitative parameter on which VQO classes are based. The change in EVC of VSUs is a measurable parameter for landscape effects associated with the facility, in accordance with provincial visual quality assessment (VQA) methods. This approach is supported by visual quality preference research (MOF 2003; MOFR 1997, 2010; MLFNRO 2011).

Visual effects from transitory interventions, such as large marine vessel traffic, are influenced by the number of occurrences the marine vessel will be seen in a given period (frequency), the length of time the vessel will be seen during each occurrence (duration), and the degree to which the vessel occupies the central field of view (prominence). Frequency, duration, and prominence are the measurable parameters used to assess potential effects on visual quality attributable to large marine vessel traffic (other projects) and LNG carrier traffic along the marine access route.

Table 7.3-1: Potential Project Effects on Visual Quality and Measurable Parameters

Potential Adverse Effects	Measurable Parameters
Reduction in visual quality related to the LNG facility	▪ Visibility
	▪ EVC
Reduction in visual quality related to LNG carriers in marine access route	▪ Visibility
	▪ Frequency, duration, and prominence of LNG carriers within field of view

7.3.2.6 Boundaries

7.3.2.6.1 Spatial Boundaries

LNG Facility—refers to the structures required for operation and includes natural gas treatment; LNG production, storage and loading; the LNG loading pipeline; marine terminal; and supporting infrastructure.

Project footprint—refers to the physical area cleared for the Project.

Local study area—The facility LSA encompasses all lands with a potential view of the LNG facility in the foreground (0 km to 1 km) and mid-ground (1 km to 8 km) because alterations to those areas attributable to the facility will be most apparent at these distances (MOFR 1997, 2001). The shipping LSA considers the visual quality related to LNG carriers along the marine access route and encompasses viewpoints that were identified through consultation with Aboriginal Groups.

Regional study area—The facility RSA encompasses the facility LSA plus the land areas beyond 8 km up to the extent of potential visibility (maximum of 20 km). The shipping RSA encompasses marine areas up to a maximum distance of 20 km. Twenty kilometres is not identified in the AIR and is adopted here because 20 km is the limit of being able to perceive the LNG facility or LNG carriers from that distance

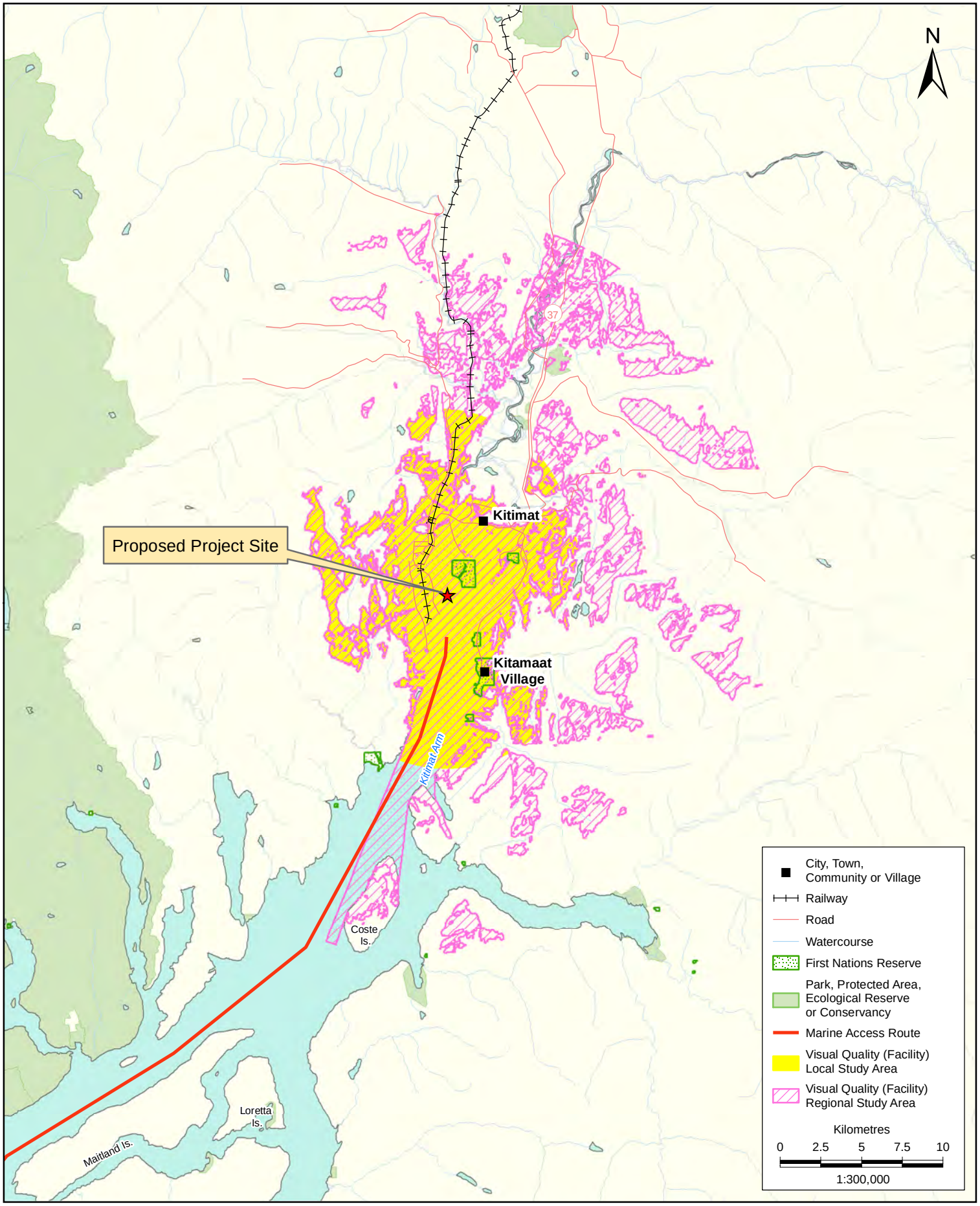
Figure 7.3-1 and Figure 7.3-2 illustrate the spatial boundaries for this assessment.

7.3.2.6.2 Temporal Boundaries

Based on the current Project schedule, the temporal boundaries are:

- construction, Phase 1 (trains 1 and 2) to be completed approximately five to six years following issuance of permits, the subsequent phase(s) (trains 3, 4) to be determined based on market demand
- operation, minimum of 25 years after commissioning, and
- decommissioning, approximately two years at the end of the Project life.

However, effects on visual quality as a result of the LNG facility will persist to varying degrees until a future point when visually effective green-up is reached (when regeneration is perceived by the public to be newly established forest). Temporal boundaries for the marine access route assessment pertain to LNG carriers related to the operation phase.



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VISUAL QUALITY ENVIRONMENTAL EFFECTS ASSESSMENT

LOCAL AND REGIONAL STUDY AREAS (FACILITY)

LNG CANADA EXPORT TERMINAL
KITIMAT, BRITISH COLUMBIA

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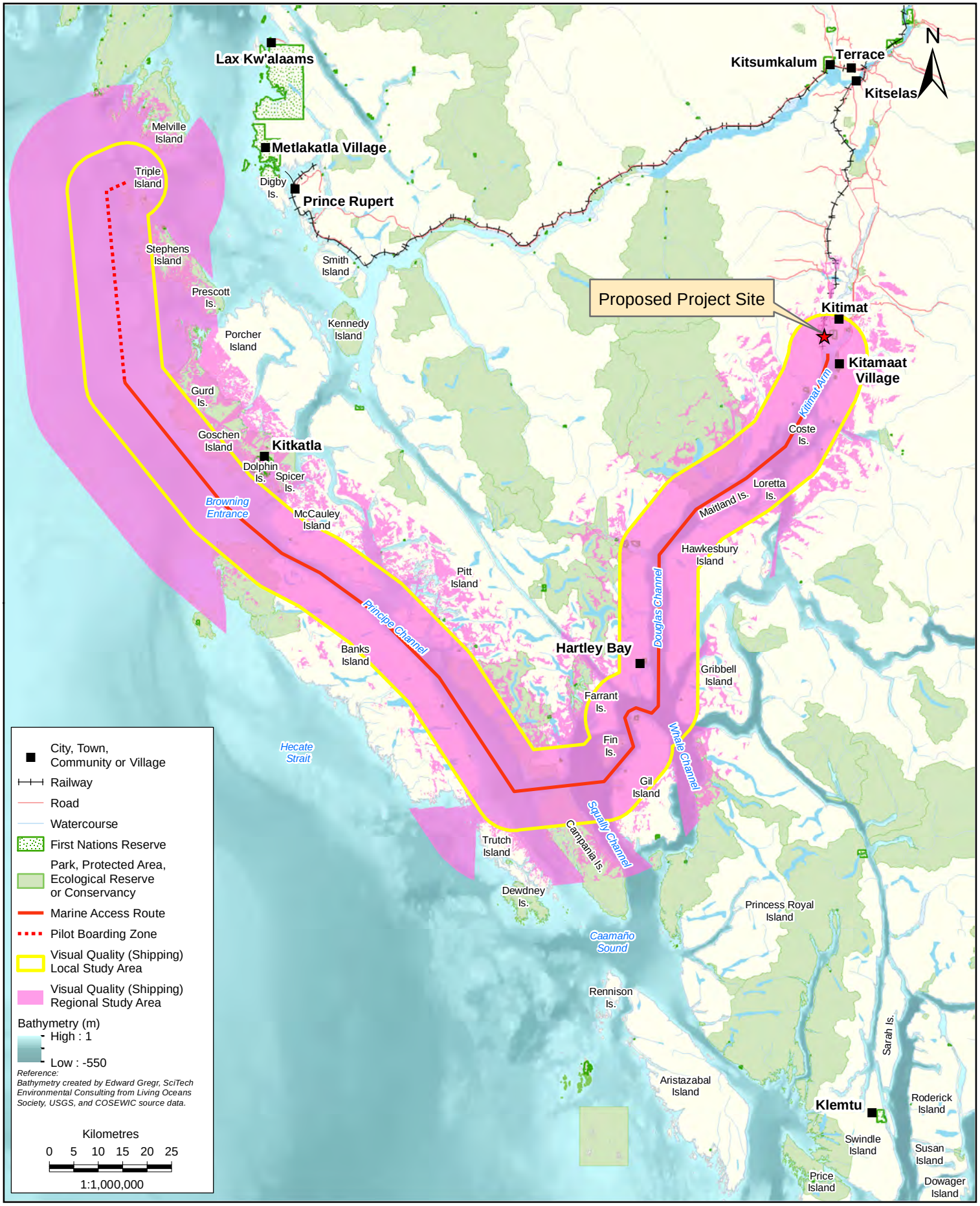

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VISUAL QUALITY ENVIRONMENTAL EFFECTS ASSESSMENT

LOCAL AND REGIONAL STUDY AREAS (SHIPPING)

LNG CANADA EXPORT TERMINAL
KITIMAT, BRITISH COLUMBIA

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7.3.2.6.3 Administrative and Technical Boundaries

Administrative boundaries include spatial boundaries for the following regulations and policies:

- District of Kitimat OCP (District of Kitimat 2013)
- KLRMP (MLFNRO 2002)
- The Province of BC's VLI (MLFNRO 2004)
- CLUDI through the *Central and North Coast Ecosystem Based Management Plan*
- *National Framework for Canada's Network of Marine Protected Areas*
- Draft PNCIMA (PNCIMA 2013)
- MaPP's draft *North Coast Marine Plan* (MaPP 2013)
- *Interim Land and Marine Resources Plan of the Allied Tsimshian Tribes of Lax Kw'alaams* (also known as Laxyuup) (2004), and
- *Metlakatla Draft Marine Use Plan* Executive Summary (no date).

Technical boundaries for the visual quality assessment are:

- The viewpoints with most potential effects are selected (viewpoints from which Project components would be most visible but are generally representative of views from other viewpoints).
- The Project's effect on visual quality is evaluated at full-build out when the Project's effect on visual quality will be greatest.
- Photo simulations do not account for atmospheric conditions such as glare, fog and haze; therefore, modelling might overestimate the visibility of LNG carriers.
- Photo simulations that are shown as panoramas tend to exaggerate the field of view because all images are in focus. Normally, content beyond an individual's central field of view will be out of focus.
- While shipping activities are well described quantitatively using the Canadian Coast Guard's Marine Communication and Traffic Services data, the related geospatial information was not released to LNG Canada. Moreover, the spatial boundaries for which these data are available (i.e., the Prince Rupert traffic zone; see Quinless 2013) are not well suited to describe shipping traffic travelling to Kitimat. Consequently, more spatially relevant data, such as from the Pacific Pilotage Authority and District of Kitimat, are used (see Section 7.4, Marine Transportation and Use).

7.3.2.7 Residual Effects Description Criteria

Residual effects are those that remain after mitigation measures have been applied, and are described in terms of magnitude, geographic extent, duration, frequency, reversibility, and ecological context (Table 7.3-2).

Table 7.3-2: Characterization of Residual Effects for Visual Quality

Characterization	Description	Quantitative Measure or Definition of Qualitative Categories
Characterization of Residual Effects		
Magnitude	The expected size or severity of effect. Low magnitude effects may have negligible to little effect, while high magnitude effects may have a substantial effect.	**LNG Facility** **Negligible**—no measurable change in the LSA's average EVC **Low**—a measurable change in the LSA's average EVC from moderate and high importance viewpoints, but EVC remains within the baseline visual quality class (VQC), and VQOs are achieved **Moderate**—measurable change in the LSA's average EVC from moderate and high importance viewpoints resulting in a change in VQC **High**—measurable change in the LSA's average EVC from moderate and high importance viewpoints resulting in a change in VQC beyond partial retention and/or exceeding an established VQO
		Marine Access Route **Negligible**—no measurable change in viewing conditions **Low**—on average, views of an LNG carrier from viewpoints of moderate or high importance are improbable, the duration would be brief and the prominence would be low, moderate or high **Moderate**—on average, views of an LNG carrier from viewpoints of moderate or high importance would be probable, the duration would be moderate and the prominence would be moderate **High**—on average, views of an LNG carrier from viewpoints of moderate or high importance would be highly probable, the LNG carrier would be visible for an extended duration and the prominence would be moderate or high
Geographic Extent	The spatial scale over which the residual effects of the project are expected to occur. The geographic extent of effects can be local or regional. Local effects may have a lower effect than regional effects.	**LSA**—residual effects extend into the LSA **RSA**—residual effects extend into the RSA
Duration	The length of time the residual effect persists. The duration of an effect can be short term or longer term.	**Short-term**—measurable for the construction phase of the Project **Medium-term**—measurable for longer than the construction phase but shorter than the life of the Project **Long-term**—measurable for the life of the Project **Extended**—measurable beyond the life of the Project until a future point when Visually Effective Green-up is reached **Permanent**—measurable parameter unlikely to recover to baseline

Characterization	Description	Quantitative Measure or Definition of Qualitative Categories
Frequency	How often the effect occurs. The frequency of an effect can be frequent or infrequent. Short term and/or infrequent effects may have a lower effect than long term and/or infrequent effects.	**Single event**—occurs once **Multiple irregular event (no set schedule)**—occurs sporadically at irregular intervals throughout construction, operation or decommissioning phases **Multiple regular event**—occurs on a regular basis and at regular intervals throughout construction, operation, or decommissioning phases **Continuous**—occurs continuously throughout the life of the Project
Reversibility	Whether or not the residual effect on the VC can be reversed once the physical work or activity causing the disturbance ceases. Effects can be reversible or permanent. Reversible effects may have lower effect than irreversible or permanent effects.	**Reversible**—residual effect will recover after Project closure and reclamation **Irreversible**—residual effects are permanent
Context	Refers primarily to the sensitivity and resilience of the VC. Consideration of context draws heavily on the description of existing conditions of the VC, which reflect cumulative effects of other projects and activities that have been carried out, and information about the impact of natural and human-caused trends on the condition of the VC. Project effects may have a higher effect if they occur in areas or regions that have already been adversely affected by human activities (i.e., disturbed or undisturbed) or are ecologically fragile and have little resilience to imposed stresses (i.e., fragile)	**Low resilience**—low capacity for the VC to recover from a perturbation, with consideration of the baseline level of disturbance **Moderate resilience**—moderate capacity for the VC to recover from a perturbation, with consideration of the baseline level of disturbance **High resilience**—high capacity for the VC to recover from a perturbation, with consideration of the baseline level of disturbance.
Likelihood of Residual Effects		
Likelihood	Whether or not a residual effect is likely to occur	**Low**—low likelihood that there will be a residual effect **Medium**—moderate likelihood that there will be a residual effect **High**—high likelihood that there will be a residual effect

7.3.2.8 Significance Thresholds for Residual Effects

Significance thresholds for visual quality relate to cultural values, perceptions, and preferences, for which there may be divergence of opinion on what constitutes acceptable change. Tourism and recreation in BC's northern coast relies on visual resources that capitalize on the remoteness and wilderness nature of the area (Quinless 2013). The thresholds for assessing the significance of the Project effects defined below consider the effect of the Project within the planning context and intended management vision for the area, as well as the degree of change from current baseline conditions.

7.3.2.8.1 LNG Facility

A residual effect on visual quality from the LNG facility is significant if the following conditions apply:

1. An established VQO is exceeded (as identified in the VLI), or
2. The average EVC within the LSA exceeds the partial retention VQC where:
    - The average baseline EVC is preservation, retention, or partial retention.
    - The viewpoints from which the change is viewed are of moderate to high importance (see Visual Quality TDR for discussion of methods for determining importance).
    - Visual quality is a principal planning objective, in consideration of other applicable planning objectives, in the LSA or RSA.

7.3.2.8.2 Marine Access Route

A residual effect on visual quality attributable to LNG carriers along the marine access route is significant if the following conditions apply:

- Viewings are highly probable with an average duration greater than four hours per day.
- The average prominence of LNG carriers in the LSA is moderate or high (see Section 7.3.3.1 for details on prominence calculation).
- The viewpoints from which the change is viewed are of moderate to high importance.
- Visual quality is a principal planning objective, in consideration of other applicable planning objectives, in the LSA or RSA.

7.3.3 Baseline Conditions

7.3.3.1 Baseline Data Sources

7.3.3.1.1 Facility LSA and RSA

Viewshed analysis is used to delineate the facility LSA and facility RSA and calculate the potential visibility of the Project. Geographic information system (GIS) software was used to identify areas, up to 20 km from the LNG facility, which have a direct sight line, taking into account topography and the earth's curvature. The viewshed analysis does not account for vegetation screening; therefore, it is a conservative estimate of visibility.

Stakeholder interviews, including District of Kitimat, consultation with potentially affected Aboriginal Groups, literature review, and professional judgment were used to identify candidate viewpoints. To identify the priority viewpoints for field assessment and photo-documentation, each candidate viewpoint is evaluated to determine if it intersected the viewshed, is within 8 km from the Project, and did not duplicate the view from another viewpoint. In cases where viewpoints duplicated the view of the LNG facility, the viewpoint with the potential for the most prominent view is identified as the priority viewpoint.

The priority viewpoints are assigned an importance rating based on GIS analysis and knowledge gained about each viewpoint through a background review. Viewpoint importance ratings are assigned based on three factors as identified in the provincial VLI standards and procedures (MOFR 1997): 1) access to the viewpoint, 2) type of activity and frequency of visitation, and 3) viewing distance. The Socio-economic Baseline Report (Stantec 2014a) provides figures and data regarding access to viewpoints, types of activity, and frequency variables for each of the marine access route viewpoints. These included recreational boating and kayak routes, BC ferry routes, marinas and coastal features, and vessel survey data. Where data were unavailable, the viewpoint importance ratings were assigned using professional judgment, in consideration of the information obtained during the background review and consultation with Aboriginal Groups, community members, and stakeholders. Ease of access and frequency of visitation are rated relative to the type of activity being pursued. Viewing distance is based on the distance from each viewpoint to the LNG facility. Only viewpoints ranked as high and moderate are included in the effects assessment because these are determined to be the viewpoints of greatest concern to local residents, Aboriginal Groups, and stakeholders.

The provincial VLI classifies the landscape according to its visual sensitivity and rates the land base according to its VQC. Sixty-five percent of the land base within the facility LSA has been inventoried within the VLI, while the remaining 35% of the land base has not.

Field studies were conducted at each of the priority viewpoints to collect baseline visual quality data. VSUs visible from each viewpoint were delineated and classified into visual sensitivity classes and VQC in accordance with provincial standards and procedures (MOFR 1997) (see Table 7.3-3 and Table 7.3-4). Baseline conditions from each viewpoint were photo documented (see the Visual Quality TDR (Stantec 2014b) for photos of the baseline conditions).

Table 7.3-3: Visual Sensitivity Class Definitions

VSC	Description
1	Very high sensitivity to human-made visual alteration. The area is extremely important to viewers. There is a very high probability that the public would be concerned if the VSU were visually altered in any way or to any scale.
2	High sensitivity to human-made visual alteration. The area is very important to viewers. There is a high probability that the public would be concerned if the VSU were visually altered.
3	Moderate sensitivity to human-made visual alteration. The area is important to viewers. There is a probability that the public would be concerned if the VSU were visually altered.
4	Low sensitivity to human-made visual alteration. The area is moderately important to viewers. There is a risk that the public would be concerned if the VSU were visually altered.
5	Very low sensitivity to human-made visual alteration. The area may be somewhat important to viewers. There is a small risk that the public would be concerned if the VSU were visually altered.

Existing human disturbances were delineated on the photos of each VSU using PhotoShop software, and the EVC was calculated. The provincial VLI and relevant plans were reviewed to understand the relevant policy context and land management direction regarding the management of visual quality within the facility LSA and facility RSA.

Table 7.3-4: Visual Quality Class Definitions

VQC	Description	Percent Alteration
Preservation	Alteration, when viewed from an important public viewpoint, is small in scale and not easily distinguished from the pre-development conditions.	0%
Retention	Alteration, when viewed from an important public viewpoint is: (i) difficult to see, (ii) small in scale, and (iii) natural* in appearance.	0–1.5%
Partial Retention	Alteration, when viewed from an important public viewpoint, is (i) easy to see, (ii) small to medium in scale, and (iii) natural and not rectilinear or geometric in shape.	1.5–7%
Modification	Alteration, when viewed from an important public viewpoint, (i) is easy to see, and (ii) is (a) large in scale and natural in its appearance, or (b) small to medium in scale but with some angular characteristics.	7–20%
Maximum Modification	Alteration, when viewed from an important public viewpoint, (i) is easy to see, and (ii) (a) very large in scale, (b) rectilinear and geometric in shape, or (c) both. (20-30% modification)	20-30%

NOTE:
Natural refers to the character of the alteration and how much it mimics a natural disturbance (e.g., does it borrow from the natural character of the landscape or show effort to mitigate contrast versus contradicting or breaking natural lines in the landscape)

7.3.3.1.2 Shipping LSA and RSA

Viewshed analysis is used to delineate the shipping LSA and RSA along the marine access route and to determine the potential visibility of the marine access route from priority viewpoints.

Candidate viewpoints along the marine access route were identified through consultation with interested Aboriginal Groups. Seventeen priority viewpoints were assigned importance ratings following methods outlined in Section 7.3.3.1. Field studies were undertaken to validate the 17 locations and photo-document the baseline view of the proposed marine access route from each location.

The visual quality assessment for the marine access route used vessel frequency, duration, and prominence as measurable parameters to assess the potential visual effect of large vessels transiting in view of priority viewpoints.

Vessel Frequency and Duration

The baseline frequency of large vessel (length greater than 100 m) movements in the shipping LSA is calculated from Pacific Pilotage Authority Canada data (PPA 2013) on piloted ship traffic to and from the port of Kitimat and the Cruise Line International Association's data (CLIA 2013) on ship movements through the Principe Channel portion of the shipping LSA.

Vessel frequency is qualified according to the following categories:

- Improbable viewing is a very low possibility of viewing a large vessel on any given day from an important viewpoint.
- Probable viewing is a distinct possibility of viewing a large vessel on any given day from an important viewpoint.
- Highly probable viewing is most likely will view a large vessel on any given day from an important viewpoint.

Vessel duration is the total length of time in a given period that a large vessel will be visible from a given viewpoint. The duration of large vessels is determined using the following formula:

$$\textit{Vessel Duration} = \frac{\textit{distance of marine access route channel in view (maximum of 10 km radius from viewer)}}{\textit{average travel velocity}} \times \textit{frequency of viewing a large vessel}$$

Average travel velocity is based on the average speed that the tugs travel when escorting large vessels along the marine access route. Average travel velocity varied depending on the portion of the marine access route the viewpoint looks upon (see Marine Use and Transportation, Section 7.4).

To determine the monthly viewing duration of large vessel traffic, the calculated duration per large vessel is multiplied by the frequency of large vessels currently travelling along different portions of the marine access route (based on 16 movements per month along Principe Channel and 12 movements per month along the rest of the route under baseline conditions).

Vessel duration uses the following categories:

- Brief is an average of less than one hour per day.
- Moderate is an average between one and four hours per day.
- Extended is an average of greater than four hours per day.
- Constant is an average of equal to or greater than twelve hours per day.

Prominence

Prominence measures the degree to which an object occupies a person's central field of vision. The potential visual effect from a vessel will primarily depend on how much of the central field of vision it occupies.

Because the size of the vessel and the distance the vessel is from a priority viewpoint are known, the following trigonometric calculation for determining tangent is used to determine prominence:

tangent (angle or degrees of prominence) = opposite / adjacent

The visual prominence of a feature is measured in degrees (both vertical and horizontal) and assigned a score (Table 7.3-5). In the calculation of overall prominence scores (Table 7.3-6), the vertical prominence scores are weighted double those of the horizontal prominence scores and the two scores are summed. When viewing the landscape, the human eye is accustomed to a strong horizontal line. As a result, vertical structures are more prominent and noticeable (Urbis 2013).

Table 7.3-5: Horizontal and Vertical Prominence

Field of View	Degrees of Field of View Occupied	Potential Visual Prominence	Associated Score
Horizontal	Less than 5°	Low visual prominence; may not be highly visible unless it contrasts strongly with background	1
	5° to 30°	Moderate visual prominence; may be noticeable. The degree it intrudes on the view depends on how well it integrates with the landscape character.	2
	Greater than 30°	High visual prominence; will be highly noticeable and will dominate view.	3
Vertical	Less than 0.5°	Low visual prominence; will appear as a small thin line on the landscape.	2
	0.5° to 2.5°	Moderate visual prominence; may be noticeable. The degree it intrudes on the view depends on how well it integrates with the landscape character	4
	Greater than 2.5°	High visual prominence; will be highly noticeable. The degree of visual intrusion will depend on the landscape character and the width/thickness of the object.	6

SOURCE:
Adapted from Urbis (2013)

Table 7.3-6: Visual Prominence

	High Vertical Angle (6)	Moderate Vertical Angle (4)	Low Vertical Angle(2)
High Horizontal Angle (3)	High (9)	High (7)	Moderate (5)
Moderate Horizontal Angle (2)	High (8)	Moderate (6)	Low (4)
Low Horizontal Angle (1)	High (7)	Moderate (5)	Low (3)

NOTE:
Sample Calculation: A low horizontal angle (1) + A moderate vertical angel (4) = An overall moderate visual prominence (5)

7.3.3.2 Baseline Overview

7.3.3.2.1 Facility LSA

The landscape character assessment confirmed that the facility LSA has high topographic variation, varied vegetation patterns, and expansive views of water. Supported by the findings from provincial visual preference literature (USDA Forest Service 1994; Sheppard 2004; MLFNRO 2011; ATPR 2013), these characteristics form a distinct and visually appealing landscape. Landscape disturbances are readily visible, including major industrial development, recent and historical forest harvesting, waterfront commercial development, and residential development. However, the degree of disturbance varies depending on the viewpoint and VSU being observed (Photo 7.3-1).

According to the provincial VLI, 35% of the facility LSA is moderately to highly sensitive to visual alteration. VQOs of partial retention or modification have been established on 25% of the facility LSA. However, the provincial VLI has predominantly focussed on viewpoints that are easily accessible along well-travelled roads and highways only (i.e., Highway 37, Haisla Boulevard, and Stewart Cassiar Highway) and not on viewpoints from marine routes, islands, tourism developments, and individual residences beyond these major roads, which may also be important to residents, Aboriginal Groups, and visitors.

Forty-three candidate viewpoints were identified within the LSA (Figure 7.3-3) and 11 priority viewpoints were selected for field visits and photo documentation. Table 7.3-7 describes the 11 priority viewpoints and their associated viewpoint ratings. These viewpoints include community parks, recreational trails, marinas, and riparian and marine recreation areas. Coghlin Park (Viewpoint 8) represents views from the community of Kitimat, and Viewpoint 1 represents the views from Kitamaat Village. The field crew was unable to access the trailhead to Mount Claque.

More information on the 43 candidate viewpoints is provided in the Visual Quality TDR (Stantec 2014b).

Isolated Residential Development (Near Viewpoint 1)

Residential Development (Near Viewpoint 29)

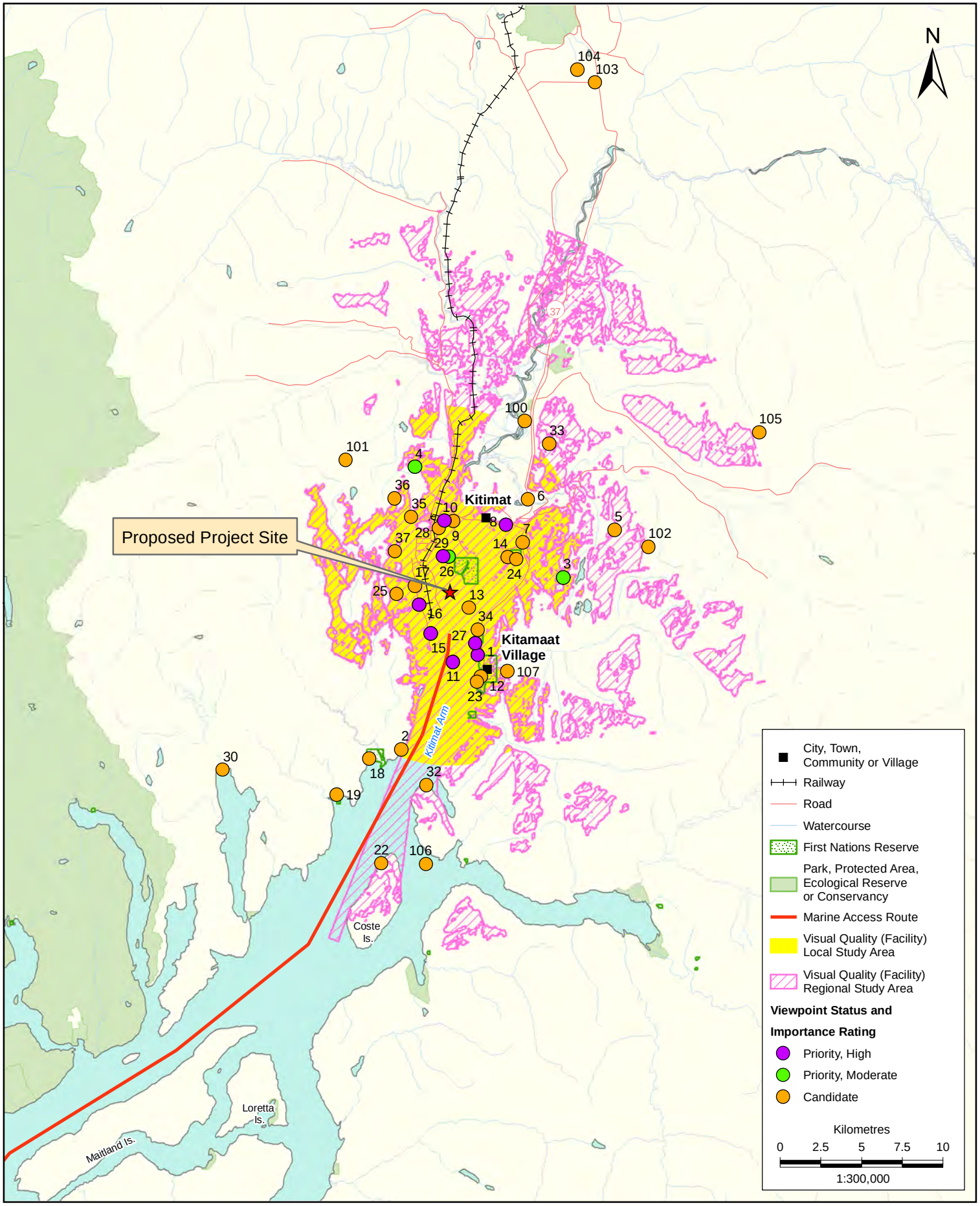
Recreation and Tourism Development (Local Park) (At Viewpoint 8)

Recreation and Tourism Development (Marina) (Viewed from Viewpoint 11)

Forest Harvesting (Viewed from Viewpoint 27)

Industrial Development (Viewed from Viewpoint 11)

Photo 7.3-1: Typical Human Modifications within the Facility LSA



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VISUAL QUALITY ENVIRONMENTAL EFFECTS ASSESSMENT

CANDIDATE AND PRIORITY VIEWPOINTS (FACILITY)

LNG CANADA EXPORT TERMINAL
KITIMAT, BRITISH COLUMBIA

PROJECTION	DRAWN BY
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DATE	FIGURE NO.
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Table 7.3-7: Viewpoints and Viewpoint Importance in the Facility LSA

Priority Viewpoint	Description	Importance	Distance to Project Footprint Centre	Project Components Visible
1 – MK Bay Marina and Camping	Tourism and recreation resource	High	Mid-ground	▪ Condensate storage tanks ▪ LNG storage tanks ▪ Acid gas incinerator stacks ▪ Gas turbine stacks ▪ Acid gas recovery units ▪ Cooling water towers ▪ Liquefaction trains ▪ Flare stack ▪ Liquid burner ▪ Utilities ▪ LNG carriers
3 – Robinson Lake Trailhead	Recreation resource	Moderate	Mid-ground	▪ Electric HV inlet ▪ Condensate storage tanks
4 – Trailhead to Mount Claque	Recreation resource	Moderate	Mid-ground	Unknown, field visit not possible due to access restraints
8 – Coghlin Park	Community resource	High	Mid-ground	▪ LNG storage tanks ▪ Acid gas incinerator stacks ▪ Gas turbine stacks ▪ Acid gas recovery units ▪ Liquefaction trains ▪ Flare stack ▪ Liquid burner ▪ LNG carriers
10 – Kitimat Radley Park Campground	Tourism and recreation resource	High	Mid-ground	View Obstructed
11 – Douglas Channel up to Kitimat Arm	Water-based view	High	Mid-ground	▪ Acid gas incinerator stacks ▪ Gas turbine stacks ▪ Flare stack ▪ Liquid burner ▪ LNG carriers
15 – Hospital Beach	Community resource	High	Mid-ground	▪ Acid gas incinerator stacks ▪ Gas turbine stacks ▪ Flare stack ▪ Liquid burner ▪ LNG carriers
16 – Moore Creek	Recreation resource	High	Foreground	View Obstructed
26 – Kitimat River Oxbow	Recreation resource	Moderate	Foreground	View Obstructed

Priority Viewpoint	Description	Importance	Distance to Project Footprint Centre	Project Components Visible
27 – Maggie Point	Community resource	High	Mid-ground	▪ Condensate tanks ▪ LNG storage tanks ▪ Acid gas incinerator stacks ▪ Gas turbine stacks ▪ Acid gas recovery units ▪ Cooling water towers ▪ Liquefaction trains ▪ Flare stack ▪ Liquid burner ▪ Utilities LNG carriers
29 – Kitimat River Informal Camp #2	Recreation resource	High	Foreground	View Obstructed

NOTES:

Foreground – Project components 0 km to 1 km from a viewpoint

Mid-ground – Project components 1 km to 8 km from a viewpoint.

Sixteen VSUs were identified as a result of the field assessment of the 10 priority viewpoints that were visited. Baseline results of the visual quality assessment of each priority viewpoint and associated VSUs are summarized in Table 7.3-8.

The LNG facility will intersect or influence VSUs that are all moderately to highly visually sensitive to visible human-made alteration. Considering topography and vegetation patterns in the LSA, these VSUs have a moderate ability to visually absorb new developments, particularly VSUs on the Kitimat River estuary.

While much of the LSA visible from the analyzed viewpoints is already highly disturbed, especially those VSUs nearest the LNG facility, some adjacent VSUs are still visually intact or their disturbances are reaching visually effective green-up. The EVC of VSUs visible from priority viewpoints ranges between preservation (0% visible disturbance) to excessive modification (greater than 30% visible disturbance). The average EVC of all assessed VSUs is maximum modification (28.9%).

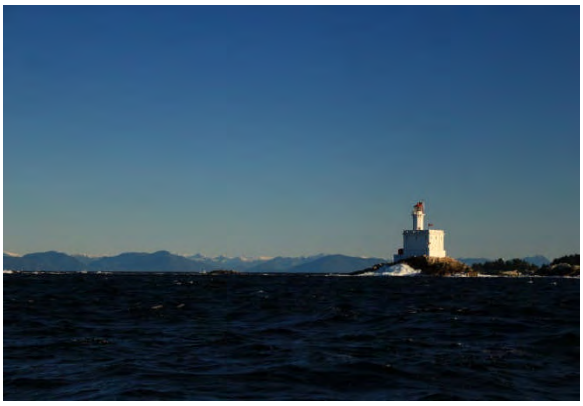
Table 7.3-8: Visual Sensitivity Class Determinations of VSUs near the LNG facility

Viewpoint	Visually Sensitive Unit	Biophysical Rating	Visual Condition	Viewer Rating	Visual Absorption Capability	Visual Sensitivity Class
1. MK Bay Marina and Camping	1	L	H	H	M	Moderate
	2	M	H	H	M	High
	3	M	H	H	M	High
3. Robinson Lake Trailhead	1	L	M	H	M	Moderate
	2	M	M	H	M	Moderate
8. Coghlin Park	1	M	H	H	M	High
	2	H	H	H	M	High
	3	H	H	H	M	High
10. Kitimat Radley Park Campground	View obstructed due to vegetation	N/A	N/A	N/A	N/A	N/A
11. Douglas Channel	1	H	H	M	M	High
	2	H	H	M	M	High
15. Hospital Beach	1	L	H	M	L	Moderate
	2	M	H	M	M	Moderate
	3	M	H	M	M	Moderate
16. Moore Creek	View obstructed due to vegetation	N/A	N/A	N/A	N/A	N/A
26. Kitimat River Oxbow	View obstructed due to vegetation	N/A	N/A	N/A	N/A	N/A
27. Maggie Point	1	L	H	H	M	Moderate
	2	M	H	H	M	High
	3	M	H	H	M	High
29. Kitimat River Informal Camp #2	View obstructed due to vegetation	N/A	N/A	N/A	N/A	N/A

NOTES:
H – high; M – moderate; L – low; N/A – not applicable

7.3.3.2.2 Shipping LSA

The shipping LSA contains a high degree of topographic variety, varied vegetation patterns, and expansive views of water; thereby, it has a distinct and visually appealing viewscape. The shipping LSA has limited human disturbance (Photo 7.3-2), although it does show some recent and historical forest harvesting and human settlement. Marine traffic varies, with views of local fishing boats interspersed with whale watching vessels, cruise ships, ferries and recreational vessels along much of the marine access route; barges, chemical tankers and aluminum carriers near Kitimat and carriers transporting grain, shipping containers, and coal near Prince Rupert.

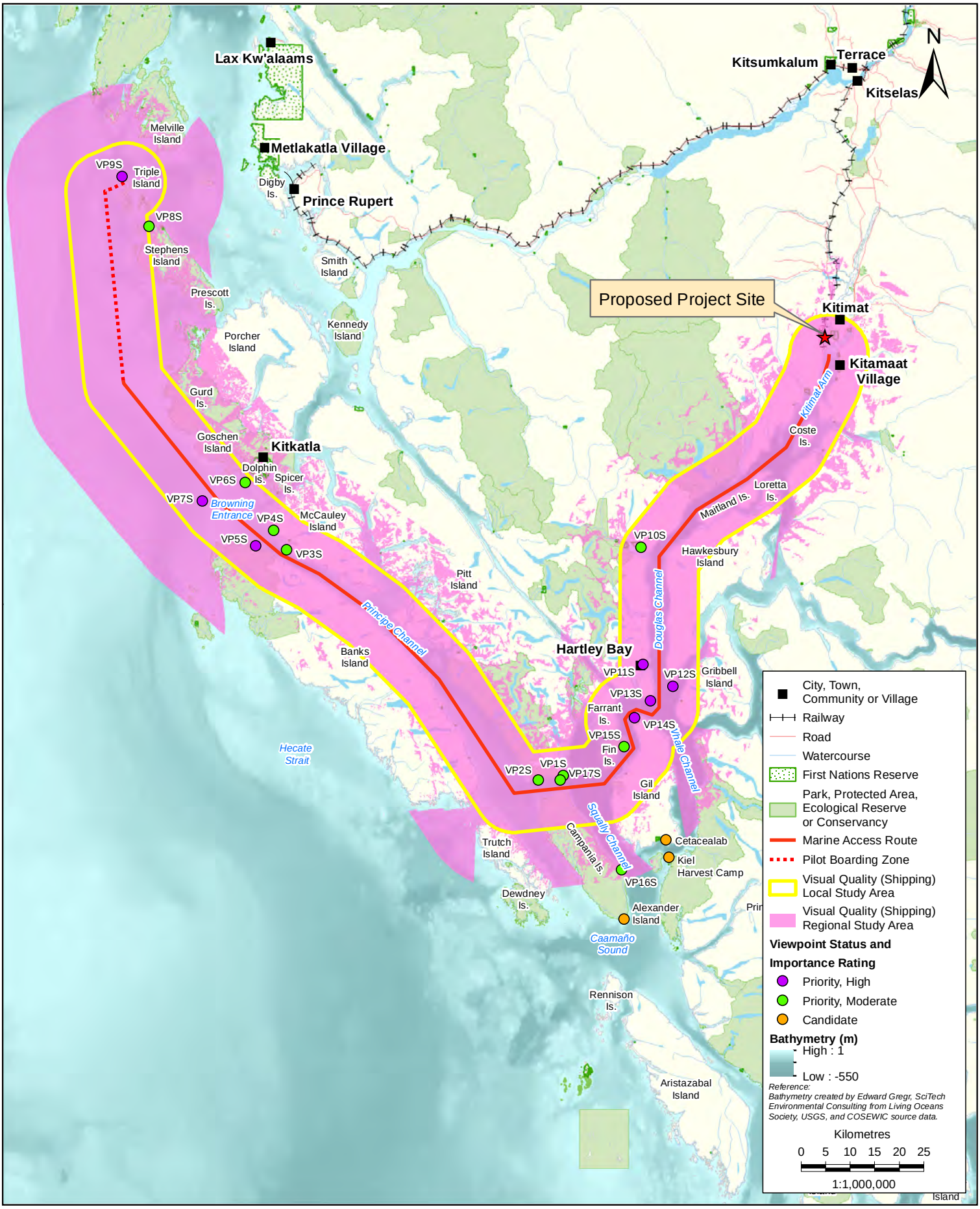


Marine Access Route (Triple Island) (Near Viewpoint 9S)

Marine Access Route (Kitkatla) (Near Viewpoints 6S and 7S)

Photo 7.3-2: Typical Human Modifications within the Shipping LSA

Within the shipping LSA, there are 17 priority viewpoints with a view of the marine access route (Figure 7.3-4 and Table 7.3-9). Many of these viewpoints have long and unobstructed views, often 180 degrees. These long and unobstructed views result in high visibility of the marine access route, with 84% (287,000 ha) of the lands and waters within 8 km of each of the 17 viewpoints (341,800 ha) having a view of the marine access route.



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VISUAL QUALITY ENVIRONMENTAL EFFECTS ASSESSMENT

CANDIDATE AND PRIORITY VIEWPOINTS (MARINE ACCESS ROUTE)

LNG CANADA EXPORT TERMINAL
KITIMAT, BRITISH COLUMBIA

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Table 7.3-9: Viewpoints and Viewpoint Importance in the Shipping LSA

Priority Viewpoint	Description	Importance	Distance
1S – Pitt Island, SE End	Gitxaala Gathering and Harvesting Grounds	Moderate	Mid-ground
2S – Pitt Island, SW End	Gitxaala Gathering and Harvesting Grounds	Moderate	Mid-ground
3S – McCauley Island, W End	Gitxaala Gathering and Harvesting Grounds	Moderate	Foreground
4S – McCauley Island, NW End	Gitxaala Gathering and Harvesting Grounds	Moderate	Mid-ground
5S – Banks Island , NE End	Aboriginal Groups Gathering and Harvesting Grounds	High	Mid-ground
6S – Dolphin Island, W End	Gitxaala Gathering and Harvesting Grounds	Moderate	Mid-ground
7S – Browning Entrance	Gitxaala Gathering and Harvesting Grounds	High	Mid-ground
8S – Stephens Island, N End	Gitxaala Gathering and Harvesting Grounds; Metlakatla and Lax Kw'alaams Gathering and Fishing Grounds	Moderate	Mid-ground
9S – Triple Island Pilotage Station	Gitxaala Gathering and Harvesting Grounds; Metlakatla and Lax Kw'alaams Gathering and Fishing Grounds	High	Foreground
10S – Old Town, Kitkiata Inlet	Gitga'at. Old village site, culturally important (petroglyphs), heavy traditional harvesting site (marine + land), high tourism spot	Moderate	Mid-ground
11S – Hartley Bay	Gitga'at. Village site	High	Mid-ground
12S – Money Point, Hawkesbury Island, S End	Gitga'at. Heavy tourist site, recreational fisheries	High	Mid-ground
13S – Cape Farewell, Promise Island, S End	Gitga'at. Fishing spot for both traditional and recreational harvests and will provide a good vantage point to view the reserve at Turtle Point	High	Mid-ground
14S – Turtle Point, Gil Island, S End	Gitga'at. Cultural site, graveyard, ceremonial	High	Foreground
15S – Clamstown, Fin Island, NE End	Gitga'at. High traditional harvesting site, high recreational fisheries/tourism site	Moderate	Mid-ground
16S – Dougan Point, Campania Island	Gitga'at. Key fishing spot for recreational fishers.	Moderate	Background
17S – McCreight Point, Pitt Island, S End	Gitga'at. Traditional harvesting site, high recreational fisheries/tourism site	Moderate	Mid-ground

NOTE:
Foreground refers to views of Project components that are 0 km to 1 km from a viewpoint
Mid-ground refers to views of Project components that are 1 km to 8 km from a viewpoint.

Carrier Frequency and Duration

A review of current and historical data indicates that the frequency of existing large vessel movement along the marine access route is low, although it varies depending on the location. On average, 12 large vessel movements per month occur within Douglas Channel compared to 16 large vessel movements per month in Principe Channel; cruise ship traffic accounts for the difference.

The length of marine access route visible within a 10 km radius distance from each viewpoint ranges from 2.7 km to 20 km, with an average of 11.4 km. A large vessel will take between 8 minutes and 67 minutes to pass (with an average of 34 minutes), depending on the viewpoint. The duration that large marine vessels are visible ranges from 2 hours per month at Viewpoints 10S and 11S (Old Town and Hartley Bay) to 16 to 18 hours per month at Viewpoints 2S (Pitt Island SW), 3S (McCauley Island W), and 5S (Banks Island NE). The average duration across all viewpoints is 8 hours per month.

Baseline results for frequency and duration are presented in Section 7.3.6.2 where they are compared to frequency and duration estimates for Project LNG carriers.

Prominence

Prominence calculations for baseline large marine traffic could not be undertaken because of a lack of dimensional data.

7.3.4 Project Interactions

Table 4.4–1 (Section 4) identifies potential interactions of concern between Project activities and each of the selected VCs that are assessed. The potential effects identified in Section 7.3.2.4 that may result in an adverse effect as a result of interactions with Project activities are assessed. The extent to which the interactions will be considered is ranked in Table 7.3-10. The ranking categories (i.e., 0, 1 or 2) in Table 7.3-10 are defined in a footnote to the table.

A conservative approach is taken in assigning a Rank of 1, whereby interactions with a meaningful degree of uncertainty are assigned Rank 2 so that a detailed effects assessment is conducted.

Table 7.3-10: Potential Project Effects on Visual Quality

Project Activities and Physical Works	Reduction in Visual Quality
Facility Activities and Works	
Construction	
Site preparation (clearing, grubbing, grading , levelling, and set-up of temporary facilities)	2
Onshore construction (installation of LNG facility, utilities, ancillary support facilities, access roads, and includes hydrotesting)	2
Dredging (includes disposal)	1
Marine terminal construction (Modifications to existing wharf, installation of sheet piling, material offloading and laydown areas, transfer piping and electrical infrastructure)	2
Vehicle and rail traffic (haul road upgrades, road use, vehicle traffic)	1
Operation	
LNG production (including natural gas treatment, condensate extraction, storage, and transfer), storage and loading	2
Vehicle and rail traffic (road use, vehicle traffic)	1
Decommissioning	
Dismantling of land-based and marine infrastructure	1
Remediation and reclamation of the site	1
Shipping Activities	
Construction	
Shipping equipment and materials	1
Operation	
LNG shipping	2
Decommissioning	
Shipping equipment and materials	1

KEY:

0 = No interaction.

1 = Potential adverse effect requiring mitigation, but further consideration determines that any residual adverse effects will be eliminated or managed to negligible levels by existing codified practices, proven effective mitigation measures, or BMPs.

2 = Interaction may occur and the resulting effect may exceed negligible or acceptable levels without implementation of Project-specific mitigation. Further assessment is warranted.

NOTE: Only activities with an interaction of 1 or 2 for at least one effect are shown.

7.3.4.1 Justification of Interaction Rankings

Project activities with Rank 0 are not anticipated to result in an effect on visual quality because the activity:

- does not involve the disturbance of vegetation or topography
- does not result in construction of Project infrastructure
- is limited to non-visible areas, or
- is unrelated to visual quality.

During construction, these non-interacting Project activities include waste management and commissioning. During operation and decommissioning, these activities include waste management, vehicle and rail traffic and post-closure monitoring and follow up.

Project activities with Rank 1 are likely to result in manageable and acceptable effects on visual quality and include dredging, road use and vehicle traffic, dismantling of land-based and marine infrastructure, and remediation and reclamation of the LNG facility. While LNG production (including natural gas treatment, condensate extraction, storage in tanks, and transfer onto rail cars) and LNG storage and loading is ranked as Rank 2, it is only the LNG storage and loading portions of the activity that are Rank 2, with the other activities noted are Rank 1. During construction and decommissioning, shipping activities will likely result in manageable and acceptable effects. These activities are not assessed further for potential effects, but are included in the assessment of cumulative effects. Project activities with potential to affect visual quality from priority viewpoints due to disturbance of vegetation or topography, due to construction of Project infrastructure, or due to prominence of large vessels are assigned Rank 2. These include site preparation, onshore and marine terminal construction, and LNG storage and loading and shipping of LNG during operation. These activities are assessed further in Section 7.3.5.

7.3.5 Assessment of Residual Effects from the LNG Facility

7.3.5.1 Analytical Methods (Facility)

7.3.5.1.1 Modelling and Photo-simulations

A 3D computer simulation model was used to prepare photo simulations that illustrate the potential post-construction conditions from each of the 11 priority viewpoints. Full build-out effects on visual quality were simulated using specialized software, and were based on the current Project plot plan, facility, and component details, resulting in a spatially accurate and scaled computer model of the LNG facility. Models of the existing tree species, characteristic of the LSA, were then applied, including the retention of a 30 m vegetation buffer. The modeled facility and surrounding vegetation may not be exactly as shown in the model, but represent the current understanding of Project design.

Virtual cameras were then assigned within the site model using the geographic coordinates of the viewpoints analyzed in the baseline field program. To ensure accuracy of the photo simulation, the virtual cameras were placed at a height of 1.75 m above the ground (typical height of a human observer), then matched in focal length and exposure settings to the settings used to capture the baseline photos.

Atmospheric conditions, geographic location and the time of day and year were taken into account, and the synthetic images were rendered from the simulation model. The renderings were then overlaid on the respective baseline condition photograph for each analyzed viewpoint. Lastly, the photo simulations were stitched together, to create the panoramas that matched each of the baseline condition photo panoramas.

7.3.5.1.2 EVC Calculations

The baseline VSU boundaries were then overlaid onto the photo simulations; the Project-related disturbances and components are delineated and the EVC is calculated using the same procedures as described in Section 7.3.3.

7.3.5.1.3 Assumptions and the Conservative Approach

The following are the conservative assumptions used in the modelling:

- The viewpoints likely to experience the greatest effects are selected (viewpoints from which Project components will be most visible but are generally representative of views from other viewpoints).
- The Project's effect on visual quality is evaluated at full-build out when the Project's effect on visual quality will be greatest.
- Photo simulations that are shown as panoramas tend to exaggerate the field of view because all images are in focus. Normally, content beyond an individual's central field of view will be out of focus.

7.3.5.2 Assessment of Reduction in Visual Quality (Facility)

7.3.5.2.1 Description of Project Effect Mechanisms for Reduction in Visual Quality

Fifty percent of the LNG facility LSA is predicted to have a view of the LNG facility. Construction and operation of the Project will alter the topography and vegetation patterns of the LNG facility site and the marine areas in which the terminal will be built. Development of the LNG facility will introduce new visible industrial modifications. Post-development photo-simulations are shown in Photo 7.3-3.

View from MK Bay Marina (Viewpoint 1)

View from Robinson Lake Trail (Viewpoint 3)

View from Maggie Point (Viewpoint 27)

View from Douglas Channel (Viewpoint 11)

View from Coghlin Park (Viewpoint 8)

View from Hospital Beach (Viewpoint 15)

Photo 7.3-3: Post-Development Photo-Simulations of the Facility

Light emitted during the construction and operation of the LNG facility has the potential to affect visual quality in the LSA at numerous viewpoints and receptor locations such as Kitamaat Village, surrounding marinas, beaches, riverfront and parks. The facility and marine terminal will be very well illuminated, as is required for large industrial sites, to ensure safe construction and operation. Project lighting will result in effects including light trespass (spill), glare and sky glow.

Project construction night lighting will consist of area-specific portable and permanent lighting used throughout the construction period and more intensively during times of the year when daylight hours are shorter. This lighting will be required to maintain a safe, secure and productive environment during project construction. More permanent structures will be installed in construction areas that require multi-year construction schedules.

Project operations lighting will be required throughout the facility site and marine terminal including process buildings, storage tanks, flare stacks (aviation safety lighting), wharf areas, loading line corridor, as well as parking lots, roads and walkways. Berthed LNG carriers will also contribute additional lighting to the marine terminal.

During nighttime hours, facility and marine terminal lighting and sky glow will be visible at nearby receptor locations. It is anticipated that terrain and vegetation screening may obstruct some of the facility or marine terminal light for more distant receptors within the District of Kitimat.

Additional information on the lighting design will be provided in the permit application as required by the OGC in their new *Liquefied Natural Gas Facility Permit Applications and Operations Manual* (OGC 2014b).

7.3.5.2.2 Mitigation for Reduction in Visual Quality

Given the dimensions of the Project components and the visual absorption capacity of the VSUs, LNG Canada will use the following mitigation measures, all of which are proven best practices, to enhance visual screening and manage visual contrast:

- A minimum 30 metre (m) wide mature riparian vegetation buffer will be maintained between the Project site and the Kitimat River, where practicable. If required, disturbance would be limited and adhere to applicable regulatory process (Mitigation 7.3-1).
- Tree and vegetation clearing for the Project components will be reduced to the extent possible outside of the Project footprint but some clearing may be required to enable construction. Where temporary tree and vegetation clearing occurs during construction, revegetation activity will occur as soon as possible (with the exception of areas cleared within the safety zone) (Mitigation 7.3-2).

- Footprint for LNG facility and temporary construction facilities will be sized to allow safe and efficient construction. Existing cleared areas will be utilized, where practicable, to limit area of new disturbance (Mitigation 5.3-4).
- The approved clearing boundaries will be clearly delineated (flagged) prior to site preparation to keep clearing activities within the designated Project footprint. (Mitigation 5.5-1).

7.3.5.2.3 Characterization of Reduction in Visual Quality

Because of local vegetation screening and topography, it is anticipated that the Project will create no visual change (during daytime hours) for the following priority viewpoints:

- Viewpoint 10 (Kitimat Radley Park Campground)
- Viewpoint 16 (Moore Creek)
- Viewpoint 26 (Kitimat River Oxbow), and
- Viewpoint 29 (Kitimat River Informal Camp #2).

Simulations indicate VSUs are unlikely to experience considerable change from baseline conditions. It is predicted that 44% (n = 7) of VSUs will experience no measurable change (see Table 7.3-11), while 31% (n = 5) of VSUs that do experience a measurable change will remain within their baseline VQC. The remaining 25% (n = 4) of VSUs experience enough change to exceed their VQC. Of these:

- Viewpoint 3 (Robinson Lake Trail Head) will change from a VQC of partial retention to modification.
- Viewpoints 11 and 15 (Douglas Channel and Hospital Beach) will change from modification to maximum modification.
- Viewpoint 27 (Maggie Point) will change from maximum modification to excessive modification.

Viewpoints 1 (MK Bay Marina), 8 (Coghlin Park), 11 (Douglas Channel), 15 (Hospital Beach), and 27 (Maggie Point) include a view to both the marine access route and the LNG facility. Therefore, an LNG carrier will be in view from these viewpoints during the time required for berthing, loading, and approaching and departing from port.

Results indicate that visual quality effects will be limited; the average EVC of VSUs in the LSA will increase slightly by 3.15%, from 28.1% to 31.25% (Table 7.3-11), and result in a subsequent change in VQC.

The greatest changes will be noticeable for:

- Aboriginal, recreational and commercial fishers
- mariners and tourists in Kitimat Arm

- recreation users along the east and west shores of Kitimat Arm, and
- residents of Kitamaat Village.

Recreational scenic viewing is an important attraction for many of the studied viewpoints; and residents and visitors may have expectations that visual quality from those viewpoints will be maintained. Approximately 50% of all lands (16,009 ha) within 8 km of the facility LSA will have a view of the LNG facility. The LNG facility will be highly visible to residents in Kitimat and Kitamaat Village, to mariners and tourists in Kitimat Arm, and to land-based recreation users along the eastern and western shores of Kitimat Arm.

With mitigation, the Project will result in a decline in visual quality within the facility LSA by an average of 3.15%, causing in a change in VQC. However, there is considerable variation between viewpoints and this decline generally occurs in VSUs in which the baseline VQC rating is maximum modification or excessive modification. The residual effects will be confined to the facility LSA, which will experience, on average, a moderate-magnitude reduction in visual quality compared with baseline conditions due to the change in VQC. Given the extent of existing visible industrial development, the LNG facility will remain generally consistent with the scale and character of the current landscape.

The Project will be visible at night from several receptor locations in the District of Kitimat and Kitamaat Village, from the northern end of the Douglas Channel, as well as on the eastern and western shores of the Douglas Channel, and that it will contribute to sky-glow effects in the area.

Local planning policy in the District of Kitimat supports industrial development at the Project site and also the maintenance of visual quality. Considering the importance of visual quality to residents' quality of life and the competitiveness of current tourism development and recreational opportunities, the resilience of the facility LSA to disturbance is moderate.

Because visual quality changes for the LNG facility and marine terminal are the result of additional vegetation removal, grading, and new infrastructure development including extensive site lighting, residual effects will be continuous and long term over the Project life. Depending on the extent of site reclamation, the effects are anticipated to reverse when the:

- LNG facility is decommissioned
- Project site is re-contoured and revegetated, and
- vegetation reaches visually effective green-up.

Table 7.3-11: Baseline and Predicted Visual Conditions

Viewpoint	VSU	VSC	VAC	Baseline VQC	Baseline EVC	Predicted VQC	Predicted EVC	Predicted Change
1. MK Bay Marina and Camping	1	Moderate (3)	M	EM	38.5	EM	52.4	+ 13.9
	2	High (2)	M	EM	38.4	EM	38.4	0.0
	3	High (2)	M	EM	40.4	EM	41.5	+ 1.1
3. Robinson Lake Trailhead	1	Moderate (3)	M	PR	2.3	M	7.7	+ 5.4
	2	Moderate (3)	M	M	13.3	M	13.3	0.0
8. Coghlin Park	1	High (2)	M	R	0.2	R	1.0	+ 0.9
	2	High (2)	M	M	9.1	M	9.1	0.0
	3	High (2)	M	M	9.7	M	10.0	+ 0.3
10. Kitimat Radley Park Campground	View obstructed	N/A	N/A	N/A	N/A	Project Not Visible		
11. Douglas Channel	1	High (2)	M	M	15.7	MM	22.4	+ 6.7
	2	High (2)	M	EM	47.4	EM	47.4	0.0
15. Hospital Beach	1	Moderate (3)	L	EM	100.0	EM	100.0	0.0
	2	Moderate (3)	M	M	12.0	MM	24.3	+ 12.3
	3	Moderate (3)	M	M	13.0	M	13.0	0.0
16. Moore Creek	View obstructed	N/A	N/A	N/A	N/A	Project Not Visible		
26. Kitimat River Oxbow	View obstructed	N/A	N/A	N/A	N/A	Project Not Visible		
27. Maggie Point	1	Moderate (3)	M	MM	28.0	EM	36.8	+ 8.8
	2	High (2)	M	EM	45.3	EM	45.3	0.0
	3	High (2)	M	EM	36.4	EM	37.5	+ 1.1
29. Kitimat River Informal Camp #2	View obstructed	N/A	N/A	N/A	N/A	Project Not Visible		
Average LSA Baseline EVC		**28.1%**	**Average LSA EVC Alteration**					**31.25%**

NOTES:
H – High; L – Low; VSC – visual sensitivity class; VQC – visual quality class; M – Moderate; VSU – visually sensitive unit; VAC – visual absorption capability; EVC – existing visual condition

7.3.5.2.4 Determination of Significance for Reduction in Visual Quality

The landscape character in the facility LSA reflects the area's industrial and resource development history. Despite the visual sensitivity of the LSA, the average baseline area of human disturbance is 28.9% (maximum modification). Therefore, much of the area visible from the priority viewpoints is already highly disturbed by current and past human modifications. The VQOs for the facility LSA will be achieved, despite development of the LNG facility.

The change in visual quality associated with the Project may affect some Aboriginal Groups, including Haisla Nation, and stakeholders. Yet, given that the facility LSA has already been visually modified by past industrial development, that proposed mitigation measures should manage residual effects, and that the planning context for the area supports industrial development as long as it mitigates visual quality effects, the effects on visual quality are assessed as not significant.

7.3.5.3 Summary

The Project will be most visible to residents in Kitamaat Village, mariners and tourists in Kitimat Arm, and recreation users along the eastern and western shores of Kitimat Arm.

Overall, the potential effects of the LNG facility on visual quality are likely to be minor because the recreational setting already has an average of maximum modification disturbance (28.9%) and VQOs on adjacent VSUs will still be met.

7.3.6 Assessment of Residual Effects from Shipping

7.3.6.1 Analytical Methods (Shipping)

7.3.6.1.1 Modelling and Photo-simulations

The effects on visual quality from LNG carrier traffic along the marine access route were simulated, based on the path of the marine access route, LNG carrier physical dimensions, and views from 17 priority viewpoints (as per Section 7.3.3.2). The dimensions of the simulated LNG carrier used in the analysis are based on the largest possible LNG carrier currently in use (the Q-Max carrier), with a length of 345 m, width of 50 m, and height of 55 m. It should be noted that the Project LNG carriers will likely be of the smaller conventional and Q-flex carrier sizes. The use of the lagest possible carrier in the assessment is a conservative approach. Photo simulations are used to depict potential views of LNG carriers from each of the 17 priority viewpoints for the shipping LSA.

Virtual cameras were assigned within the site model using the geographic coordinates of the viewpoints analyzed in the baseline field program. The virtual cameras were then matched in focal length and

exposure settings to the settings used to obtain the baseline photos. For two viewpoints where baseline photos were not captured, the virtual cameras were set to match the focal length of the baseline photos captured during field work and to a height of 1.75 m above the shoreline (typical height of a human observer). Atmospheric conditions, geographic location, and the time of day and year were taken into account, and the synthetic images were rendered from the simulation model.

The resulting LNG carrier renderings from each analyzed viewpoint were then overlaid on the respective baseline condition photograph, or rendering, for visual comparison. A model of the baseline landscape character was produced using specialized software and available GIS information to illustrate the baseline conditions for the remaining two viewpoints that could not be accessed. Lastly, the photo simulations were stitched together, as required, to create the final panoramas that matched each of the baseline photo panoramas.

7.3.6.1.2 Frequency, Duration, and Prominence

Large Vessel Frequency and Duration

Large vessel frequency and duration represent the regularity and period of time that LNG carriers will pass in front of viewpoints along the marine access route. This is estimated using the same methods as described for vessels in the baseline modelling. For vessel frequency, the anticipated number of LNG carriers per year is added to the baseline large vessel traffic, which varied depending on whether it is for the Principe Channel or other portions of the marine access route.

For large vessel duration, viewshed analysis is used to determine the length of the marine access route that is visible from each viewpoint[1]. The length of the marine access route visible is divided by the average travel velocity along that segment of the marine access route.[2] The duration per large vessel is multiplied by the number of large vessel movements per month, which varied along different portions of the marine access route because of varied shipping patterns (70 per month along Principe Channel and 74 per month along the rest of the route).

Prominence

The horizontal and vertical prominence of the LNG carrier is calculated from each viewpoint along the marine access route using the same methods as described in the baseline modelling.

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[1] The total length of the marine access route visible is kept to a maximum extent of a 10 km radius from each viewpoint because the visibility of a LNG carrier is greatly reduced when it is farther than 10 km.

[2] Average travel velocity is determined based on the average speed that tugs travel when they will be escorting LNG carriers along the marine access route (see Section 7.4).

7.3.6.1.3 Assumptions and the Conservative Approach

The following conservative assumptions are used in the modelling:

- While the prominence calculation is based on the largest LNG carriers currently in use (Q-Max carriers), the more likely LNG carrier will be the smaller conventional and Q-flex carriers.
- At full build-out there will be between 170 to 350 LNG carrier visits to Kitimat annually. The estimate of 350 LNG carrier visits is used in this analysis and might overestimate the results of the frequency and duration measurable parameters.
- Prominence is calculated for a Q-Max LNG carrier when it is at the closest location to a viewpoint.
- Photo simulations do not account for atmospheric conditions such as, darkness, glare, fog, and haze; therefore, modelling displays the image under daylight sky, which will overestimate the visibility of the LNG carrier.

7.3.6.2 Assessment of Reduction in Visual Quality (Shipping)

7.3.6.2.1 Description of Project Effect Mechanisms for Reduction in Visual Quality

Based on the full build-out number of 350 LNG carrier visits to Kitimat each year, there will be approximately 700 large ship movements per year past each viewpoint (approximately 2 large vessel movements per day). The increased visual presence of industrial shipping traffic may affect cultural and spiritual values and sense of place for Aboriginal Groups' communities, as well as tourism and recreational values. Post-development photo-simulations of LNG carriers along the marine access route are shown in Photo 7.3-4.

The lighting system on the LNG carriers will consist of navigational lights and other lights to enable the crew to work and move about the ship safely. Navigation lights help ships avoid collisions by signaling their position, heading and status. Navigation lights and other ship lighting may be visible, at receptor locations along the shipping route, during night transits of the LNG carriers.

View from Pitt Island SW (Viewpoint 2S)

View from Triple Island (Viewpoint 9S)

View from Turtle Point (Viewpoint 14S)

View from Banks Island NE (Viewpoint 5S)

Photo 7.3-4: Post-Development Photo-Simulations of LNG Carriers

7.3.6.2.2 Mitigation for Reduction in Visual Quality

LNG Canada will implement the following mitigation measures to manage the frequency, duration, and prominence of views of LNG carriers:

- Project-related marine traffic including LNG carriers will use the Coast Guard Marine Communication and Traffic System (MCTS) to provide notice of planned arrival time at Triple Island, and encourage Aboriginal Groups and stakeholders to use the system to plan their routing and scheduling (Mitigation 7.3-3).
- No planned anchoring for the LNG carriers along the marine access route (unless directed to do so by BC Coast Pilots due to weather or other unplanned conditions); LNG carriers will only be permitted to enter the marine access route if a berth at the terminal will be available (Mitigation 7.3-4).

There are few measures that can be employed to reduce the actual sight of a large vessel in transit. The LNG carriers will be in transit and therefore visible for a discreet amount of time from any given viewpoint. If implemented, the aforementioned mitigation measures will be an effective means to allow Aboriginal Groups and stakeholders to better understand LNG carrier schedules and potentially adjust their travel

routing where possible to reduce their views of LNG carriers if necessary. Limited anchoring along the marine access route will result in short viewing duration of LNG carriers.

7.3.6.2.3 Characterization of Reduction in Visual Quality

Viewshed analysis is completed for each viewpoint, and the resulting viewshed is clipped to an 8 km radius around each viewpoint because views of the LNG carriers beyond this radius would be in the background. This analysis determined that 84% of the lands and waters within an 8 km radius of viewpoints along the marine access route will have potential views of LNG carriers within the foreground or mid-ground viewing distance. The degree of visibility ranges from 55% of the 8 km radius around viewpoint 16S (Dougan Point) with potential views of LNG carriers in the foreground or midground to 100% at viewpoint 7S (Browning Entrance), depending on whether the view of the marine access route is limited by vegetation or landscape features such as islands or points of land.

Large Vessel Frequency

The maximum anticipated LNG carrier traffic of one carrier visit per day (two movements per day) results in 700 movements per year. This is a 400% increase from baseline large vessel movements in Douglas Channel and a 265% increase from baseline in Principe Channel. When aggregating the Project-related LNG carriers with the baseline large vessel movements, this results in a change from 141 large vessel movements to 841 large vessel movements in Douglas Channel, a 500% increase from baseline, and a change from 191 large vessel movements to 891 large vessel movements in Principe Channel, a 365% increase from baseline (Table 7.3-12). While these are substantial increases in frequency and duration of large vessel movements relative to baseline conditions, numbers have varied over the past several decades. Recent counts of both small and large vessels to the port of Kitimat are much lower than the historical peak. Details of historical shipping traffic are in Section 7.4, though it is not possible to separate the large vessels, which visual quality is most concerned with, from the smaller vessels also included in the historical data.

Large Vessel Duration

The predicted duration of individual LNG carrier transits within a 10 km radius of the 17 priority viewpoints is predicted to range from 8 minutes to 67 minutes (Table 7.3-13). The total monthly duration in visibility of the Project's LNG carriers will range from 7.8 hours (VP10S, Old Town) to 64.9 hours (VP2S, Pitt Island SW); see Figure 7.3-4. On average, LNG carriers will be visible for 33 hours per month (1.1 hours per day), across all viewpoints (Table 7.3-13), resulting in an increase of 483% in the total monthly duration in visibility of large vessel traffic compared with baseline conditions.

Table 7.3-12: Large Vessel Frequency

	Baseline		**Predicted**	
	Average 2008–2013 (for all portions of the route except Principe Channel)		**Anticipated (for all portions of the route except for Principe Channel)**	
	Total Average Vessel Movements per Year	**Average Large Vessel Movements per Month**	**Total Vessel Movements (baseline based on avg. 2008–2013) per Year**	**Large Vessel Movements per Month**
Baseline Traffic	141	12	141	12
Proposed Additional Movements from Project LNG Carriers	-	-	700	58
Total Vessel Movements	141	12	841	70
	Average 2008–2013 (for Principe Channel Only)		**Anticipated (for Principe Channel Only)**	
	Total Average Vessel Movements per Year	**Average Large Vessel Movements per Month**	**Total Vessel Movements (baseline based on 2013 data)**	**Large Vessel Movements per Month**
Baseline Traffic	141	12	141	12
Baseline Traffic from Cruise Ships	50	4	50	4
Proposed Additional Movements from Project LNG Carriers	-	-	700	58
Total Vessel Movements	191	16	891	74

NOTES:

Predicted frequency is based on baseline large vessel traffic and the associated Project-related LNG carrier traffic.

Proposed LNG carrier movements assessed for the operation phase only (not for construction-related shipping).

Table 7.3-13: Large Vessel and LNG Carrier Duration by Viewpoint

Assumptions				Baseline Conditions		Predicted Future Conditions			
Viewpoint	Length of Visible Marine Route within 10 km Radius from Viewpoint (km)	Travel Velocity (km/h) (based on location along marine access route)	Viewing Duration (minutes/ vessel movement)	Number of Baseline Large Vessels Passing (per month)	Monthly Large Vessel Duration in Viewshed (hours/ month)	Monthly Number of Predicted LNG Carriers	Monthly Project LNG Carrier Duration in Viewshed (hours/ month)	Number of Baseline Large Vessels and Project LNG Carriers (per month)	Monthly Large Vessel and Project LNG Carriers Duration in Viewshed (hours/ month)
VP1S - Pitt Island SE	11.5	17	41	12	**8**	58	**39**	70	**47**
VP2S - Pitt Island SW	19.0	17	67	16	**18**	58	**65**	74	**83**
VP3S - McCauley Island W	20.1	20	60	16	**16**	58	**58**	74	**74**
VP4S - McCauley Island NW	13.9	20	42	16	**11**	58	**40**	74	**51**
VP5S - Banks Island NE	19.5	20	58	16	**16**	58	**56**	74	**72**
VP6S - Dolphin Island W	16.4	28	35	16	**9**	58	**34**	74	**43**
VP7S - Browning Entrance	19.0	28	41	16	**11**	58	**39**	74	**50**
VP8S - Stephens Island N	7.8	28	17	16	**4**	58	**16**	74	**21**
VP9S - Triple Island	11.3	28	24	16	**6**	58	**23**	74	**31**
VP10S - Old Town	2.7	20	8	12	**2**	58	**8**	70	**9**
VP11S - Hartley Bay	3.9	20	12	12	**2**	58	**11**	70	**14**
VP12S - Money Point	8.1	17	29	12	**6**	58	**28**	70	**34**
VP13S - Cape Farewell	13.3	17	47	12	**9**	58	**46**	70	**55**
VP14S - Turtle Point	9.2	17	33	12	**7**	58	**32**	70	**38**
VP15S – Clamstown	8.4	17	30	12	**6**	58	**29**	70	**34**

Assumptions				Baseline Conditions		Predicted Future Conditions			
Viewpoint	**Length of Visible Marine Route within 10 km Radius from Viewpoint (km)**	**Travel Velocity (km/h) (based on location along marine access route)**	**Viewing Duration (minutes/ vessel movement)**	**Number of Baseline Large Vessels Passing (per month)**	**Monthly Large Vessel Duration in Viewshed (hours/ month)**	**Monthly Number of Predicted LNG Carriers**	**Monthly Project LNG Carrier Duration in Viewshed (hours/ month)**	**Number of Baseline Large Vessels and Project LNG Carriers (per month)**	**Monthly Large Vessel and Project LNG Carriers Duration in Viewshed (hours/ month)**
VP16S - Dougan Point	0 (>10 km)	17	0 (>10 km)	12	0 (>10 km)	58	0 (>10 km)	70	0 (>10 km)
VP17S - McCreight Point	10.7	17	38	12	**8**	58	**37**	70	**44**
AVERAGES		**20.5 km/h**	**34 minutes**		**8 hours/ month**		**33 hours/ month**		**41 hours/ month**

NOTES:

17 km/h = 9.1 knots; 20 km/h = 10.8 knots; 28 km/h = 15.1 knots

When combined with baseline large vessel traffic, large vessels and LNG carriers will be visible for a minimum of 9 hours per month and a maximum of 83 hours per month, with an average of 41 hours per month (1.4 hours per day). This represents an increase of 33 hours per month from the current average baseline conditions of 8 hours per month. Viewpoint 16S has a viewing duration of 0 minutes even though a large vessel could be seen; this is because Viewpoint 16S is 18 km away, beyond the 10 km radius from the marine access route that is used for the vessel duration calculation.

Prominence

The distance between each viewpoint and the closest point on the marine access route varies from 1.3 km (VP3S, McCauley Island West, and VP14S, Turtle Point) to 18.0 km (Dougan Point), with an average distance of 3.9 km (Table 7.3-14). No viewpoints will experience a high prominence effect. Eighty-two percent (n = 14) of the viewpoints are predicted to experience a moderate prominence with the remaining three viewpoints having low prominence.

Table 7.3-14: Visual Prominence of LNG Carrier from Each Viewpoint

Viewpoint	Distance to Marine Access Route (km)	Horizontal Angle	Horizontal Prominence	Vertical Angle	Vertical Prominence	Overall Visual Prominence (score)
VP1S - Pitt Island SE	2,469	8.2	M	1.3	M	Moderate (6)
VP2S - Pitt Island SW	2,113	9.6	M	1.5	M	Moderate (6)
VP3S - McCauley Island W	1,305	15.4	M	2.4	M	Moderate (6)
VP4S - McCauley Island NW	2,725	7.4	M	1.5	M	Moderate (6)
VP5S - Banks Island NE	1,989	10.2	M	1.6	M	Moderate (6)
VP6S - Dolphin Island W	6,530	3.1	L	0.5	M	Moderate (5)
VP7S - Browning Entrance	2,559	7.9	M	1.2	M	Moderate (6)
VP8S - Stephens Island N	8,265	2.5	L	0.4	L	Low (3)
VP9S - Triple Island	1,319	15.3	M	2.4	M	Moderate (6)
VP10S - Old Town	6,644	3.1	L	0.5	L	Low (3)
VP11S - Hartley Bay	3,230	6.3	M	1.0	M	Moderate (6)
VP12S - Money Point	2,898	7.0	M	1.1	M	Moderate (6)
VP13S - Cape Farewell	1,682	12.0	M	1.9	M	Moderate (6)
VP14S - Turtle Point	1,391	14.5	M	2.3	M	Moderate (6)
VP15S - Clamstown	1,686	12.0	M	1.9	M	Moderate (6)
VP16S - Dougan Point	18,009	1.1	L	0.2	L	Low (3)
VP17S - McCreight Point	1,641	12.3	M	1.9	M	Moderate (6)
					Average	**Moderate (5.4)**

Effects on visual quality along the marine access route will be confined to the shipping LSA. The resilience of the LSA to visual change from LNG carriers is low because of three factors:

- visual quality is important to residents' quality of life (both Aboriginal and non-Aboriginal people)
- there is increased activity from tourism development and recreational opportunities, and
- users and Aboriginal Groups expect a low disturbance setting (Quinless 2013; Gitxaala Nation and the Firelight Group 2014).

Due to the use of navigation and other lighting, the LNG carriers will be visible from sensitive receptors along the marine access route.

To the extent that the sight of large vessels is perceived as a negative phenomenon by Aboriginal Groups, residents, recreationalists, tourist operations, and other stakeholders, the increase in such traffic due to the Project will adversely affect visual quality. Such effects will be continuous and long-term over the Project life but will cease once shipping stops.

7.3.6.2.4 Determination of Significance for Reduction in Visual Quality

At full build out the project will result in an increase of approximately two vessel movements per day. This is a substantial increase in the frequency and duration of large vessel movements and the cumulative monthly duration that such vessels will be visible relative to baseline conditions; however, numbers have varied over the past several decades and recent counts of both small and large vessels to the port of Kitimat are much lower than the historical peak. The reduction in visual quality is anticipated to be, on average, of moderate magnitude. During operation, there will be a high probability of viewing a large vessel, on any given day, at a low to moderate visual prominence. While some viewpoints will be subject to an increase of 2.5 hours daily duration for visibility of large vessels, the average increase in duration is 1.4 hours per day. Considering the low to moderate visual prominence estimated for LNG carriers at sensitive viewpoints, the effect on visual quality is assessed as not significant.

7.3.6.3 Summary

While the frequency and duration of large vessels will increase considerably over baseline conditions with the addition of the Project's LNG carriers, prominence is limited across all viewpoints and the average duration across all viewpoints is 41 hours per month (1.4 hours per day). However, because some viewpoints will experience an increase of 2.5 hours of viewing duration per day, it will be important to implement and maintain effective communication with other marine users so that they may plan routing around the LNG carrier schedules and thus limit undesired views of large industrial marine traffic.

7.3.7 Summary of Project Residual Effects

The likelihood of reduced visual quality occurring is high for both the LNG facility and the marine access route. Table 7.3-15 summarizes residual effects on visual quality.

7.3.8 Assessment of Cumulative Effects

Cumulative effects are considered for each Project-specific residual effect. Three stages are involved: (1) establishing context by providing an overview of the cumulative effects of other projects and activities on the VC; (2) determining the potential for Project-specific residual effects to interact with the effects of other projects and activities; and if the Project does interact cumulatively with other actions, (3) assessing the significance of the resulting overall cumulative effect, and characterizing the Project's contribution to the change in cumulative effects.

7.3.8.1 Stage 1, Cumulative Effects Context

Kitimat has a long history of industrial activity, as evidenced by the former Methanex/Cenovus terminal and Moon Bay Marina footprints and ongoing Rio Tinto Alcan and forestry activities. Industrial development in Kitimat is expected to expand rapidly in the near future. In addition to growing port developments, the RSA is experiencing new greenfield and brownfield developments in the LNG, pipeline, aggregate, and forestry sectors. There are approximately 25 other projects in the RSA at various stages of development—operating, approved, proposed, or reasonably foreseeable (see Table 7.3-16). These projects, where they intersect the Project's viewshed, have the potential to result in cumulative effects on visual quality in the facility RSA and the shipping RSA.

Shipping activity in the RSA between 2008 and 2013 amounts to an average of 141 large vessel movements per year (excluding cruise ship movements along Principe Channel; PPA 2013). Assuming a regular distribution of traffic throughout the year, this constitutes, on average, 12 large vessel movements per month through the harbour. Vessel traffic is higher along Principe Channel as a result of cruise ship traffic movements, which resulted in approximately 50 movements in 2013 (CLIA 2013). When cruise ship movements are considered, the frequency of large vessel movements in Principe Channel portion of the marine access route is, on average, 191 large vessel movements per year, or 16 large vessels per month from viewpoints looking onto Principe Channel.

Table 7.3-15: Summary of Project Residual Effects: Visual Quality

Project Phase	Mitigation Measures	Residual Effects Rating Criteria						Likelihood of Residual Effects	Significance	Prediction Confidence	Follow-up and Monitoring
		Magnitude	Geographic Extent	Duration	Frequency	Reversibility	Context				
Facility Works and Activities											
Effect #1: *Reduced visual quality as a result of vegetation clearing, grading and infrastructure development of the LNG facility*											
Construction	Mitigation 7.3-1 Mitigation 7.3-2 Mitigation 5.3-4 Mitigation 5.5.1	L	LSA	ST	C	R	M	H	N	M	N/A
Operation		M	LSA	LT	C	R	M	H	N	M	N/A
Decommissioning		L	LSA	ST	C	R	M	H	N	M	N/A
Residual effect for all phases		**M**	**LSA**	**E**	**C**	**R**	**M**	**H**	**N**	**M**	**N/A**
Shipping Activities											
Effect #1: *Reduced visual quality due to ongoing LNG carrier operations*											
Construction	Mitigation 7.3-3 Mitigation 7.3-4	L	LSA	ST	C	R	L	H	N	M	N/A
Operation		M	LSA	LT	C	R	L	H	N	M	N/A
Decommissioning		L	LSA	ST	C	R	L	H	N	M	N/A
Residual effect for all phases		**M**	**LSA**	**LT**	**C**	**R**	**L**	**H**	**N**	**M**	**N/A**

KEY

MAGNITUDE:

LNG Facility:

N = Negligible—no measurable change in the LSA's average EVC

L = Low—a measurable change in the LSA's average EVC from moderate and high importance viewpoints; but, EVC remains within the baseline VQC, and VQOs are achieved.

M = Moderate—measurable change in the LSA's average EVC from moderate and high importance viewpoints resulting in a change in VQC

H = High—measurable change in the LSA's average EVC from moderate and high importance viewpoints resulting in a change in VQC below partial retention and/or exceeding an established VQO

Marine Access Route:

N = Negligible—no measurable change in viewing conditions

L = Low—on average, views of a Project LNG carrier from viewpoints of moderate or high importance are improbable, the duration would be brief and the prominence would be low, moderate, or high

M = Moderate—on average, views of a Project LNG carrier from viewpoints of moderate or high importance would be probable, the duration would be moderate, and the prominence would be moderate

H = High—on average, views of a Project LNG carrier from viewpoints of moderate or high importance would be highly probable, the vessel would be visible for an extended duration, and the prominence would be moderate or high

GEOGRAPHIC EXTENT:

LSA—effects extend into the LSA

RSA—effects extend into the RSA

DURATION:

ST = Short-term—measurable for the construction phase of the Project

MT = Medium-term—measurable for longer than the construction phase but shorter than the life of the Project

LT = Long-term—measurable for the life of the Project

E = Extended— measurable beyond the life of the Project

P = Permanent—measurable parameter unlikely to recover to baseline

FREQUENCY:

S = Single event—effect occurs once over the life of the Project

MI = Multiple irregular event—effect occurs at sporadic intervals

MR = Multiple regular event—effect occurs on a regular basis and at regular intervals

C = Continuous—effect occurs continuously through life of the Project

REVERSIBILITY:

R = Reversible—residual effect will recover after Project closure and reclamation

I = Irreversible—residual effects are permanent

CONTEXT:

L= Low resilience— low capacity for the VC to recover from a perturbation, with consideration of the baseline level of disturbance

M = Moderate resilience—moderate capacity for the VC to recover from a perturbation, with consideration of the baseline level of disturbance

H = High resilience—high capacity for the VC to recover from a perturbation, with consideration of the baseline level of disturbance.

SIGNIFICANCE:

S = Significant

N = Not Significant

PREDICTION CONFIDENCE:

Based on scientific information and statistical analysis, professional judgment and effectiveness of mitigation, and assumptions made.

L = Low level of confidence

M = Moderate level of confidence

H = High level of confidence

LIKELIHOOD OF RESIDUAL EFFECT:

Based on professional judgment

L = Low likelihood that there will be a residual effect

M = Moderate likelihood that there will be a residual effect

H = High likelihood that there will be a residual effect

Table 7.3-16: Potential for Cumulative Effects on Visual Quality

Other Projects and Activities with Potential for Cumulative Effects	Potential Cumulative Effects	
	Reduction in Visual Quality, LNG Facility	**Reduction in Visual Quality, Marine Access Route**
Kitimat Area Project/Facility		
Coastal GasLink Pipeline Project	✓	
Douglas Channel LNG Project (also known as BC LNG)	✓	✓
Enbridge Northern Gateway Project	✓	✓
Former Eurocan Pulp and Paper Co. Site	✓	
Former Methanex/Cenovus Terminal	✓	✓
Former Moon Bay Marina (footprint only)	✓	
Kitimat LNG Terminal Project	✓	✓
MK Bay Marina	✓	✓
Pacific Northern Gas Pipeline (includes proposed looping)	✓	
Pacific Trail Pipelines Project	✓	
Rio Tinto Alcan Facility and Modernization Project	✓	✓
Sandhills Materials – Aggregate Processing	✓	
Prince Rupert Area Project/Facility		
BG Group – Prince Rupert LNG Project		✓
Canpotex – Potash Export Terminal		✓
Maher Terminals – Fairview Terminal Phase 2 Expansion Project		✓
Pinnacle Renewable Resources – Pellet Export Terminal		✓
Prince Rupert Grain Terminal		✓
Prince Rupert Port Authority –Ridley Island Road, Rail Utility Corridor		✓
Progress Energy – Pacific Northwest LNG Project		✓
Ridley Terminal Inc.		✓
Watco – Watson Island Re-Development		✓
Activities		
BC Ferries		✓
Cruise Ships		✓
Forestry Activities	✓	✓
Fishing and Aquaculture Activities		✓

NOTES
✓ = those 'other projects and activities' whose effects have potential to interact cumulatively with the Project's residual effects.

7.3.8.2 Stage 2, Determination of Potential Cumulative Interactions

The residual effects on visual quality from LNG facility development and LNG carrier traffic along the marine access route have the potential to act cumulatively with the projects listed in Table 7.3-16. The projects located in the port of Kitimat will contribute to changes in vegetation patterns and topography and will introduce new industrial projects with associated increase large vessel traffic along the marine access route. The alterations and increased traffic will change the visual quality from viewpoints of importance in the facility RSA and shipping RSA.

7.3.8.3 Stage 3, Determining Significance of Cumulative Effects

The Project's contribution to cumulative effects on visual quality in the facility RSA is assessed as not significant because 1) the EVC of the facility LSA is currently maximally modified from identified viewpoints of importance (much of this associated with forestry cutblocks, which are not permanent effects) and 2) the combined visual effects of the projects will not exceed any established VQOs,

The Project's LNG carrier traffic, together with traffic from the other operating, approved, and reasonably foreseeable projects, is predicted to result in a fundamental change in the frequency and duration with which large vessels are visible from viewpoints in the shipping RSA. However, the cumulative effects on visual quality in the shipping RSA are assessed as not significant because of the following reasons:

- The prominence of large vessels travelling in the shipping RSA is predicted to be low to moderate.
- Effective communications can be used to enable other users to reduce unwanted views of large vessels along their travel route, including LNG carriers.

7.3.8.4 Summary of Cumulative Effects

Proposed or reasonably foreseeable projects in the RSA may contribute to additional changes in vegetation patterns and topography, as viewed from identified viewpoints.

The shipping requirements of the Project and other operating, approved, proposed, and reasonably foreseeable projects in the shipping RSA will reduce visual quality because of increased frequency and duration of large vessels that are visible from viewpoints of importance in the shipping RSA.

Various land and marine management plans are currently being developed as a result of collaborative efforts between provincial and federal governments and Aboriginal Groups. Aboriginal Groups could provide future management direction relating to future large vessel use and activities in the shipping RSA, including effects on visual quality. See Table 7.3-17 for a summary of cumulative effects on visual quality.

Table 7.3-17: Summary of Cumulative Effects on Visual Quality

Effects	Other Projects, Activities and Actions	Cumulative Effects Characterization					
		Magnitude	Geographic Extent	Duration	Frequency	Reversibility	Context
Facility Works and Activities							
Cumulative reduced visual quality related to the LNG facility							
Cumulative effects with the Project and other projects, activities and actions ▪ Past and present developments have affected visual quality from identified viewpoints in the Kitimat area. The proposed Project, along with reasonably foreseeable projects within the RSA, may contribute to additional changes in vegetation patterns and topography, and the addition of facilities and associated infrastructure, as viewed from identified viewpoints	▪ Coastal GasLink Pipeline Project ▪ Douglas Channel LNG Project (also known as BC LNG) ▪ Enbridge Northern Gateway Project ▪ Former Eurocan Pulp and Paper Co. Site ▪ Former Methanex/Cenovus Terminal ▪ Former Moon Bay Marina (footprint only) ▪ Kitimat LNG Terminal Project ▪ MK Bay Marina ▪ Pacific Northern Gas Pipeline (includes proposed looping) ▪ Pacific Trail Pipelines Project ▪ Rio Tinto Alcan Facility and Modernization Project ▪ Forestry Activities	M	RSA	LT	C	R	L
Contribution from the Project to the overall cumulative effect ▪ The Project may contribute to additional changes in vegetation patterns and topography, and the addition of facilities and associated infrastructure, as viewed from identified viewpoints		M	LSA	LT	C	R	M

Effects	Other Projects, Activities and Actions	Cumulative Effects Characterization					
		Magnitude	Geographic Extent	Duration	Frequency	Reversibility	Context
Shipping Activities							
Cumulative reduced visual quality related to LNG carriers in the marine access route							
Cumulative effects with the Project and other projects, activities and actions ▪ The shipping requirements of the Project and other operating and reasonably foreseeable projects in the shipping RSA could reduce visual quality because of increased frequency and duration of large vessels that are visible from viewpoints of importance in the shipping RSA	▪ Douglas Channel LNG Project (also known as BC LNG) ▪ Enbridge Northern Gateway Project ▪ Former Methanex/Cenovus Terminal ▪ Kitimat LNG Terminal Project ▪ MK Bay Marina ▪ Rio Tinto Alcan Facility and Modernization Project ▪ BG Group – Prince Rupert LNG Project	M	RSA	LT	C	R	L
Contribution from the Project to the overall cumulative effect ▪ The shipping requirements of the Project could reduce visual quality because of increased frequency and duration of large vessels that are visible from viewpoints of importance in the shipping RSA	▪ Canpotex – Potash Export Terminal ▪ Maher Terminals – Fairview Terminal Phase 2 Expansion Project ▪ Pinnacle Renewable Resources – Pellet Export Terminal ▪ Prince Rupert Grain Terminal ▪ Prince Rupert Port Authority –Ridley Island Road, Rail Utility Corridor ▪ Progress Energy – Pacific Northwest LNG Project ▪ Ridley Terminal Inc. ▪ Watco – Watson Island Re-Development ▪ BC Ferries ▪ Cruise Ships ▪ Forestry Activities ▪ Fishing and Aquaculture Activities	M	LSA	LT	MR	R	L

KEY

MAGNITUDE:

LNG Facility:

N = Negligible—no measurable change in the LSA's average EVC

L = Low—a measurable change in the LSA's average EVC from moderate and high importance viewpoints; but, EVC remains within the baseline VQC, and VQOs are achieved.

M = Moderate—measurable change in the LSA's average EVC from moderate and high importance viewpoints resulting in a change in VQC

H = High—measurable change in the LSA's average EVC from moderate and high importance viewpoints resulting in a change in VQC below partial retention and/or exceeding an established VQO

Marine Access Route:

N = Negligible—no measurable change in viewing conditions

L = Low—on average, views of a Project LNG carrier from viewpoints of moderate or high importance are improbable, the duration would be brief and the prominence would be low, moderate, or high

M = Moderate—on average, views of a Project LNG carrier from viewpoints of moderate or high importance would be probable, the duration would be moderate, and the prominence would be moderate

H = High—on average, views of a Project LNG carrier from viewpoints of moderate or high importance would be highly probable, the vessel would be visible for an extended duration, and the prominence would be moderate or high

GEOGRAPHIC EXTENT:

LSA—effects extend into the LSA

RSA—effects extend into the RSA

DURATION:

ST = Short-term—measurable for the construction phase of the Project

MT = Medium-term—measurable for longer than the construction phase but shorter than the life of the Project

LT = Long-term—measurable for the life of the Project

E = Extended— measurable beyond the life of the Project

P = Permanent—measurable parameter unlikely to recover to baseline

FREQUENCY:

S = Single event—effect occurs once over the life of the Project

MI = Multiple irregular event—effect occurs at sporadic intervals

MR = Multiple regular event—effect occurs on a regular basis and at regular intervals

C = Continuous—effect occurs continuously through life of the Project

REVERSIBILITY:

R = Reversible—residual effect will recover after Project closure and reclamation

I = Irreversible—residual effects are permanent

CONTEXT:

L= Low resilience— low capacity for the VC to recover from a perturbation, with consideration of the baseline level of disturbance

M = Moderate resilience—moderate capacity for the VC to recover from a perturbation, with consideration of the baseline level of disturbance

H = High resilience—high capacity for the VC to recover from a perturbation, with consideration of the baseline level of disturbance.

SIGNIFICANCE:

S = Significant

N = Not Significant

PREDICTION CONFIDENCE:

Based on scientific information and statistical analysis, professional judgment and effectiveness of mitigation, and assumptions made.

L = Low level of confidence

M = Moderate level of confidence

H = High level of confidence

LIKELIHOOD OF RESIDUAL EFFECT:

Based on professional judgment

L = Low likelihood that there will be a residual effect

M = Moderate likelihood that there will be a residual effect

H = High likelihood that there will be a residual effect

The Project's contribution to cumulative effects on visual quality in the facility RSA is assessed as not significant because of 1) the maximally modified nature of the LSA and 2) the combined visual effect from the projects will not exceed any established VQOs.

The Project's contribution to cumulative effects on visual quality in the shipping RSA are assessed as not significant because of 1) the low to moderate prominence of LNG carriers and 2) effective communications can help Aboriginal Groups and stakeholders to adjust their schedules or routing in order to reduce unwanted views of large vessels, including LNG carriers.

7.3.9 Prediction Confidence and Risk

Confidence in the conclusion that the contribution of residual effects from the LNG facility will be not significant is moderate because the potential overlapping effects of associated vegetation and landscape alteration, and infrastructure development from proposed and foreseeable projects are not detailed enough to be cumulatively assessed. In addition, much of the current landscape disturbance is associated with forestry cutblocks, and will reach VEG in the future, thereby increasing the visual quality of the LSA while other industrial developments will likely decrease the visual quality of the LSA.

Confidence in the conclusion that the contribution of residual effects from LNG shipping will be not significant is moderate. While the District of Kitimat's OCP and the KLRMP support industrial development (MLFNRO 2002; District of Kitimat 2013) as long as the design maintains visual quality, the existing draft policies related to the shipping RSA express the intent to expand tourism and ecotourism activities, which may not be compatible with LNG carrier or other large vessel traffic along the marine access route. In addition, the public and Aboriginal Groups' thresholds of acceptance regarding frequency and duration of encounters with large vessels are not well understood.

7.3.10 Follow-up Program and Compliance Monitoring

No follow-up and monitoring programs are proposed for visual quality.

7.3.11 Summary of Mitigation Measures

LNG Facility

- A minimum 30 metre (m) wide mature riparian vegetation buffer will be maintained between the Project site and the Kitimat River, where practicable. If required, disturbance would be reduced and adhere to applicable regulatory process. (Mitigation 7.3-1).

- Tree and vegetation clearing for the Project components will be reduced to the extent possible outside of the Project footprint but some clearing may be required to enable construction. Where temporary tree and vegetation clearing occurs during construction, revegetation activity will occur as soon as possible (with the exception of areas cleared within the safety zone) (Mitigation 7.3-2).
- Footprint for LNG facility and temporary construction facilities will be sized to allow safe and efficient construction. Existing cleared areas will be utilized, where practicable, to reduce area of new disturbance (Mitigation 5.3-4).
- The approved clearing boundaries will be clearly delineated (flagged) prior to site preparation to keep clearing activities within the designated Project footprint (Mitigation 5.5-1).

Marine Access Route

- Project-related marine traffic including LNG carriers will use the Coast Guard Marine Communication and Traffic System (MCTS) to provide notice of planned arrival time at Triple Island, and encourage Aboriginal Groups and stakeholders to use the system to plan their routing and scheduling (Mitigation 7.3-3).
- No planned anchoring for the LNG carriers along the marine access route (unless directed to do so by BC Coast Pilots due to weather or other unplanned conditions); LNG carriers will only be permitted to enter the marine access route if a berth at the terminal will be available (Mitigation 7.3-4).

7.3.12 Conclusion

7.3.12.1 LNG Facility

Despite the long history of industrial development and its continued expansion in the LSA, the landscape characteristics of the LSA, including its rugged topography, diverse vegetation, and views of water, combine to create a unique and visually appealing landscape that is important to residents, Aboriginal Groups, tourism operators, and recreation users from Kitimat and beyond.

The Project will be built on private land in an area zoned for industrial development. Both the Kitimat OCP and the KLRMP identify the future land use of the site of the Project as industrial (MLFNRO 2002; District of Kitimat 2013). These land use plans provide direction to limit the effects of industry on scenic quality given its importance to quality of life in Kitimat and the potential to attract tourists.

The Project site will be visible from the communities of Kitimat and Kitamaat Village, popular terrestrial and marine recreation areas, and Aboriginal Groups' traditional use areas that are used or have been identified through land-use plans as having potential to support future tourism and recreation development and use. Recreational viewing of scenery is an important attraction for many of the studied viewpoints, and viewers have expectations that visual quality from those viewpoints will be maintained.

The facility LSA is visually sensitive and has a limited ability to absorb human modifications. Considerable existing human disturbance is visible throughout the LSA. The average EVC of all assessed VSUs is 28.1%, or maximum modification. VSUs closer to a facility tend to have greater levels of disturbance than VSUs located farther away. The Project will intersect areas with established VQOs of modification and partial retention.

At full build-out, the Project will have a minimal effect on visual quality in the LSA; VSUs with established VQOs will be achieved.

Current and reasonably foreseeable projects in the RSA may contribute to cumulative changes in vegetation patterns and topography, as viewed from identified viewpoints. The Project's contribution to cumulative effects on visual quality in the facility RSA is assessed as not significant because of 1) the maximally modified nature of the LSA and 2) the combined visual effect of projects will not exceed any established VQOs. Confidence in this conclusion is moderate because the potential overlapping effects of associated vegetation and landscape alteration, and infrastructure development from proposed and foreseeable projects are not detailed enough to be cumulatively assessed.

7.3.12.2 Shipping

The shipping LSA includes a high degree of topographic variety, varied vegetation patterns, and expansive views of water, which create a distinct and visually appealing landscape. As a whole, the LSA has limited human intervention, although recent and historical forest harvesting, occasional human settlement, and several large industrial developments near Prince Rupert and Port Edward are evident. The CLUDI, PNCIMA, MaPP and Lax Kw'alaams Laxyuup plans recognize the importance of visual quality to traditional use sites and to tourism and recreation, and, in general, indicate the need to retain visual quality along the marine access route.

Marine traffic varies throughout the LSA, with smaller local fishing boats, recreational vessels, and whale-watching vessels interspersed with large cruise ships and ferries throughout much of the shipping LSA and carriers transporting aluminum, grain, chemicals, shipping containers, coal, or other cargo near Prince Rupert and Kitimat.

Currently, large vessel movements are infrequent in the LSA but are expected to increase considerably once the Project becomes operational and to a much greater extent in combination with other projects that have a shipping component. In Douglas Channel, large vessel movements are expected to increase from 12 per month to 70 per month. In Principe Channel, large vessel movements are expected to increase from 16 per month to 74 per month. Many viewpoints in the shipping LSA have long and relatively unobstructed views of the marine access channel. At full build-out of the Project, the combined

monthly duration of vessel viewing is predicted to increase from between 8 and 65 hours per month, with an average of 36 hours per month.

Considering the distance between the viewpoints and the marine access route, the prominence of the LNG carriers is anticipated to be moderate to low. Although the Project will result in increases in the frequency and duration of large vessel movements in the shipping LSA, the average duration is 1.4 hours per day and the carriers will, on average, not be close enough to the viewpoints to dominate a person's central field of view.

The shipping requirements of the Project and other operating, approved, proposed, and reasonably foreseeable projects in the shipping RSA could reduce visual quality because of increased frequency and duration of large vessels that are visible from viewpoints of importance in the shipping RSA. Various management plans are currently in development that may provide future management direction relating to future large vessel use and activities in the shipping RSA. Cumulative effects on visual quality in the shipping RSA are assessed as not significant because of the anticipated low to moderate prominence of LNG carriers, and because effective communications can enable Aboriginal Groups and stakeholders traveling along the marine access route to reduce unwanted views of large vessels, including LNG carriers. However, confidence in this conclusion is moderate due to the potential incompatibility of tourism and ecotourism interests and LNG carrier or other large vessel traffic. In addition, Aboriginal Groups' and stakeholders' thresholds of acceptance regarding frequency and duration of encounters with large vessels are not well understood.