

## Executive Summary

Zero Emission Energy Developments, Inc. (ZED) is proposing the development of the Pennask Wind Power Project with up to 15 MW of installed capacity. The Project is located approximately 44 km west of Kelowna, BC.

The proposed project will consist of seven 2.0MW wind turbine generators manufactured by Vestas. The proposed permanent footprint of the project will be less than 11 Hectares (ha). Based on preliminary engineering design, temporary and permanent footprint of the key projects components are presented in Table 1.1-1. The General License of Occupation (GLOO) area covers approximately 502 ha, while the Investigative Use Permit (IUP) area covers approximately 3,094 ha.

The geographical maps below show the project location and layout in more details.

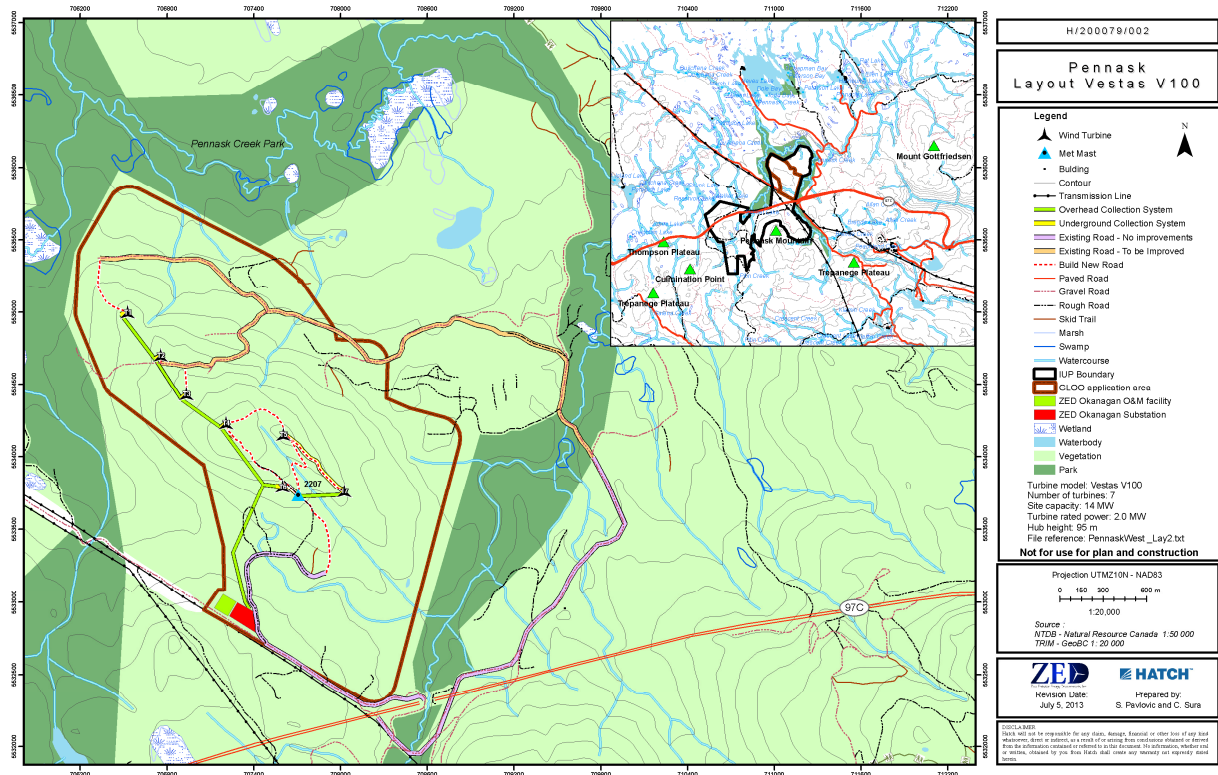


Figure 1.1-1: Overview Map of Project Area showing project location

ZED - Pennask Wind Project  
Development Plan

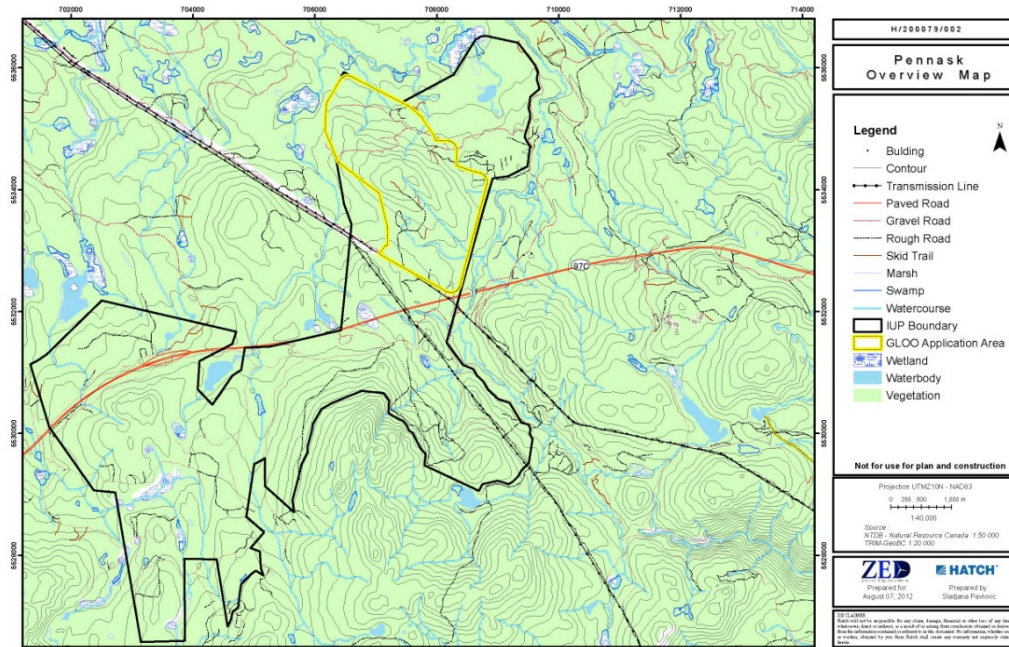


Figure 1.1-2: Overview of Project area showing IUP and GLOO

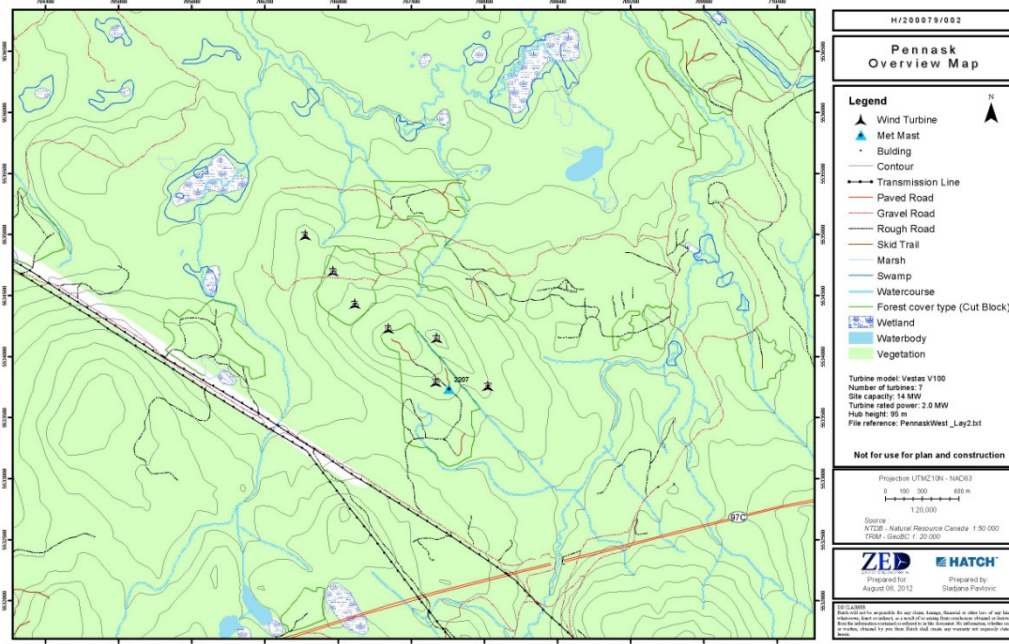


Figure 1.1-3: Overview Map of Project Area (1:20 000)

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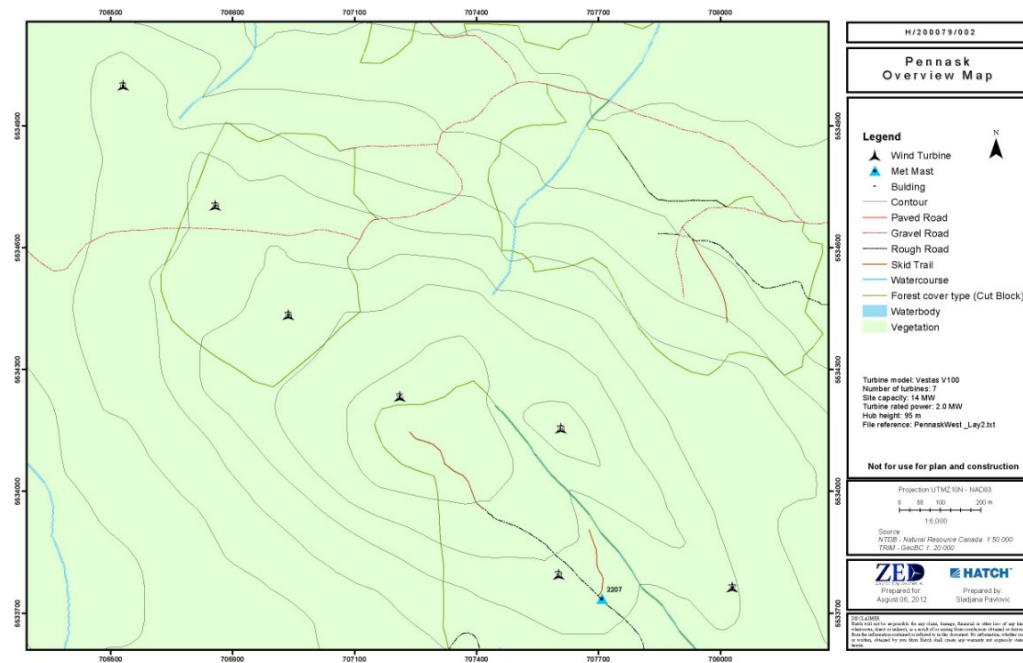


Figure 1.1-4: Overview Map of Project Area (1:6 000)

Table 1.1-1: Summary of Project disturbances for key components

Pennask - Project components	Number/length	Temporary disturbance (m <sup>2</sup> ) during construction	Permanent Disturbance (m <sup>2</sup> ) during operation of wind farm after land reclamation	Comment
<b>Wind Turbines</b>	no.	2,500 m <sup>2</sup> /per turbine	500 m <sup>2</sup> /per turbine	
Wind Turbine Generator	7	17,500	3,500	
<b>Total for 7 turbines (m<sup>2</sup>)</b>		<b>17,500</b>	<b>3,500</b>	
<b>Roads</b>	length (m)	18m width	5m width	
Existing roads that do not need improvement	5,642	-	-	
Existing Roads that need improvement	5,477	98,600	27,400	
New Roads	3,913	70,400	19,600	
<b>Total for roads (m<sup>2</sup>)</b>		<b>169,000</b>	<b>47,000</b>	



Collection Network	length (m)	20 m (underground)/ 30 m (overhead)	2 m (underground)/ 15m (overhead)	
Underground collection network	1,038	20,750	2,100	630 m of underground collection line will be installed along new road
Overhead collection network	2,880	86,400	43,200	
<b>Total for collection network (m2)</b>		<b>107,150</b>	<b>45,300</b>	
<b>Other components</b>	no.			
Substation	1	19,600	3,000	
O&M facilities	1		10,000	Area used as Laydown area during construction will be converted in O&M facility towards the end of construction
Laydown area	1	12,200		
<b>Total for other components (m2)</b>		<b>31,800</b>	<b>13,000</b>	
<b>Total for all components (ha)</b>		<b>32.5</b>	<b>10.9</b>	Actual disturbance areas should be smaller as overlapping areas of disturbance for components have been considered separately in this table.

The wind turbines proposed for the project are manufactured by a tier 1 company. The turbine model selected has an extensive operational track record in North America and Canada. The proposed wind turbines are of proven technology and of the typical size and height that comply with IEC 61400-12 standards. The turbine positions are in the process of being permitted by Transport Canada that sets the requirements for color and markings for each unit. The turbines will be painted military grade off white color and equipped with obstruction lights according to Canadian Aviation Regulations (CARs) 2012-1 (Standard 621), on the direction of Transport Canada. The collection network, electrical lines that collect electricity from turbines and connect to substation, will be constructed on wooden poles of typical height between 12m and 15m, and may deviate from this typical height at some places due to terrain constraints.

Note that the met tower shown on Figure 1.1-1 will be removed prior to construction. Potentially, a new permanent Met tower will be constructed at the site to collect reference data during the operation of the wind farm. The need and location of permanent Met tower will be confirmed at later date, based on discussions with BC Hydro and the turbine vendor.

## **Key Impact Issues**

### **Aquatic Environment**

The primary pathways of effects on the Aquatic Environment are related to: installation of one new culvert at a new road crossing and one new culvert at an existing road crossing; upgrades to three existing culverts (i.e., widening) at existing road crossings; new culvert installations where necessary as dictated by terrain and water flows; installation of the overhead collection line; the potential for erosion and sedimentation of local watercourses as a result of land clearing and road construction activities; and the potential for spills of hydrocarbons or lubricants into local watercourses. These effects have a potential to occur during Construction or Decommissioning Phases of the Project. Potential effects will be mitigated to the extent possible by adhering to the Terms and Conditions of Fisheries and Oceans Canada (DFO) Operational Statement for Overhead Line Construction (Pacific Region Version 3.0); adhering to the Fish-stream Crossing Guidebook (BC MFLNRO, BC MOE and DFO 2012) and the provincial Forest Planning and Practices Regulation (Part 5) specifications for the construction of new stream crossings (Province of BC 2004); and implementation of the following Construction Environmental Management Plans (CEMPs): Erosion and Sediment / Soil Management Control Plan (#4), Spill Prevention and Emergency Response (#8), and Landscape Design and Restoration Plan (#11).

### **Terrestrial Environment**

The primary pathway of effects on the Terrestrial Environment during Construction is largely related to land clearing that has the potential to disturb or remove habitat and can cause sensory disturbance. The potential remains for sensory disturbance to cause habitat abandonment or alienation of some bird species (particularly the blue-listed, and federally “Threatened” olive-sided flycatcher, and northern goshawk, a regional species of concern) during Construction and Operations. However, the effects are expected to be low due to the existing timber harvesting disturbances that have been undertaken to manage beetle-killed timber in the area. The remaining residual effects of the Project during Operations are largely limited to collisions or other effects on bats (barotrauma) and birds, including avian Species-at-risk such as olive-sided flycatcher, northern goshawk, and sandhill crane as a result of operation of wind turbines.

The significance of residual effects of turbine operation on local bird, bat, and avian Species at-Risk (i.e., mortality and habitat avoidance) is uncertain, and therefore, will be subject to an Operational Environmental Management Plan (OEMP) following the principles of Adaptive Management. Additional mitigation measures to reduce effects on wildlife to the extent possible during Construction include implementation of the Human-Wildlife Conflict Management Plan (#14) and Landscape Design and Restoration Plan (#11). Potential effects on wetlands will be mitigated by the implementation of relevant federal and provincial best management practices (BMPs) for overhead line construction and culvert installation as well as CEMPs for Erosion and Sediment / Soil Management Control Plan (#4), Air Quality and Dust Control (#1), Spill Prevention and Emergency Response (#8), and the Landscape Design and Restoration Plan (#11).

### **Socio-Economic Environment /Land Use**

The primary pathway of effects on the Socio-Economic environment is associated with the presence of a small temporary workforce during the Construction phase and the potential for nuisances such as construction traffic and detours. During the approximate 16 month Construction phase, the anticipated number of persons directly employed on the Project will range between 5 and 80, including activities associated with road construction and upgrades. The Project's direct employment will total an estimated 37 person-years (PYs) during its Construction phase.

Most employment could be sourced within the region; however some of the positions related to turbine assembly are specialized and may need to be sourced outside of the Province or through the turbine manufacturer. During the Operations phase, the Project will employ approximately 10 (full-time and part-time) workers per year. The regional study area is well populated and serviced and an increase of approximately 10 individuals, even if they brought their families, would not stress nearby communities. Economic benefits of the Project will be modest given the size of the local economy and the modest number of Operations phase employment positions.

ZED will formulate a purchasing strategy to source goods and services based on local capacity and capabilities, thereby enhancing local economic benefits.

During Construction and Operations, population effects are predicted to be negligible. Effects on labour market and business opportunities will be positive but modest.

### **Health**

The primary pathways of effects on human health are limited to the Construction and Operation of the project infrastructure, including the wind turbines.

During Construction and Operations, there is the potential for personal injury as a result of hazards associated with recreational activities; industrial accidents at adjacent sites; and traffic accidents. Proposed mitigation measures include the development of a comprehensive safety plan, providing other land users with project information so they are aware of upcoming construction work, and providing fencing and signage at access points with a 1-800 contact number for ZED.

It is anticipated that there will be minimal residual traffic impacts. Proposed measures to mitigate traffic impacts include the development of a comprehensive traffic management plan for each stage of construction.

Noise impacts from the operation of the turbines is considered to be at a low level, as the closest residential dwelling being approximately 10.5 km from the closest turbine. There is however, the need to address equipment noise during construction. These measures will include maintaining specific construction hours as possible. During Operations, turbine-generated noise will be maintained at a level that is keeping with the requirements of the Crown Land Use Operational Policy: Wind Power Projects (amended August 15, 2010), which is below 40 dB at the closest permanently occupied year round residence.

Ice throw and ice shed can pose a danger to people in proximity of the turbines. To mitigate this residual effect, the turbines have been located at a safe setback distance from any occupied structure, road or public area. Additional measures will include providing warning signs and the turbine operations and maintenance team following approved turbine manufacturer operations and maintenance safety guidelines when servicing turbines in potential icing scenarios. The turbines will have a remotely operated automatic shutdown feature to allow management to take discretionary actions to manage turbine operation, including deactivating a turbine, for safety reasons, in the event of a weather related or other event.

Potential structural hazards include full or partial blade failure and turbine collapse. Mitigation measures include the implementation and execution of a regular maintenance schedule, the development and enforcement of health and safety plans and the establishment of emergency response procedures to transfer injured individuals to the nearest treatment centre in the event of a structural failure.

### **Land and Resource Use**

In terms of Land Use, the Project is consistent with local and regional resource objectives and land use plans including: the Thompson-Nicola Regional District (TNRD), Regional District of Okanagan – Similkameen (RDOS), and Regional District of Central Okanagan (RDCO) Official Community Plans, bylaws, and policies; the Okanagan-Shuswap Land and Resource Management Plan (LRMP); and directions and guidelines pertaining to Provincially designated protected areas, reserves and land use.

The LSA is adjacent to and overlaps various Crown land tenures and resource values including three registered forest licenses (much of which has been harvested to remove the beetle-killed timber); 57 mineral and placer claims, 1 placer reserve and 2 aggregate extraction tenures. The LSA overlaps four snowmobile trails, one Limited Entry Hunting Moose Zone, one guide outfitter territory, and four registered trapline areas. There are 14 units of recreation features as identified in the Recreational Features Inventory, and 42 Visual Quality Objectives units as identified by the Okanagan-Shuswap LRMP.

Other Crown tenures overlapping the LSA include one lease for recreational residential, and two licences of occupation (communication and wind power). These adjacent or overlapping Crown land tenures and resource values are potentially affected through the placement of Project components and changes to the access to, or use of, these Crown resources. Crossing and proximity agreements with tenure holders are in progress and will be obtained prior to Construction. A protected area (Pennask Creek Provincial Park) lies within the LSA but there is no overlap between it and the Project's General Licence of Occupation.

The significance of residual effects on aesthetic and visual resources is considered to be at a low-medium level. During the Operations phase of the Project, wind turbine operation, including the towers and their rotating blades, will have an impact on the visual character of the project area. The visibility of the turbines will depend on a number of factors, including the position of the observer/receptor, weather conditions, the topography, paint and finish of turbines, towers and

turbine markings (lighting which affects nighttime visibility). Visual simulations from three representative view points in the vicinity have been completed.

With respect to Navigation, Transportation, and Access, the layout of turbines, collection line routes, and access roads was planned to minimize potential effects on the natural environment (which includes navigable waters), and constitutes a negligible difference to the existing network of roads and cleared rights-of-way access.

### **Archaeological Resources**

The LSA has been identified as containing archaeological sites and areas of archaeological potential. Activities associated with the Construction Phase that modify the ground surface have the potential to affect Archaeological Resources. A Heritage Conservation Act (*HCA*)-permitted Archaeological Impact Assessment (*AIA*) will be conducted as a mitigation measure prior to the Construction Phase of the Project. The *AIA* will evaluate whether the Project components that constitute the Site Study Area (*SSA*), will affect Archaeological Resources. Mitigation to reduce adverse effects on archaeological sites encountered could include avoidance of these resources, systematic data recovery, archaeological construction monitoring, or a combination of these options. In addition, mitigation and protocols have been outlined that recognize the importance of Archaeological Resources that could be encountered during the Construction Phase. A reporting protocol for unanticipated archaeological finds identified during the Construction Phase will be followed as per the Archaeological Chance Find Management Plan (*ACFMP*).

### **Estimated Project benefits**

The Project will positively affect employment but this effect will be modest given the project's short construction period and small amount of direct employment relative to the large construction labour forces in the RDOS and TNRD. Similarly, income generation will be positively affected. Fiscal benefits to governments at local and provincial levels will be registered at a low to moderate magnitude and opportunities for local businesses at a moderate magnitude.

The Project's direct employment will total an estimated 37 person-years (*PYs*) during its Construction phase. Project employment levels will range from 5 to 80 persons over the course of the Construction phase, peaking when the turbine towers are erected and commissioned. During the Operation phase, Project employment is estimated at approximately 10 (full-time and part-time) workers per year. A project employment estimate has not been made for the Decommissioning phase which is estimated to be around the year 2040. The estimated capital cost for construction is \$31.5 M including turbines and balance of plant.

### **Conclusion from environmental and socio-economic assessments**

For the consideration of the Responsible Authorities, it is the opinion of Zero Emission Energy Developments, Inc. at the time of review that the Project is not likely to cause significant adverse environmental, socio-economic, or community effects, taking into account the implementation of appropriate mitigation measures, as identified in the Development Plans (*DP's*) "Table of Proposed Commitments for the Pennask Wind Power Project". Additional reporting relating to



this DP is forthcoming, and will include completion of the Archaeological Impact Assessment (AIA) and a Metal Leaching and Acid Rock Drainage (ML/ARD) Assessment.

### **First Nations Engagement and Communications**

ZED understands that the land has significant importance to the First Nations and Aboriginal interests must be respected. As a result, ZED has considered the potential project impacts on First Nations interests based on the use of the land and the resources within the vicinity of the Project.

During the engagement process with First Nation's, ZED's goal is to understand the nature of the interests and to determine how those interests may be reasonably accommodated within the scope of the Project.

ZED has, as directed by the Province, informed the following First Nations about the Project in September 2011:

1. Shackan Indian Band;
2. Nooaitch Indian Band;
3. Coldwater Indian Band;
4. Nicola Tribal Council (comprised of the Upper Nicola Band, Coldwater Indian Band, Cook's Ferry Indian Band, Nicomen Indian Band, Shackan Indian Band, and Siska Indian Band);
5. Nlaka'pamux Nation Tribal Council (comprised of Ashcroft Indian Band, Boothroyd Band, Boston Bar Band, Kanaka Bar Indian Band, Lytton First Nation, Oregon Jack Creek Band, Skuppah Indian Band, Spuzzum First Nation);
6. Lower Nicola Indian Band;
7. Westbank First Nation;
8. Penticton Indian Band; and
9. Upper Nicola Band.

No response was received from the Shackan Indian Band, Nooaitch Indian Band, Coldwater Indian Band or the Nlaka'pamux Nation Tribal Council. The Nicola Tribal Council acknowledged by way of letter that they had received and reviewed the Pennask Preliminary Field Reconnaissance Report.

ZED met with representatives of the Lower Nicola Indian Band in October 2011 and informed them about the Project. ZED representatives made further efforts to connect with LNIB but were unable to receive further direction or input from LNIB. In subsequent discussions with representatives of the Province, it was agreed that the Province did not require any further efforts at this time by ZED. Based on direction received from the Okanagan Nation Alliance, ZED is aware that deep engagement should be undertaken with UNB and WFN.

Discussions regarding potential impacts to Aboriginal interests remain ongoing and both communities are now completing Aboriginal Interest and Use Studies. Based on this information, ZED may decide to adjust the Project design to avoid or mitigate identified interests. ZED is also committed to entering into a Benefits Agreement with these two First Nations. Discussions on this understanding are progressing well and ZED is hopeful that the agreement will be executed by the Fall of 2013.

ZED believes that the Project design and proposed mitigation measures (see Section 10 “Summary of Commitments and Conclusions”) will reduce the residual risk to First Nations interests. To resolve any outstanding issues raised by First Nations, ZED is continuing its engagement with interested First Nations.

## **Public Consultation and Communications**

### **Overview**

Cornerstone Planning Group and Zero Emission Energy Developments (ZED) designed and have implemented a Public Consultation and Communications Program for the Pennask Wind Power Project. The Program objectives are to:

- Introduce the Pennask Wind Power Project to potentially interested individuals and organizations
- Identify issues that are important to potentially interested individuals and organizations
- Develop relationships with local stakeholders
- Provide a variety of methods for target audiences to submit input
- Document and summarize input for the Development Plan (DP) in support of the General License of Occupation (GLOO) application

Target audiences for the Public Consultation and Communications Program include:

- Local residents (Merritt, Kelowna, West Kelowna, Peachland and residents in the Fraser-Nicola, Penticton, Kelowna-Mission, and Westside-Kelowna Electoral District electoral areas)
- Thompson-Nicola Regional District
- Regional District of Okanagan-Similkameen
- Regional District of Central Okanagan
- Municipal governments (Merritt, Kelowna, West Kelowna, and Peachland)
- Relevant provincial ministries and agencies
- Relevant federal departments and agencies
- Local non-governmental organizations
- Local businesses
- Local oil and gas industries
- Local agriculture/ranching operations
- Local recreation/ecotourism organizations
- Local outfitters
- Local media

- Local Wineries
- Tenure holders
- Adjacent operators

#### Information Distribution Activities

ZED undertook information distribution activities, including advertisements in local newspapers, newsletters to stakeholders, a project open house in the District of West Kelowna on March 5, 2012 and links to a project website ([www.zeroemissiondevelopments.com](http://www.zeroemissiondevelopments.com)) containing project information. Detailed activities are provided in Section 6 of the Development Plan.

#### Summary of Issues Raised

From public consultation efforts to date, ZED received input through a variety of feedback mechanisms. The following table represents a summary of key issues raised during consultation with the public. The nature of an open house event allows for comments to be noted, but not ascribed to specific individuals. A detailed list of issues raised and ZED responses to those issues is provided in Section 6 of the Development Plan.

**Table 1.1-2: Consultation Key Issues Summary**

Group consulted and contact names	Dates of meetings, calls, correspondence	Summary of issue raised and proposed solutions	Mitigative measures adopted/ rationale for not adopting /proponent comments
Open House attendees Correspondence	March 5, 2012  Received November 2011 – May 2012	Interest in employment	ZED will utilize local services and resources wherever possible. ZED is maintaining a Schedule of Contractors who have expressed interest in providing ZED their services and will forward this Schedule to its General Contractor for the Project.
Open House attendees Correspondence	March 5, 2012  Received November 2011 – May 2012	Interest in Project investment opportunities	ZED welcomes discussion regarding potential investment opportunities.
Open House attendees	Project Open House March 5, 2012	Concern regarding potential impact on wildlife and wildlife habitat	The Project's environmental assessment of wildlife and wildlife habitat (Section 4.4.1) identifies any potential impacts the Project may have on within the local study area.
Open House attendees	Project Open House March 5, 2012	Interest in location of project components	Project location, including planned turbine layout, is presented in Section 2.1.2.
Open House attendees	Project Open House	Potential impacts to local environment	The Project's environmental assessment identifies any potential impact the

Group consulted and contact names	Dates of meetings, calls, correspondence	Summary of issue raised and proposed solutions	Mitigative measures adopted/ rationale for not adopting /proponent comments
	March 5, 2012		Project may have on protected areas within the local study areas. These assessments will be included in the Development Plans as part of the General License of Occupation applications to the Ministry of Forests, Lands and Natural Resource Operations.
Open House attendees	Project Open House March 5, 2012	Concern regarding project impacts on recreational activities	ZED will consult with recreational user groups and clubs wherever possible to identify and address Project access and security in its Socio-economic assessment.

#### Agency Consultation

ZED Project representatives consulted with key agencies, organizations and institutions regarding environmental assessment, and required approvals/permits during early Project development, including:

- Ministry of Forests, Land and Natural Resource Operations  
Ministry of Environment
- Environment Canada – Canadian Wildlife Service
- BC Parks, Kootenay Okanagan Region
- Thompson-Nicola Regional District
- District of West Kelowna
- Transport Canada
- NAV Canada

Topics discussed in communication with these agencies meetings related primarily to anticipated information requirements for the Development Plan including: wildlife habitat areas, migratory routes, wildlife surveys, valued ecosystem components (VECs), Archaeological Impact Assessments, the provision of maps, zoning, government consultation processes and area tenure holders. Key agency issues are identified in detail in Section 4 of the Development Plan.