

Denman Island Avoided Conversion of Forestlands Project

A Project Design Document for Validation under the Climate Community and Biodiversity Standard – Second Edition

May 8, 2012



Table of Contents

- General..... 6
 - G1. Original Conditions in the Project Area 6
 - General Information 6
 - G1.1 Location of the Project and Basic Physical Parameters..... 6
 - G1.2 Types and Condition of Vegetation within the Project Area..... 9
 - G1.3 Boundaries of the Project Area and the Project Zone..... 10
 - Climate Information..... 12
 - G1.4 Current Carbon Stocks Within the Project Area..... 12
 - Community Information 15
 - G1.5 Description of Communities Located in the Project Zone..... 15
 - G1.6 Current Land use, Customary and Legal Property Rights in the Project Zone 17
 - Biodiversity Information 19
 - G1.7 Description of Current Biodiversity within the Project Zone 19
 - G1.8 High Conservation Values (HCVs) in the Project Zone 21
 - G1.8.1 Globally, Regionally or Nationally Significant Concentrations of Biodiversity Values; 21
 - G1.8.2 Globally, Regionally or Nationally Significant Large Landscape-level Areas Supporting Viable Populations of Most or All of a naturally Occurring Species 24
 - G1.8.3 Threatened or Rare Ecosystems..... 24
 - G1.8.4 Areas that Provide Critical Ecosystem Services..... 25
- G2. Baseline Projections 27
 - G2.1 Most likely Land-use Scenario in the Absence of the Project 27
 - G2.2 Document that Project Benefits Would Not Have Occurred in the Absence of the Project..... 32
 - G2.3 Estimated Carbon Stock Changes Associated with the ‘Without Project’ Scenario..... 32
 - G2.4 Without Project (baseline) Scenario Affects on Communities in the Project Zone 37
 - G2.5 Affects of ‘Without Project’ Scenario on Biodiversity in the Project Zone 38
- G3. Project Design and Goals..... 39
 - G3.1 Major Climate, Community and Biodiversity Objectives 39
 - G3.2 Project Activities and Expected Impacts and Relevance to the Project’s Objectives. 39
 - G3.3 Location and Boundaries of the Project Area and the Project Zone..... 40
 - G3.4 The Project Lifetime and GHG Accounting Period 40
 - G3.5 Natural and Human-induced Risks to the Expected Climate, Community and Biodiversity Benefits during the Project Lifetime, and Measures to Mitigate these Risks..... 40
 - G3.6 Measures to Ensure the Maintenance or Enhancement of High Conservation Value Attributes 43

Measures Specific to Coastal Douglas-fir Ecosystems	45
G3.7 Measures that will be taken to Maintain and Enhance the Climate, Community and Biodiversity Benefits beyond the Project Lifetime	45
G3.8 Identification and Involvement of Communities and other Stakeholders Potentially Affected by the Project Activities	46
G3.9 Methods Used to Publicize the CCBA Public Comment Period to Communities and other Stakeholders and to Facilitate their Submission of Comments to CCBA	49
G3.10 Process for Handling Unresolved Conflicts and Grievances that Arise During Project Planning and Implementation	49
G3.11 Adequate Flow of Funds for Project Implementation	49
G4. Management Capacity and Best Practices	51
G4.1 Project Proponent Responsible for the Project’s Design and Implementation	51
G4.2 Technical Skills Required to Implement the Project Successfully	51
G4.3 Employee Orientation and Training Plan	53
G4.4 Equal Opportunity Employment.....	53
G4.5 Relevant Laws and Regulations Covering Worker’s Rights	53
G4.6 Situations Posing Substantial Risk to Worker Safety and These Will Be Addressed	53
G4.7 Financial Health of the Implementing Organization	54
G5. Legal Status and Property Rights.....	55
G5.1 Project Compliance with Relevant Laws and Regulations, Treaties and Agreements	55
G5.2 Approval from the Appropriate Authorities, Including the Established Formal and/or Traditional Authorities Customarily Required by the Communities.....	58
G5.3 Encroachment on Private, Community, or Government Property.....	59
G5.4 Involuntary Relocation of People or Activities Important for Livelihoods and Culture	59
G5.5 Illegal Activities that Could Affect Climate, Community or Biodiversity Impacts	60
G5.6 Title to Carbon Rights	60
Climate	61
CL1. Net Positive Climate Impacts	61
CL1.1 Estimated net Change in Carbon Stocks Due to the Project Activities	61
Assumptions about How Project Activities will Alter Carbon Stocks.....	61
<i>Estimated Change in Carbon Stocks</i>	66
CL1.2 Net Change in the Emissions of Non-CO2 GHG Emissions Such as CH4 and N2O	67
CL1.3 Other GHG Emissions Resulting from Project Activities	67
CL1.4 Demonstrate that the Net Climate Impact of the Project is Positive	67
CL1.5 Double Counting of GHG Emissions Reductions or Removals	68
CL2. Offsite Climate Impacts (‘Leakage’)	68
CL2.1 Types of Leakage Expected and Potential Offsite Increases in GHGs due to Project Activities	68

CL2.2 Mitigation of Any Leakage.....	69
CL2.3 Subtraction of Likely Project-related Unmitigated Negative Offsite Climate Impacts	69
CL2.4 Inclusion of Non-CO2 Gases if Likely to Account for More than a 5% of the Project’s Overall Off-site GHG Emissions Reductions or Removals Over Each Monitoring Period.....	69
CL3. Climate Impact Monitoring	69
CL3.1 Initial Plan for Selecting Carbon Pools to be Monitored, and the Frequency of Monitoring ...	69
<i>Climate Impact Monitoring Plan Purpose and Introduction</i>	69
<i>Data and Information to be Reported</i>	69
<i>Monitoring Methods</i>	70
<i>Quantification Specific and Special Concern Related Climate Impact Monitoring Entries</i>	72
<i>Monitoring of Conifer Release from Deer Browsing</i>	72
<i>Year 30 Inventory Plots and GHG Quantification</i>	72
<i>Periodic Risk of Reversal Focussed Climate Impact Monitoring Entries</i>	73
<i>Level 1 Risk of Reversal Monitoring</i>	73
<i>Level 2 Risk of Reversal Monitoring</i>	73
<i>Monitoring Costs</i>	74
CL3.2 Full Monitoring Plan	75
Community.....	76
CM1. Net Positive Community Impacts	76
CM1.1 Estimate of Impacts on Community Well-being.....	76
<i>Evaluation of Project’s Impacts to Community Well-being</i>	77
<i>Comparison of Baseline versus Project Scenarios: Net Community Impacts</i>	78
<i>Participation of Affected Groups</i>	79
CM1.2 No Negative Affect to High Conservation Values identified in G1.8.4-6.....	80
CM2. Offsite Stakeholder Impacts	80
CM2.1 Potential Negative Offsite Stakeholder Impacts	80
CM2.2 Describe How the Project Plans to Mitigate these Negative Offsite Social and Economic Impacts.....	80
CM2.3 Demonstrate that the Project is Not Likely to Result in Net Negative Impacts on the Well-being of Other Stakeholder Groups.....	80
CM3. Community Impact Monitoring.....	80
CM3.1 Initial Plan for Selecting Community Variables to be Monitored and the Frequency of Monitoring and Reporting	80
CM3.2 Initial Plan for Assessing the Effectiveness of Measures Used to Maintain or Enhance High Conservation Values Related to Community Well-being (G1.8.4-6)	80
CM3.3 Commit to Developing a Full Monitoring Plan Within Six Months of the Project Start Date or Within Twelve Months of Validation	80

Biodiversity	81
B1. Net Positive Biodiversity Impacts	81
B1.1 Changes in Biodiversity as a Result of the Project in the Project Zone	81
B1.2 Potential Negative Effects on High Conservation Values Identified in G1.8.1-3	81
B1.3 Introduction of Invasive Species	81
B1.4 Adverse Effects of Non-native Species Used by the Project.....	82
B1.5 GMOs used to Generate GHG Emissions Reductions or Removals	82
B2. Offsite Biodiversity Impacts	82
B2.1 Potential Negative Offsite Biodiversity Impacts	82
B2.2 Plans to Mitigate these Negative Offsite Biodiversity Benefits.....	82
B2.3 Likely Unmitigated Negative Offsite Biodiversity Impacts.....	82
B3. Biodiversity Impact Monitoring	82
B3.1 Initial plan for Selecting Biodiversity Variables to be Monitored.....	82
B3.2 Initial Plan for Assessing the Effectiveness of Measures to Maintain or Enhance High Conservation Values Related to Globally, Regionally or Nationally Significant Biodiversity	82
B3.3 Full Monitoring Plan.....	83
References	84

General

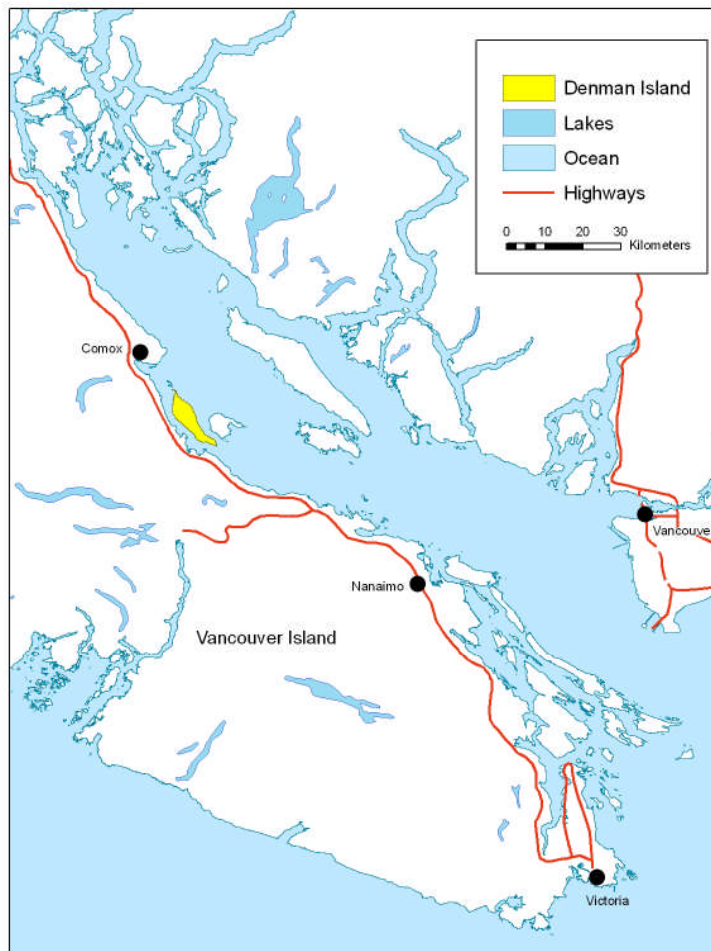
G1. Original Conditions in the Project Area

General Information

G1.1 Location of the Project and Basic Physical Parameters

Denman Island is located in British Columbia (B.C.), the western-most province of Canada, in the north-central portion of the Strait of Georgia (Figure G1.1). The Strait of Georgia separates Vancouver Island from the B.C. mainland. Denman Island is 2 km off the coast of Vancouver Island and south of the city of Comox. It has an area of 5,150 hectares.

Figure G1.1-1: Denman Island as Located in the Strait of Georgia



The Denman Island Forestland Conservation Project is located on the north-central part of Denman Island and covers 493 hectares of forests, lakes and wetlands (Figure G1.1-2). The project site consists generally of gently rolling terrain. Lewis (2006) defines the project area soils as belonging to three main soil associations. The most predominant, described as the Sedimentary Soil Association, consists of well

to rapidly drained sandy soils overlying conglomerate and sandstone bedrock. The second, described as the Beach Soil Association, consists of sandy and sometimes gravelly soils resulting from post-glacial drops in sea level. Drainage ranges from moderate to imperfect and poor, and the imperfect to poorly drained segments of this association contribute to dispersed areas of high water table. A third soil association, described by Lewis as the Wetland Association, consists of poor to very poorly drained areas which, due to the absence or very limited occurrence of trees, have been defined as non-forest area and do not contribute to the quantification of GHG removal enhancements for the project. These sites occur in mapped wetland areas and as dispersed flat and depressional areas of the Beach and Sedimentary Soil Associations.

Figure G1.1-2: The Project Area as Located on the Northern Reaches of Denman Island

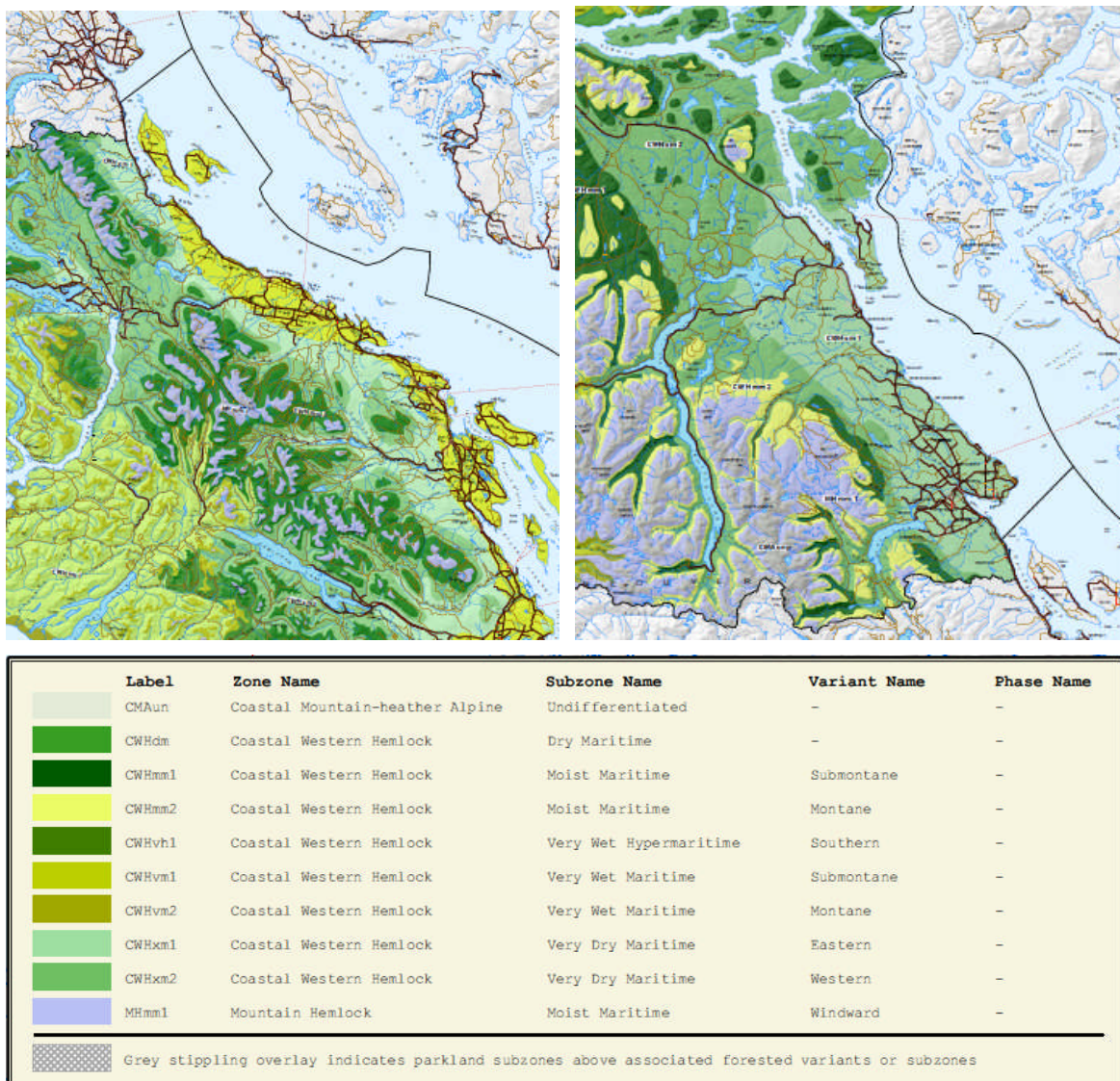


Mahony (2010) confirms the significant presence of weathered bedrock, glacial till, and glaciomarine/marine sediment parent material. Glaciomarine deposits form the more productive of eight ecological site units identified on the project site. Coarse glacial till veneers and weathered

bedrock materials at crest and upper slope positions form the poorer productivity sites from forest growth and yield point of view.

North Denman Island is situated within the northern-most reaches of the Coastal Douglas-fir (CDF) biogeoclimatic zone (Figure G3.1-3), in the Moist Maritime Subzone known as the CDFmm (Green & Klinka 1994). Due to its proximity to the northern edge of the CDF Zone, along with local effect from the Comox Glacier, the project site itself is transitional between the Coastal Douglas Fir and adjacent Coastal Western Hemlock Zone, specifically the Very Dry Maritime Subzone known as the CWHxm1 (H. Kimmins, personal communication, December, 2010; Mahony 2011). It is likely that the CDF will extend northward due to the effects of climate change, making the site less transitional over time.

Figure G1.1-3: Denman Island as Located within the Biogeoclimatic Zones of Coastal BC



Subzone/Variant Maps are for the South Island Forest District (left), and Campbell River Forest Districts (right).

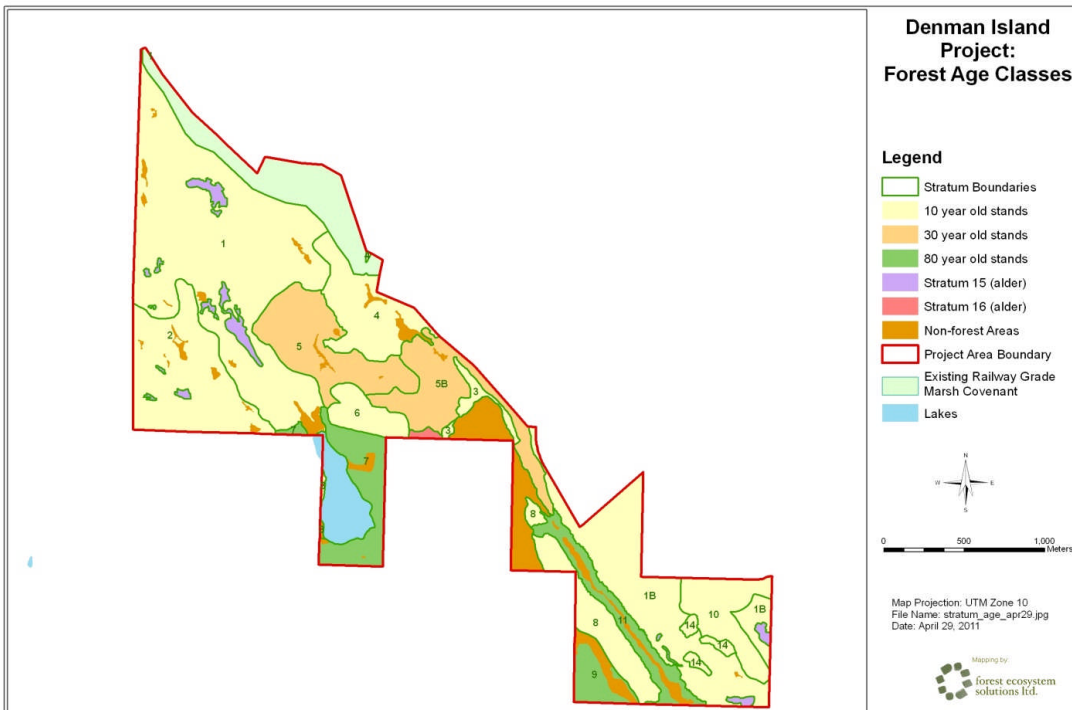
The CDFmm is described as having “mild, wet winters” and “warm, dry summers” with long growing seasons having “pronounced water deficits on zonal and drier sites” (Bradley et al. 1998). Climate for the CWHxm is described in similar terms to that of the CDFmm, with “moist mild winters” and “warm dry summers” that are also marked by water deficits on zonal sites (p. 64). Mean annual precipitation is significantly greater, however, at 1570mm versus 873 for the CDFmm (Green & Klinka 1994). Mean annual temperatures for the CWHxm are estimated at 8.7 degrees Celsius versus 9.5 for the CDFmm.

G1.2 Types and Condition of Vegetation within the Project Area

In the absence of disturbance (wildfire, windthrow, or harvest), forests on zonal sites in the CDF develop into old-growth stands dominated by Douglas fir (*Pseudotsuga menziesii*) with lesser components of western red cedar (*Thuja plicata*) and grand fir (*Abies grandis*), with some western hemlock (*Tsuga heterophylla*) in the lower canopy and understory (Bradley et al. 1998). Zonal sites in the CWHxm are typically dominated by Douglas fir, but with a greater component of Hemlock than would be found on zonal sites for the CDFmm.

The Denman project site consists of regenerating forest stands of three ages (Figure G1.2-1). The three age classes reflect three distinct periods of logging on the site. Young, recently regenerated stands on the majority of the project site averaged 10 years of age at project commencement in 2010. These sites were harvested during the years 1998 to 2000. A smaller component of stands averaged 30 years of age at the project commencement date. These sites were harvested in about 1980. The oldest stands on site at the time of project commencement averaged 80 years of age in 2010. These sites were harvested in about 1930. Minor components of veteran trees in these stands had attained ages of between 150 and 200 years at the time of project commencement.

Figure G1.2-1: Forest Age Distinctions on the Project Site



Forest stands on the site are composed of native tree species originated from natural seed sources on or adjacent to the site following logging activities. A minor component is residual trees left growing on site during logging operations. A small component of regeneration in the southern project area originates from a previous plantation prior to the 1998 to 2000 logging. Tree species present on site are indicated in Table G1.2-1.

Common shrub species encountered on site include salal (*Gaultheria shallon*), dull Oregon grape (*Mahonia nervosa*) and lesser amounts of red huckleberry (*Vaccinium parviflorum*) and rose (*Rosa* spp.). Common herbs on site include sword fern (*Polystichum munitum*), bracken (*Pteridium aquilinum*), and lesser amounts of twinflower (*Linnaea borealis*), among others. Sedges and rushes occur on wetter sites.

Table G1.2-1: Tree Species on the Project Site

Common Name	Scientific Name	Symbol
Douglas fir	<i>Pseudotsuga menziesii</i>	Fd
Western hemlock	<i>Tsuga heterophylla</i>	Hw
Grand fir	<i>Abies grandis</i>	Bg
Western red cedar	<i>Thuja plicata</i>	Cw
Red alder	<i>Alnus rubra</i>	Dr
Lodgepole pine	<i>Pinus contorta</i>	Pl
Western white pine	<i>Pinus monticola</i>	Pw
Sitka spruce	<i>Picea sitchensis</i>	Ss
Birch*	<i>Betula</i>	
Arbutus*	<i>Arbutus menziesii</i>	
Bigleaf maple*	<i>Acer macrophyllum</i>	Mb
Cherry*	<i>Prunus</i>	

* Trace amounts only

G1.3 Boundaries of the Project Area and the Project Zone

The project area (Figure G1.3-1) is a contiguous parcel of what were, prior to the project, fee simple lands consisting of several sub-parcels, with legal land descriptions as noted below in Table G1.3-1. These lands were acquired by the province of BC through the help of funding provided in part by the project proponent (ERA) through the sale of carbon offsets generated by the project. The province acquired the lands with the purpose of creating a new park or ecological reserve on the island and avoiding conversions of the lands to agricultural and residential development. The project proponent (ERA) exerts a degree of control over the project lands through a 100 year legal covenant which prohibits the province from removing the forest cover.

The project area does not include lands which will be included in the future park but were already public lands owned by the province. The project area also does not include lands encompassed by a previously existing conservation covenant known as the Railway Grade Marsh Conservation Covenant. This area, while a part of the fee simple lands acquired by the province, is not additional to the baseline scenario as the existing covenant already precluded conversion of the lands for development purposes.

The Railway Grade Marsh Conservation Covenant and several segments of the project boundary which were affected by its subdivision from a larger parcel to the east were resurveyed in 2006 by Hoerburger Land Surveyors (see Section 1.7). The total project area is derived through a process of linking the legal land survey with previously surveyed parcels using TRIM data from the Islands Trust (detailed procedures for boundary and area determination are stored on the ERA Denman Archives and available on request).

Figure G1.3-1: The Denman Project Area Boundaries

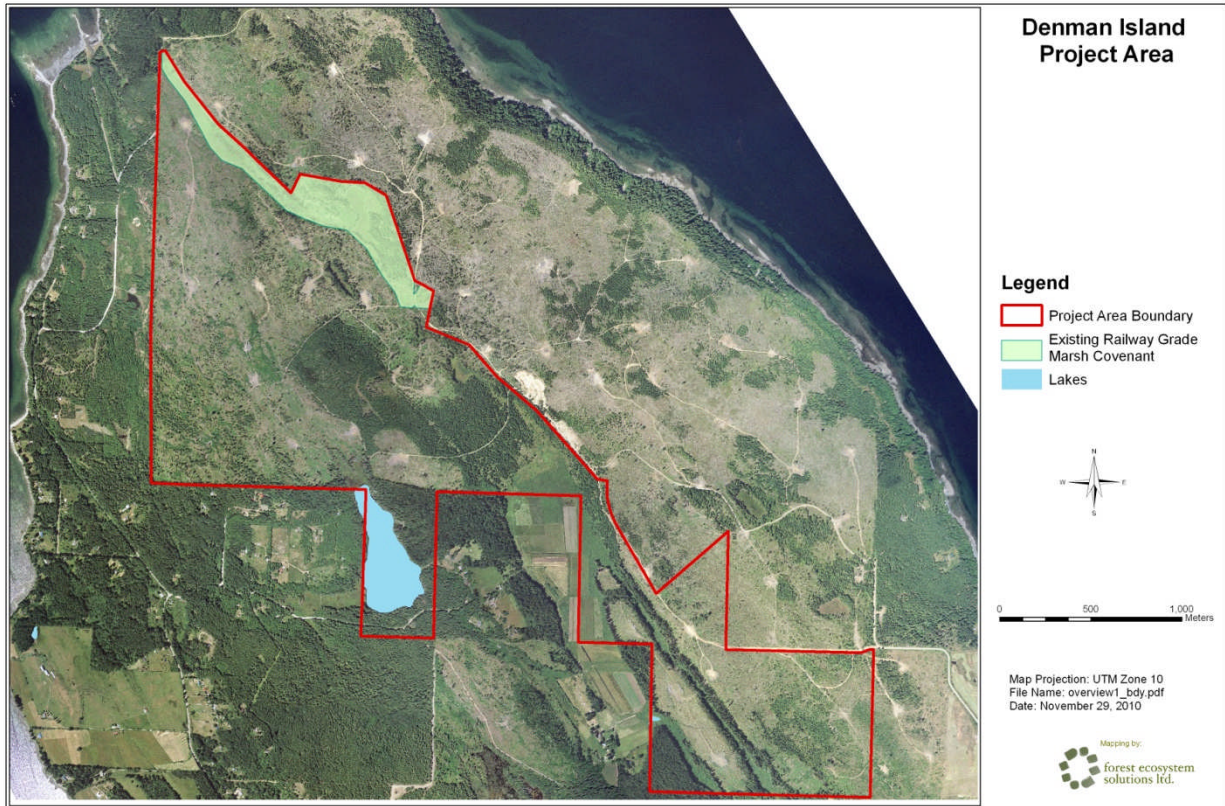


Table G1.3-1: Sub-parcels and Legal Land Descriptions.

PID #	Description
006 660 495	East ½ Section 28
006 660 614	Fractional Section 29
003 619 079	NE ¼ Sec. 27
006 660 185	North ½ Sec. 26
006 660 231	East ½ SW ¼ Sec. 26
006 639 089	West ½ SW ¼ Sec. 25
006 638 830	REM. East ½ NW ¼ Sec. 22
006 657 737	REM. NE ¼ Sec. 22

The project zone is defined as Denman Island. This is due to the island’s physical isolation from Vancouver Island and the BC mainland, its autonomy with respect to local governance (the Denman Island Local Trust Committee), Denman based land-use planning through the Denman Island Official Community Plan, the large quantity of Denman based community groups, and the relatively independent nature of the community identity.

Climate Information

G1.4 Current Carbon Stocks Within the Project Area

Carbon stocks in the project area were quantified to ISO 14064-2 standards and independently validated by a qualified auditor. The quantification procedure involved the following steps:

1. Delineation of the project boundary and an accurate estimation of the number of hectares of forest land contributing to the project. Legal land surveys and GIS were used to accurately delineate the project boundaries and estimate the gross project area (492.9ha). A pre-existing conservation covenant and a 10ha reserve area for the Taylor’s Checkerspot Butterfly were deducted. The area (46.7ha) of mappable, naturally occurring non-forest land areas (swamp and rock and lake) was estimated via digitization in GIS, and these areas were also deducted from the gross project area contributing to the quantification. Unnatural non-forest land (existing roads and landings) were estimated and deducted as well.

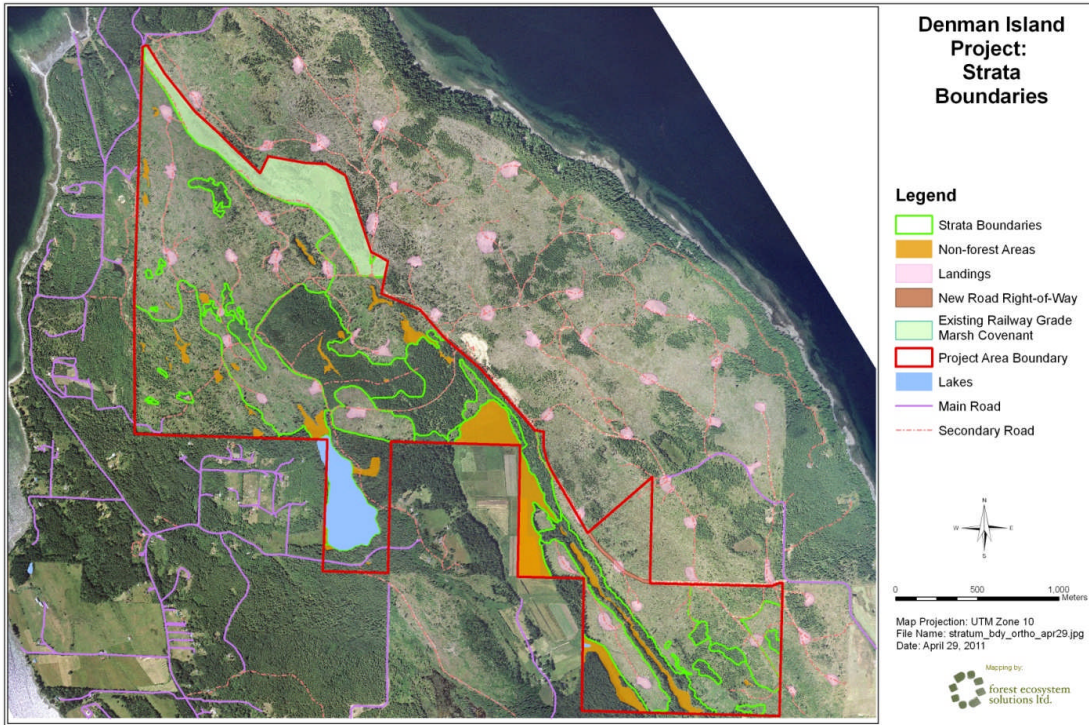
Table G1.4-1 Deductions from Contributing Forest Land Area

Gross Project Area	492.9
Deductions:	
Railway Grade Marsh Complex (existing covenant)	31.3
Taylor’s Checkerspot Reserved Area	10.0
Chickadee Lake	13.3
Mappable natural non-forest areas*1	33.4
Disturbed non-productive	
Roads	11.2
Landings	10.1
Net Productive Forestland Area (NPA)*2	383.7

*1 Includes wetland, minor brush, rock and 4.4ha of former wetland that was drained (ditched) for agriculture. *2 NPA is the gross area less Railway Grade Marsh, Taylor’s Checkerspot reserve, Chickadee Lake, Mappable non-forest areas and disturbed non-productive.

2. Forest land within the project area was stratified into units with similar attributes (e.g. stand age, species, trees per hectare, ecological characteristics and site productivity). Seventeen strata were identified in total (Figure G1.4-1).

Figure G1.4-1: Strata Boundary Identification for the Project Lands



3. An inventory by strata of tree species, density, height, tree diameter for older strata, forest health considerations and site productivity characteristics was conducted using approved silviculture survey, timber cruising and ecological site identification guidelines for British Columbia (BC Ministry of Forests 2010b; 2010a; Green & Klinka 1994). Table G.4 details the quantity of inventory plots established.

Table G1.4-2: Sampling intensity for the Denman Avoided Conversion Project.

Strata	Area Sampled*1	Plot Radius	Plots Established	Point Survey Plots	DOM Plots
1a	108.2	3.99	55	141	
1b	41.0	3.99	20	57	
2	44.6	5.64	30	53	
3	4.5	3.99	9		
4	23.1	5.64	13		
5	31.1	3.99	21		
5b	26.7	3.99	20		
6	9.5	5.64	9		
7	18.4	BAF 12	36		3
8	16.7	3.99	24		
9	7.4	BAF 12	15		3
10	17.3	3.99	15	34	
11	13.3	BAF 12	29		
13	19.2	3.99	16		
14	3.4	3.99	7		
15	8.4	3.99	13		
16	1.0	3.99	5		
Totals	393.7		337.0	285.0	6.0

*1 Note: the sampled area is the Net Productive Area (383.7ha) plus the Taylors Checkerspot reserve area.

4. With the help of forest growth and yield experts the inventory data from step 3 above was used to develop modeling parameters for input to forest growth and yield models (BC Ministry of Forests 2002) approved for use in British Columbia. TASS growth and yield model runs were conducted by a Ministry of Forests specialist.

5. Growth and yield projections were input to the Canadian Forest Sector Carbon Budget Model (CBM-CFS3), to simulate live biomass, dead organic material and soil organic matter for the project area. The CBM-CFS3 is a model of forest ecosystem carbon dynamics developed and supported by Natural Resource Canada's Canadian Forestry Service. It can be used by forest managers and analysts to assess carbon stocks and changes in carbon stocks (Kull et al. 2008). The CBM-CFS3 model is configured to simulate carbon stocks based on inputs from TASS II age volume curves and, accordingly, any projected change in carbon stock by CBM-CFS3 is the result of both of these two models (TASS II as a growth and yield model and CBM-CFS3 as a carbon budget model). Although developed primarily to assess carbon dynamics at the operational scale, the model can also be used to explore carbon dynamics for smaller areas, down to the stand level. The model can be used to assess past changes in carbon stocks using information on management actions and natural disturbances that have already occurred. It can also be used to evaluate changes that would result from future management actions and natural disturbances.

The CBM-CFS3 accounts for carbon stocks and stock changes in 10 tree biomass and 11 dead organic matter (DOM) pools. It simulates annual changes in the carbon stocks of each pool that occur due to growth, biomass turnover, litter-fall, transfer and decomposition. CBM-CFS3 also simulates complex disturbances that can alter biomass turnover, and transfers between DOM pools. The CBM-CFS3 modeling framework can be used to simulate the dynamics of all forest carbon stocks required under the Kyoto Protocol (above-ground biomass, below-ground biomass, litter, dead wood, and soil organic carbon). It is compliant with the carbon estimation methods outlined in the *IPCC Good Practice Guidance For Land Use, Land-Use Change and Forestry* (2003) report.

CBM-CFS3 runs were initialized according to good practice guidance including use of the correct regional zone (e.g. Pacifica Maritime). The CBM-CFS3 simulates the long term build-up of dead organic material (DOM) on site by performing repeated iterations of stand growth and natural stand ending disturbance events typical for coastal BC since the last ice age, as a run up to the actual project simulation. In addition, previous forest harvest events on the project site from the 1940s onwards, including the most recent harvest from 1998 to 2000 on some strata, were incorporated into the simulations using appropriate disturbance regime options (clear-cut with slash burn).

6. Field sampling of above ground dead organic material was conducted to assist with corroborating model results and calibrating outputs to reflect measured values.

7. Biomass DOM results were compared to published values for similar sites in the region.

8. A final rationalization for carbon stocks in the project area was developed. As described in CL1 the comparison of modelled values for dead organic material for stands at 80 years of age, to values measured on two 80 year old stands on the project site (the oldest available stands for comparison), and values indicated in the literature for nearby sites on Vancouver Island resulted in a reduction to

estimated DOM carbon stocks to a level below the values predicted in the model. Modelled values for above ground non-soil DOM were reduced by 42% to minimize the possibility of overestimation. This ratio was developed based on the difference between CBM predicted 80 year values and measured values for 80 year old stands on site (the lower DOM value from the two 80 year stands available for measurement, which also most closely reflected literature reviewed values, was taken). These reductions are reflected in Table G1.4-3. DOM carbon pools in the table are presented in groupings that most closely permit comparison with measured values in the literature.

Due to the uncertainties encountered with non-soil DOM in the model and to minimize the possibility of overestimation of soil organic carbon, soil organic carbon estimates were reduced uniformly by 40%. This adjustment is also reflected in Table G1.4.3. The final adjustments to these values are currently under process of final third party validation, verification, with completion expected by the end of May, 2012. There is a possibility that further adjustment will be required as a result of the validation process. Any questions with respect to the specifics of the process currently underway or the final results can be directed to ERA Ecosystem Restoration Associates Inc.

Table G1.4-3: Current (2010) Carbon Stocks by Strata in the Project Area

Stratum	Live Biomass tC/ha	Above Ground DOM tC/ha	Below Ground DOM (fine, coarse roots) tC/ha	Soil Organic Carbon tC/ha	Total Ecosystem tC/ha	Forest Land (ha)	Total tC per strata
1a	7.3	37.01	1.45	116.8	155.28	108.2	16801
1b	6.2	36.93	1.42	118.9	157.26	41	6448
2	7.6	37.05	1.45	115.4	153.88	44.6	6863
3	23.1	28.13	0.95	70.6	99.70	4.5	449
4	12.6	50.70	2.09	155.6	208.43	23.1	4815
5	70.4	29.91	0.64	119.3	149.89	31.1	4662
5b	84.4	35.93	0.73	136.5	173.17	26.7	4624
6	4.2	35.41	1.34	121.8	158.55	9.5	1506
7	224.2	48.07	1.81	127.4	177.32	18.4	3263
8	3.4	39.49	1.59	139.2	180.28	16.7	3011
9	304.6	56.60	2.43	149.6	208.61	7.4	1544
10	8.0	40.54	1.65	128.5	170.71	17.3	2953
11	231.4	50.13	1.87	132.7	184.66	13.3	2456
13	10.1	28.16	0.95	80.7	109.81	19.2	2108
14	9.1	45.83	1.94	144.9	192.67	3.4	655
15	44.5	43.33	1.87	115.9	161.06	8.4	1353
16	52.1	43.05	1.82	112.0	156.83	1	157
Totals							63666

Community Information

G1.5 Description of Communities Located in the Project Zone

For thousands of years the Pentlatch people lived on Denman Island in three separate villages. After the 1862 small-pox epidemic drastically reduced their numbers the Pentlatch re-settled on Vancouver Island and used Denman as a summer home and a base to fish and to dig for oysters, clams, and roots. Eventually the few remaining descendants of the Pentlatch band joined K'omoks First Nation, part of the

Coast Salish Nation (Denman Island Trust Committee 2008). There are no first nations' reserves on Denman Island, however the K'omoks First Nation traditional territory on Vancouver Island runs from the Salmon River watershed in the north to the Englishman River watershed in the south and includes all of Denman and Hornby Islands and other gulf islands (Komoks First Nations 2011).

European settlers came to the island in the 1870s, and by the 1890s it had become a predominantly Scottish settlement with over 100 individuals (SuperNatural 2010). The last century has seen an ever increasing population on the island and today the Denman Island community includes 1,500 year-round residents. The population has been growing rapidly since the 1976 census and is expected to stabilize with current zoning regulations at 2,000 people (Denman Island Trust Committee 2008). As Denman is a highly desired location for summer homes and long-term vacationers, the island's population swells in the summer months. Many of those residents that do stay in the community year round are retired or semi retired and recent censuses reflect this by showing that the age of the islands' population is increasingly divided (BC Stats 2006). The population under 39 is decreasing while the population over 40 is increasing. This change is in part due to the challenge of availability and accessibility of jobs and, on the flip side, to the island's appealing rural atmosphere and mild climate for relatively affluent retirees. Both Denman's population and age structure determine the demand for housing, jobs, infrastructure, community services and recreation (Denman Island Trust Committee 2008). The gender dynamics on the island are a relatively equal split between the sexes, such as the rest of the province.

In 2006 the average income on Denman and Hornby Islands was \$28,235 and the number of persons over 15 that reported working on Denman Island in 2006 was 485 (BC Stats 2009; BC Stats 2006). In the 2006 census 65 individuals (3%) on Denman and Hornby islands identified themselves as visible minorities (BC Stats 2006). The provincial percentage is 24.8% visible minorities (BC Stats 2006).

The current Denman Island population is highly engaged in formal and informal community groups. There are over 50 of these groups that range in interest from the arts to gardening and exercise and community development. Denman Island has adopted an Official Community Plan (OCP) that highlights issues that the community has deemed most important. The OCP's three focuses are the natural environment, the social fabric of the community and the wellbeing of families and individuals. While resources are finite on the island the nature of modern distribution networks enables islanders to access most resources from other locations. Access to fresh water however, is an issue that affects all islanders as water supply on the island is from individual wells. The importance of this resource to the community is reflected in the OCP where fresh water is highlighted as a guiding objective in all three categories; Natural Environment, Social Fabric and Families and Individuals (Denman Island Trust Committee 2008).

First Nations have a significant cultural connection to the island and archaeology sites are known in a few different locations. There are no known archaeological sites within 50m of the project area (Campbell 2009). First Nations' use of the project lands in recent history has been limited due it being privately owned prior to the Denman Park project.

G1.6 Current Land use, Customary and Legal Property Rights in the Project Zone

Current land use in the project zone (Denman Island) is a mixture of agriculture (149 lots or 46% of the island), commercial (11 lots or 5%), forestry (18 lots or 4.5%), institutional (11 lots), light industrial (1 lot), park (17 lots), residential (405 lots), rural residential (239 lots) and resource (6 lots). Within the above lots there are 583 occupied residential properties, the increasing majority of which are 2-person households (43%). There are 16 occupied farms in which grain, fruit trees, beef and other types of farming are practiced (Denman Island Trust Committee 2011).

The project area itself is currently being used unofficially by the community for recreational activities such as hiking, horseback riding, cycling as well as swimming and fishing in Chickadee Lake (Bente Pilgard, personal communication, September, 2010). These activities have continued from prior to the private to public land transfer. When the project area becomes designated as a provincial park the activities permitted in the area will be regulated by the park management plan. Most of the activities already enjoyed in the project area will be allowed to continue with the likely exception of recreational hunting.

The legal property rights were transferred from North Denman Lands Inc. to the Province of British Columbia on September 17, 2010. The only additional rights held in relation to the property outside of the land tenure are the rights to the carbon, which are held by ERA for the duration of the project's GHG accounting period (see Denman PDD – Atmospheric Benefits).

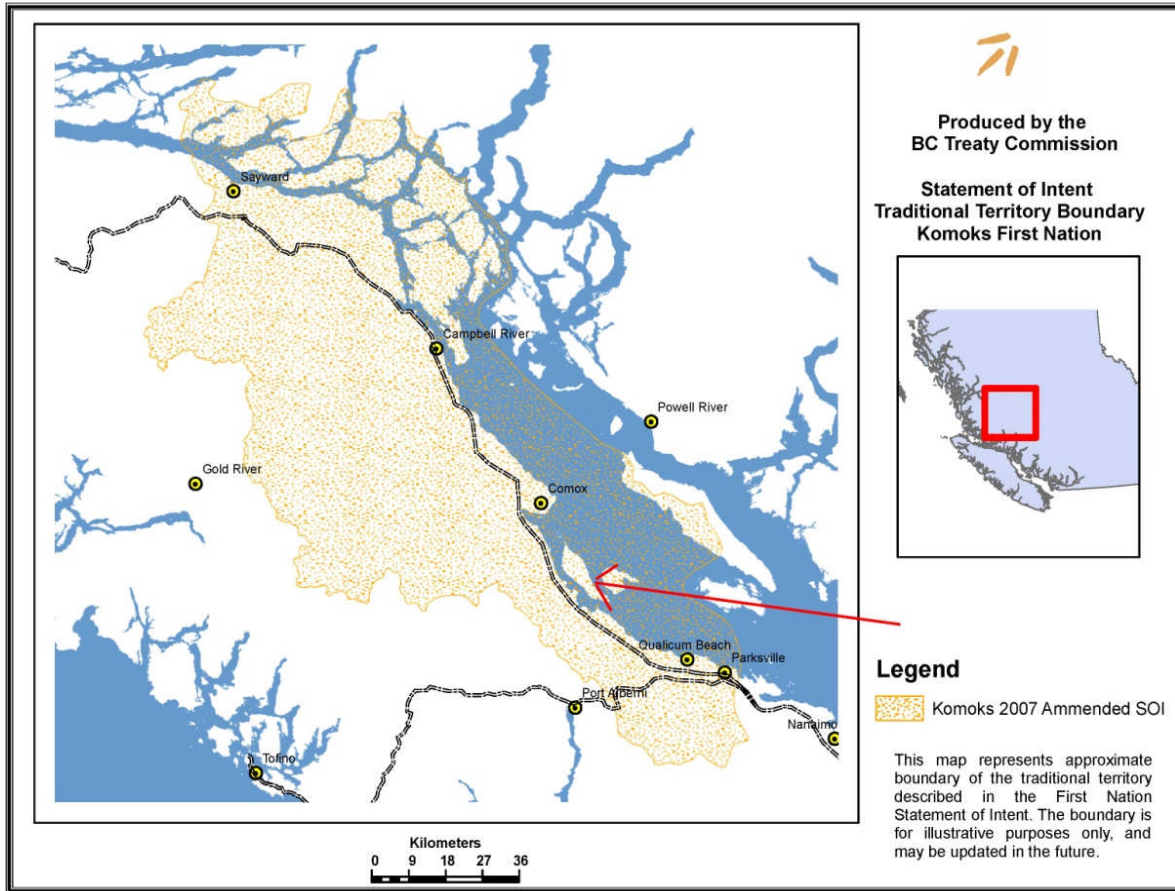
The project area lies within the Traditional Territory of the K'omoks First Nation (Figure G1.6-1). K'omoks First Nation is currently engaged in a treaty negotiation process with the Governments of BC and Canada. The treaty process seeks to “provide certainty in respect of K'omoks ownership and use of lands and resources, K'omoks law-making authority and the relationship of Federal Laws, Provincial Laws and K'omoks Laws” (Government of Canada, K'omoks First Nation, Government of BC, 2011, p. 4). K'omoks is currently in Stage Four of the treaty process and in 2011 voted in favour of a draft ‘Agreement in Principle.’ The draft agreement in principle provides K'omoks First Nation with authority to create and administer certain types of laws on K'omoks Lands. K'omoks Lands as defined in the agreement will include lands identified as the former K'omoks First Nation Reserves, and additional parcels are current Crown lands located along the eastern portions of Vancouver Island. K'omoks lands in the agreement do not include lands on Denman Island. For more information regarding the K'omoks' traditional use of Denman Island see section G1.5.

In May of 1995 John Hancock Timber Resources Group purchased 1,540 hectares of land on North Denman Island, a portion of which is now the project area. The Denman Conservancy Association (DCA) made efforts to alert the new owner to the significant ecological values of two areas: the Railway Grade Marsh Complex and the Komas Bluffs. A joint attempt to conserve these areas through the Pacific Marine Heritage Fund failed.

In June of 1997 Hancock sold the project lands to an intermediary owner who then sold the land to 4064 Investments Ltd. DCA and Hancock placed a condition on the sales contract that any purchasers would

make the “best commercial efforts” to place covenants on the Komas Bluffs and the Railway Grade Marsh Complex.

Figure G1.6-1: Denman Island within the K’omoks’ First Nation Traditional Territory



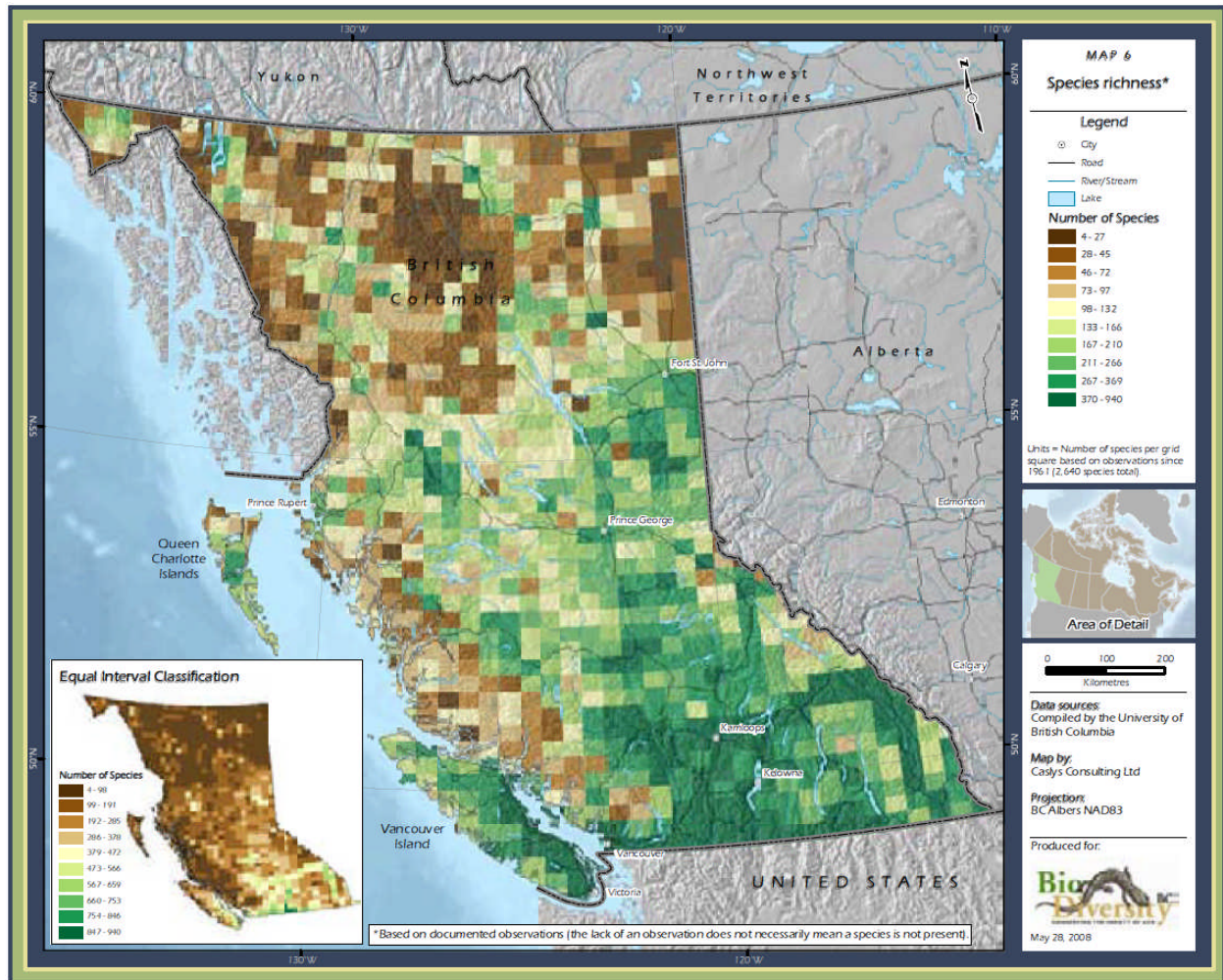
Between 1997 and 2000, 4064 Investments Inc. (4064), the DCA and the Islands Trust Fund negotiated the text of the covenants. A period of conflict followed, however, and it wasn't until 2005 when Henning and Tomas Nielsen of North Denman Lands Inc. approached the DCA regarding their interest in buying the land that the possibility of covenants on the lands was revisited in any formal sense. After the Neilsens completed the purchase of the land in 2006, the final conservation covenants on the Railway Grade Marsh Complex and Komas Bluffs were drafted, submitted, and agreed to on April 6, 2006.

Biodiversity Information

G1.7 Description of Current Biodiversity within the Project Zone

As described in G1.1 Denman Island lies within the Coastal Douglas-fir biogeoclimatic zone, which occurs within BC along the southeast coast of Vancouver Island (Figure G1.1-3), in narrow segments along the mainland's sunshine coast and on the southern Gulf Islands. As indicated in figure G1.7-1 the CDF and Denman Island itself are located among the areas of highest species richness in the province (Austin et al. 2008).

Figure G1.7-1: Species Richness in the Province of B.C.



Used with permission from Biodiversity B.C.

The northern reaches of Denman Island and the project site itself are transitional to the adjacent Coastal Western Hemlock Biogeoclimatic Zone on Vancouver Island. Denman Island is second growth forest (following logging passes late in the 19th and throughout the 20th century) consisting of Douglas-fir, western redcedar, western hemlock, grand fir and red alder. A full list of tree species encountered on the project site and commonly encountered shrub and herb species are detailed in G1.2. Several associations of commonly encountered plant communities were identified on the on the project's

forestland area during an ecosystem assessment conducted in 2010 which used Coastal Western Hemlock biogeoclimatic ecosystem plant association descriptors due to the transitional nature of the area. These are, as described in greater detail in Green & Klinka (1994): Western hemlock, Douglas-fir and Kindbergia (most common); Western hemlock, Western Red Cedar and Deer Fern; Western Red Cedar, Sword fern; Western Red Cedar, Sedge; Western Red Cedar, Sitka Spruce, Skunk Cabbage. While the survey did not encompass areas sites outside the project boundary it is reasonable to conclude that these plant communities occur elsewhere on the island, although do not necessarily represent all plant communities found on the island, particularly in the southern reaches which are drier.

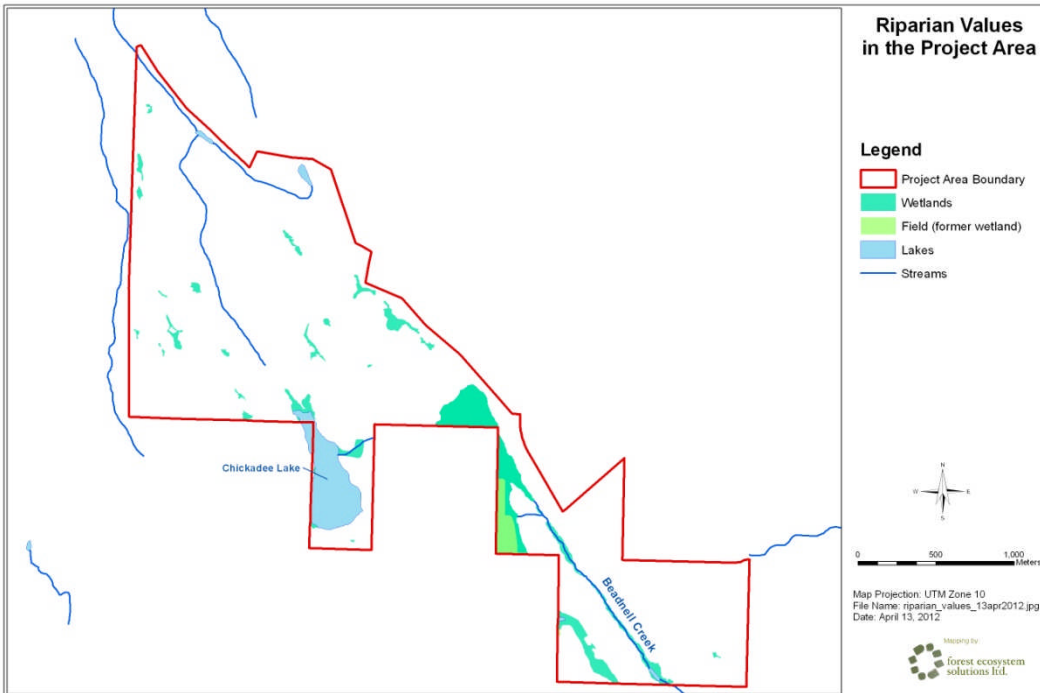
Meidinger & Pojar (1991) describe mammal species commonly encountered in young seral and managed second growth coniferous forests of the CDF. Common mammals include Black-tailed Deer, Black Bear, Cougar, Grey Wolf, Marten and Deer Mouse. Of these, Black-tailed deer are particularly prolific on Denman Island and often a problem for local gardeners. Due to the relatively small size of the island most other mammals if not present on a continuous basis are capable of and have been known to swim to Denman from Vancouver Island.

Several bird species are known to occur commonly within the CDF (Meidinger & Pojar 1991). These are the Great Horned Owl, Barred Owl, Blue Grouse, Ruffed Grouse, Band-tailed Pigeon, Northern Flicker, Hairy Woodpecker, Common Raven, Gray Jay, Steller's Jay, Chestnut-backed Chickadee, Red-breasted Nuthatch, and Winter Wren. The CDF is also home to amphibian species including the Western Toad, Pacific Tree Frog, Western Red-backed Salamander, Ensatina Salamander and North Western Salamander.

Several riparian features within the project area provide important habitat for a diversity of species (Denman Island Trust Committee 2008). These riparian features were deemed ecologically sensitive, including Chickadee Lake (one of only two lakes on the island, several wetland complexes and the Coho Salmon bearing Beadnell Creek (Figure G1.7-2) These features were proposed in the 1998 report to be included within a protected areas network for the island (Bradley et al. 1998). The most northerly of the wetland complexes achieved conservation status prior to the project, through implementation of the Railway Grade Marsh Conservation Covenant.

Threats to biodiversity in BC were assessed by Austin et al. (2008) using methodologies developed through a combination of input from 25 B.C. experts and the IUCN system of threat classification. Ecosystem conversion (buildings, parking lots and agriculture) and ecosystem degradation were found to be leading factors in the decline of many of the currently problematic species and ecosystem declines in the province. The report describes these types of disturbances as prevalent within CDF ecosystems and notes that (p. 159) "there has been significant ecosystem conversion in the Coastal Douglas-fir biogeoclimatic zone on the southeast coast of Vancouver Island." Forty nine percent of CDF ecosystems are estimated to have already been converted to human uses. Project activities on Denman are focussed primarily toward avoiding ecosystem conversion. Ecosystem degradation is also an important element of the project's baseline scenario as components of forest land not converted to residential and agricultural development would experience a significant degree of ecosystem and habitat fragmentation as well as disruption of natural water flow patterns.

Figure G1.7-2: Riparian Values in the Project Area



Alien species invasion is noted as an additional leading threat to biodiversity in B.C. with factors of lesser concern consisting of environmental contamination, species disturbance and species mortality (Austin et al. 2008). Alien species have greatest presence in the southwestern BC including the southern regions of Vancouver Island where human development activities are high. Alien species exist on Denman and the project site (B1.3) and will increase in the baseline scenario. Environmental contamination is also a threat associated with baseline activities and its reduction a benefit of project activities although not a specific focus of the project. Species disturbance (behaviour alteration from human activities) and species mortality are lesser threats in relation to the project lands.

G1.8 High Conservation Values (HCVs) in the Project Zone

G1.8.1 Globally, Regionally or Nationally Significant Concentrations of Biodiversity Values;

a. protected areas

Two parks currently exist on Denman Island. Fillongley Provincial Park is a 23 hectare Class A park with 10 ocean front campsites located midway along the east coast of the island. The park protects includes remnants of the former estate of an early island settler, the lower reaches of fish bearing Beadnell Creek, and Douglas-fir forest. Resource management objectives of the park include protection of evolving vegetation ecosystems, wildlife and fish resources. Boyle Point Park is a 125ha Class A day-use park located on the southern point of the island. A forested trail leads through second growth forest to viewpoints.

Several conservation covenants have been established throughout the island and held by the Denman Conservancy Association. These include:

- **Railway Grade Marsh Complex Conservation Covenant (2006)**

Located within the project area, the Railway Grade Marsh covenant features three marshes and a connecting creek that flows through open water, marsh and forest vegetation.
- **Lindsay Dickson Nature Reserve**

Like all of the other covenants held on Denman Island, the Lindsay Dickson Nature Reserve provides protection and conservation to the 52Ha area with one exception; a single parcel preserved for agricultural use as part of the provincial Agricultural Land Reserve (ALR). The remaining land is second growth Douglas-fir forest.
- **Denman Island Chocolate Ltd. Conservation Covenant (2007)**

This conservation covenant protects bluffs overlooking Baynes Sound and is home to the Denman Island Chocolate factory. The intention of the covenant was to set at precedence and demonstrate how commercial operations can place importance on preserving the biodiversity and the natural ecosystem.
- **Komas Bluffs Conservation Covenant (2006)**

Protecting 41ha of corporate and privately owned land parcels, the Komas Bluffs is an area that supports both old and second growth trees, seasonal wildlife, red and blue listed species and the largest aquifer on the island.
- **Danes Creek North Conservation Covenant at The Point**

A privately owned area consisting of a wetland, forested swamp and Labrador tea bog complex. Similar to the project area, this covenant protects the habitat of the Taylor Checkerspot Butterfly. The covenant prevents public access as the swamp and wetland characteristics do not support the future development of trails.
- **Danes Creek South Conservation Covenant**

Located on the north end of the island, the Danes Creek South Conservation Covenant protects 12.4Ha of wetland pockets with marshy areas and a mix of Western red cedar, Western hemlock, Sitka spruce forests. The covenant restricts any public access due to the observed presence of the Taylor's Checkerspot and the general vulnerability of the habitat found in the area.
- **Morrison Marsh Nature Reserve**

Owned by the Island Trust Fund and managed by the Denman Island Association, the Morrison Marsh Nature Reserve is approximately 52ha of mixed ecosystems including rock outcrops, creek and marsh riparian areas and Douglas-fir salal forest. This area is considered to provide an important corridor to surrounding rare ecosystems.

These conservation covenants in combination with Boyle Point and Fillongley parks constitute an important matrix of biodiversity, habitat and ecosystem function on the island, as well as recreation and education opportunities. However they do not on their own meet definition criteria for globally, nationally or regionally significant concentrations of biodiversity values.

b. threatened species

The British Columbia Conservation Data Centre (CDC) collects and disseminates information on plants, animals, and ecosystems at risk in British Columbia. Those species identified as at risk are categorized as either blue or red listed. The blue list includes any ecological community and indigenous species and subspecies considered to be of special concern in British Columbia (Harper et al. 1994). The red list includes any ecological community and indigenous species and subspecies that is extirpated, endangered, or threatened in British Columbia.

Five blue-listed species have been found on Denman Island outside the project area (Table G1.8b).

Table G1.8-2: Blue-listed Species Encountered on Denman Island outside the Project Area

Species	Habitat/Range
Allium amplexens (slimleaf onion)	Dry fields and hillsides in the lowland zone (CDFmm, CWHxm1, CHWxm2) (Douglas et al. 2002).
Dryopteris arguta (coastal wood fern)	Mesic forest margins and rocky sea cliffs in the lowland zone (CDFmm) (Douglas et al. 2002).
Isoetes nuttallii (Nuttall’s quillwort)	Vernal pools and ephemeral winter seepages in the lowland zone (CDFmm, CWHxm1, CWHxm2) (Douglas et al. 2002)
Megascops kennicottii kennicottii (western screech owl, <i>kennicottii</i> subspecies)	Lower elevations generally wooded environments that are often riparian zones. Does not seem linked to a particular type of woodland. Also found in treed urban locations. Roosts in coniferous or deciduous tree (COSEWIC 2002a).
Rana aurora (northern red-legged frog)	Lower altitudes. Adults breed in cool ponds or lake margins, slow-moving streams, marshes, bogs, or swamps at least 50 cm deep. Uses both temporary and permanent water bodies. Tadpoles move to warmer parts of pond. Prefers mature forests with plenty of leaf litter and fallen logs (COSEWIC 2002b).

One red-listed species, the Taylor’s Checkerspot Butterfly (Edith’s checkerspot, *taylori* subspecies) is known to occur on Denman Island. The butterfly is a keystone insect of woodland prairies of the Pacific Northwest. The majority of the Taylor’s Checkerspot Butterfly’s current population on the island is within and adjacent to the project area itself. Given its disappearance from most of its natural range in B.C. and globally, and the significant concentrations of this species on the project site during key lifecycle stages (G1.8d) it has been designated as a High Conservation Value for the purposes of this project.

In addition to those CDF species found explicitly on Denman, Stevens (1995) indicates the distribution of at risk species for CDF in general (Table G1.8-1). These species and those listed above in Table G1.8b have not been designated as High Conservation Values on their own for the purposes of the project,

however, the CDF itself, as a threatened ecosystem incorporating all of these individual species has been designated a High conservation Value under G1.8.3 below. A current record of listed species in the CDF, whether or not they have been specifically located on Denman Island is available on the B.C. Conservation Data Centre website. A 2012 records search of these species was conducted by ERA and is available on request.

Table G1.8-1: Distribution of At Risk Species Known to Occur in the CDF

Class	Red	Blue	Endangered	Threatened	Total
Amphibians	1	-	-	-	1
Reptiles	2	-	1	-	3
Birds	15	36	-	-	51
Mammals	4	3	1	1	9
Total	22	39	2	1	64

c. endemic species

There are no currently known endemic species occurring on Denman Island. Denman Island’s close proximity to Vancouver Island (approximately kilometers) allows for the travel and transfer of species to and from the island over time and therefore the island is not isolated enough to generate endemic species for mobile organisms (T. Stevens, personal communications, February, 2012).

d. areas that support significant concentrations of a species during any time in their lifecycle

Denman contains the most significant known remaining population of Taylor’s Checkerspot Butterfly in the world (T. Stevens, personal communications, February, 2012). The present early seral open habitat currently provided on the project site as a result of recent clearcut logging is critical to the reproduction and continued survival of the species on site. Due to the significance of this concentration the Taylor’s Checkerspot Butterfly is considered a High Conservation Value under this category.

G1.8.2 Globally, Regionally or Nationally Significant Large Landscape-level Areas Supporting Viable Populations of Most or All of a naturally Occurring Species

There are no known globally, nationally or regionally significant large landscape-level areas supporting viable populations of most or all of a naturally occurring species on Denman Island (T. Stevens, personal communication, February, 2012). The small size of Denman Island (roughly 5,000ha) is not generally significant enough to meet the intent of this scale of area. While literature specific to landscape scales in the pacific north west was not identified, recent research examining the efficiency of mammal conservation determined that the minimum area required to avoid loss of disturbance sensitive mammals. species in the absence of active habitat or species population management is 270,000 hectares a much greater area than that available on Denman Island (Gurd et al. 2001).

G1.8.3 Threatened or Rare Ecosystems

The conservation status of Coastal Douglas-fir ecosystems in B.C. have been rated as *imperilled (S2)* by Austin et al. (2008), the second highest threat rating within the status ranks available for ecosystems in B.C. An imperilled rating indicates “at very high risk of extinction due to very restricted range, steep declines or other factors. The majority (70 to 80%) of the global distribution of CDF ecosystems occurs in BC, with the remainder in Washington State. Forty nine percent of the CDF has already been converted

to non-forest use. With only 1310km² remaining the CDF is the smallest of the twelve biogeoclimatic zones identified in the province, but is one of five biogeoclimatic zones with more than 100 species of conservation concern. Four red listed ecological communities are known to occur specifically on Denman Island. These include the Grand fir/Three-leaved foamflower, Red alder/Skunk cabbage, Douglas-fir/Dull Oregon-grape and Western Red Cedar/Vanilla-leaf ecological communities.

The factors described make CDF a conservation priority for the B.C. Ministry of Environment, and B.C. Parks (Austin et al. 2008). It has been designated a High Conservation Value for the purposes of this project.

G1.8.4 Areas that Provide Critical Ecosystem Services

Forest lands of the project area provide hydrological services in the form of stream flow regulation and water quality for portions of the northern reaches of Denman Island. Several riparian features within the project area help with flood control and provide important habitat for a diversity of species (Denman Island Trust Committee 2008). A small number of local water licenses exist for Chickadee Lake; however, there are no critical community water intakes associated with Chickadee Lake or elsewhere on the project lands. Most domestic water intakes are via wells (Campbell 2009). Therefore while hydrological services from the project lands are very important to island residents they do not meet the criteria of critical in terms of flood control or water supply.

Topography on the Island is generally moderate, and forest cover, while contributing to the long term conservation of soils, does not provide a critical role in terms of erosion control. Neither do the project forestlands fulfill a role in terms of critical barriers to destructive fire as defined in the HCVN Tool Kit: fire is a normal and natural part of ecosystem function in the Coastal Douglas-fir biogeoclimatic zone. There are therefore no critical ecosystems services and subsequently no High Conservation Values related to this criterion.

G1.8.5 Areas Fundamental for Meeting the Basic Needs of Local Communities

The project zone, as defined in G1.3, is the entirety of Denman Island. There are no areas on the island that can be described as “fundamental for meeting the basic needs of local communities”. The High Conservation Value Resource Network’s Global HCV Tool Kit delineates between land use that is a basic need such as food, medicine, fuel, building and craft materials, and land use that is not a basic need such as hunting and gathering for recreational purposes and recreational activities such as walking (Jennings et al. 2003). Based on these definitions the project zone is not fundamental for meeting the basic needs of communities. Although there is some small scale agricultural production on the island there is sufficient access to outside and alternative resources of food, fuel and building materials and the majority of the island’s resources already, and will continue, to come from these sources.

G1.8.6 Areas Critical for the Traditional Cultural Identity of Communities

Denman Island is located within the K’omoks First Nation’s traditional territory. The island was actually inhabited by the Pentlach tribe until the small-pox plague of 1862. After the epidemic the Pentlach left the island and it was used as a summer base for hunting, fishing and gathering by both the Pentlach and the K’omoks, whom the remaining Pentlach eventually joined (Denman Island Trust Committee 2011).

Reginald Pidcock wrote in 1862 that the island had large quantities of cedar which the local people used to make a great number of their canoes (GeoBC 1999). As well, archaeological surveys have discovered housing and housing depressions, shell middens, petroglyphs and burial sites (Denman Island Trust Committee 2011), although there are no known archeological sites on the project area itself (Campbell 2009). The project lands themselves, having been privately held for more than 100 years, have not been accessible for the practice of cultural activities in recent times.

The High Conservation Value Resource Network's *Global HCV Tool Kit* provides indicators for determining if cultural association with an area is critical to the cultural identity of a local community. These include the following (Jennings et al. 2003):

- *When change to a forest can potentially cause an irreversible change to traditional local culture (e.g., temples, sacred burial grounds or sites linked to particular cultural or religious activities);*
- *When a particular forest provides cultural value that is unique or irreplaceable (e.g., when a forest is used to gather materials for artistic, traditional, and social status purposes that are not present in, or available from, other local forests);*
- *When a value is 'traditional' to a community. Where a community has been associated with a particular forest for hundreds of years, then they are clearly traditional. When the community has arrived more recently, this becomes less clear.*

From the historical information described above it is apparent that Denman Island is traditionally significant for the cultural identity of the Pentlatch people, as now incorporated with the K'omoks First Nation. When assessed specifically against the indicators noted, however, it does not seem likely that changes to the project area's forests, and in particular the conservation of those forests for future generations would result in irreversible changes to traditional culture or considerably affect cultural values that are unique or irreplaceable. For the purposes of this document then the area does not align with the definition of High Conservation Value, although this does not by any means diminish the cultural importance of the area. It is also worth noting that the central project activity: acquisition of former privately held lands for designation under provincial protected status increases access and ability for local aboriginal peoples to practice important cultural activities on the land. The K'omoks First Nation have been contacted by ERA to obtain their direct input with regard to the area's conservation value and this indicator.

G2. Baseline Projections

G2.1 Most likely Land-use Scenario in the Absence of the Project

The UNFCCC Methodological tool: *Combined tool to identify the baseline scenario and demonstrate additionality* (Version 02.2) was used to determine the baseline scenario and demonstrate project additionality. This tool was used due to its acceptance as good practice, its combined ability to determine both baseline and additionality, and its applicability to a wide range of projects. Other baseline tools considered but deemed less appropriate for the context of the Denman project include the UNFCCC tool for afforestation / reforestation project additionality (Denman is not an AR project however), and the VCS additionality tool for AFOLU projects. This tool is focused only toward additionality, however, and does not provide specific direction for baseline determination.

The UNFCCC combined baseline and additionality tool involves four steps:

- STEP 1. Identification of alternative scenarios
- STEP 2. Barriers analysis
- STEP 3. Investment analysis (if applicable)
- STEP 4. Common practice analysis

As demonstrated below the results of the process clearly demonstrate that the most likely scenario in the absence of the project is conversion of the project lands to non forest-land. Steps 1, 2 and 3 described here under CCBA indicator G2.1. Step 4, related more closely to additionality, is described under the subsequent CCBA indicator G2.2.

Step 1. Identification of Alternative Scenarios

Step 1a. Definition of alternative scenarios to the proposed project activity

The following alternative land use scenarios were developed in order to systematically evaluate what would happen to the lands in question in the absence of the Denman project.

1) *Transfer of the land to protected status without the sale of carbon offsets.*

In this scenario the land within the project boundary would be transferred to the BC provincial government and converted to protected status without financial support from the sale of carbon offsets generated by the Denman AC Project.

2) *Continuation of the pre-project land use.*

In this scenario the land would continue as forest land with or without forest management, and without conversion to other land uses. Stands of timber could be harvested as they reach merchantable age. This scenario includes the possibility of the lands being administered as a privately or community owned woodlot, for commercial purposes.

3) *Conversion of the land to cropland, grassland, and settlement.*

In this scenario the land within the project boundary would be subdivided, sold, and converted to agricultural use (Croplands and Grasslands as defined by the IPCC (2003)), and residential use (Settlement as defined by the IPCC (2003)). This conversion would take place beginning at the Denman project start date and continue through to the year 2045.

Step 1b. Consistency with Mandatory Applicable Laws, Regulations and Plans

Each scenario was assessed and found to be consistent with relevant applicable laws and regulations. That is, none of the three scenarios would be restricted from happening by any of the corresponding legislation, regulations, or plans. All of the scenarios move forward, therefore, to Step 1c: Selection of the Baseline Scenario. Following are the relevant laws and regulations and a brief discussion of how they relate to each scenario.

Provincial Statute: *Assessment Act*, RSBC 1996, c. 20.

General description: Part of the legal framework for forest management on private managed forest land.

Regulations: Managed Forest Land and Cut Timber Values Regulations, B.C. Reg. 90/2000.

Provincial Statute: *Land Act*, RSBC 1996 c. 245.

General description: Provides for the disposition of crown lands including the creation of reserves.

Provincial Statute: *Ecological Reserves Act*, RSBC 1996 c. 103.

General description: Provides for the protection and management of ecological reserves on Crown Land.

Relevant Regulations: Application of Park Legislation to Ecological Reserves Legislation, B.C. Reg. 364/97. Ecological Reserve Regulations, B.C. 335/75.

Provincial Statute: *Private Managed Forest Land Act*, S.B.C. 2003, c. 80.

General description: Provides for the protection of key values including water quality, fish and wildlife habitat and reforestation on untenured private managed forest land.

Relevant Associated Regulations: *Private Managed Forest Land Council Matters Regulation*, B.C. Reg. 372/2004, *Private Managed Forest Land Council Regulation* B.C. Reg. 336/2004, and the *Private Managed Forest Land Regulation* B.C. Reg 371/2004.

Provincial Statute: *Wildlife Act*, RSBC 1996.

General description: Provides the legal framework for establishment of critical wildlife areas, designation of provincially endangered and threatened species, protection of nests, etc.

Provincial Statute: *Water Act*, RSBC 1996, c 483.

General description: Provides the legal framework for water licensing, making changes in or about streams, wells and groundwater protection.

Relevant Associated Regulations: *Ground Water Protection Regulation* B.C. Reg. 299/2004. *Water Regulation*, B.C. Regulation 204/88.

Provincial Statute: *Park Act*, RSBC 1996 c. 344.

General description: Defines the various classes of parks and conservancies in BC and conveys authority to the Minister to designate them. It sets the framework for management of parks and protected areas, including the modification of boundaries, collaborative agreements, and relations with First Nations.

Regulations: Application of Park Legislation to Ecological Reserves Regulation B.C. Reg. 364/97. Class C Parks Regulations B.C. Reg. 227/67. Park, Conservancy and Recreation Area Regulations and Schedules.

Provincial Statute: *Protected Areas of BC Act*, RSBC 2000 c. 17

General description: Class A Provincial Parks and Conservancies can be established under this Act for the purposes of the Park Act and Ecological Reserves can be established under this Act for the purposes of the Ecological Reserves Act.

Provincial Statute: *Islands Trust Act* RSBC 1996

General Description: Establishes the Islands Trust, identifies the Islands Trust Area and the mandate of the Trust, transfers land use planning powers from Regional Districts to Local Trust Committees, prohibits a Regional District from adopting by-laws, issuing permits or undertaking work contrary to a Local Trust Committee bylaw, establishes the relationship with Island Municipalities and guides governance procedures.

Planning Bylaw: *Denman Island Official Community Plan Bylaw No. 185*

General description: A bylaw to designate the community plan for Denman Island as the Official Community Plan for Denman Island

Planning Bylaw: *Denman Island Land Use Bylaw No. 186*

General Description: To establish regulations and requirements respecting the use of land, including the surface of water, the use, siting and size of buildings and structures, the provision of parking, landscaping, screening, signs, and the subdivision of land within the Denman Island local trust Area.

Provincial plan: *Denman Island Official Community Plan*, approved May 2009

General Description: Sections 944 and 948 of the *Local Government Act* authorizes the Denman Island Trust Committee to adopt Official Community Plans (OCP), and Section 949 of the *Local Government Act* requires that all bylaws enacted, permits issued and works undertaken by the Denman Island Trust Committee be consistent with the Official Community Plan. An Official Community Plan is a general statement outlining the planning goals of a community and the policies that will help the community to reach these goals.

Federal Statute: *Fisheries Act*, R.S.C. 1985, c. F-14

General description: Describes licensing, requirements for fish habitat protection (no harmful alteration, disruption or destruction) and associated penalties for non-compliance, among other topics.

Relevant Associated Regulations: Fishery (General) Regulations.

Federal Statute: *Species at Risk Act*, S.C. 2002, c. 29

General description: while applying mainly to federal lands, this Act, which pertains to the listing and protection of species and their habitat has broader implications for listed species protection in BC.

International Agreements relevant to the Denman AC Project include:

- The United Nations Convention on Biological Diversity;
- The United Nations Framework Convention on Climate Change;
- Convention on the Protection of Migratory Birds in Canada and the United States

For more information on these agreements refer to their corresponding websites.

Scenario 1: Transfer of the land to protected status without the sale of carbon offsets.

Laws and regulations relevant to this scenario consist of the provincial *Land Act*, *Ecological Reserves Act*, *Protected Areas of BC Act*, *Park Act*, *Wildlife Act*, and *Water Act*, as well as the federal *Fisheries* and *Species at Risk Acts*. These acts and their associated regulations, while governing the manner in which the transfer of and to protected status is conducted, and the activities carried out within the protected area once it is established, do not prevent the land transfer or establishment of a protected area.

Scenario 2: Continuation of the pre-project land use.

Laws and regulations relevant to this scenario consist of the provincial *Assessment Act*, the *Private Managed Forest Land Act*, the *Wildlife and Water Acts*, and the federal *Fisheries* and *Species at Risk Acts*. Again, while these acts and their associated regulations govern how forest management activities would be carried out in this scenario they do not prevent forest management activities from occurring. Note that the *Private Managed Forest Land Act* is only relevant if the property were to be officially designated as managed forest land under the act.

Scenario 3: Conversion of the land to cropland, grassland, and settlement.

Laws, regulations, and plans relevant to this scenario consist of the provincial *Land*, *Wildlife and Water Acts*, the federal *Fisheries and Species at Risk Acts*, the *Islands Trust Act*, and the Denman Island Official Community Plan. Again, while these acts and their associated regulations govern how development activities would be carried out in this scenario, they do not prevent these activities from happening. Current zoning and the Denman OCP permit the proposed conversion to agricultural and residential development or are expected to be adjusted to allow these activities to occur in the future (and within the projected development timeframe of the scenario) due to development pressures in the area (Appendix G.2).

Step 2. Barrier Analysis

Step 2a. Identification of barriers that would prevent the implementation of alternative scenarios

In this step the scenarios one through three were assessed against existing barriers that would effectively prevent their implementation. The following barriers were identified:

Investment Barriers

- a. Lack of available funding for the province to purchase the land and transfer it to protected status without financing from the sale of carbon offsets.
- b. Lack of available capital to maintain the property intact (property was in receivership immediately prior to project commencement).
- c. Lack of an existing timber profile sufficient to justify continued investment for management as forest land (the majority of merchantable timber on site was logged from 1998 to 2000).

Other Barriers

Other conditions, including technological, institutional, local tradition (including traditional First Nations uses that would be allowed to occur within the eventual provincial park or protected area), land tenure, and prevailing practice were considered but not found to be barriers to implementation of any of the scenarios.

Step 2b. Elimination of land use scenarios which are prevented by the identified barriers.

Scenario 1: Transfer of the land to protected status without the sale of carbon offsets. This scenario is prevented by Barrier a) Lack of available funding to purchase the land and transfer it to protected status without financing from sale of carbon offsets. There was a gap in the funding required for the province to purchase the lands and subsequently convert it to protected status. Without the \$1.23M paid to the land owner/receiver for the carbon sequestration rights “there would have been a continual total cash shortfall in the Crown’s intended acquisition of \$1.7M as the vendor and the Crown each likely would not have contributed \$230,000 shares. With such a shortfall the Crown acquisition would not have been realized” (Appendix A).

Scenario 2: Continuation of the pre-project land use (forest land). This scenario is prevented by two barriers. Barrier 2, lack of available capital to maintain the property intact, stems from the fact that the property was being held in receivership immediately prior to initiation of the Denman AC Project (Appendix G.1). This was due to a financing shortfall among the consortium of landholders. The property was scheduled to be disposed of by the mortgage holder, with the most feasible outcome from this being the selling off of the property in pieces to developers.

Scenario 2 is also prevented by Barrier 3: Lack of an existing timber profile sufficient to justify continued management as forest land. Due to recent clearcut logging activities the majority of the project lands

are young regenerating forests averaging five to ten years of age (see Section 1.8). It would be at least 50 to 60 plus years before a reasonable crop of timber could be harvested from the majority of the site. This lack of multi-aged stand profile and deficit of mature stands is a barrier to managing the project area as forest land.

Outcome of Step 2b: alternative scenarios that are not prevented by any barrier

Following the barrier analysis, only one scenario remains feasible. This is Scenario 3: Conversion of the land to cropland, grassland, and settlement. In accordance with the UNFCCC baseline and additionality tool, as this alternative is not the project activity undertaken without carbon offset funding, it becomes the baseline scenario.

G2.2 Document that Project Benefits Would Not Have Occurred in the Absence of the Project

Existing laws and regulations are discussed above (Indicator G2.2) as they relate to Step 1b of the UNFCCC Methodological tool: *Combined tool to identify the baseline scenario and demonstrate additionality*.

As further explanation to the outcome of step 2b above, the project activity of land acquisition for designation under protected status is not possible without the registration and sale of carbon offsets. This is because, as noted, the BC provincial government did not have the funding in place to purchase the property without the additional financing provided by the carbon offsets (Appendix A). As such, the UNFCCC baseline and additionality assessment proceeds to Step 4 and an investment analysis (Step 3) is not required.

Step 4: Common Practice Analysis

The Denman Island Avoided Conversion of Forest Land to Cropland, Grassland and Settlement is the first of its kind in British Columbia and, most likely, Canada. That is to say, it is not common practice. Evidence in support of this includes the fact that there was no precedent process in place from which to base the land transfer process and conservation covenant. Neither was there any legislation in place to guide this process. The conservation covenant, land transfer, and subsequent planned designation as a protected area process is precedent setting.

Based on this finding and in accordance with the UNFCCC *combined tool to identify the baseline scenario and demonstrate additionality* (Version 02.2), the Denman Island Avoided Conversion of Forest Land to Cropland, Grassland and Settlement is additional, and the benefits being claimed by the project would be unlikely to occur without the project.

G2.3 Estimated Carbon Stock Changes Associated with the 'Without Project' Scenario

Analysis of Relevant Drivers and Rates of Deforestation

Calculation of estimated carbon stock changes associated with the 'without project' reference scenario (the baseline) necessitate that the amount and timing of future land conversion to residential and agricultural uses be determined. A detailed, preliminary baseline scenario for the project lands was

developed by the previous landowner and developer, and Island resident Dr. Hamish Kimmins, based on an independent assessment of land capability and demand for similar properties on the Gulf Islands (Barrs 2010).

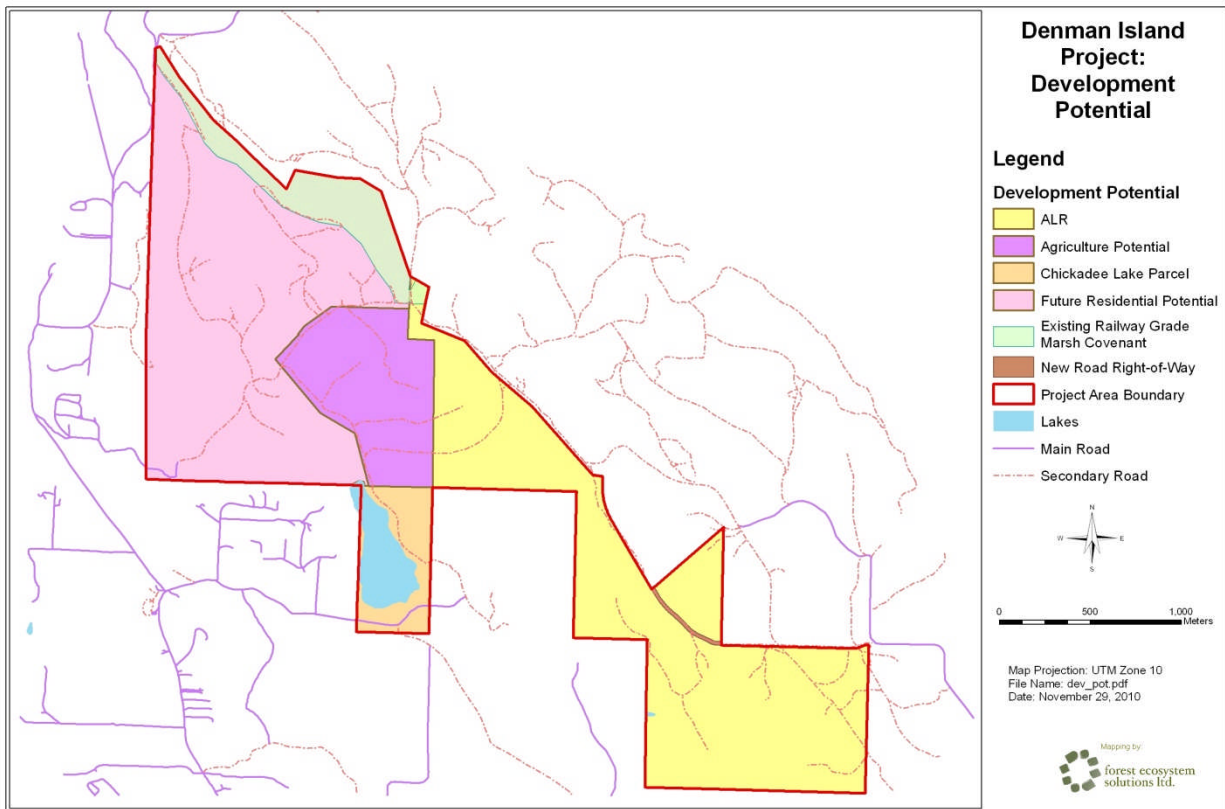
The resulting preliminary baseline scenario was later assessed and confirmed as reasonable by a third party professional land-use planner (Barrs 2010). Barrs in his assessment considered population and development trends in the region over the past decades, expected population pressures in the coming decades, land-use planning regulations, and similar developments on properties in the region. Previous logging activities which removed the majority of existing forests from of the project area were also considered by Barrs with respect to their impact on the extent of permanent forest-land conversion to residential development in the baseline scenario(similar observations were made with respect to lands available for conversion to agriculture):

...it is worth noting that most of the land is already cleared or recently logged and not in mature forest. This is significant because it increases the likelihood that the land would end up in a deforested condition as there would be few practical or ethical barriers to clearing or maintaining the land in a deforested condition for buildings, roads, driveways, gardens, lawns, horse paddocks and to create views.

The baseline scenario is described through the distinction of four sub-parcels (Figure G2.3 -1). The parcels are distinguished from one another based on land suitability and current zoning. Future changes in land use for each sub-parcel are based on the data, assumptions and rationale mentioned above and detailed in the baseline document itself, and Barrs (2010) (these are available on request). In some cases the development schedules/timeframes extend beyond the 30 year CCBA project period (Table 3.1). These timeframes do fit within the ISO 14064-2 validated GHG accounting period of 100 years.

Table G2.3.1 shows future land-use classes, the timelines over which conversion from forest to non-forest land use is expected to occur, and the proportion of forest land expected to be retained within each conversion type. As a measure to ensure conservativeness of estimations, 5% forest land retention was incorporated into the agricultural conversion scenarios subsequent to the development and independent review of the baseline scenario. In addition, for modeling purposes all conversion activities were delayed to the furthest year out in the conversion schedule, resulting in a reduced net project minus baseline GHG reduction assertion.

Figure G2.3-1: Land Use Conversion Units for the Denman Project Lands



Agricultural Development: lands currently zoned as Agricultural Land Reserve (ALR). This 191-hectare area is converted to cropland (vineyards, tree fruits, and berries) and grassland (pasture and hay crops), from the period 2015 through 2030. Barrs (2010), Kimmins and Henning (2009) and C&F Land Resource Consultants (French 2006) provide background on the suitability of these lands for conversion to agricultural use. Barrs provides background on the likelihood of such a conversion.

Agricultural Development: lands suitable for agriculture and approved to be zoned as ALR (arable future ALR). These lands (58 ha gross area) have similar agricultural potential to the lands currently zoned ALR above and will similarly be converted to agricultural use, from the period 2025 to 2035.

Lakeside Estate: Chickadee Lake. This 32-hectare lakeside property will be sold and developed as a high-value trophy property and partially cleared for building sites, horse pasture, and lake views.

Residential Development. These lands are currently zoned for forestry use; however, given population growth and current land-use trends they would be rezoned for development to lots averaging five to six acres (two to two and half hectares) in size.

Table G2.3-1: Future Forest-Land Conversion Areas by Sub-Units

Land-use Unit	Gross Area (ha)	Future Land Use	Conversion Schedule	% of Forest-land Retained	Net Area Converted
Agriculture: current ALR	190.9	cropland, grassland	2015 to 2030	5%	149.0 ha
Agriculture: future ALR	57.8	cropland, grassland	2020 to 2035	33%	50.5
Lakeside Estate	31.8	grassland, settlement	2015	5%	12.1
Residential	212.3	settlement, grassland	2015 to 2045	20%	133.1
Total	492.8			Total	344.8

Definition of Carbon Pools

Carbon pools included in the quantification are above-ground biomass, below-ground biomass, dead wood, litter, and soil carbon. The latter pools are stratified into dead standing, coarse woody debris litter, and forest floor litter compartments. Consideration of soil carbon is restricted to areas of conversion to residential land-use.

Above-ground non-tree biomass has been excluded due to its minor component (less than 1% of tree biomass) and difficulties with modeling and monitoring. Burning of fossil fuels due to transport of equipment and personnel to the site for development of the project are also excluded: project transportation emissions were calculated and determined to be less than 1% of project carbon stock changes. Emissions from baseline agricultural land use have been excluded: ERA consulted with Canadian experts and was unable to obtain sufficient data on these emissions. Their exclusion is conservative as it results in a reduced project minus baseline GHG assertion.

Carbon Stock Changes Associated with the 'Without Project' Reference Scenario

Carbon stocks for each of the baseline land-use classes of concern (agriculture and residential development) were estimated using the Canadian Forest Sector Carbon Budget Model (CBM-CFS3), to simulate live biomass, dead organic material and soil organic matter. The CBM-CFS3 meets IPCC Tier 3 criteria. The results of the model simulations are shown in Table G.2.3-2. As described in G1.4, comparison of modelled to measured and literature values for DOM resulted in a reduction to modelled values for DOM. These reduced values are reflected in Table G.2.3-2 and 3.

Baseline carbon stocks associated with each of the project strata at year 30 are shown in Table G2.3-3. Values are presented as the combined weighted average of both converted (forestland to other uses) and corresponding proportion of non-converted area for each strata.

Table G.2.3-2. Carbon Stocks Immediate Post Land-use Conversion Disturbance

Stratum	% Conversion Type and Year				Live Biomass tC/ha	Above Ground DOM tC/ha	Below Ground DOM (fine, coarse roots) tC/ha	Soil Organic Carbon tC/ha	Total Ecosystem tC/ha
	Ag	Ag	Res	Res					
	2030	2035	Lake 2015	2045					
1a		3		97	0	42.7	42.7	110.6	157.7
1b	100				0	34.0	34.0	115.0	151.0
2				100	0	43.6	43.6	109.4	157.4
3	93		7		0	33.3	33.3	69.6	105.0
4		86		14	0	55.2	55.2	149.3	209.2
5		100			0	49.6	49.6	115.2	171.7
5b		100			0	57.1	57.1	131.8	196.5
6		100			0	31.7	31.7	116.3	150.2
7		8	87	5	0	69.9	69.9	127.1	207.1
8	100				0	31.5	31.5	133.9	167.0
9	100				0	163.6	163.6	160.9	352.4
10	100				0	38.3	38.3	124.4	165.1
11	100				0	76.6	76.6	131.0	219.2
13	88			12	0	30.3	30.3	78.6	110.7
14	100				0	44.2	44.2	140.2	187.2
15	29			71	0	70.5	70.5	113.3	190.0
16		100			0	65.9	65.9	110.0	181.9

Table G2.3-3: Combined Weighted Baseline Carbon Stocks by Strata at Year 30

Stratum	Live Biomass tC/ha	Above Ground DOM tC/ha	Below Ground DOM (fine, coarse roots) tC/ha	Soil Organic Carbon tC/ha	Total Ecosystem tC/ha	Forest Land (ha)	Total tC per strata
1a	95.8	29.99	0.83	111.2	237.9	108.2	25737
1b	0.0	22.42	0.38	112.7	135.5	41.0	5557
2	98.9	30.37	0.82	109.9	240.0	44.6	10705
3	0.0	19.51	0.40	68.6	88.5	4.5	398
4	20.5	40.87	1.85	148.4	211.6	23.1	4888
5	0.0	36.40	3.10	114.6	154.1	31.1	4793
5b	0.0	41.99	3.46	131.1	176.5	26.7	4714
6	0.0	24.55	0.89	115.2	140.6	9.5	1336
7	14.7	30.80	0.73	122.9	169.1	18.4	3112
8	0.0	21.95	0.31	130.9	153.2	16.7	2558
9	0.0	56.38	3.27	147.4	207.0	7.4	1532
10	0.0	24.90	0.48	121.9	147.3	17.3	2548
11	0.0	46.85	2.46	130.1	179.4	13.3	2386
13	8.2	19.25	0.37	77.5	105.3	19.2	2022
14	0.0	28.34	0.56	137.5	166.4	3.4	566
15	135.9	54.39	1.24	112.9	304.4	8.4	2557
16	0.0	49.90	2.70	109.8	162.4	1.0	162
Totals							75569

Non-CO2 Greenhouse Gasses

Non-CO2 GHG emissions in the baseline, such as CH4 and N2O, will come primarily from activities such as the burning of logging slash for land conversion, emissions from agricultural operations, and emissions from residential construction activities as well as from the future residences themselves. It is anticipated that these emissions represent less than 5% (in terms of CO2 -equivalent) of the project's overall GHG impact. Given that non-CO2 GHG emissions in the baseline will be greater than those of the project scenario (the project scenario does not involve land clearing, agriculture or residential construction activities), the omission of these gasses from the quantification and GHG assertion aligns with ISO 14064-2 principles of conservativeness and an exact value for non-CO2 GHG emissions has therefore not been calculated.

G2.4 Without Project (baseline) Scenario Affects on Communities in the Project Zone

In the without project reference scenario the land remains private and will be converted over time from forestland to residential and agricultural development (G2.1). As detailed in Table G2.3-1 above, 200ha of forestland would be converted to agricultural, and 145ha would be converted to residential use. The effect of these changes on the Denman community would be significant, particularly with respect to the values determined to be community priorities within the Denman Island Official Community Plan. These affects are summarized as follows:

Agriculture: a greater area and opportunity would be available for local agricultural and agricultural products including hay, berries, and grapes.

Housing: approximately 60 small rural acreages would become available on the island. Given recent trends on the island it is likely that a portion of these would be vacation / summer homes owned by people living off the island.

Employment: there would be temporary employment opportunities associated with housing construction. It is most likely that a significant portion or majority of the workers would be from off the island. Seasonal employment opportunities would be available through agricultural activities although it is likely that given their small size many of the operations would be owner / operator oriented with limited need for additional work force.

Recreation: the recreational uses occurring unofficially prior to the project implementation would become more restricted and eventually eliminated altogether as the land in its previous receivership status would have been sold off to private developers and subdivided. These recreational uses included hiking, horseback riding, cycling, swimming and picnicking.

Biodiversity: provincially, a rare opportunity to protect the threatened Coastal Douglas-fir ecosystem and associated listed species would be lost. Instead the project area would continue along the development trajectory of the majority of other remaining Coastal Douglas-fir ecosystems.

Species at Risk: in the without project scenario, continuation of the project area as private land and its eventual subdivision for development activities limits the ability to establish a long term species recovery plan for the Taylor's Checkerspot Butterfly. This is due to the uncertainty associated with the ability to influence or control land use practices on private land. As well, habitat loss from development

activities will further reduce the probability of recovery. Other species listed elsewhere in this document will be subject to greater development pressure and reduced opportunity for recovery.

Soils: Conversion to residential and agricultural uses will result in considerable loss of the natural forest floor (humus) layers and dead organic material as soils are bladed and debris pushed into piles to be burned. Soil structure will be lost and some compaction will occur during the clearing and road building process and also as a result of agricultural practices. These types of impacts are widely known to result in increased water runoff during rain events, adversely affecting upland water storage capacity and dry season low stream flows. Application of chemical fertilizers and pesticides generally associated with agricultural practices would also result in impacts to both soil and water chemistry.

Water and Riparian Habitat: Fresh water is in limited supply and its conservation is a concern on the Island (Denman Island Trust Committee 2011). Low summer rainfall levels combined with a relatively poor ground and surface water storage capacity are significant contributors to water levels reaching critical levels for wildlife and community consumption during some years (Denman Island Trust Committee 2008). In the without project scenario, BC Provincial requirements (e.g. the Water Act) and Federal legislation including the Fisheries Act would provide a degree of protection for riparian habitat and water resources including lakes and streams during development activities. The accumulated affect, however, from soil compaction, reduced forest cover and increased surface runoff, road construction and drainage, and agricultural production activities would have a negative impact on water and riparian resources compared to the project scenario of protection.

G2.5 Affects of 'Without Project' Scenario on Biodiversity in the Project Zone

The 'without project' or baseline scenario is conversion of a majority of the project forest land area to rural residential and agricultural use. Both of these outcomes will result in a significant loss of ecosystem function due to fragmentation and habitat loss due to loss of forest cover and associated species. The controlled environments of residential development including lawns and ornamental species, as well as those of agricultural use including continued soil disturbance and use of fertilizers and pesticides lead to relatively sterile habitats in comparison to the baseline scenario of continued forest land (Hooper 2007).

Development will limit connectivity create fragmented ecosystems that may not provide sufficient land mass or corridors for species movement in response to environmental change. Many insect species, including butterflies are known to only fly a maximum of a few hundred meters over the course of their lifetime and can be threatened by a fragmented landscape (Austin et al. 2008). An additional consequence of residential areas is home owners acquiring and introducing pets into these areas. The presence of pets negatively impact and drive out birds, rodents and lizards that may normally be found on site (T. Stevens, personal communications, February, 2012).

G3. Project Design and Goals

G3.1 Major Climate, Community and Biodiversity Objectives

Climate objectives: ensure a net positive climate benefit from the GHG emission reductions and removal enhancements due to the avoided conversion forestlands to residential and agricultural development on Denman Island.

Community objectives: facilitate the achievement of community driven priorities related to maintenance of the natural beauty of the island, promotion and support of low impact, environmentally sensitive tourism and associated opportunities for local small scale enterprises and local products. Ensure the protection and enhancement of recreational opportunities.

Biodiversity objectives: to preserve and protect the integrity of the natural ecosystems on Denman Island, including the diversity, structure, and ecological functions of forests, and sensitive areas which provide import ecosystem services including habitat for rare or endangered species. Increase the protected area of the threatened Coast Douglas-fir ecosystems from 4% to 4.3%.

Note: some segments have been quoted or paraphrased with permission from objectives in the Denman Island Official Community Plan, and from know objectives of the BC Provincial Government.

G3.2 Project Activities and Expected Impacts and Relevance to the Project's Objectives.

The Denman project is defined by those activities that took place to achieve the transfer of land from North Denman Lands Inc. to BC Parks for designation under protected status. This includes the carbon funding component provided by ERA to enable purchase of the lands by BC Parks, the registration of a conservation covenant on the project lands and the assignment of carbon rights to ERA from the province.

- 1) A conservation covenant was signed which ensures the protection of the biomass on the land, allows ERA access to the land for monitoring, and defines a reserve area for the Taylor's Checkerspot butterfly. The conservation covenant is registered against the title of the land under Sections 218 and 219 of the *Land Title Act* to "ensure that the environmental value and plant life value of the Land are protected, preserved, maintained, enhanced, and restored in accordance with the terms of this Covenant for the purposes of preventing the destruction of the forest currently found on the Land."
- 2) A Carbon Sequestration Rights Assignment agreement was signed between ERA, North Denman Lands Inc., 0736800 BC Ltd., and the Receiver. This document assigns the carbon sequestration rights arising from the project lands to ERA.
- 3) CAN\$1.2 million in funds were provided by ERA to the provincial government to fill a funding shortfall for purchase of the project lands from NDLI. The funding was provided through an ex-ante estimation of GHG emissions reductions and removal enhancements to be provided by the land's designation under protected status, and the conservation covenant.
- 4) The project lands were purchased by the Province of British Columbia.

- 5) An Acknowledgement and Indemnity agreement was then signed between ERA and the Ministry of Environment ensuring that the Province would not claim any carbon rights from the project lands.

These activities ensure achievement of the project's climate, community and biodiversity objectives by facilitating the transfer of the project land from private to public ownership for eventual inclusion in the BC Protected Areas System. This protected status ensures avoidance of the baseline scenario conversion to residential and agricultural development, and thus the achievement of the net climate benefits, as well as the community and biodiversity objectives described above.

G3.3 Location and Boundaries of the Project Area and the Project Zone

See Figure 1.2

G3.4 The Project Lifetime and GHG Accounting Period

Project Lifetime

The CCBA project period is 30 years with a project start date of September 8, 2010. The ISO 14064-2 GHG ex-ante accounting period is 100 years with a project start date of September 8, 2010. The CCBA project period is less than the GHG accounting period as thirty years was considered a sufficient length of time to monitor and ensure that community and biodiversity benefits are in place and / or progressing as anticipated. In reality, once formal designation of the project lands as a park or protected area takes place, protected status will be guaranteed in legislation with the intent that the park will endure in perpetuity.

Implementation Schedule

The central project activity is the acquisition of the project lands, through funding support from the associated carbon emissions reductions, for designation of the land under park or protected area status. This happened on September 8, 2010.

G3.5 Natural and Human-induced Risks to the Expected Climate, Community and Biodiversity Benefits during the Project Lifetime, and Measures to Mitigate these Risks.

The VCS AFOLU Non-Permanence Risk Tool was used to assist with the assessment of natural and human-induced risks to the expected climate, community and biodiversity benefits (VCS 2011). The results of this assessment are summarized below.

Natural Risks to Climate Benefits

Potential for climate change to affect future growth rates

Only limited data are available with respect to the potential effects of climate change on forest growth on the BC coast. Some of the evidence indicates a potential decrease in Fd productivity in the CDFmm subzone, while other evidence suggests an increase in Fd productivity in the neighboring CWHxm subzone (Nigh 2006; Coops et al. 2009). Based on a sensitivity analysis to the effect of lower than anticipated growth rates, and consultation with a recognized local forest ecologist, site index reductions were applied to Hw and Bg to address potential negative future climate change effects on these species. A contribution of 2% to the project's 8% natural risk buffer pool was made to address risk from drought (below).

Reduced Growth of Regenerating Conifers due to Browse from Deer

Young regenerating Fd, Bg, and Cw are being subjected to persistent, moderate to heavy deer browse that is delaying their height growth. This can potentially have a negative impact on future carbon stock levels. It was necessary therefore to assess the potential impacts of deer browse. As a result of significant literature review, sensitivity analysis, and consultation with local experts, modelling parameters were developed to account for a delay in height growth on browse-affected strata. In addition, browse impact will be specifically assessed in the monitoring plan.

Fire

There is low incidence of lightning in this climatic zone and the risk of catastrophic fire is very low (an analysis of fire incidence records on the island over the past 27 years was incorporated into the VCS AFOLU Non-Permanence Risk Tool based buffer calculation. Access to the project area via road will be limited and controlled by BC Parks during periods of extreme or high fire hazard ratings to minimize the risk of human caused fires. The same road access will provide good access for fire crews. The Denman Island volunteer fire department is only 4 km away and any fire would be aggressively addressed due to the close proximity of residential properties. B.C. provincial forest fire crews with helicopter capability are stationed relatively close by on Vancouver Island. A contribution of 0.5% to the project's 8% natural risk buffer pool was made to address risk from fire.

Wind

Recently exposed timber faces (from the 1998 to 2000 clearcut logging event) along the riparian reserve for Beadnell Creek have experienced significant windthrow over the past 10 years, however windthrow along these faces has not been significant lately and it is likely that the majority of exposed and unstable trees have come down, barring extreme wind events. These faces comprise a very minor portion of the project carbon stocks. Poorly drained sites with high water tables will be more vulnerable to wind damage; however, they also comprise a minor component of the project area. ERA's conservation covenant and the statutory protected status of the project lands mean that there will be no road construction, harvest or other activities within the project area that result in the exposure of unstable timber faces, therefore limiting the potential for significant windthrow events excepting through unusual storm events. Damage from windthrow will be assessed during regularly scheduled monitoring entries. A contribution of 2% to the project's 8% natural risk buffer pool was made to address risk from wind damage.

Drought

Extended summer droughts are a feature of the CWHxm and CDFmm biogeoclimatic subzones. The project area contains some tree species that are vulnerable to extended summer drought on dry, moisture-shedding micro-sites. A contribution to the buffer pool and downward site index adjustments for some species and strata were applied to address potential effects of drought (also see Climate Change above). A contribution of 2% to the project's 8% natural risk buffer pool was made to address risk from drought (below).

Disease and Insects

White pine blister rust will result in the mortality of most immature western white pine growing currently on site. Western white pine represents a minor component of the forest inventory. Carbon modelling parameters assumed 100% mortality of western white pine, therefore eliminating risk of reversal to the GHG assertion from this factor.

Endemic levels of root rot exist on site. As forest pathogens root rots spread slowly and hence do not experience what might be considered an outbreak condition. Opinion from the forestry consultants responsible for the project's carbon inventory and from a widely recognized local forest ecologist indicate that root rot does not pose a significant threat to carbon stocks.

The Ministry of Forests, Lands and Natural Resource Operations' Forest Health – Aerial Overview Survey website (<https://www.for.gov.bc.ca/hfp/health/overview/overview.htm>), and communications with forests ministry personnel indicate that risk from defoliators and bark beetles on Denman Island is very low. Minor Fd and Ss bark beetle have been known to occur in the general Vancouver Island area but only rarely. Occurrence of the Hw looper (a defoliator) is also very rare.

To address risk from disease and insects, operational adjustment factors applied to the modelling parameters assumed future timber volume losses from disease and insects of 6%. An additional contribution of 3.5% has been made to the risk of reversal buffer for insects and disease.

Landslides

No areas of unstable terrain exist on the project site.

Anthropogenic Activities

Human activities on the project area that could affect carbon stocks include illegal Christmas tree and firewood cutting. These activities are currently very minimal and will be reduced even further under protected status. They do not present a material risk to carbon stocks.

Flooding and earthquakes

Flooding has a very low risk factor as there are no significant watersheds / water sources feeding the project area. Earthquakes have a moderate risk of occurring but a low risk of impacting carbon stocks.

Re-quantification and Measures to Address Underperformance of Climate Benefits

As noted under CL3.2 Climate Impact Modelling, a re-quantification of climate impacts will be triggered if a monitoring entry determines that a change of greater than 10% to the projected net project carbon sequestration could result at the project end-date. The project development plan validated to ISO 14064-2 criteria for the GHG accounting period states that if there is an underachievement of projected carbon benefits by more than 8% due to non-permanence reasons or more than 7% due to modelling uncertainty / error, the carbon reserve will be increased by ERA by an amount that is equal to what is required to fill the gap.

Natural Risks to Community Benefits

Community benefits as defined by the objectives stated in G3.1 (maintenance of the natural beauty of the island, support of low impact, environmentally sensitive tourism and local small scale enterprises,

recreational opportunities) are derived from the central project activity: acquisition of the project lands for designation under protected status. Acquisition of the project lands by the province took place in 2010 as a result of the addressing the purchase funding gap through an ex-ante estimate of the project's climate benefits. In addition, the conservation covenant held by ERA guarantees conservation oriented uses of the project lands for 100 years, and statutory protection of the area will in all likelihood result in its protection in perpetuity. As such, the community benefits are essentially guaranteed well beyond the CCBA project lifetime.

Natural Risks to Biodiversity Benefits

As for risks to community benefits above the project's biodiversity benefits derive from the acquisition of the project lands by the province for designation under protected status. Ensuring the continued forestland status of the project area allows for the long term recuperation and retention of the diversity, structure, and ecological functions of an important CDF ecosystem in the island. Future events such as fire or insect outbreaks, while posing a risk of reversal to the project's climate benefits, do not necessarily present a risk to the projects biodiversity benefits under normal circumstances. These events at historically normal scales are a part of the natural ecological functioning of the CDF. As for both community and climate benefits above, legally protected conservation status of the project land ensure that biodiversity benefits will continue well beyond the CCBA project period.

Human-induced Risks to Climate, Community and Biodiversity Benefits

The VCS AFOLU Non Permanence Risk Tool was used to assess risk related to project management, financial viability, project longevity, land ownership and resource access, community engagement, and political risk. The results of the tool indicate no risk associated with these factors that would trigger the need for additional contributions to the project's risk of reversal buffer.

G3.6 Measures to Ensure the Maintenance or Enhancement of High Conservation Value Attributes

High conservation values as identified in G1.8 are:

G8.1b threatened species: Taylor's Checkerspot Butterfly

G8.1d significant concentration of species: Taylor's Checkerspot Butterfly

G8.3 threatened or rare ecosystems: Coastal Douglas-fir

Measures Specific to the Taylor's Checkerspot Butterfly

ERA has made significant efforts to work proactively with the government agencies involved with the management and conservation of the Taylor's Checkerspot butterfly. The Taylor's Checkerspot biology is not completely understood; however, it is believed to be a species that requires early seral habitat for important stages of its reproductive cycle (Page et al. 2009). These early seral habitats are typically a result of forest disturbances that result in a temporary reduction of crown closure. The reduced tree cover allows significant light penetration to the forest floor. As forest re-growth occurs and light penetration subsequently decreases, the butterfly migrates to new areas of recent disturbance.

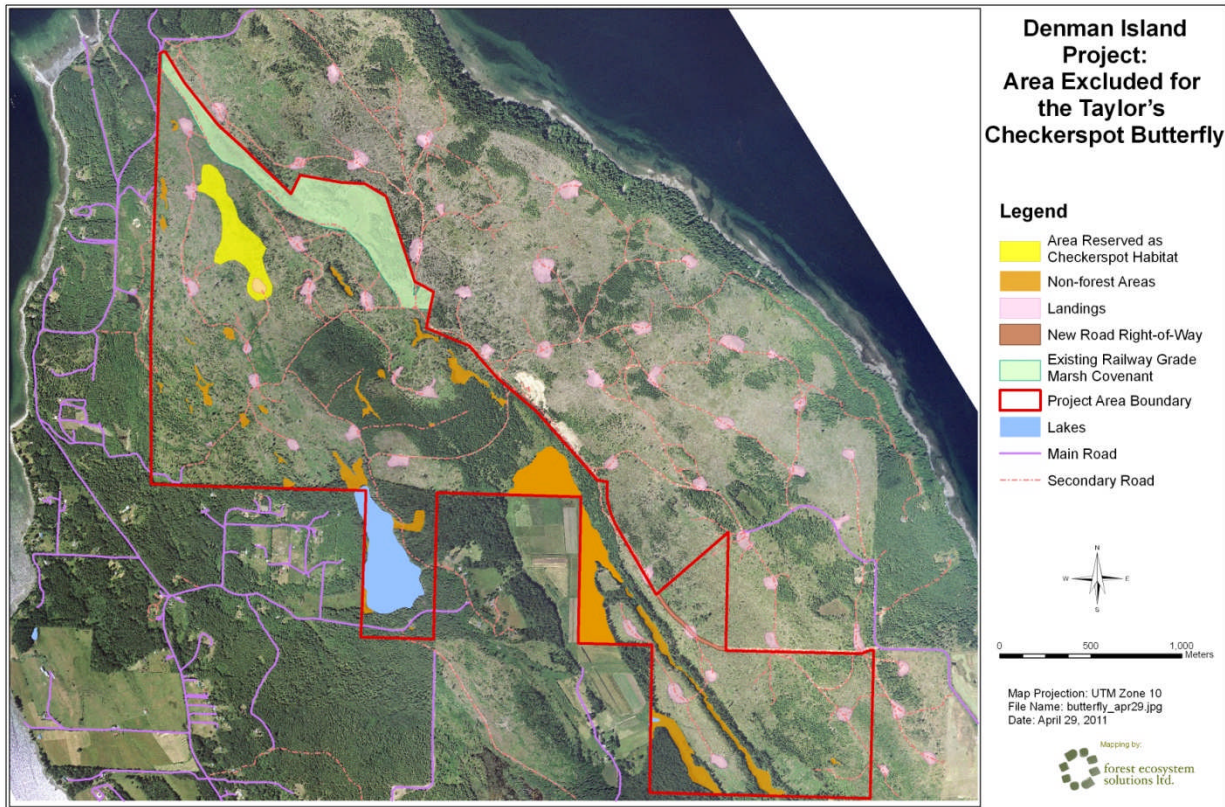
Low-lying, moisture-receiving areas with an abundance of specific host plants are critical to the larva stage of the reproductive cycle (Page et al. 2009). The project protects these habitat areas from conversion to residential and agricultural development. Unfortunately the natural re-growth and recovery of native forest species on the project site will eventually provide too much shade for the long-term maintenance of the existing Taylor's Checkerspot habitat on site. Scientific understanding to date, however, is that this will only lead to what would be considered a natural and normal sequence for the butterfly: migration to other recently disturbed areas.

The Denman project results in several long-term outcomes for the Taylor's Checkerspot which are better when compared to what would have happened without the project. Without the project, the lands in question would remain in private hands and be converted to residential and agricultural development. Threatened species legislation does little to protect invertebrate species on private lands and therefore there would be very limited certainty or control with respect to future habitat measures. With the project the lands are under provincial government control, providing greater opportunity to undertake management actions. The project protects the existing lowland habitat features important to the butterfly's larva stage. Without the project, many of these moisture-receiving sites and associated host plants would likely be destroyed. The greater security provided with respect to available habitat and ability to undertake management activities provides opportunities to plan for eventual relocation of the butterfly to other early seral stage habitats.

In collaboration with the BC Ministry of Environment the Denman project designated 10 hectares of forest land within the project area to be dedicated toward Taylor's Checkerspot habitat management. The 10-hectare area will be available for management activities including tree removal to allow for continued exposure to full sunlight. The 10 hectare area has been excluded from forestland area contributing to climate benefit quantification for the project. The size of the area was negotiated with the objective of providing a substantive opportunity for habitat management in conjunction with the non-forested lands while not jeopardizing the project's economic viability and opportunity to protect and conserve an important Coastal Douglas-fir ecosystem.

Concerns exist with respect to ability of the 10 hectare area to sufficiently support the Checkerspot's continued viability on the project site and Denman Island, and ERA continues to communicate with the BC Ministry of Environment on potential additional measures to enhance the habitat available. Potential options, provided they are consistent with the terms of the conservation covenant and mutually agreed to, include relocation of the 10 ha area or portions of it to maximize its effectiveness, a management zone or buffers that could be located around the 10-hectare area and managed at a lower tree density to allow for increased light penetration, ERA participation in habitat enhancement activities such as treatments on landings, and alternatives for maximizing benefits from the 10-hectare habitat commitment which could be explored. For example, a habitat area of greater than 10 hectares could be maintained if the period during which forest regeneration is to be restrained is less than 100 years.

Figure G3.6-1: Location of the 10-ha Taylor’s Checkerspot Reserve Area



Measures Specific to Coastal Douglas-fir Ecosystems

The project activities by affording long term protection of the project lands and avoiding their conversion to residential and agricultural development explicitly provide the best possible scenario for the maintenance and enhancement of Coastal Douglas-fir ecosystem values.

G3.7 Measures that will be taken to Maintain and Enhance the Climate, Community and Biodiversity Benefits beyond the Project Lifetime

A 100 year legal conservation covenant held by ERA ensures that the climate, community and biodiversity benefits will be maintained or enhanced beyond the CCBA validated project lifetime of 30 years. The covenant also guarantees access to the land for monitoring purposes, as well as defining a reserve area of 10 hectares for the purpose of conserving habitat for the Taylor’s Checkerspot butterfly. The covenant has been registered against the title under Sections 218 and 219 of the *Land Title Act* (British Columbia) to “ensure that the environmental value and plant life value of the Land are protected, preserved, maintained, enhanced, and restored in accordance with the terms of this Covenant for the purposes of preventing the destruction of the forest currently found on the Land.”

In addition, designation the project area as a provincial park under the *Protected Areas of BC Act* will either be through an Order-In-Council, which requires approval of the Cabinet of the BC government, or through an amendment to the *Protected Areas Act*, which requires approval of the BC Legislature. Both provide a very high level of protection and the most likely scenario will be that the project lands remain under protected status in perpetuity, i.e. well beyond the project period.

G3.8 Identification and Involvement of Communities and other Stakeholders Potentially Affected by the Project Activities

Identification of Stakeholders Potentially Affected by the Project

The Denman Island community and the K'omoks First Nation have been identified as the stakeholders that could potentially be affected by project activities. These entities were identified as being potentially affected through the following rationale: Denman Island residents are the only community located within the project zone and isolated from the adjacent Vancouver and Hornby islands by water and through independent land-use and community planning processes. The project area and zone lie within the K'omoks First Nation traditional territory and are not claimed or contested by any other aboriginal groups.

Stakeholder Involvement with the Project Design

The community consultation processes held in relation to the project and eventual creation of the provincial park can be separated into five stages:

- 1) An initial house to house consultation by North Denman Lands Inc. (the previous land owner) sought community input with respect to the best options for a future park boundary.
- 2) A formal public hearing and public reading process in regard to amending island bylaws in order to enable the transfer of the land to the Province. This process was led by the Islands Trust.
- 3) Consultation efforts with First Nations on the part of the original project area landowner, the Islands Trust, and the Ministry of Environment.
- 4) A carbon specific community education and park update process led by ERA with contribution from North Denman Lands Inc. and the Ministry of Environment. This process involved informing and educating the Denman Island community about the carbon component of the project and how this enabled the acquisition of the land.
- 5) A further stage in the public involvement process will be led by BC Parks in order to consult with stakeholders and First Nations regarding the designation and management of the project area.

These five consultation stages and their results are described in detail below.

House to House Consultation by North Denman Lands

Community involvement with the conservation of the project lands and the optimization of stakeholder benefits began when the previous land owner, North Denman Lands Inc., was preparing to submit bylaw amendments and rezoning applications for the project lands to the Islands Trust. This process began in 2007 and carried through into 2009. The bylaw amendments were necessary to change the zoning of the project lands and to transfer the development densities to an adjacent parcel.

Community consultation in this initial stage involved informal household meetings to inform community members of the proposed bylaw amendments. Community members were presented with three options for the park and development boundaries. It was found that the overwhelming majority of islanders preferred to conserve the largest area possible. An Island wide poll by the Mustel Group formally determined this preference and the location of the future park. The result of these activities was the revision of drafted bylaw amendments to ensure the needs of the community were met and that benefits from the project were optimised. One of the significant revisions made was to modify the boundary of the proposed conservation area to include the headwaters of Danes Creek, an area described as a wetland with beaver activity.

Statutory Bylaw Amendment Process

A community information meeting was held by North Denman Lands on June 29, 2009 and the Denman Island Local Trust Committee held a second information meeting on October 8, 2009. At these meetings North Denman Lands Inc. gave a detailed overview of the bylaw amendment proposal and the roles and responsibilities of those involved in project. The meetings were opened to the floor for comments and all community members were given an opportunity to speak twice. All comments were taken into consideration for the final revision of the bylaw amendment proposal. In addition, written comments to the Denman Island Local Trust Committee were received and considered during the approval process.

Once the content of the bylaw amendments were accepted in general by the Denman Island community the rezoning application followed the statutory process set out in the BC Local Government Act (LGA). The LGA has a purpose to, among other things, to provide the legal framework for local governments to represent the interest of and respond to the needs of their communities (BC Laws 1996). This process includes providing the proposed bylaws to the applicable government agencies and First Nations for comment as well as giving three readings of, and holding a public hearing on, the proposed bylaws. The public hearing and readings are required to be adequately advertised to the public. The public hearing for the proposed project bylaw amendment was held on October 20, 2009 and was attended by over 135 Islanders.

The Denman Island Local Trust Committee, in considering whether to approve the bylaw amendments or not, weighed all comments made at the public hearing and submitted in writing. Alignment of the proposed amendment with the objectives and policies outlined in the Denman Island Official Community Plan was also considered (Campbell 2009).

Consultation with First Nations

As statutory authorities for land use planning and park management in B.C. the consultation process with local aboriginal communities was led by the Islands Trust and the BC Ministry of Environment, not by ERA. Prior to the public information session held on Denman Island in June 2009 the Islands Trust had telephone conversations with K'omoks First Nation staff to provide informal information on the proposal. Once the application for a bylaw amendment was submitted the K'omoks First Nation was provided with a summary of the proposal and an invitation to meet (the invitation to meet did not receive a response). During this time there was also correspondence between North Denman Lands Inc., the BC Ministry of Environment, and K'omoks First Nation regarding the proposal.

In late 2009 the Ministry of Environment sent letters regarding the pending acquisition to ten First Nations groups in the area. All of these First Nations groups declined comment or deferred comment to the K'omoks First Nation. In late 2009 and early 2010 written correspondence to and from K'omoks was exchanged. The understanding from the BC Ministry of Environment at that time and additionally during subsequent meetings with the K'omoks First Nation was that transfer of the lands from private to public ownership, its designation under conservation status and the carbon aspects of the project were acceptable to the K'omoks First Nation.

K'omoks First Nation has and will continue to have the opportunity to be involved in the future park designation and park planning process. The first of these meetings took place between BC Parks and K'omoks First Nation in March 2011.

Carbon Specific Community Awareness and Project Update Sessions

In the spring of 2010 ERA became involved with the project as the contributor of the carbon finance required to make the land acquisition possible. On October 7, 2010, two stakeholder meetings were held in The Old School on Denman Island. The first meeting was called to brief the Islands Trust on project activities and carbon aspects, prior to the public announcement of the land transfer and carbon rights agreement. The second meeting was a briefing of island stakeholder representatives. The meeting was an opportunity for attendees to voice their perspectives to date on the project activities. These meetings were well received. The meetings were called by BC Parks and Islands Trust and were attended by the representatives from the Ministry of Environment, ERA, the Islands Trust and North Denman Lands Inc., the Islands Trust fund and the Denman Island Residents Association. Minutes from these meetings are held on file at the offices of ERA and the Islands Trust.

A second information session arranged at ERA's request was held on the afternoon of March 14, 2011, at the Denman Island Seniors' Centre. Representatives from stakeholder groups with a vested interest in the new park and the process behind its protection were invited to attend. Background information on the climate benefit aspects of the project was provided and the session opened to questions. Minutes from the meeting and a PowerPoint presentation related to climate benefit aspects were emailed to attendees along with an invitation to contact ERA with any further questions or comments. The meeting was attended by representatives from the Parks Liaison Group, Trails Committee, Parks Committee, Graham Lake Dock Committee, Denman Island Volunteer Fire Department, Island Equines, the Island Trust and the Denman Conservancy Association.

On the evening of March 14th 2011 ERA attended the March general meeting of the Denman Island Residents Association (DIRA). The meeting was announced in the Denman Island newspaper *The Grapevine* and was very well attended by community members. During the meeting ERA provided further information regarding the project and associated climate benefit aspects as well as the newly signed conservation covenant. An opportunity for questions was provided and attendees were invited to contact ERA with any further questions or comments. Minutes from this meeting were taken by both ERA and DIRA, both of which are on file at the respective offices.

Consultation Based Revisions and Benefits Optimization

As stated earlier, significant changes to the protected area boundary were made in response to early community consultations. In addition, the underlying project concept was designed in light of and assessed against the principles and objectives stated in the Official Community Plan.

Continued Communication and Adaptive Management

As detailed in CL3, CM3 and B3 ERA will be monitoring climate, community and biodiversity benefits over the lifetime of the project. This monitoring will include periodic communication and consultation with community groups about the project and its impacts. The results of this monitoring will be provided to BC Parks and community groups for their use in decision making and continual improvement related to the ongoing management of the project lands.

G3.9 Methods Used to Publicize the CCBA Public Comment Period to Communities and other Stakeholders and to Facilitate their Submission of Comments to CCBA

The CCBA public comment period will be communicated to the Denman Island community stakeholders by way of a public announcement printed in the Denman and Hornby Island newspaper, *the Grapevine*.

The Denman Island Residents Association will also be advised as well and other relevant community groups on the Island.

ERA will contact the K'omoks First Nation provide a copy of the PDD and extend an invitation for further input or questions related to First Nations specific criteria and the document in general.

The *Grapevine* announcement and notice to the aforementioned groups will include a brief explanation of the Climate Community and Biodiversity Alliance standard and validation, a link to the CCBA website where the Denman PDD and public comment area can be accessed, Stakeholders and First Nations will be invited to contact ERA if they have further questions about the PDD or the comment process.

G3.10 Process for Handling Unresolved Conflicts and Grievances that Arise During Project Planning and Implementation

The project activities as identified in G3.2 are concluded. A grievance process for the project was formally agreed to within the Conservation Covenant signed between North Denman Lands Inc. and ERA Ecosystem Restoration Associates Inc. This grievance process now applies to the relation between ERA and BC Parks for the duration of the project period. Article 8, entitled Dispute Resolution, indicates that the following steps will be followed if a dispute between the parties arises:

- 1) The parties engage in discussions of good faith to attempt to resolve the dispute.
- 2) If the parties cannot resolve the dispute through discussions they will hire a mediator to assist them in doing so.
- 3) If the parties are not able to resolve the dispute with the assistance of a mediator then the dispute will be resolved by a single arbitrator under the *Commercial Arbitration Act*.

G3.11 Adequate Flow of Funds for Project Implementation

All funding required to complete the primary project implementation activity - acquisition of the land for transfer to the BC Ministry of Parks - occurred on Sept 8, 2010. This funding gap filled by carbon

financing was \$1.3 million Canadian dollars. This funding was obtained through a conservative, ex-ante estimation and sale of 438,800 tonnes of carbon offsets that will be generated by the project lands over the next 100 years. Risks associated with reversal events or quantification errors are mitigated through the application of a 15% buffer. The anticipated climate, community and biodiversity benefits are a direct result of the land transfer process (i.e. no further project activities are required other than monitoring), and therefore project implementation is fully funded already.

The necessary funds for ongoing monitoring and verifications have been estimated based on the monitoring schedules outlined under Indicators CL3, CM3 and B3. The net present value of these costs over the full project period will be set aside in a restricted cash account or other secure manner.

G4. Management Capacity and Best Practices

G4.1 Project Proponent Responsible for the Project's Design and Implementation

ERA Ecosystem Restoration Associates Inc. is the project proponent and responsible for its design and implementation.

G4.2 Technical Skills Required to Implement the Project Successfully

Required Technical Skills: Climate

- Baseline land-use analysis and determination
- Ecological classification for forest land stratification and determination of site productivity
- Forest and carbon inventory, including statistical analysis
- Assessment of forest health and other risks of reversal
- Forest growth and yield projection
- Carbon stock estimation using appropriate models

These capacities were filled through a combination of ERA's project team expertise and specialist consultants. ERA's project team includes significant expertise in forest planning and management, project management, including the writing and successful validation/verification of forest based carbon sequestration projects to ISO 14064-2 and CCBA standards on the lower mainland of B.C. Team members involved in the development of the climate benefits component of the Denman project are registered forest professionals within the province of B.C.

A number of specialist consultants have been relied on. These include:

Forest Ecosystem Solutions Ltd: GIS expertise, development of the project map base and associated area calculations.

HB Lanarc: expert land-use planning advice related to the baseline scenarios.

BA Blackwell & Associates: carbon stock measurement and ecological expertise applied to elements of the forest carbon inventory (dead organic material), ecological classification and site productivity and growth and yield modelling parameters.

Nick Smith Forest Consulting: Dr. Smith provided expert advice on the sampling plan design, the assessment of statistical variance of the field data, and site index.

Azura Formetrics: forest growth and yield modelling which was applied to customized TASS runs for growth and yield projections for multi cohort and older project strata.

3GreenTree: forest ecosystem and carbon modelling provided expert advice on field data requirements for carbon modelling, the development of modelling parameters, and provided a comparative carbon stock simulation run.

Ecora Resource Group Ltd: provided forest and carbon modelling expertise and services.

ESSA Technologies: provided forest and carbon modelling expertise and services.

Contour Forest Consultants: coastal timber cruising and data compilation experts conducted the timber cruise and data compilation for older forest strata.

Kerley & Associates Forestry Consulting Ltd: timber cruising expertise provided quality control / check cruise services.

Forsite Consultants Ltd: forest inventory specialists collected the majority of field data for the projects younger regenerating stands.

Required Technical Skills: Community

- Understanding of regional and local land-use planning processes
- Community engagement and consultation
- Understanding of cultural and socio-economic aspects and implications
- Synthesize input and community interests
- Evaluate and align project design in recognition of community priorities

ERA team members experience includes the development and successful validation of ERA's CERP project in the lower mainland of B.C., to the Climate Community and Biodiversity Standard. ERA received the first forest project validation to CCB Gold Level standard in Canada.

Land use planning process leading to a decision to approve the necessary rezoning of the project lands for designation under protected status was led by qualified land planners within the Islands Trust, the legally designated authority for land use planning on the Gulf Islands including Denman, in conjunction with Denman Island Local Trust and volunteer members of various community groups.

Required Technical Skills: Biodiversity

- Ability to analyze and interpret existing information related to biodiversity, HCVs, and ecosystem function as related to the project area
- Knowledge of endangered species frameworks for BC and Canada
- Understanding of non-native species dynamics in the project zone

ERA's project team includes substantial training and experience in the management of natural resources in British Columbia (e.g. registered professional foresters, personnel with degrees in biology and environmental geography). ERA was also able to draw on expert advice from local experts and the extensive studies already available related to the biodiversity and ecosystem function of the project area and the Coastal Douglas-fir biogeoclimatic zone. These sources of expertise include:

BC Ministry of Environment: expert terrestrial ecologist advice on ecosystem function and endangered species, High Conservation Values.

Garry Oak Invertebrates Recovery Implementation Group: specifically in respect to the red-listed Taylor's Checkerspot Butterfly.

The BC Conservation Data Centre: records with respect to listed species in BC.

Publications: various publications related to species and ecosystem function as referenced in the respective sections of this document.

G4.3 Employee Orientation and Training Plan

Given the small size of this project and the fact that project activities were completed with the acquisition and transfer of the lands to BC Parks there will not be an ongoing program of project activities or employment on site beyond those required for monitoring. Monitoring is undertaken for short periods at five year intervals. Where feasible, local people including minority and underrepresented groups will be considered for this activity, however, due to the sort duration and periodic nature of monitoring activities it may be necessary to rely on qualified specialists from outside the community.

G4.4 Equal Opportunity Employment

As a Canadian company, ERA is required and governed by provincial law to provide equal opportunity employment and equality when hiring temporary employees for all related project work. Sections 11, 12 and 13 of the British Columbia Human Rights Act ensure that no discrimination be shown in employment advertisements, wages or employment towards individuals of a particular race, colour, ancestry, place of origin, religion, marital status, family status, physical or mental disability, sex or sexual orientation.

G4.5 Relevant Laws and Regulations Covering Worker's Rights

Worker Compensation Act: lists the rights and responsibilities of employers and their workers including; compensation and workplace safety committees and frameworks.

Occupational Health and Safety Regulation: adopted under the Worker Compensation Act, this regulation lists the legal health and safety requirements that must be followed and provided in all workplaces within British Columbia. These requirements are under the jurisdiction of and can be subjected to inspection by WorkSafeBC .

WorkSafe BC/Workers Compensation Board: responsible for enforcing the Occupational Health and Safety Regulations and Standards, providing support for workers injured or disabled while performing workplace duties and assessing employers for appropriate WorkSafeBC fees.

Employee Standards Act: promotes fair treatment, compensation and conditions for British Columbian employees and provides disputes resolution procedures.

G4.6 Situations Posing Substantial Risk to Worker Safety and These Will Be Addressed

Worker activities for project monitoring are survey oriented and pose minimal risks to the worker safety. Potential work hazards are trips and falls, danger trees and environmental exposure (hypothermia, heatstroke). ERA's safe work procedures include:

Working Alone

Definition: To work in circumstances where assistance would not be readily available to the worker in case of an emergency or in case the worker is injured or in ill health.

ERA Work Safety Practices:

- A contact person will be established with whom workers, at predetermined intervals, will establish contact. The results of this contact will be recorded. These must include, but are not limited to; beginning of the day, lunch hour and end of day
- Procedures to follow in case the worker cannot be contacted
- Provisions for emergency rescue
- The use of a handheld radio when necessary

Danger Trees

Definition: Any tree that poses a hazard to people because of lean, physical damage, overhead hazard, deterioration of limbs, stem or root system or combination thereof.

ERA Work Safety Practices:

- Previous stand condition records will be reviewed for past failures or disturbances, health of stand and age any observed windthrow or windthrow potential
- Safety equipment including safety glasses, vest and helmet will be required when on site
- Workers will be encouraged to maintain an “eyes-up” working habit, to monitor the health of the forest canopy and potential for overhead hazards
- Workers will be instructed to maintain a distance from of 1.5 times the size of the overhead hazard when one is identified or observed
- When windy conditions are observed, workers will be instructed to vacate to open areas and ground to observe the movement of the forest canopy and will not re-enter until winds slow and no longer pose a safety threat
- Stand condition records will be updated at the end of the monitoring period and will include any newly observed hazardous crown or stand conditions

G4.7 Financial Health of the Implementing Organization

Financing required to fill the funding gap for purchase of the project properties by the BC Ministry of Environment was paid by ERA to the BC government in 2010. Funding for project monitoring activities for the duration of the project is represented as a fully funded liability on the company’s balance sheet. An auditor’s letter, including ‘going concern note’, and audited financial statements are available through www.sedar.com.

G5. Legal Status and Property Rights

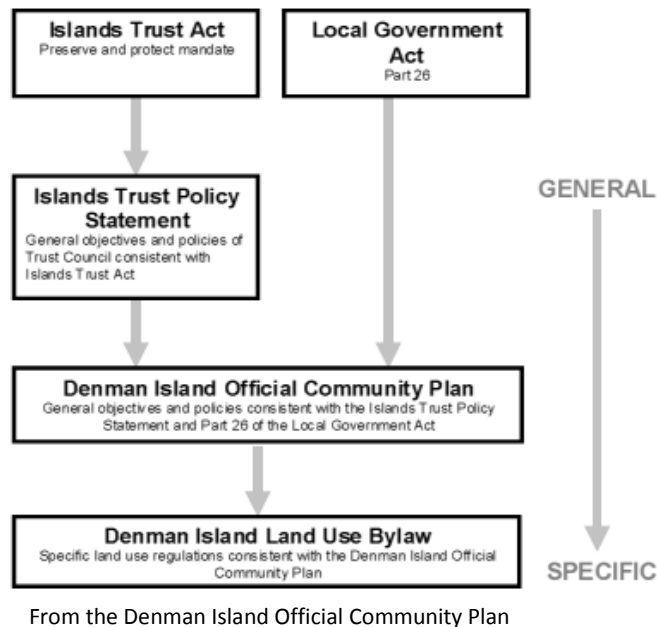
G5.1 Project Compliance with Relevant Laws and Regulations, Treaties and Agreements

Following is a description of the local and national laws and regulations relevant to the project's legal status and property rights, and how compliance is achieved. They are arranged in four categories.

Local Land Use Planning Authority

Authority for local land use decisions is provided through the legal structure identified in Figure G5.1 below. BC provincial legislation (the Islands Trust and Local Government Acts) establishes local planning authority (the Islands Trust) and the specific tools and documents (official community plans and land use bylaws) that ensure proper process is carried out, that the public is consulted on land use decisions and that the results of these processes are well documented. The specific acts and associated documents and policies are described in this section.

Figure G5.1: Enabling Legal Structure for Land Use Planning in Denman Island



Provincial Statute: **Islands Trust Act RSBC 1996**

General Description: Establishes the Islands Trust, identifies the Islands Trust Area and the mandate of the Trust, transfers land use planning powers from Regional Districts to Local Trust Committees, establishes the relationship with Island Municipalities and guides governance procedures, establishes the Denman Island Local Trust Committee Area.

Local Government Act

Sections 944 and 948 authorize the Denman Island Trust Committee to adopt Official Community Plans (OCP). Section 949 requires that all bylaws enacted, permits issued and works undertaken by the Denman Island Trust Committee be consistent with the Official Community Plan.

Planning Bylaw: Denman **Island Official Community Plan Bylaw No. 185**

General description: A bylaw to designate the community plan for Denman Island as the Official Community Plan for Denman Island.

Denman Island Official Community Plan, approved May 2009

General Description: An Official Community Plan (OCP) is a general statement outlining the planning goals of a community and the policies that will help the community to reach these goals.

Denman Island Local Trust Committee – **Bylaw No. 191**: To Amend the Official Community Plan.

Denman Island Local Trust Committee – **Bylaw No. 192**: To Amend the Denman Island Land Use Bylaw.

General Description: these Bylaws provide approval for the land re-zoning and density transfers associated with the land acquisition and conversion of the project lands to protected status.

Compliance: the Islands Trust and Local Government Acts clarify and demonstrate how the decision to acquire the project lands and designate them under protected status complies with legislated decision making requirements with respect to local land use. The Official Community Plan and amendments further demonstrate how proper process, including associated consultation, was followed. The Islands Trust decision to proceed with rezoning and bylaws required to enable the creation of a park on the project area lands was made in careful consideration of the objectives and policies outlined in the OCP. A description of how OCP objectives and policy were considered in the decision is located in CM1.1.

Designation of the Project Lands as a Provincial Park or Protected Area

Provincial Statute: **Land Act**, RSBC 1996 c. 245.

General description: Provides for the disposition of crown lands including the creation of reserves.

Provincial Statute: **Protected Areas of BC Act**, RSBC 2000 c. 17

General description: Class A Provincial Parks and Conservancies can be established under this Act for the purposes of the Park Act and Ecological Reserves can be established under this Act for the purposes of the Ecological Reserves Act.

Provincial Statute: **Ecological Reserves Act**, RSBC 1996 c. 103.

General description: Provides for the protection and management of ecological reserves on Crown Land.

Relevant Associated Regulations: Application of Park Legislation to Ecological Reserves Legislation, B.C. Reg. 364/97. Ecological Reserve Regulations, B.C. 335/75.

Compliance: these acts provide the legislative mechanisms which allow for the designation of the project lands as a park or protected area. All process related to the land acquisition has been fulfilled by the BC Ministry of Environment in compliance with requirements. The final land designation will be made through an act of the Provincial legislature, likely sometime in 2012.

First Nations Consultation

Canada's Constitution Act, 1982

General description: Section 35 recognizes and affirms the existing aboriginal and treaty rights of the aboriginal peoples of Canada.

Canadian and BC Case Law

Description: Through the courts, case law continues to clarify and define obligations for consultation with aboriginal peoples in Canada. The government is "legally required to consult with First Nations and seek to address their concerns before impacting claimed or proven aboriginal rights (including title) or treaty rights" (Province of BC, 2010, p. 5). This duty to consult is with respect to "crown land and resources" (p. 8).

Compliance: while consultation is not specifically required with respect to land use decisions for private lands in BC and the project lands were privately held prior to their acquisition for the project, a series of consultation efforts have been undertaken and continue with the K'omoks First Nation with respect to creation of the park and its future management. These are detailed under indicator G3.8.

Environmental Protection

Federal Statute: ***Species at Risk Act***, S.C. 2002, c. 29

General description: while applying mainly to federal lands, this Act, which pertains to the listing and protection of species and their habitat, has broader implications for listed species protection in BC.

Compliance: the project provides a better scenario for recovery of Taylor's Checkerspot butterfly populations in the region. ERA continues to be available to participation in discussions with the recovery committee with respect to options for habitat management on the project lands.

Provincial Statute: ***Wildlife Act***, RSBC 1996.

General description: Provides the legal framework for establishment of critical wildlife areas, designation of provincially endangered and threatened species, protection of nests, etc.

Compliance: there are no critical wildlife areas or provincially designated species on the project site (note that designation under the Wildlife Act is distinct from listings on the Conservation Data Centre).

Federal Statute: **Fisheries Act**, R.S.C. 1985, c. F-14

General description: Describes licensing, requirements for fish habitat protection (no harmful alteration, disruption or destruction) and associated penalties for non-compliance, among other topics.

Relevant Associated Regulations: Fishery (General) Regulations.

Provincial Statute: **Water Act**, RSBC 1996, c 483.

General description: Provides the legal framework for water licensing, making changes in or about streams, wells and groundwater protection.

Relevant Associated Regulations: *Ground Water Protection Regulation* B.C. Reg. 299/2004. *Water Regulation*, B.C. Regulation 204/88.

Compliance: the project scenario does not involve activities which could result in damage to fish habitat or water resources. The project is the best possible scenario for fish habitat and water resource protection on the Island.

International Agreements relevant to the Denman AC Project include:

The United Nations Convention on Biological Diversity;
The United Nations Framework Convention on Climate Change;
Convention on the Protection of Migratory Birds in Canada and the United States

Compliance: The project benefits in terms of biological diversity, climate change mitigation and habitat or migratory birds align well with and support the objectives of these international agreements.

For more information on these agreements refer to their corresponding websites.

G5.2 Approval from the Appropriate Authorities, Including the Established Formal and/or Traditional Authorities Customarily Required by the Communities

Approval from Established Formal Authorities

As outlined in **G5.1**, the Denman Island Local Trust Committee (DILTC), through the authority given to it by the Islands Trust and Local Government Acts, is the designated decision maker for land use on Denman. The DILTC gave its official approval for the density transfers and rezoning required for the acquisition of the land by the Province of BC. The process undertaken by DILTC for the undertaking of these decisions, including public consultation, is outlined under **G3.8**.

The sale and transfer of the fee simple project land was legal and the province now holds clear title to all project land. As detailed in G5.1, the Land Act, Protected Areas of BC Act, and Ecological Reserves Act provide the Province of BC with authority to designate the lands as a park or protected area.

At the time of writing no provincial or federal legislation exists to prohibit or regulate the quantification, sale, or transfer of carbon offsets. ERA's right to market the carbon offsets generated from the project activities is documented in an acknowledgement and indemnity agreement between ERA and the Province of British Columbia.

Approval from Traditional Authorities

As described in Section G5.1, obligation to consult with First Nations with respect to land use decisions is limited to crown lands. As the project lands were privately held prior acquisition by the province there was not an official duty to consult or obtain approval from First Nations prior to the land acquisition. Regardless of this the K'omoks First Nation was consulted during the initial stages of project decision making and will continue to be consulted by the BC government during the park designation and park planning processes. These consultation processes are detailed in the response to Indicator G3.8. Indications from the early consultation processes are that the K'omoks First Nation does not object to designation of the project lands as park. The transfer of the lands to public ownership provides a greater opportunity for K'omoks First Nation to be involved in decisions with respect to management of the lands and to exercise their rights to traditional gathering and ceremonial activities. This is a better alternative compared to the without project scenario of private lands developed for residential and agricultural development. In addition the conservation of the lands aligns with K'omoks First Nation values toward the environment.

G5.3 Encroachment on Private, Community, or Government Property

Encroachment on Private Property: the project boundaries are based on legal land surveys. The project remains within these boundaries and access to the project area is via public road systems.

Encroachment on community property: as above for private property. The property is now publicly owned by the Government of BC.

Encroachment on Government Property: the project property is owned by the BC government.

The ERA/BC Parks Covenant provides ERA the "Right to enter onto land" for monitoring purposes (Article 5, Statutory Right of Way (See ISO PDD, App. E)).

G5.4 Involuntary Relocation of People or Activities Important for Livelihoods and Culture

The project does not require the relocation of people or of activities important for the livelihoods and culture of the communities. The project area was privately owned by North Denman Lands Inc. prior to its transfer to the Ministry of Environment on September 17th, 2010. Before and after the transfer of project land from private to crown ownership community members have been using the area for recreational activities in the forest and trails. Most of these activities, such as walking, horseback riding and swimming, will be allowed to continue once the project area comes under the management of BC

Parks. These recreational activities would not have been assured if the project had not been undertaken and the land continued to be in private ownership.

G5.5 Illegal Activities that Could Affect Climate, Community or Biodiversity Impacts

There are no illegal activities taking place that could affect the project's climate, community or biodiversity impacts.

G5.6 Title to Carbon Rights

Uncontested title to carbon rights is demonstrated through a legal carbon rights Assignment Agreement between ERA Ecosystem Restoration Associates and the previous landowner, dated July 9, 2010, and an Acknowledgement and Indemnity Agreement between ERA Ecosystem Restoration Associates and the Province of British Columbia. This agreement states that the Province will not claim any atmospheric benefits arising as a result of the project, and that the province will not cause, assist or support a third party in a claim to any of the atmospheric benefits.

Climate

CL1. Net Positive Climate Impacts

CL1.1 Estimated net Change in Carbon Stocks Due to the Project Activities

Assumptions about How Project Activities will Alter Carbon Stocks

Subsequent to clearcut harvest entries from 1998 to 2000 (and previously in some cases), the project lands have regenerated naturally to a mix native conifer and deciduous species. These stands were inventoried as a part of the project quantification process as described in G1.4 The estimate of net change in carbon stocks due to the project activities is based on the assumption that the protection of the project lands will allow these existing forest stands to continue growing throughout the duration of the project period at productivity rates that would be normally expected for the area. Assumptions with respect to these growth rates were determined through a process of developing modeling parameters to drive growth and yield models approved for use in B.C.

Ecosystem-based site index estimates (estimated tree height at breast height age 50) were derived through an independent study of geology, soils, moisture and nutrient regimes as well as existing vegetation complexes (Mahony 2010). The results of the study were a stratification of the project area into eight site units, each with similar productivity and ecologically acceptable tree species combinations. Height and age samples from representative trees within each of the eight site units were used to derive an estimated site index for Douglas-fir (Fd), unless Fd was not an acceptable species on the site unit in question, in which case other species were selected. GPG utilized during the implementation of this process include the Site Index Curve Method for site index estimation and the *SIBEC Sampling and Data Standards* for the selection of site trees during the cruise (BC Ministry of Forests 2010b; 2009). The resulting site index values were corroborated with values published in SIBEC and available literature, and a weighted Fd site index was calculated for each of the 17 forest-land stratum based on the percentage of each site unit present. Where additional species beyond Fd were considered acceptable on any given site unit, the site index values for Fd were converted to those of the other species through use of the BC Ministry of Forest Site Tools program.

Species acceptability on each of the site units was determined in consultation with the BC species acceptability guidelines as well as Klinka et al. (2000), and personal communications with Dr. Hamish Kimmins and Bob Green, both recognized ecosystems experts in the province of BC. To address the possibility that some species, notably Hw and Bg, may have regenerated naturally on some sites that are less than optimum for their particular ecological amplitudes (drier, less nutrient-rich sites), and considering the potential for extended periods of drought brought on by climate change ERA reduced the site index values for Hw and Bg on average by 5% on strata 1, 1b and 2 (Table CL1.1-1). These reductions were estimated based on sensitivity analysis and expert opinion from Bob Green.

Table CL1.1-1: Site index values applied to TASS II Growth and Yield Model

Stratum	Major Site Units	Fd Site Index	Stratum	Major Site	Fd Site Index
1a	01p, 06, 01z	27.9	8	01g, 06	32.5
1b	06, 01p, 01z	28.5	9	not rated	34.9
2	01p, 03, 01z	26.9	10	01p, 01z, 06	28.7
3	12, 06	Cw 16	11	not rated	30.7
4	01p, 01z, 01g,	29.6	13	15	Cw 22
5a	01p, 01z, 01g	29.6	14	01z, 06	29.5
5b	01g, 06	31.8	15	06, 15	27.4
6	01p, 01z, 01g	28.9	16	06, 15	27.4
7	01z, 03, 01p	29.9			

In British Columbia, the approved TASS II growth and yield model is adjusted to compensate for site specific factors through the application of *Operational Adjustment Factors* (OAFs). OAFs compensate for factors which have the potential to reduce forest growth and yield but are not quantifiable directly via mapping or other means. The default OAF factors are available for use on the scale of a timber supply area and when site specific detail is not available (Nussbaum 1998):

OAF1a (4%): for small un-mappable non-productive areas

OAF1b (4%): for endemic disease and insect loss

OAF1c (4%): for espacement and non-commercial competition

OAF1d (3%): for miscellaneous losses other than disease and insects (random risk factors)

OAF2 (5%): losses from wood decay and breakage which reduce the net recoverable lumber from harvested stands, and losses from disease and pests.

Site specific data available for the Denman site was used to revise these values where appropriate. For example, the default value for OAF1a of 4% is based information normally available for timber supply analysis at larger scales where mapping resolution is down to 2ha. In the case of the project lands, however, non-productive areas were mapped down to units as small as 0.2ha in size. In this case, instead of using the default value, OAF1a values were assigned individually to each of the strata based on point surveys and ocular estimates of actual dispersed non-productive areas. For smaller strata with no occurrence of dispersed NP, a value of zero was applied to the OAF1a Table 5.5). For strata with significant proportions of un-mappable non-productive wet areas the OAF1a value was increased considerably beyond the provincial default (e.g. strata 3 and 13 at 45% and 50%).

The OAF1b value, defined by Nussbaum as the approach to addressing risk from endemic disease and insects for timber supply analysis, is a spatially defined factor based on mortality which results in future holes in the stand. The project site was walked extensively during forest inventory activities and only minor occurrence of mortality-causing agents was detected. The most significant of which (white pine blister rust) was addressed not via OAFs but by the complete removal of affected species from the

species modelled (i.e. 100% mortality of Western White Pine trees has been assumed in the quantification).

Low levels of root disease were noted on site by Forsite Consultants Ltd. These were described as endemic and not anticipated to affect stand growth. The endemic nature of these diseases and improbability that they will significantly affect future stand growth on the site has been corroborated through discussions with Dr. Kimmins in November 2010. Further evidence to support this is found in the significant third-growth stand volumes achieved in strata 7, 9, and 11, and second-growth stand volumes achieved in the remaining strata prior to their recent harvest. An OAF1b value of 1%, and the provincial 5% default for OAF2 was assigned to all strata to address the risk from root rot.

OAF1c is defined by Nussbaum as an approach to addressing risk from espacement and non-commercial competition for timber supply analysis. Variability in spacing does occur on the Denman site due to the unmanaged nature of the regeneration. With no detailed breakdown available as to what component of the 4% OAF1c default would normally be allocated to espacement, ERA has allocated 3 percent. The remaining 1% is allocated to non-commercial cover. These values have been applied to all strata (Table 5.5) except for the exceptions noted below where increased values have been applied. A point survey conducted in stratum 1a indicated that approximately 7% of the stratum is occupied by small (< 0.1ha) areas with less than 400 trees per ha. A subsequent sensitivity analysis of the effect of these areas resulted in an additional 2% added to the espacement component for the OAF1c on stratum 1a.

The only significant deciduous forest cover on site from a carbon perspective is red alder. The majority of red alder on site has been delineated separately as strata 15 and 16 and modelled according to the stand dynamics that are expected to ensue. An OAF1c value for non-commercial cover does not apply then to these two strata. With the separation of alder into strata 15 and 16 it does not represent a significant component of the forest inventory in the remaining strata. It only appears in the forest inventory for strata 1b and 2 (approximately 2% alder) and stratum 13, which has a 13% component. For strata 1b and 2 the OAF1c value has been increased by 2%, to a total of 5%. For stratum 13, the combined OAF1c value was increased to 10 percent.

The OAF1d value is defined by Nussbaum as the standard approach to addressing risk from miscellaneous losses other than disease and insects in timber supply analysis. Random risk factors are intended to account for potential losses from non-biological factors such as endemic windthrow and snow damage. On Denman Island there is a very low risk of snow events that could cause significant stem damage. Neither is wind considered to pose a more than occasional and minor ongoing risk to stand integrity. As well, these factors and other forest health factors are also considered in the non permanence buffer. A 1% risk factor was assigned for OAF 1d.

High populations of Vancouver Island black-tailed deer (*Odocoileus hemionus columbianus*) occur on Denman Island, including the project site. The deer eat fresh succulent shoots at the tips of branches and the tops of young regenerating trees. When the top shoot (*leader*) is browsed, height growth is stunted and multiple leaders frequently develop, resulting in short, bushy trees. The fieldwork found that tree species on the Denman site being most affected by the browsing damage are Douglas fir,

western redcedar, and grand fir. The damage occurs throughout the Denman site but is most intense on landings and close to roads due to the easy access they provide for the deer. Western hemlock and lodgepole pine species are not generally browsed.

Table CL1.1-2: OAFS for All Strata

Stratum	OAF1a	OAF1b	OAF1c	OAF1d	Total OAF1	OAF2	Total OAF
1a	1.0%	1%	5%	1%	8.0%	5%	13%
1b	1.0%	1%	5%	1%	8.0%	5%	13%
2	1.0%	1%	5%	1%	8.0%	5%	13%
3*1	45.0%	1%	3%	1%	50.0%	5%	55%
4	1.4%	1%	3%	1%	6.4%	5%	11.4%
5	1.0%	1%	8%	1%	11.0%	5%	16%
5b	2.0%	1%	5%	1%	9.0%	5%	14%
6	0.0%	1%	3%	1%	5.0%	5%	10%
7	0.0%	1%	3%	1%	5.0%	5%	10%
8	0.0%	1%	3%	1%	5.0%	5%	10%
9	0.0%	1%	3%	1%	5.0%	5%	10%
10*1	3.6%	1%	3%	1%	8.6%	5%	13.6%
11	0.0%	1%	3%	1%	5.0%	5%	10%
12	0.0%	1%	3%	1%	5.0%	5%	10%
13	50.0%	1%	8%	1%	60.0%	5%	65%
14	0.0%	1%	3%	1%	5.0%	5%	10%
15*1	14.0%	1%	3%	1%	19.0%	5%	24%
16*1	10.0%	1%	3%	1%	15.0%	5%	20%

Despite the browse pressure on site there is significant evidence that many of the damaged trees have released or are close to releasing from the effects of the browse, except on strata 6 and 8 where browsing is most severe (Figure 5.4). Observations indicate that the Island deer population browses only up to a level of slightly more than one metre in height. The browsed trees on generally maintain good color and vigor despite the suppressed height growth (with the exception of severely damaged trees often on or in the vicinity of landings). From observations of the release occurring on site and expert opinion (personal communication, H. Kimmins, 2010) it is expected that, generally speaking, once beyond the browsing height of slightly greater than one meter the trees will release and grow quite vigorously.

Data on the extent and effect of browse were collected during the forest inventory for regenerating strata. These data, while limited in their ability to predict precisely when affected trees will release from browse, were combined with the expert guidance received to develop modelling parameters that address the probability of a loss in carbon stocks due to browse. Five and ten-year delays (based on browse severity level) were applied to the germination date of browse-susceptible species. The delays were applied to the proportion of susceptible trees in each stratum still suppressed by browse at the time of the field inventory. The assessment of release from browse is included as a key component of the monitoring plan.

Figure 5.4: Western redcedar (left) and Douglas-fir (right) Released from Heavy Deer Browse.



The growth rate and adjustment factors described above, combined with species, and density and current age values from the forest inventory were input to the TASS 2 growth and yield model and runs conducted by a Ministry of Forests specialist for each species. TASS II does not model Red alder. The BC Ministry of Forest’s Table Interpolation Program for Stand Yields (TIPSY 4.2) was used instead therefore to model Red alder-leading strata 15 and 16. Customized TASS II runs were done for strata 7, 9, and 11 by Ian Cameron at Azura Formatics. These custom runs took into account the veteran tree cohorts. An example of the TASS modeling parameters for Stratum 1a is shown in Table CL1.1-3.

Table CL1.1-3: Modelling Parameters for Stratum 1a

Species	Total* sph	sph modelled	SI	% of modelled	OAF 1	OAF 2	2010 age	browse delay*1	% sph delayed*2
Dr	0	0							
Fd	618	618	27.9	27%	0.92	0.95	10	5	43%
Hw	895	895	23	39%	0.92	0.95	10	n.a.	
Bg	764	764	Fd 27.1	34%	0.92	0.95	10	5	43%
Cw	73	0		0%					
Ss	4	0		0%					
PI	7	0		0%					

Total Conifers: 2,361 2,277 100%

* Regen only, no residuals included. *1 Delay to germination date to account for browse effect.

*2 is the percent of each species being delayed by the specified amount. That is, a delay of 5 means that for modeling purposes the germination date is delayed to the year 2005 from the known date of 2000.

Estimated Change in Carbon Stocks

Subsequent to CBM-CFS3 initialization, carbon stock changes for each of the project strata were simulated out 100 years to the year 2110, to correspond to the project's ISO validated GHG accounting period. The current age of the forest stands in each of the strata at the time of project commencement was reflected by commencing each stand simulation at the actual year of germination. Therefore carbon stocks at project commencement reflect actual stand age and condition at that time. For example, strata 5a and 5b were 30 years of age at the project start date (2010), and hence 130 years of age in the year 2110.

Separate model runs were carried out for each species. The individual species runs for each stratum were then re-compiled together based on the weighting of each species' relative contribution to the total stocking density. In some cases where a particular species was able to be modeled in either TASS 2 or the CBM-CFS3, conservative surrogate species were used. For the baseline scenario runs for each stratum the modeling parameters were identical to those of the project scenario up to the anticipated year of residential or agricultural conversion. The results of the CBM-CFS3 carbon stock simulations for the 30 year CCB project period are shown in Table CL1.1-4. DOM values have been adjusted downward as described in G1.4.

Table CL1.1-4: Carbon Stocks by Strata in the Project Scenario at Year 30

Stratum	Live Biomass tC/ha	Above Ground DOM tC/ha	Below Ground DOM (fine, coarse roots) tC/ha	Soil Organic Carbon tC/ha	Total Ecosystem tC/ha	Forest Land (ha)	Total tC per strata
1a	98.7	30.03	0.82	111.24	240.8	108.2	26054
1b	95.1	29.34	0.79	113.1	238.3	41.0	9771
2	98.9	30.37	0.82	109.92	240.0	44.6	10705
3	69.4	26.65	0.69	68.94	165.7	4.5	746
4	146.1	41.56	1.11	148.2	337.0	23.1	7784
5	190.7	35.48	1.51	114.12	341.8	31.1	10630
5b	210.9	41.07	1.66	130.5	384.1	26.7	10256
6	77.8	26.28	0.68	115.2	220.0	9.5	2090
7	294.8	55.63	2.43	124.56	477.4	18.4	8785
8	90.9	27.99	0.75	131.34	251.0	16.7	4191
9	396.5	68.72	3.29	146.64	615.1	7.4	4552
10	114.1	32.39	0.91	122.28	269.7	17.3	4665
11	303.2	57.69	2.50	129.6	493.0	13.3	6557
13	68.5	24.96	0.66	77.76	171.9	19.2	3300
14	135.0	36.41	1.03	137.7	310.1	3.4	1054
15	191.3	61.13	1.29	112.92	366.6	8.4	3080
16	197.7	62.34	1.32	109.44	370.8	1.0	371
Total							114591

CBM-CFS3 results were compared to findings in the literature and those of a second model simulation conducted for comparison purposes: an ecosystem simulation model known as FORECAST, developed at the University of British Columbia. Comparisons to literature values were made using CBM-CFS3 results for stands at age 80 due to the availability of studies in the literature for nearby stands of approximately this age, and the presence of 80 year stands in three of the project strata.

In the case of live biomass, the CBM-CFS3 project minus baseline results at year 100 were approximately 11% higher than those of the FORCAST model. When compared to results in the literature, however, for nearby stands on Vancouver Island the CBM-CFS3 results were lower. The age 80 CBM-CFS3 results averaged over all strata were 256tC/ha, compared to 344 tC/ha across 4 separate sites averaging 82 years of age and 362 tC/ha for stands averaging 86 years of age (Trofymow & Blackwell 1998; Trofymow & Kurz 2008). For these reasons the CBM-CFS3 results for live biomass were considered reasonable. As an additional comparison point the CBM-CFS3 results for total ecosystem carbon at year 100 (i.e. for stands ranging from 110 to 180 years of age) were compared to the upper limits for old growth stands in the Pacific Northwest, as measured on 42 sites by Smithwick et al. (2002). The CBM modeled average total ecosystem carbon of 685 tC/h falls well within Smithwick's upper bounds of 1127 tC/ha for old growth stands.

CL1.2 Net Change in the Emissions of Non-CO2 GHG Emissions Such as CH4 and N2O

As noted under G2.3, non-CO2 GHG emissions in the baseline, such as CH4 and N2O, will come primarily from activities such as the burning of logging slash for land conversion, emissions from agricultural operations, and emissions from residential construction activities as well as from the future residences themselves. It is anticipated that these emissions represent less than 5% (in terms of CO2 -equivalent) of the project's overall GHG impact. Given that non-CO2 GHG emissions in the baseline will be greater than those of the project scenario (the project scenario does not involve land clearing, agriculture of residential construction activities), the omission of these gasses from the quantification and GHG assertion aligns with ISO 14064-2 principles of conservativeness and an exact value for non-CO2 GHG emissions has therefore not been calculated.

CL1.3 Other GHG Emissions Resulting from Project Activities

Project activities are limited to acquisition of the lands for designation under protected status. Restoration of Coastal Douglas-fir forest land attributes and associated biodiversity benefits is achieved through the protection of existing natural regeneration of native species on site, and no biomass burning, site preparation or use of synthetic fertilizers, etc. are planned.

Burning of fossil fuels from transport of equipment and personnel to site for project development (forest inventory, stakeholder interviews etc.) ongoing monitoring activities was calculated. All project transportation emissions were determined to be less than 1% of the project's carbon impacts.

Other GHG emissions in the project scenario, such as burning of fossil fuels from tourism to the park, will be outweighed by fossil fuel emissions in the baseline scenario from agricultural activities and residential development. Exclusion of the emissions from these activities from the GHG quantification procedure aligns with ISO 14064-2 principles of conservativeness.

CL1.4 Demonstrate that the Net Climate Impact of the Project is Positive

The net climate impact of the project, as demonstrated in Table CL1.4, is positive. Over the 30 year CCB project period the net climate impact is 39021 tonnes of elemental carbon, or 143,077 tonnes CO2e.

Table CL1.1-4: Project minus Baseline Scenario at Year 30 – Total Ecosystem Carbon

Stratum	Project	Project	Baseline	Baseline	Project Minus	Project Minus
	tC/ha	tC/strata	tC/ha	tC/strata	Baseline tC/ha	Baseline tC/strata
1a	241	26054	238	25737	3	317
1b	238	9771	136	5557	103	4214
2	240	10705	240	10705	0	0
3	166	746	88	398	77	347
4	337	7784	212	4888	125	2896
5	342	10630	154	4793	188	5838
5b	384	10256	177	4714	208	5542
6	220	2090	141	1336	79	754
7	477	8785	169	3112	308	5673
8	251	4191	153	2558	98	1633
9	615	4552	207	1532	408	3020
10	270	4665	147	2548	122	2117
11	493	6557	179	2386	314	4171
13	172	3300	105	2022	67	1279
14	310	1054	166	566	144	489
15	367	3080	304	2557	62	523
16	371	371	162	162	208	208
Total				75569		39021

CL1.5 Double Counting of GHG Emissions Reductions or Removals

Double counting of GHG emissions or removals is avoided through a legal Acknowledgement and Indemnity Agreement between ERA Ecosystem Restoration Associates and the Province of British Columbia. The agreement states that the Province will not claim any atmospheric benefits arising as a result of the project, and that the province will not cause, assist or support a third party in a claim to any of the atmospheric benefits.

CL2. Offsite Climate Impacts ('Leakage')

CL2.1 Types of Leakage Expected and Potential Offsite Increases in GHGs due to Project Activities

Market leakage with respect to timber harvest volumes is not relevant for this project as the demonstrated baseline scenario is land-use conversion to agriculture and residential development.

Activity shifting or displacement did not result from the project lands acquisition process for designation under park / protected status. Acquisition of the project lands by the provincial government was partially funded (in addition to funding from the carbon offsets), by the transfer of a number of development density rights to the previous landowner (North Denman Lands Inc.), for use on a parcel of land adjacent to and east of the project area. Development density rights transferred to the previous landowner are associated with 12 dispersed parcels of Crown land on Denman Island that were

transferred from the Ministry of Forests and Range to the Ministry of Environment for incorporation into the new protected area.

Thirty one densities in total from nine of these Crown land parcels were transferred to the adjacent parcel of land held by North Denman Lands Inc. (NDLI) as partial payment for the project lands. This transfer occurred under Appendix C of the Denman Island Official Community Plan, whereby the Local Trust Committee can consider using density transfers for conservation and park purposes. These density transfers are undertaken to protect one property by removing some or all of the development potential from it and transferring an equivalent number of densities to another property. Under this mechanism there is no net increase in development densities for the island as a whole as the additional densities transferred to NDLI were offset by an equal reduction of densities from the lands that were then transferred to the Ministry of Environment to be managed for park purposes. In addition, the crown land parcels from which the densities were transferred are currently forested, whereas the NDLI lands to which the densities were transferred to were clearcut logged during the same time period as the project lands (1998 to 2000). This reduces any potential for increases in GHG emissions outside the project boundary due to project activities.

CL2.2 Mitigation of Any Leakage

As leakage is not anticipated there are no leakage mitigation activities planned.

CL2.3 Subtraction of Likely Project-related Unmitigated Negative Offsite Climate Impacts

Not applicable.

CL2.4 Inclusion of Non-CO2 Gases if Likely to Account for More than a 5% of the Project's Overall Off-site GHG Emissions Reductions or Removals Over Each Monitoring Period

Not applicable.

CL3. Climate Impact Monitoring

CL3.1 Initial Plan for Selecting Carbon Pools to be Monitored, and the Frequency of Monitoring

Climate Impact Monitoring Plan Purpose and Introduction

The purpose of the climate impact project monitoring plan is twofold:

- a. Ascertain the extent to which carbon stocks follow modelled trajectories.
- b. Assess for any significant stand-damaging and/or stand-replacing events.

The CCBA 30 year climate impact monitoring plan for this project follows the first 30 years of the ISO 14064-2 monitoring plan validated for the 100 year GHG project accounting period.

Data and Information to be Reported

The following carbon pools will be reported to the carbon offset purchaser. Precise definitions of each pool are described earlier in this document.

Table 7.1: Carbon Pools to be Reported

Carbon Pool	Unit of Measurement
Above-ground live tree biomass	Tons CO ₂ s/ha
Below-ground biomass: living trees	Tons CO ₂ s/ha
Dead wood and litter	Tons CO ₂ s/ha
Litter	Tons CO ₂ s/ha

The following pools will not be monitored and reported due to their exclusion from the quantification for reasons described earlier:

- Burning of fossil fuels due to transport of equipment and personnel to the site (non-significant)
- Baseline agricultural emissions (non-significant)
- Above-ground non-tree biomass (shrubs, herbs, and mosses) (non-significant)
- Soil organic carbon (non-significant)
- Increased harvesting of wood products outside the project boundary (not applicable)

Monitoring Methods

Current and appropriate GPG at the time of each specified monitoring activity will be implemented by qualified professionals with adequate experience. Technologies and best practice methods for the measurement, analysis, and estimation of carbon stocks will likely evolve and improve significantly over the 100 year ISO GHG accounting period and the 30 year CCBA validated project period. Appropriate GPG will be used with respect to all aspects of the monitoring procedures, including:

- Stratification for sampling purposes.
- Type and number of plots.
- Sampling and measurement procedures.
- Tools, technologies, and methods for estimating carbon stocks, including the selection and proper use of growth and yield and/or carbon models.

Examples of relevant GPG at the time of project initiation include: the US Department of Agriculture’s Measurement Guidelines for the Sequestration of Forest Carbon (Pearson et al. 2007); Canada’s National Forest Inventory Ground Sampling Guidelines (Canadian Forest Service 2008); the Silviculture Survey Procedures Manual for BC (BC Ministry of Forests 2010b); the BC Ministry of Forests Cruise Manual (2010a); and guidance from experts.

Table 7.2 outlines the GPG and measurements applicable to carbon stock estimation at the time of project commencement. These data and processes will be used to ascertain the extent to which carbon stocks follow modelled trajectories (climate impact monitoring plan purpose ‘a’). Current GPG (e.g., Pearson et al. 2007) allows for the selection of either permanent or temporary sampling plots based on monitoring objectives and strategy. Due to the length of the ISO validated GHG accounting period for the project and the significant time periods between quantification related monitoring activities (explained further below), it is anticipated that temporary plots will be used. A greater number of

temporary plots will be required to meet standard practice guidance for statistical precision, however the establishment of additional plots will likely be more practical than the regular maintenance of a lesser number of permanent plots over the 100 year GHG accounting period. From the plot data, biomass, dead wood and litter pools will be estimated on a per-hectare basis using appropriate GPG and modelling technology at the time of each scheduled quantification monitoring entry. It is expected that new technologies, including the use of remote sensing, will play a role in the methods used.

Table 7.2: GPG applicable for carbon stock estimation at the date of project commencement

Carbon Pool	Current GPG for Carbon Stock Estimation	Units of Measurement
Above-ground live tree biomass	Measurement of tree heights and measurement of tree diameters at breast height (1.3m) for trees located within sample plots and that have greater than a specified diameter (e.g., 5 cm, (Pearson et al. 2007)) in nested plots up to 50+ cm dbh. A sufficient number of plots will be established in each stratum in the project area to receive a statistical significance of +/- 10% at 90% at the project level.	Height: m Diameter: cm Biomass: tons C/ha
Below-ground biomass: living trees	Due to the impractical nature of below-ground root measurement, accepted and current coefficients will be used for estimating below-ground biomass from above-ground data.	Biomass: tons C/ha
Dead wood and litter	Standing dead wood is measured by means of height and diameter as specified for above-ground live biomass above. Coarse woody debris is measured via diameters encountered along transects, classified by decay class. Forest floor litter compartment samples are taken, dried, and weighed.	Height: m, diameter: cm Diameter in cm (Minimum 10 cm at intercept for coarse debris)
Soil organic carbon (SOC) for residential conversion scenarios	SOC comprises only 1.8% of the 100 year GHG assertion and would be prohibitively expensive to measure in relation to the small component it comprises. SOC will be re-modelled at each specified modelling interval using appropriate GPG and updates in the science.	Biomass: tons C/ha

Additional data (Table 7.3) will be collected to ascertain the extent to which carbon stocks follow modelled trajectories. From this data, previous estimates with respect to operational adjustment factors (OAF1 and OAF2) used to drive volume/age curve projections and loss from endemic mortality and stand damaging events will be updated. Significant stand-damaging events (monitoring purpose 'b') will also be assessed. Data will be collected at sample plots during scheduled monitoring plot establishment (see Table 7.4) and through other methods including transects during field visits (see level 2 monitoring entries) or the use of remote sensing. Methods used will be collected according to GPG at the time of each monitoring event.

Table 7.3. Additional Climate Impact Monitoring Data to be Collected

Factor	Anticipated Data Collection Methods	Units of Measurement
Area impacted by insects or disease	Sample plots, transects, and remote sensing images	Area in hectares, percent of stems
Impact of deer browse and the timing and extent of browse release	Sample plots, transects, and ocular observations	Tree height in cm, stems/ha and distribution of released stems
Espacement and impacts from areas of lower stocking	Sample plots, transects, point surveys, ocular observations and remote sensing	Proportion of the area (ha)
Changes or differences in species composition and performance	Sample plots, transects, and ocular observations	Stems per ha, site index in meters
Differences in the projected impacts of red alder	Sample plots, transects, point surveys, ocular observations, and remote sensing	Area in hectares, tree heights in meters

Quantification Specific and Special Concern Related Climate Impact Monitoring Entries

Monitoring entries in this category address monitoring objective ‘a’: ascertain the extent to which carbon stocks follow modelled trajectories. The first of these entries is specific to quantification concerns related to conifer release from deer browse. Subsequent quantification specific monitoring entries are focused toward full scale carbon inventory and re-modeling at specified intervals. As described below these intervals are prescribed based on what is considered a reasonable frequency of re-measurement over a 100 year GHG accounting period and considering the slower growth rates in northern temperate climates as opposed to tropical or sub-tropical regions. The extent to which carbon stocks are following modelled trajectories becomes more discernible and relevant for tracking as stands have time to develop and display the extent to which they align with projected estimations. Climate impact monitoring for reversal events such as insect outbreaks, wind and fire is carried out at regular five year intervals throughout the project period as detailed in the subsequent section.

Monitoring of Conifer Release from Deer Browsing

Deer browse has been distinguished as a factor which may delay the release of susceptible conifer species on site. This is particularly the case for strata 6 and 8. A monitoring entry in year 5 will be implemented to assess the progress of conifers release from browse with a focus on strata 6 and 8, and an overview assessment of the other regenerating strata. Plots, transects, or other methods per accepted GPG will be prescribed and established by qualified forest professionals to an adequate intensity. Issues with the rate of release as compared to projections will be reported and further browse assessments carried out during the subsequent 5-year monitoring interval.

Year 30 Inventory Plots and GHG Quantification

At year 30 of the project period, inventory plots will be established to provide the data necessary for a re-modelling and re-quantification of above-ground tree biomass and below-ground tree biomass. Year 30 was chosen because at that time the younger stands will have reached an age sufficient to have expressed species dominance and provide a preliminary confirmation of productivity levels on the project lands, which reflect northern temperate growth rates. Thirty years will also be a sufficient period

from which to track changes in biomass for the older stands/strata and their degree of alignment with projections. Deadwood and litter will not be assessed at 30 years due to the longer timeframes involved with the development of deadwood and litter over the 100 year GHG project accounting period. Their measurement at year 30 would have limited ability to confirm the extent to which their accumulation aligns with modelled projections. The CCBA project period and associated monitoring are complete at this time.

Periodic Risk of Reversal Focussed Climate Impact Monitoring Entries

A series of lower intensity monitoring activities is scheduled to occur at regular intervals between the major inventory and re-quantification events. This schedule of activities has been established to fulfill the second of the two monitoring purposes: Assess for any significant stand-damaging and/or stand-replacing events. The monitoring entries are distinguished in two levels as described.

Level 1 Risk of Reversal Monitoring

Level 1 is the most coarse or high level of the scheduled monitoring events to take place over the project period. It is intended primarily to assess for disturbances that signify risk of reversal to estimated carbon stocks in the project scenario (climate impact monitoring purpose 'b'). Level 1 monitoring will be conducted at five-year intervals as indicated in Table 7.4. It will consist of consultations with BC Parks to review the occurrence of any significant forest-damaging events. The results of these consultations will be documented in a monitoring report and will be available for public review.

If the detail of the information gathered during this process is not sufficient to reliably determine the occurrence or not of significant reversal events, further assessment will be conducted through either a site visit or via the documented assessment of remote sensing images.

Significant disturbances detected during level 1 monitoring will be further investigated by means of a site visit (level 2). If material impacts are confirmed to any of the carbon pools, these impacts will be subject to a preliminary assessment by a qualified forest professional using appropriate GPG (see Monitoring Commitments).

Level 2 Risk of Reversal Monitoring

Level 2 is of higher intensity than level one and involves a site visit. In addition to the assessment of reversal events, Level 2 monitoring will provide general overview observations on the extent to which forest growth and performance align with projected estimates. A walk-through of representative areas of the project site will be conducted by a qualified professional. The walk-through will be supported by written and photographic documentation, and is expected to take one day to a maximum of two days to complete. Level 2 site visits will occur as scheduled in Table 7.3 and as a result of issues encountered during level 1 monitoring, or as a result of ERA becoming aware at any time of a significant disturbance which has the potential to affect carbon stocks by more than 10%.

Table 7.4 Climate Impact Monitoring Schedule over the 30 Year CCBA Project Period

Year	Monitoring Activity Description
5	Browse release assessment
10	Level 2 (and continued browse release assessment if necessary)
15	Level 1 assessment
20	Level 2 assessment
25	Level 1 assessment
30	Inventory plots and re-quantification

Monitoring commitments

Monitoring Costs

ERA will be responsible for the full costs of implementing the monitoring activities. Adequate funding to cover monitoring costs throughout the 30-year project period has been set aside by ERA in a restricted cash account.

Re-quantification

A re-quantification of the GHG assertion will be triggered if a monitoring entry determines that a change of greater than 10% to the projected net project climate benefits could result at the project end-date. Additional factors would trigger a re-quantification if it is determined they will reduce the net project carbon sequestration by more than 10 percent. These include:

- Advances to GPG or technologies such as carbon models or quantification procedures

- Scientific findings that affect the quantification

Updates or advances to GPG and quantification-related technologies will be reviewed and documented at each five-year monitoring interval. Substantial changes will be assessed with respect to the possibility that they could lead to a greater than 10% underachievement of the GHG assertion.

Quantification Benchmark

Re-quantification outcomes at year 30 will be compared to projected carbon stock values for the project scenario. This comparison will form the basis for determining the extent to which actual carbon stocks align with those in the GHG assertion.

Commitments to replace carbon for underperformance as determined through monitoring activities are listed in Section 7.2.

Roles and Responsibilities

ERA will be responsible to ensure that monitoring activities take place as scheduled and achieve their intended purpose as outlined in this plan. All elements of sampling design and implementation, data analysis, and carbon stock quantification will be undertaken and/or supervised by qualified professionals with adequate experience.

Information Management and QA/QC

Quality assurance (QA) and Quality control (QC) procedures will be applied to all monitoring phases. All data will be archived electronically and kept for at least five years after the project end-date.

A ledger will be established to track the implementation of all monitoring activities. This ledger will be kept on file and provided to the project buyer subsequent to monitoring activity updates.

Reports documenting the results of each monitoring activity will be kept on file and provided to the project's carbon offset buyer.

CL3.2 Full Monitoring Plan

A full monitoring plan will be developed within 12 months of validation. The plan will be disseminated to communities and other stakeholders and made publicly available.

Community

CM1. Net Positive Community Impacts

CM1.1 Estimate of Impacts on Community Well-being

Factors Identified by the Community as Important for Well-being

Denman Island residents, through development of the Denman Island Official Community Plan (OCP) have identified social and economic objectives as well as ecosystem services considered important to the community. The creation and adoption of the OCP was a community driven process that involved public readings and hearings. The OCP identifies ecosystem services important to the community:

- The ability to maintain diversity, structure and ecological functions of forests on the Island;
- Habitat for native and rare or endangered species;
- Natural beauty of the Island;
- Fresh water sources (quantity and quality) including ground water, Chickadee Lake, Graham Lake and the major water courses;
- Services provided by a healthy climate;
- Recreation opportunities in a natural environment.

Objectives and policies outlined within the community plan prioritize the protection of these ecosystem services (e.g. the plans guiding objective for the natural environment as “the highest priority in land use planning” p. 18). The OCP also identifies several social and economic factors important to the community:

- Provide for a range of economic activities that respects the natural environment and the character of the human community.
- Provide an environment that supports the creation and manufacture of local products and opportunities for self employment.
- Promote and support types of tourism that are low impact, environmentally sensitive and educational and that provide local employment.
- Protect land for conservation and recreation purposes
- Increase the amount of land designated for parks
- Ensure that land uses involving renewable resources are sustainable and compatible with the small-scale rural character of the Island;
- Protection of archeological, historic and natural heritage sites;
- Encourage housing that accommodates the needs of a variety of families and individuals while protecting the natural environment, the social fabric and the rural character of the community;
- Ensure that housing options are sensitive to ground water availability;
- Promote employment through agricultural activities that have minimal negative environmental impact;
- Protect Crown lands from inappropriate development.

The OCP contains additional objectives and policy not related or relevant to this analysis and not listed here, for example those related to the marine environment, energy efficiency, waste management, emergency services and health and transportation. These can view viewed within the OCP document which is available on the Islands Trust website.

Evaluation of Project's Impacts to Community Well-being

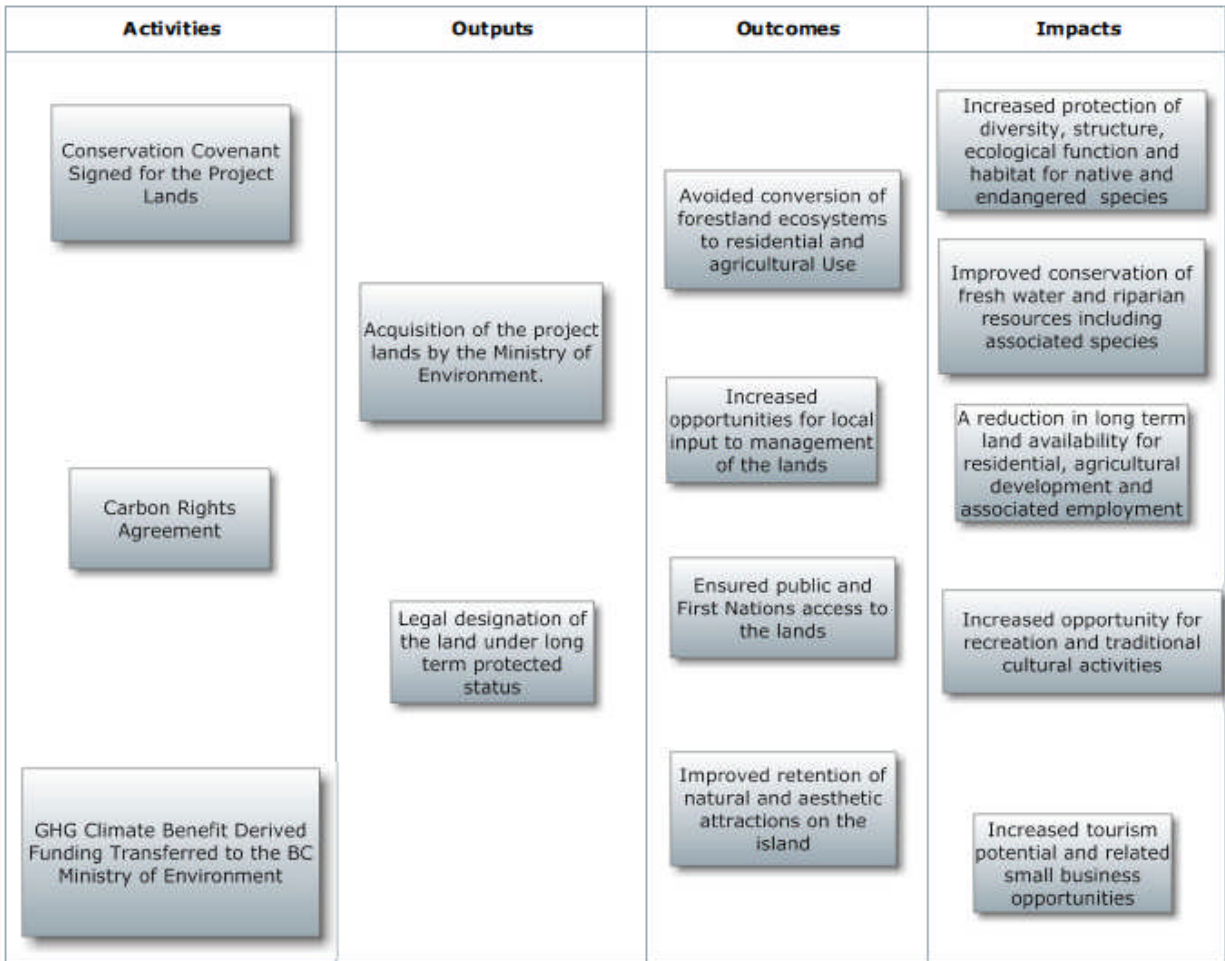
The *theory of change* method, also known as the *causal* model, was chosen to estimate the impacts on the community. The theory of change process provides a structured, cause and affects oriented approach to estimating how project activities result in specific outputs, which in turn lead to outcomes and subsequent long-term impacts. In addition to the benefits from using a logical, structured approach the causal model allows indicators to be developed from each or any of the outputs and outcomes depicted, enabling a measurement of progress toward longer-term impacts (Olander & Ebeling 2011; Richards & Panfil 2010). This is particularly helpful where direct measurement of long-term impacts is difficult.

Cause and affect sequences can be developed by working forwards from the initiation of activities through to final impacts, or by starting with a number of identified desirable impacts and working backwards to activities. The model for the Denman Project was developed using a combination of both methods. We incorporated desirable community impacts into the right hand side of the causal model based on factors defined in the Official Community Plan as beneficial for the well-being of island residents (Figure CM1.1-1). These include the environmental services noted above and several of the socio-economic objectives. In addition we noted increased access for the practice of traditional cultural activities as a desirable impact for local first nations.

Next, the project activity was entered in the left hand side of the model. Outputs and outcomes arising from the project activity are illustrated through the cause and effect sequences identified. In most cases the project activities, outputs and outcomes lead to one or more of the factors identified by the community as important to well being. This is not a surprising result as the community-based process led by the Islands Trust itself decided in favour of the project based on input from community stakeholders and the well-being criteria outlined in the OCP. An exception is impacts related to promotion of increased housing opportunities. Long-term protection of the project lands does not improve the ability to meet these concerns. As illustrated in the causal model, however, long-term protection does support several other socio-economic objectives of the community.

Proceedings of the Islands Trust rezoning application report for the project lands were referenced to see if they corroborate the results of the theory of change model. Part 2 of the Islands Trust Staff Report Dated July 20, 2009 contains an analysis of the impacts of the rezoning proposed for the project, using the Denman OCP as a guide. Their analysis concurs that the conservation aspects of the project provide significant contribution to forest and land objectives, freshwater objectives including wetland areas, and conservation/recreations objectives for Denman Island (Campbell 2009).

Figure CM1.1 -1: Theory of Change Model



Comparison of Baseline versus Project Scenarios: Net Community Impacts

A comparison of the ‘with project’ impacts identified above, with impacts anticipated in the baseline or ‘without project’ scenario indicates that in most cases project impacts are positive and aligned with community priorities for well-being. In two cases project impacts are negative (e.g. reduced long term availability of land for housing development and reduced economic opportunities from agriculture). Overall, however, there are significantly more positive impacts than negative, and most importantly the Denman community, having considered and weighed all aspects decided that conservation of the project lands resulted in the greatest net benefit to the well-being of the community.

Diversity, structure, ecological function, habitat and natural beauty of the Island

The project will have a significant positive impact as compared to the baseline scenario where a majority of the project lands would have been cleared for agricultural or residential use, with associated ecosystem fragmentation, loss of habitat and biodiversity values.

Freshwater Resources

The project will have a significant positive impact in terms of greater protection for these resources compared to development for agricultural or residential use, with associated reduction to hydrological cycle regulation from forest cover and reduced riparian value protection, as well as increases to chemical and sewage run off, disruption to natural drainage patterns, etc.

Climate

The project will have a net climate benefit.

Recreation and Viewscapes

The project will have a significant positive impact in terms of recreational opportunities and maintenance of the islands natural beauty.

Housing

The project will have a negative impact on the future availability of housing on the island.

Economic Opportunities

The project will have a negative impact on employment from future housing construction and agricultural activities, and will have a positive impact on tourism related business including accommodation and sale of locally made arts and crafts.

Archeological, historic and natural heritage sites

As there are currently no known sites of this kind on the project area the impact will be neutral.

Access to the land for traditional cultural activities

The project will have a significant positive impact by providing increase access for the practice of traditional cultural activities, as compared to the baseline scenario of privately held land.

Participation of Affected Groups

Through the processes described, affected groups have had opportunity to evaluate the impacts of the project through several means. Participation in the development of the Denman Island Official Community Plan provided Denman Island residents the opportunity to contribute to the setting of priorities for community well being. These objectives and associated policy form the criteria against which the Islands Trust decision to rezone the project lands was evaluated and made. The land rezoning process itself involved a public hearing process during which the benefits and potential detriments of the project were discussed and debated (G3.8). The neighbouring K'omoks First Nation was consulted with respect to the land rezoning for eventual designation as a provincial park or protected area. The ultimate decision by Islands Trust to proceed with the rezoning is inclusive of the input and debate received through these processes and reflective of the fact that the majority of citizens affected by the project believe the net impacts to community well being are positive (Section G3.8).

CM1.2 No Negative Affect to High Conservation Values identified in G1.8.4-6

Not applicable: there are not HCVs identified in G1.8.4-6.

CM2. Offsite Stakeholder Impacts

CM2.1 Potential Negative Offsite Stakeholder Impacts

The public acquisition of private lands on Denman Island for designation under protected status does not result in negative impacts for people living off the island. The size of the project lands and extent of the avoided land-use change is not significant enough to appreciably affect employment opportunities off the island. In addition, the presence of a new protected area on Denman has the potential draw increased tourist traffic to the region as access to Denman is provided via Vancouver Island.

CM2.2 Describe How the Project Plans to Mitigate these Negative Offsite Social and Economic Impacts.

Not applicable.

CM2.3 Demonstrate that the Project is Not Likely to Result in Net Negative Impacts on the Well-being of Other Stakeholder Groups.

Stakeholders and net project impacts are discussed in CM1.1. CM1.1 demonstrates that when all factors are considered the net impacts are positive. Access to the project lands increases and top community priorities for land-use planning are realized.

CM3. Community Impact Monitoring

CM3.1 Initial Plan for Selecting Community Variables to be Monitored and the Frequency of Monitoring and Reporting

The selection of community variables to be monitored will be done through collaboration with BC Parks, the Islands Trust and the Denman Island Residents Association. These groups will be contacted subsequent to the project validation to make arrangements for discussion and designation of appropriate variables and methods for monitoring. Variables to be monitored will be linked to community development objectives (G3.1) and impacts (CM1.1). This process will be completed within twelve months of project validation. Monitoring and reporting will take place at five year intervals throughout the duration of the 30 year CCBA validated project life time. The first monitoring and reporting event is anticipated to take place in year five (or earlier).

CM3.2 Initial Plan for Assessing the Effectiveness of Measures Used to Maintain or Enhance High Conservation Values Related to Community Well-being (G1.8.4-6)

NA: there are no High Conservation Values related to indicators G1.84-6.

CM3.3 Commit to Developing a Full Monitoring Plan Within Six Months of the Project Start Date or Within Twelve Months of Validation

A full monitoring plan will be developed within 12 months of validation. The plan will be disseminated to communities and other stakeholders and made publicly available.

Biodiversity

B1. Net Positive Biodiversity Impacts

B1.1 Changes in Biodiversity as a Result of the Project in the Project Zone

The *theory of change* method described in CM1.1 estimates community and biodiversity impacts at a coarse level using a structured, cause and effect approach, clearly demonstrating significant positive impacts on biodiversity through increased protection of diversity, structure, ecological function and habitat for native and endangered species. Protection of the project lands in perpetuity will allow the native, naturally regenerated species on site to grow and mature through natural stages of forest ecosystem succession. Old-growth Coastal Douglas-fir attributes will develop over time along with the ecosystem functions and habitat associated with the forest type. Old-growth Coastal Douglas-fir attributes provide habitat for additional mammal and bird species not encountered in young seral and managed second growth forest (Meidinger & Pojar 1991) including the California Myotis and Red Squirrel, Downey Wood Pecker, Anna's Hummingbird and Western Flycatcher. Threatened ecosystem communities within the CDF where they occur on the project site will be afforded greater opportunity to recover.

The baseline scenario does not afford nearly the same level of protection for biodiversity. Ecosystem fragmentation and associated loss of function and habitat would result from the conversion of forestland to residential and agriculture use. The net biodiversity benefit from the project then is clearly positive.

B1.2 Potential Negative Effects on High Conservation Values Identified in G1.8.1-3

Avoided conversion of the project's forestlands to residential and agricultural use allows for a natural process of Coastal Douglas-fir ecosystem function. The recovery of forest stands on the project site will in the long term shade out the temporary habitat currently provided for the Taylor's Checkerspot butterfly through recent clear cut logging. The currently high densities of the Checkerspot are a result of this non-natural disturbance and are highly variable from one year to the next. As described in G3.6, measures undertaken by the project provide an increased opportunity for management actions oriented towards mainlining viable populations of the butterfly on Denman and nearby areas. The long term maintenance of this species on the island is problematic, however, in both the project and baseline scenarios.

B1.3 Introduction of Invasive Species

Forests on site are the result of the natural regeneration of native species following logging. Project activities do not involve the planting or introduction by other means of any species. Some non-native species currently exist on site in low to moderate amounts (e.g. Himalayan Blackberry, Scots Broom, Holly). The avoidance of forestland conversion to residential and agricultural land use will greatly reduce the future introduction of invasive species to the site through a reduction of mineral soil exposure (seed bed) and human caused invasive species seed propagation. Re-growth of native forest stands will shade out light demanding invasive species such as blackberry.

B1.4 Adverse Effects of Non-native Species Used by the Project

This indicator is not applicable as no non-native species will be planted within the project area.

B1.5 GMOs used to Generate GHG Emissions Reductions or Removals

No GMOs will be used to generate GHG emissions reductions or removals as project activities do not involve planting trees or other organisms.

B2. Offsite Biodiversity Impacts

B2.1 Potential Negative Offsite Biodiversity Impacts

ERA does not anticipate any negative offsite biodiversity impacts from this project. Natural ecosystem processes integral to Coastal Douglas-fir forests will be allowed to function on the project site, helping to restore connectivity with and function of adjacent areas, including movement of species in response to any future changes in climate conditions. This is particularly important given the projects location within the northern most reaches of the CDF along the coast of Vancouver Island.

B2.2 Plans to Mitigate these Negative Offsite Biodiversity Benefits

Not applicable.

B2.3 Likely Unmitigated Negative Offsite Biodiversity Impacts

The net effect of the project on biodiversity will be positive both on and offsite given all of the positive biodiversity outcomes already discussed and the connectivity implications outlined in B2.1.

B3. Biodiversity Impact Monitoring

B3.1 Initial plan for Selecting Biodiversity Variables to be Monitored

The selection of biodiversity variables to be monitored will be done through collaboration with BC Parks, and the provincial Ministry of Environment. Representatives of these groups, with whom ERA has developed a working relationship as a result of the development of the Denman project, will be contacted subsequent to the project validation to make arrangements for discussion and designation of appropriate variables and methods for monitoring. This process will be completed within six months of project validation. Monitoring and reporting will take place at five year intervals throughout the duration of the 30 year CCBA validated project life time. The first monitoring and reporting event is anticipated to take place in year five (or earlier).

B3.2 Initial Plan for Assessing the Effectiveness of Measures to Maintain or Enhance High Conservation Values Related to Globally, Regionally or Nationally Significant Biodiversity

The identified High Conservation Values for the project are:

G8.1b threatened species: Taylor's Checkerspot Butterfly

G8.1d significant concentration of species: Taylor's Checkerspot Butterfly

G8.3 threatened or rare ecosystems: Coastal Douglas-fir

Monitoring with respect to the effectiveness of measures for conservation of the Taylor's Checkerspot Butterfly will be undertaken every five years through interviews with B.C. Ministry of Environment personnel in charge of the recovery plan for this species. Factors to be considered for inclusion in the monitoring plan may include effectiveness of the designated 10ha Checkerspot management area in supporting viability of the species on site, additional management options being considered, current population levels and estimated future viability of the species on site.

Monitoring activities with respect to the effectiveness of measures for conservation of Coastal Douglas-fir ecosystems on the project site will be focused on the assessment of readily measurable indicators of ecosystem function and habitat, such as the continued presence and succession of native tree species/stands, riparian features, and young seral versus old growth attributes. The Conservation Data Centre (CDC) website will be consulted during five year monitoring activities to provide a more general indication of CDF and species specific conservation trends in B.C.

B3.3 Full Monitoring Plan

A full monitoring plan will be developed, made available and communicated to stakeholders within twelve months of the project's validation.

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