

DRIVEN BY NATURE

A HOLISTIC APPROACH TO ANALYSIS AND DESIGN  
OF THE WHISTLER NORDIC CENTRE

by

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## Abstract

Standard planning, engineering, architecture, and construction methods are too often a means of development for a generic site program and design unaware of the inherent site condition, context, and character. In response, landscape planning and design must be receptive and adaptive to the natural character and spirit of the place, in order to enhance the social, economic, ecological, and experiential qualities of the site. The distinction of the Whistler Nordic Centre proposal of the Vancouver 2010 Olympic Bid provides the opportunity to explore the realm of landscape design possibilities in light of a magnificent recreation park project.

The site analysis integrated a multidisciplinary iterative approach of thorough scientific and experiential planning and design site investigations, observations, and hypotheses. The selection of three design hypotheses and the subsequent testing of these hypotheses against specific site design criteria formed the basis for the selection and evaluation of a design solution in consideration of the intrinsic site conditions and intended site purposes. The process developed a comprehensive understanding of the landscape and program, in order to effectively determine the proper locations, orientations, and connections of the Ski Jump, Biathlon Range, and Cross Country Stadium.

The meticulous planning and design considerations enlightened the development of a range of essential design imperatives to consider sense of arrival, experience of place, experience of events, preservation of nature, preservation of character, vision of the whole, image of the games, seasonality of use, response to climate, and legacy opportunities. The imperatives of design exemplified the level of detail consideration envisioned for the eventual successful design of the Whistler Nordic Centre. The experience of the project process provided recommendations for the importance of the vision of the project as a whole, through the provision of a central lodge facility, the deliberate consideration of tourism planning and opportunities for the site, and the careful consideration as to the location and proximity of the Olympic Village.

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## Preface

The seed of an idea for the planning and design of the Whistler Nordic Centre as a graduate thesis project in Landscape Architecture developed from the familiarity and interest in alpine design and the opportunity to participate in the project of a lifetime, the Vancouver 2010 Olympic and Paralympic Games. The consideration of the project began in the winter of 2002, and developed into a passion after watching the Salt Lake 2002 Winter Games continuously for the duration of the events. The spirit of competition, the international goodwill, and the triumphs of athletes provided the inspiration and desire to pursue a vision for the Whistler Nordic Centre. An admiration for the natural coast mountain environment and an enthusiasm for outdoor winter sport fuelled the aspiration to design an exceptional winter sport recreation facility.

The thesis project finds its start with the excellent preliminary design work and site selection of the Vancouver 2010 Bid Committee, and specifically Tom Barratt and Jan Jansen, winners of the Canadian Society for Landscape Architects National Honour Award for their inspiring design of the Vancouver 2010 Bid Book. The project considers the natural environment and precedents of park design as a basis for analysis and planning in an attempt to enhance the image, function, and experience of the site as a whole. The breadth and scope of the entire project limits the depth of design exploration, relinquishing the final decisions to the Organizing Committee of the Olympic Games upon the successful outcome of the July bid decision. In acknowledgment of the potential magnitude and reach of the project vision, this work hopes to provide a sound background for the eventual planning and design of an extraordinary Whistler Nordic Centre, in the midst of an exceptional coast mountain setting.

## Acknowledgements

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From coast to coast  
from sea to sky, we are driven by nature  
For over 10,000 years, our hands  
have shaped the land  
The land in return, has shaped us  
It has inspired our artists, and fuelled our growth  
Challenged our explorers, and delighted our guests  
Nourished our ancestors, and fed our souls  
It has tested our limits of endurance, just as it has  
pushed us on to astonishing achievements  
In a country so vast and so wide, it is perhaps only natural  
that one quickly comes to believe in a world  
of limitless horizons and endless possibilities  
A place where a hundred tongues and countless cultures  
have both the space and the freedom  
to realize their destinies in harmony with each other, and with the land  
A place where 30 million dreams live  
Bound by the sea, united beneath the sky  
Driven by nature

The Sea to Sky Games  
Vancouver 2010 Bid Book

# Chapter 1

## Background Concepts

The literature reviews and case study precedents will serve as a source of ideas, beliefs, and concepts for the justification and implementation of the landscape analysis, planning, and design processes. The foundation of the thesis premise builds upon the sound background concepts and precedents of valued and respected landscape architecture theory and design practice to inform the thrust and focus of the design project.

## Planning, Environment, and Place

### Landscape Solutions

The comparable physical structure and experiential quality of our surrounding global environment displays our gradual move towards righteous ideals, aesthetics, and ethics in the design of the urban milieu. Changes in technology, communication, agriculture, transportation, and lifestyle affect the manifestation of our situation, but the moral imperatives of society dictate the application of median design standards to our general surroundings. The professional disciplines of planning, engineering, architecture, and landscape architecture practice their craft through the guidance of standards, regulations, codes, and ethics, often leading to the physical similarity and experiential mediocrity of the modern built environment. The typical approach to landscape analysis and design as a problem of definite parameters generally guides the development of the site program towards a conventional design solution. In response, the façade of contemporary development masks an inherently diverse and complex landscape of variable physiography and ecological character reflective of environmental processes that demand solutions responsive to their dynamic environmental settings. (Marsh, 1998)

### Disciplinary Integration

Ecology, the study of the dynamic relations between a community of organisms and its habitat, often ignores the inclusion or response of humanity in the balance, while economics, the social science of the production and distribution of wealth, often ignores the existence or the value of the natural environment in the solution. The study of economy, ecology, geography, geology, hydrology, literature, and art, among others, are essential to the comprehension and practice of landscape planning and design. The contributions of these fields towards solving societal problems are enormous, yet the applied professions of planning, engineering, architecture, and landscape architecture synthesize, reformat, refine, and adapt the knowledge base towards viable and creative landscape solutions. In landscape architecture, the interests of artistic, social, and environmental sciences are bridged through a mutual concern for resources, land use, and nature. Landscape planning and design in harmony and balance with the surrounding setting is generally more economical, aesthetic, and efficient. (Marsh, 1998)

### Design with Nature

Classic philosophy tends to examine man in isolation, or to examine nature without noting the presence of man, rarely pondering the relation of humanity to its environment as a whole. The modern awakening to nature drives the effort to determine the

constitution of an environmental balance in support of human biological prosperity, social cooperation, and spiritual stimulation. The inspiration to design with nature comes from the attempt to observe the world from within, as a participant and an actor, and not merely look at all nature and human activity from the external vantage point of ecology. The emphasis is neither on design nor nature, but on the preposition, *with*, through implications of human cooperation and biological partnership. (McHarg, 1992)

### Landscape Analysis

The sources of landscape design, existing site conditions and the intentions of land use, offer insight into the analysis and process of landscape planning. Purpose depends on site limitations, and site analysis depends on purpose. The site investigation involves the examination of fitness for human purposes and the inherent rights of the natural living ecosystem. The observation and interpretation of site conditions, drainage patterns, and plant communities informs the interpretation of the site ecosystem. The topography of the site often determines the possibilities and limitations of the landscape plan, while plant species and communities are excellent indicators of climate, soil, water, and the history of a site. (Lynch, 1971)

### Geography of Place

The sensitivity to the significance of characteristic places is essential to the planning and design of unique and distinguishing landscapes. The eradication of distinctive places and the production of standard landscapes result in a *placeless* geography, a labyrinth of endless similarity, where the development of environments are ordered by conceptual principles rather than by patterns of direct experience. "Nothing calls attention to itself: it is all remarkably unremarkable... You have seen it, heard it, experienced it all before, and yet ... you have seen and experienced nothing..." (Relph, 1976) The geography of place is characterized by variety and meaning, where places are fusions of human and natural order and are the significant centres of our immediate experiences in the world. The landscape of place begins with the assumption that each place is different, that each place must respond to specific virtues, and that apparently similar places may require completely different solutions. The compelling principle of place represents an opportunity for the creation of a place of significance, an environment that reflects and enhances the varieties of human experience. (Relph, 1976)

### Imageability of Place

The image of place references the relation to our surroundings, the sequence of events, and the memory of past experience. The mobile elements of place, people, and their activities, are as important to our perceptual image of place, as are the stationary physical components of landscape. We are not merely observers of the spectacle, but are also participants of the whole. The environment is an object of individual perception, of people of widely diverse class and character, ever changing in detail, with no final result, only a continuous succession of phases. The image of place seeks legibility, a visual clarity of recognition, and a comprehension of coherent patterns, as a setting of delight, or an extension of the meaningfulness and richness of the world. Organization is fundamental to efficiency, where districts, landmarks, and pathways are easily identifiable and grouped into an overall pattern of distinction. The environmental image, an individual mental picture of the exterior physical world, is the product both of immediate sensation and of the memory of past experience, and it is used to interpret information and to guide action in response to the setting. A good environmental image, familiar but distinctive, gives its possessor an important sense of emotional security, and

a harmonious relationship between himself and the outside world. A vivid and integrated physical setting capable of producing a sharp image can provide the symbols and collective memories of group communication, heightening the potential depth and intensity of the human experience. (Lynch, 1960)

### Mountain Design

The design of places for people in mountain environments faces tremendous opportunities and constraints far different from those that characterize other landscapes. The proper design within the alpine setting requires a thorough understanding of the ecological processes, the natural hazards, and the unique aesthetic qualities of the mountain environment. The mountain landscapes of commanding presence and splendid visual character remain a magnetic frontier for our collective spirit manifesting potent sensory images mistaken for no other environment on earth. The dominant and unforgiving natural forces that shape high mountain landscapes clearly influence the form of mountain communities, where villages counter the vastness of nature with the security and comfort of human scale. The appeal of traditional alpine communities lies in their manifestation of environmental wisdom, their ingenuity with limited resources, and their emotional attachment to place. (Dorward, 1990)

### Design Process

The image of the site guides the design; it does not dictate the design. The plan develops from the creative effort of the designer, in response to the site conditions and context, allowing the designer to work with the grain of the locality, emphasizing the strong points, or to dramatically oppose its nature in response to a thorough understanding of the site complexities. Experience allows the preliminary selection and application of realistic purposes to a specific site in the analysis and planning process prior to the comprehensive determination of land use. The purpose of the program and the nature of the site determine the final selection of analysis and design criteria. The repetition of analysis and of trial plans leads to the emergence of a stable site pattern, a basic set of landscape forms, which is the essence of the place for the purpose in mind. The flexibility to adapt a coherent pattern towards an alternate purpose, or to change a purpose to suit a pattern, are essential in the development of alternate site proposals. The clear comprehension of the ecological relationships of a place are important to create a new landscape balance, in harmony with the surrounding setting and as stable as the previous natural balance, to ensure a favourable environment for the intended landscape purpose. (Lynch, 1971)

### Design Exploration

The careful consideration of the natural landscape environment and experience expands the realm of possibilities to suggest and examine a wide range of opportunities inherent to the program of the site. The opportunity exists to expand our understanding beyond the abstract economic valuation of landscape and conventional codes of construction practice to discover the meaning of place in our environment. The meticulous observation and interpretation of the site location, orientation, condition, context, and connection to the surrounding environment, both natural and built, informs the possibilities and limitations to the scope and breadth of landscape intervention. The agile investigation of environmental experience and program potential pushes the boundaries of possibilities towards the imaginative exploration of design ideas and landscape narratives. The landscape design of observation and imagination creates an environment of experiential wealth, intensity, and diversity. (Paterson)

## Parks and Recreation Precedent



Figure 1.1  
Banff Springs (Fairmont Hotels and Resorts)

### National Parks

The establishment of the first state park, Yosemite (USA 1864), and the first national parks, Yellowstone (USA 1872) and Banff (Canada 1885), set the pattern of expectations and served as the model for subsequent parks in North America. The ideals, the settings, and the role of tourism relating to the establishment of these original state and national parks strategically informed the comprehension and planning for preservation and recreation in contemporary wilderness parks. (Boyd & Butler, 2000)

The nineteenth century development of national images of nature, wilderness, and man's activity in such settings, by artists and authors such as George Catlin, James Fennimore Cooper, Henri David Thoreau, and George Perkins Marsh, drew attention to the loss of the natural environment, initiating a rethinking of the then-current approach to the environment, and a need for the introduction of the concept of conservation. The concerns over the impact of settlement and expansion on the natural landscape, in conjunction with an interest in landscape design and preservation, by the eminent park designer Frederick Law Olmstead, and the emergence of modern evolutionary science, by the prominent naturalist Charles Darwin, were influential in the establishment of the forerunner to the national parks, Yosemite Park in 1864. (Boyd & Butler, 2000)

The ideals of Yosemite, seen as an opportunity to preserve both the image of awesome nature and a landscape suitable for human relaxation, and the landscape images of Thomas Moran, a member of Ferdinand Hayden's 1871 Yellowstone expedition, did much to influence congress in the establishment of the first national park, Yellowstone, in 1872. The Yellowstone Act (1872) withdrew more than one million acres of land from settlement, occupancy, or sale, for the dedication and setting apart 'as a public park or pleasuring ground for the benefit and enjoyment of the people'. The ideals and language of the Yellowstone Act in the United States subsequently influenced the legislation establishing the first Canadian national park, Banff National Park, in 1885. (Boyd & Butler, 2000)

The growing need for space to be put aside for relaxation and recreation was a major influence in the establishment of the first national parks, for activities from hunting and fishing, to mountaineering, scientific endeavours, painting and writing, or simply travel, often by train, for the scenic enjoyment of nature. Frederick Law Olmstead, in particular, was a strong proponent of the need to bring people to the outdoors, or, as he did in

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Central Park, New York, to bring the outdoors to all people. The American and European elite were the early visitors to these parks, with a growing need for the provision of such space, but it was clear that numbers were never envisioned to reach the current level of several million visitors to these parks. (Boyd & Butler, 2000)

The perception of economic benefits, which could accrue from the development of tourism, was another major influence in the establishment of national parks, in particular, Banff National Park. The railroads, pushing further west, needed income to finance their endeavours, while affluent Americans and Europeans with time and money for those exotic expeditions into the new wilderness were engaging in a variety of recreation activities. The impetus for the establishment of Banff National Park came by accident, with the discovery of hot springs by the engineers working for the Canadian Pacific Railroad, and their attempts to commercialize the hot springs. Concern in the nation's capital resulted in the initial stimulus for the establishment of a federal reserve of ten square miles, in 1885, surrounding the hot springs, where economic gain from tourism and the provision of recreation opportunities for Canadians were of great importance in the founding of the park. (Boyd & Butler, 2000)

The three ideals of preservation, recreation, and economics were central to the establishment and early expansion of the Canadian park system. The Rocky Mountains Park Act (1887) legislated the creation of the first Canadian national park, expanding the area to 260 square miles, noting the space was reserved 'as a public park and pleasure ground for the benefit, advantage, and enjoyment of the people of Canada', and stating that there would 'not be issued any leases, licenses, or permits' that would 'impair the usefulness of the park for the purposes of public enjoyment and recreation'. The statements clearly displayed the importance of the place of recreation in the establishment of these first national parks. (Boyd & Butler, 2000)

The creation of Yosemite, Yellowstone, and Banff national parks provided the precedent for subsequent national parks, by establishing the political feasibility of setting aside large areas to be protected and enjoyed as part of a national heritage, by establishing an alternate public policy to the private exploitation of natural resources, and by demonstrating the national responsibility for the establishment and preservation of park land. The American parks at Yosemite and Yellowstone focused on the attractions and spectacles of nature, from the soaring granite towers of Yosemite to the spouting geysers of Yellowstone, while the Canadian park at Banff focused on the European tradition of the spa, from the natural provision of thermal hot springs and the therapeutic power of the mineral water, to the grand hotel, albeit against a spectacular scenic mountain backdrop. (Boyd & Butler, 2000)

The ideal images of ancient privilege, nobility, and land management of eighteenth century English landscapes, featuring a mixture of woodland and pasture, wild and domestic animals, with stylized castles and mountain backdrops captured the imaginations of the New Worlds, and were influential in the development of North American images of nature and wilderness. The great desire for cultural equality or superiority with the Old World sparked the fascination and desire to match these images with creations of their own. While in Canada's first national park, the building of the Banff Springs Hotel by the Canadian Pacific Railroad, some three decades after the creation of Banff National Park, modelled the magnificent structure after early nineteenth century Scottish baronial-style castles, the American proponents of national parks were discovering a natural heritage of castles, fortresses, and ramparts in the American

landscape, in the gushing geysers and granite towers of Yosemite and Yellowstone. (Boyd & Butler, 2000)

The original wordings of the Yellowstone Act (USA) and the Rocky Mountains Park Act (Canada) confirmed the dual mandate of parks, namely the conservation of park resources, as well as providing for the enjoyment of the public, establishing the basis of conflict within parks between protection and use, a conflict that continues to plague national parks to this day. Revisions in Canada and the USA oriented more recent park policies towards the preservation of ecological integrity and cultural heritage, ensuring that recreational use did not threaten scenic beauty and wildlife. Emphasis in the current policy has shifted towards ecosystem-based planning and management, and the potential within parks to offer sustainable forms of tourism. (Boyd & Butler, 2000)

### Whistler Village



Figure 1.2  
Whistler Village Ski Out (Tourism Whistler)

The Resort Municipality of Whistler, 120 km north of Vancouver, at the edge of Garibaldi Provincial Park, has become the definitive hub of the scenic alpine region known as the sea to sky corridor, popular for winter and summer recreation activities. Whistler Village, the extraordinary pedestrian community, is the product of an outstanding natural setting, visionary local proponents, federal and provincial support, and comprehensive promotion strategies to become the authoritative model of alpine tourism design (Jensen, 1991).

Whistler Village nestles comfortably at the base of two adjoining mountain destinations, Whistler and Blackcomb. The village positions the heart of cultural interest and community interaction at the gateway to boundless alpine recreation activities. Whistler Village, the centre of tourism activity, displays the linkages, interaction, diversity, and vitality of a vibrant authentic community. The liveliness, sensory stimulus, human scale, and comfortable spaces of the village combine with the magnificent natural setting and west coast character to create an experience of place. The natural terrain of Whistler and Blackcomb Mountains provide the stunning visual backdrop to the compact aesthetic alpine architecture of the village (Dorward, 1990).

The concepts that contribute to the success of Whistler are the pedestrian village orientation, the diversity, scale, and density of design, the reference to the natural landscape, the alignment of view and climate corridors, and the proximity to recreation activities. The community identity arises from a vision of Whistler as an international tourist destination and the desire to create a stable year-round economic base. The tourism market consideration requires an alteration in concepts of circulation, layout, form, and use. The conceptual priorities consider the proportion of structures and space, the sequence of discovery and experience, and the orientation to views and sun. The village design vision and intent, of visual continuity and spatial quality, subordinates

individual and fractured concepts of structure and alignment, for a collective concept of the place as a whole (Dorward, 1990).

The outstanding success of Whistler Resort was the result of vision, planning, design, and most importantly, the proper location of Whistler Village. The community prior to village construction featured few commercial amenities, sprawling cottage settlements, and little environmental control over sanitation and water. The original concept of Whistler Village located the town centre along the scenic shores of Alta Lake, a significant distance from Whistler and Blackcomb Mountains. The situation would have separated the ideal winter mass tourism connection of village and mountain, creating a need for massive parking structures at the base of the mountains, and inevitably altering the quaint, compact experience of Whistler. The sensible recognition of the surrounding mountains as a key element in the attraction of recreation tourists, and the position of the village at the pinnacle of that activity, created the outstanding tourism success of Whistler Resort (Jensen, 1991).

The human scale of the village structure creates a hierarchy of compact pedestrian streetscapes and open plaza spaces. The primary choreography of the village unfolds as a sequence from the concealment of the Village Gate entrance, to the vibrant open gathering space of Village Plaza, to the lively visual continuity and progression of Village Stroll, to the eventual revelation of Skier's Plaza, the gateway to the alpine recreation experience of Whistler and Blackcomb Mountains. The primary lessons learned were the compact integration of commercial services, recreation, and accommodation, the importance of visual continuity and connectivity, and the scale, density, and diversity of planning and design (Dorward, 1990).

## Chapter 2

### Planning Mission

The campaign, obligation, and context of the Olympic Movement, the Vancouver 2010 Bid, and the Legacy Program serve to enlighten the form and function of the park planning and design project. The development and comprehension of the complex site programs inform the scale and quality requirements of the events and surrounding settings in light of the anticipation and expectations of the Olympic Games.

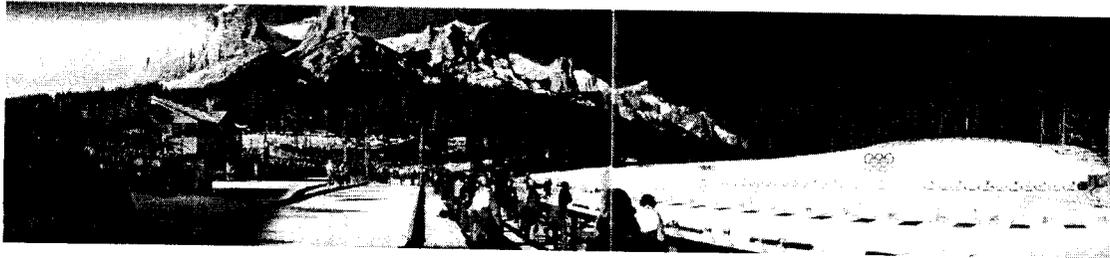


Figure 2.1  
Canmore Nordic Centre (XV Olympic Winter Games)

### Olympic and Tourism Concepts

#### Olympic Movement

The Olympic Charter defines Olympism as a philosophy of life exalting and combining in a balanced whole the qualities of the body, will, and mind, blending sport with culture and education, creating a way of life based on the joy in effort, the educational value of good example, and the respect for universal fundamental ethical principles. The Olympic Charter states the goal of Olympism is to place everywhere sport at the service of the harmonious development of man, with a view to encouraging the establishment of a peaceful society concerned with the preservation of human dignity. To this effect, the Olympic Movement engages, alone or in cooperation with other organizations and within the limits of its means, in actions to promote peace.

The Olympic Movement consists of the International Olympic Committee, Organizing Committees of the Olympic Games, National Olympic Committees, International Federations, National Associations, and Olympic Athletes. The Olympic Charter states the goal of the Olympic Movement is to contribute to building a peaceful and better world by educating youth through sport practiced without discrimination of any kind and in the Olympic spirit, requiring mutual understanding with a spirit of friendship, solidarity, and fair play. The activity of the Olympic Movement, symbolized by five interlaced rings, is universal and permanent, covering the five continents, and reaching its peak with the bringing together of athletes of the world for the great sports festival of the Olympic Games.

The Olympic Charter states that the Olympic Games are competitions between athletes in individual or team events, and not between countries. The Olympic Games bring together the athletes designated for such purpose by their respective National Olympic

Committees, whose entries have been accepted by the International Olympic Committee, and who through their sports performances compete under the technical direction of the International Federations concerned. The International Olympic Committee takes measures to promote a positive legacy from the Olympic Games to the host city and country, and to ensure concern and measures for environmental issues in the activities of the Olympic Games. The Committee promotes the consideration of sensible control for the size, cost, and sustainability of the Olympic Games, creating, where needed, simple, functional, and economic sports facilities in cooperation with national or international bodies, and supporting the organization of competitions at regional, national, and international level under the authority and patronage of the National Olympic Committees. A testimony from the Lillehammer Games in Norway states that the quality of the Olympic Games will be judged based on the experience and impression created in the minds of athletes, guests, and spectators. (International Olympic Committee, 2002)

### Olympic Legacy

The conclusions and recommendations of the International Conference on Architecture and International Sporting Events, held May 2002, state that the permanent legacy facilities must be realistic for long term use and benefit to the host community, that success in creating big events comes from quality planning and consistent decision making, and that the appointment of high quality design teams results in better value and outcomes for the Olympic Games. The consideration and inclusion of specialist expertise and previous event design experience strengthens the creative process and the transfer of knowledge from previous host cities. The comprehension of facility function and operation is vital to the event and legacy planning, design, and management. The careful evaluation of audience size, perhaps moving towards a lesser venue scale, will encourage the success of the event legacy. The concern for sustainability and care of the environment is important in the creation of healthy results for the future, while the consideration of temporary facilities in support of permanent venues is integral to the planning and design of the event venues. The proper planning, provision, and access for people with disabilities and minority groups remains a vital component for spectators and participants at all levels. The opportunities for heritage and legacy buildings, which are special and unique, ensure a viable and vibrant life to the venue after the event. (International Olympic Committee, 2003)

The conclusions and recommendations of the Symposium on the Legacy of the Olympic Games, held November 2002, suggest that the possible long-term effects, the benefits for the community, and the possible contribution of each bid to the culture and continuity of the Olympic Movement to be considered as key aspects of the evaluation of the bids. The concept of legacy is considered multidisciplinary and dynamic, changing over time, affected by local and global factors, and ultimately fundamental to the understanding of the mission of Olympism in society. The sustainable long-term legacy planning of the Olympic Games attempts to address concerns for the environment, while benefiting social and economic development. The emergence and recognition of legacy aspects and dimensions beyond architecture, planning, marketing, sport infrastructure, tourism, and economic development broaden the scope and importance of the legacies to consider intangible aspects and dimensions of the production of ideas and cultural values, multicultural and inclusionary experiences, popular memory, education, collective effort, volunteerism, sport adoption, and notoriety on a global scale. The formation of unique historical and biographical reference points in time and space are legacies not

only for the citizens of the host city, but also for the citizens of the globe. The values of the non-governmental organization of the Olympic Movement promote the culture of peace, athleticism, and education through the Olympic Truce and education programs. The contributions of International Olympic Committee Members promote and facilitate the organization of the Games at the lowest possible cost and at the maximum benefit for the athletes and citizens. (International Olympic Committee, 2003)

The Vancouver 2010 Bid Book states that great care has been taken in the selection of the 2010 Games venue locations to ensure that the precious natural heritage of British Columbia is respected and not diminished. Construction and operation of the Games facilities will ensure that significant local features and sensitive environments are protected through landscape buffers and careful land development practices. The Squamish and Lil'wat nations will participate in the development of the Whistler Nordic Centre to ensure that its development is respectful of their sensitive areas and land use plans. Vancouver 2010 has conducted a preliminary assessment of likely environmental, social and economic effects resulting from the development, operations and post-Games use of the venues and infrastructure. The environmental impact assessment looked at potential impacts on geophysical, hydrological, atmospheric, biological, land use and social conditions. The proposed venues will have negligible or low environmental effects as a result of careful design, best management practices and innovative mitigation and enhancement strategies. Hosting the 2010 Olympic and Paralympic Winter Games will have a lasting positive influence on the region's economy, enhancing the province's worldwide reputation as an innovative, diverse economy and as an international tourist and convention destination. (Vancouver 2010, 2003)

#### Tourism Planning

In light of the Norwegian testimony of experience, that the quality of the Olympic Games will be judged based on the experience and impression created in the minds of athletes, guests, and spectators, the concept of tourism planning merits contemplation. The goals of tourism planning consider visitor satisfaction, economic development, sustainable resource use, and community integration, displaying considerable similarities to the planning goals of the Vancouver 2010 Bid. A critical approach to visitor satisfaction concerns the integration of the legitimate desires of site developers, of destination developers, and of regional developers, constituting a major challenge in the successful planning of tourism. Development schemes frequently consider tourism as an additional justification of purpose and economic feasibility for many questionable projects, while the satisfaction of the customer is the ultimate end product of tourism. Success depends on the level and sustainability of visitor satisfaction, and not merely on the measurement of economic benefits. The recent awareness of the negative impact of burgeoning tourism on the natural environment demands a new balance between tourism development and environmental protection, in constant vigilant regard for the satisfaction of the visitor. (Gunn, 2002)

## Olympic and Legacy Programs

#### Olympic Program

The proposed Whistler Nordic Centre, located in the Callaghan Valley south of Whistler, is the official venue site of the Vancouver 2010 Winter Olympic Games and Winter Paralympic Games. The Olympic site program requires three separate facilities to host

the disciplines of Biathlon, Cross Country, Ski Jumping, and Nordic Combined in a series of 22 independent events over 17 days in duration, from Friday, February 5 to Sunday, February 21, 2010. The Paralympic site program requires the use of two facilities to host the disciplines of Biathlon and Cross Country in a series of 15 independent events over 10 days in duration, from Friday, March 5 to Sunday, March 14, 2010 (Vancouver 2010, 2003).

## OLYMPIC COMPETITION SCHEDULE

DAY	DATE	TIME	DISCIPLINE EVENT
	February 06, 2010	09:00 - 10:30	Cross Country W 15 km Mass
		10:00 - 12:00	Ski Jump M K90 Individual (Q)
		12:30 - 14:00	Cross Country M 30 km Mass
3	Sunday February 07, 2010	10:00 - 12:00	Biathlon M 20 km Individual
		10:00 - 13:00	Ski Jump M K90 Individual (F)
		13:00 - 15:00	Biathlon W 15 km Individual
4	Monday February 08, 2010	10:00 - 12:00	Nordic Combined M K90 Individual
		13:00 - 15:00	Nordic Combined M 15 km Individual
5	Tuesday February 09, 2010	09:00 - 10:30	Cross Country W 10 km Individual
		12:00 - 13:30	Cross Country M 15 km Individual
6	Wednesday February 10, 2010	10:00 - 11:30	Biathlon M 10 km Sprint
		13:00 - 14:30	Biathlon W 7.5 km Sprint
7	Thursday February 11, 2010	09:15 - 10:30	Cross Country M 10 km Pursuit
		10:00 - 12:00	Ski Jump M K120 Individual (Q)
		12:00 - 13:00	Cross Country M 10 km Pursuit
8	Friday February 12, 2010	09:00 - 10:30	Cross Country W 5 km Pursuit
		10:00 - 13:00	Ski Jump M K120 Individual (F)
		11:30 - 12:30	Cross Country W 5 km Pursuit
9	Saturday February 13, 2010	10:00 - 11:00	Biathlon M 12.5 km Pursuit
		13:00 - 14:00	Biathlon W 10 km Pursuit
10	Sunday February 14, 2010	09:30 - 11:30	Cross Country M 4x10 km Relay
11	Monday February 15, 2010	10:00 - 12:00	Nordic Combined M 4x5 km Team Relay
		13:30 - 14:30	Nordic Combined M K90 Team Relay
12	Tuesday February 16, 2010	09:00 - 11:00	Cross Country M/W 1.5 km Sprint (Q)
		12:30 - 14:30	Cross Country M/W 1.5 km Sprint (F)
13	Wednesday February 17, 2010	10:00 - 12:00	Biathlon M 4x7.5 km Relay
		10:00 - 13:00	Ski Jump M K120 Team
		13:00 - 15:00	Biathlon W 4x6 km Relay
14	Thursday February 18, 2010	12:00 - 14:00	Cross Country W 4x5 km Relay
15	Friday February 19, 2010	10:00 - 11:00	Biathlon M 15 km Mass
		10:00 - 12:00	Nordic Combined M K120 Sprint
		13:00 - 14:00	Biathlon W 12.5 km Mass
		13:30 - 14:30	Nordic Combined M 7.5 km Sprint
16	Saturday February 20, 2010	09:30 - 12:00	Cross Country M 50 km Individual
17	Sunday February 21, 2010	09:30 - 11:30	Cross Country W 30 km Individual

Table 2.1 Olympic Competition Schedule

The central essence of the Olympic and Paralympic Winter Games programs is the functional requirement for sports and athletes. The Vancouver 2010 Bid focuses on the needs of athletes, and the provision of world-class venues, facilities, and support technology, ensuring the best possible environment for competition. The site selection for sports venues requires a careful consideration of location, accessibility, physical amenities, and operational ability to provide a world-class competitive experience, with

particular concern for venue and village connections in response to parameters of convenience, performance, and proximity. Communication with national and international sports federations, the Fédération Internationale de Ski (FIS) and the International Biathlon Union (IBU), ensures the provision of optimal sports venue conditions, and the accommodation of all operational functions (Vancouver 2010, 2003).

The sport concept of the Olympic site considers a global analysis of the overall program requirements and individual sport analyses, to achieve an optimum balance and density for the sports schedule. The site concept attempts to minimize the environmental impact and maximize the benefits of venue concentration in order to maximize logistical efficiencies and enhance the event experience for the athletes, officials, media, and spectators. The Olympic program considers the terrain of the Callaghan Valley site suitable and economically viable for developing courses and facilities that will meet the needs of the Olympic and Paralympic Nordic events for the Vancouver 2010 Winter Games and future sport possibilities (Vancouver 2010, 2003).

The design of the Whistler Nordic Centre will feature three primary sport venues, the Ski Jump Stadium, the Cross Country Stadium, and the Biathlon Range and Stadium, in a convenient layout for accessibility and mobility. The scale and seasonality of the Olympic program requires the consideration of several temporary support facilities for medical and health, food and beverage, water and sanitation, transportation and parking, access and security, power and lighting, and communication and media services. The program will require temporary event structures for guest services, emergency response, doping control, security control, team training, equipment maintenance, print media, and television broadcasting. The international importance and visibility of the events and participants will demand the highest level of public safety, for athletes, officials, and spectators, with broad concerns for transportation control, site security and accessibility, avalanche control, emergency response, and terrorism prevention (Vancouver 2010, 2003).

## PARALYMPIC COMPETITION SCHEDULE

DAY	DATE	TIME	DISCIPLINE EVENT
			Biathlon M/W 7.5 km
3	Sunday March 07, 2010	10:00 - 12:00	Biathlon M/W Mass Start - All
5	Tuesday March 09, 2010	10:00 - 11:00	Cross Country M 5 km Classic - All
		11:00 - 12:00	Cross Country W 2.5 km Classic - Sit
		12:00 - 13:30	Cross Country W 5 km Classic - Stand
7	Thursday March 11, 2010	10:00 - 11:00	Cross Country W 5 km Free - Sit
		11:00 - 12:00	Cross Country M 10 km Free - Sit
		12:00 - 13:00	Cross Country W 10 km Free - Stand
		13:00 - 14:00	Cross Country M 10 km Free - Stand
8	Friday March 12, 2010	10:00 - 11:00	Cross Country M 3x2.5 km Relay - Sit
		11:00 - 12:00	Cross Country W 3x2.5 km Relay - All
		12:00 - 13:00	Cross Country M 4x5 km Relay - Stand
10	Sunday March 14, 2010	10:00 - 11:00	Cross Country W 10 km Free - Sit
		11:00 - 12:00	Cross Country M 15 km Free - Sit
		12:00 - 13:00	Cross Country W 15 km Free - Stand
		13:00 - 14:00	Cross Country M 20 km Free - Stand

Table 2.2 Paralympic Competition Schedule

The scope of the Olympic venues proposes a total site capacity of 15,000 guests, with a breakdown of 3,000 non-revenue tickets, 3,000 sponsor/broadcast tickets, and 9,000 general public tickets. The design of the site facilities will feature a seating capacity of 10,000 seats with an additional standing capacity for 5,000 people. Site transport and entrance facilities will require a mobilization and access capacity for 15,000 guests within a brief timeframe constraint. The Olympic site transportation program envisions automobile access and parking for a total of 845 vehicle parking spaces, with a breakdown of 75 International Olympic Committee (IOC) vehicles, 320 team vehicles, 350 broadcast vehicles, and 100 staff/volunteer vehicles, and an additional 560 bus parking spaces, with a breakdown of 20 broadcast buses, 40 sponsor buses, and 500 spectator buses (Vancouver 2010, 2003).

The proposed Whistler Olympic Village, located at the junction of the Sea to Sky Highway and the entrance to the Callaghan Valley, 12 km or 12 minutes south of Whistler Village and 123 km or 120 minutes north of the Vancouver Olympic Village, will accommodate 2000 athletes and coaches in an atmosphere of an intimate alpine community at an elevation of 550 metres above sea level. The Whistler Nordic Centre, 8 km or 12 minutes distance by vehicle from the Whistler Olympic Village, will feature the Nordic events of Biathlon and Cross Country on a plateau of rolling terrain, in a range of 850-900 metres in elevation, and the Ski Jump on an adjacent steep slope, in a range of 900-1100 metres in elevation. The rolling terrain variability allows the flexibility to satisfy spectator and media desires for wider, shorter courses developed with 12 metre trail widths, and more traditional narrow, longer courses in harmony with the coast forest setting. The ideal topography of the terrain allows the fit of the Ski Jump Stadium to the natural slope of the hillside, including K30 and K50 training jumps, and K90 and K120 competition jumps (Vancouver 2010, 2003).

The broad site concept envisions plans for an efficient, convenient, and responsible celebration of athletic excellence, a model of compact urban and alpine sustainability.

The provincial government, owner of the proposed site, has approved the development of the Whistler Nordic Centre in the event of a successful Vancouver 2010 Bid, with a construction estimate of \$65 million (US). The initial stages of construction on the trail system are intended to begin the summer of 2005, with venue completion for the winter 2006/2007 competition season, well ahead of the Vancouver 2010 Olympic schedule (Vancouver 2010, 2003).

### Legacy Program

The central concern for the Whistler Nordic Centre, beyond the requirements for the Vancouver 2010 Olympic and Paralympic Winter Games, is the provision of a sustainable sport legacy, advancing the interests of athletics and competition for local, national, and international sports communities. The intentions of the Whistler Nordic Centre legacy are to increase interest and participation in sports, a key goal of the Olympic Movement, to facilitate National Team sport development, and to provide a greater concentration of winter sports facilities in North America. The intentions of the Whistler Olympic Village legacy are to provide an Athlete Centre, permanent guest athlete accommodation, and to provide non-market resident housing (Vancouver 2010, 2003).

The philosophy of the Whistler Nordic Centre plans to create a balance with an accessible, world-class winter sport destination, displaying our national reverence for snow and ice, and our deep passion for winter sports, with a compatible outdoor recreation summer sport facility featuring hiking and cycling trails. The Whistler Legacy Society (WLS), a non-profit organization, will operate and maintain, under long-term tenure, the Whistler Olympic Village Athletes Centre and the Whistler Nordic Centre. The Whistler Legacy Society members include the Governments of Canada and British Columbia, the Lil'wat and Squamish First Nations, the Resort Municipality of Whistler, and the Canadian Olympic and Paralympic Committees. An Endowment Trust of \$71 million (US), established by the Governments of Canada and British Columbia to support the Whistler Nordic Centre, Whistler Sliding Centre, and the Simon Fraser University Speed Skating Oval, will ensure the support of future operations at the Whistler Nordic Centre (Vancouver 2010, 2003).

The Whistler Nordic Centre legacy requires a site capability of hosting annual World Championship and World Cup events, both prior and following the Olympic and Paralympic Games. The range of facilities endeavor to encourage and maximize seasonal use, adapt to recreational and professional activities, and provide outstanding theatres for sport. The proposed construction of the facilities encourages development in harmony with their setting and surrounding communities, enhancement of the biodiversity and habitat of the area, attainment of Leadership in Energy and Environmental Design (LEED) standards for new facilities, and exceedence of British Columbia Building Codes for spectator and athlete accessibility (Vancouver 2010, 2003).

#### Program Analysis

The Olympic site combines all Nordic disciplines in a convenient location and terrain to suit all events. The site requires separate and direct access for all three venues, with little cohesion and difficult connection among the individual venues. The multiple and distinct site foci create a potential comprehension and direction confusion about site location and layout for the casual visitor. The Olympic program demands large-scale areas for temporary facilities, transport drop-off, and vehicle parking in excess 6 hectares.

The critical factor in the long-term success of the facility will hinge upon the ability to foster interest and support in the non-event periods of time. The overall success of the facility will depend greatly upon seasonal visitors, with complementary activities to the site. The ski jump will be the primary visual feature, structural component, and experiential attraction of the legacy facilities from the perspective of the recreational visitor. The ski jump will be the primary year round facility, with the application of a summer gliding surface for off-season training. The attraction and experience of the site will vary in perspective dependent upon the type of visitor, where the professional athlete, recreational resident, or international tourist will experience and appreciate the site in a variety of different ways. The lodge, central focus and primary image of the site, will become the central attraction and facility for the site following the Olympic events. The governance and maintenance of the site facilities will require the ongoing support of staff.

The fall might feature hiking season with interest in the colours of the season. The summer might concentrate on cycling, a destination for cyclists, and interpretive walking

tours of the native forest. The winter might expand the recreational offerings to skating on the lake, a toboggan slope that may take advantage of the lift. The stadiums may feature theatre or symphony in the park. The provision of infrastructure, water, sanitation, hydro, communication will be required for the legacy facilities and a potential lodge. The lodge, apart from serving as an information source, weather shelter, provision of water and sanitation services, and interpretive facility, might also function as a source of accommodation for training athletes. The central lodge facility may serve as a possible location to combine overlapping program requirements for washrooms facilities, food distribution, security services, and emergency medical services. The legacy of the site will require the continuation of administration with respect to access and security, in close proximity to the venues, arguing for a central lodge at the site.

## **Landscape and Community Visions**

The landscape visions will serve as a tool to quickly explore the imaginary possibilities and opportunities of plausible site schemes, wilderness park, alpine community, and community diversity, irrespective of definite site selection and program determination. The power of the vision lies in the ability to allow the imagination to transcend the limitations and implications of predetermined site decisions.

### **Wilderness Park**

The dark green valleys of old growth forest, the expansive vistas to distant alpine peaks, and the rippling clear waters of mountain lakes and streams serve as the setting for the Whistler Nordic Centre. The wilderness park is located at the end of a long winding journey travelling deep into the heart of the Callaghan Valley. Callaghan Lodge serves as a distant secluded destination and symbol of civilization in the vast surrounding wilderness. The lakeside lodge setting provides ideal accessibility to seasonal recreation activities of skiing, snowshoeing, canoeing, and hiking, as well as a source of food and shelter in a wild environment. The location of the facility at the edge of the alpine ecosystem creates an ideal starting point for visitors to explore the surrounding open expanse of high mountain peaks and glaciers, or the diffuse enclosure and majesty of the old growth forest and meandering streams of the lower valley.

The wilderness park blends a passion for sensitive recreation activities and pristine native environment into an experience of wilderness recreation. The park focus centres on the wilderness experience and a harmonizing interaction of humanity and nature, minimizing the visual and ecological impacts to the environment. The success of the wilderness park depends on the isolation from civilization, the scenic beauty of the setting, and a perception of a pristine natural environment. The surrounding context and commercial activities of the site directly affect the quality of the wilderness park experience for the visitor. The park lodge serves as the central focus in a nordic sport facility of international calibre. The outdoor venues for the nordic events blend with the natural environment. The flexibility and scale of the site allow a range of adaptability from international sporting event to an individual experience of seclusion in nature.

### **Alpine Community**

The magnificent southern solar exposure, the breathtaking scene of snow capped alpine peaks, and the thunderous waterfall at the heart of the village provide an ideal setting for the alpine community of Callaghan. The winding road ascends through temperate coastal rainforest to the subalpine valley location of Callaghan Village, providing

distance and seclusion from the brisk pace of Whistler. The small community derives an identity from a direct relationship to mountain culture and the integration of extensive recreation facilities throughout the community. Residents of the small community share in their passion for the alpine environment and the recreation opportunities of the Callaghan Valley. Callaghan Village serves as the central hub to a diverse recreation program of alpine culture, complementing the tourism wealth of Whistler, Vancouver, and British Columbia.

The strength of the alpine community lies in the integration of recreation and culture both in the physical environment and in the social context of the whole. Community and recreation blend together in a balanced relationship stronger than the individual components, derived from a vision of distinct identity and self-determination. The integration of the village and recreation facilities ensures the resident and visitor the requisites of shelter, sustenance, health, and safety in proximity to the recreation activity. The combination of community and recreation facility provides the efficient and economic distribution of services and infrastructure to the whole. Recreation diversity and participation increases due to the direct relationship with the Callaghan Nordic Centre, where mountaineering, climbing, and kayaking play greater roles in local recreation. Callaghan Village serves as the central focal point to a vision of the Callaghan Valley as a unique alpine recreation community and tourism destination.

#### Community Diversity

The picturesque winding valley, tremendous village structure, and renowned international success of Whistler serve as an ideal setting for the Whistler Nordic Centre and Olympic Village. The diversity of terrain, ideal environment, and recreation focus of the community create a unique opportunity to locate additional facilities within the Municipality of Whistler. The nordic facilities build upon the wealth of tourism attractions in the Whistler Valley, serving to diversify the tourism offerings of the community. The wide range of services and support in Whistler ensure the success and legacy of the world-class recreation facility.

The western lower flanks of Whistler Mountain provide a backdrop for the Whistler Nordic Centre. The proximity and adjacency to both Whistler Village and Whistler Mountain provide strong support for a southern expansion to the community of Whistler. The opportunity allows Whistler to design and develop a new gateway to the community, foster a base facility in conjunction with the planned expansion of Whistler Mountain, and develop employee-housing facilities within the existing boundaries of the community. The Whistler Nordic Centre and Olympic Village provide a key focal point to the southern expansion of Whistler, creating a link between the communities of Function Junction and Spring Creek.

## Chapter 3

### Analysis Methods

The analysis methods serve as perspectives of scientific and experiential observation and interpretation of the site condition and environment. The physiographic and biogeoclimatic methods of site interpretation form the basis of scientific investigations into the formative processes of the site and surrounding environment, while phenomenology and narrative methods of site exploration form the basis of pragmatic interpretations into the experience of the events and their settings. The importance of multiple scientific and experiential perspectives in the analysis of the site lies in the thorough comprehension and consideration of the site environment, context, and program as a whole.

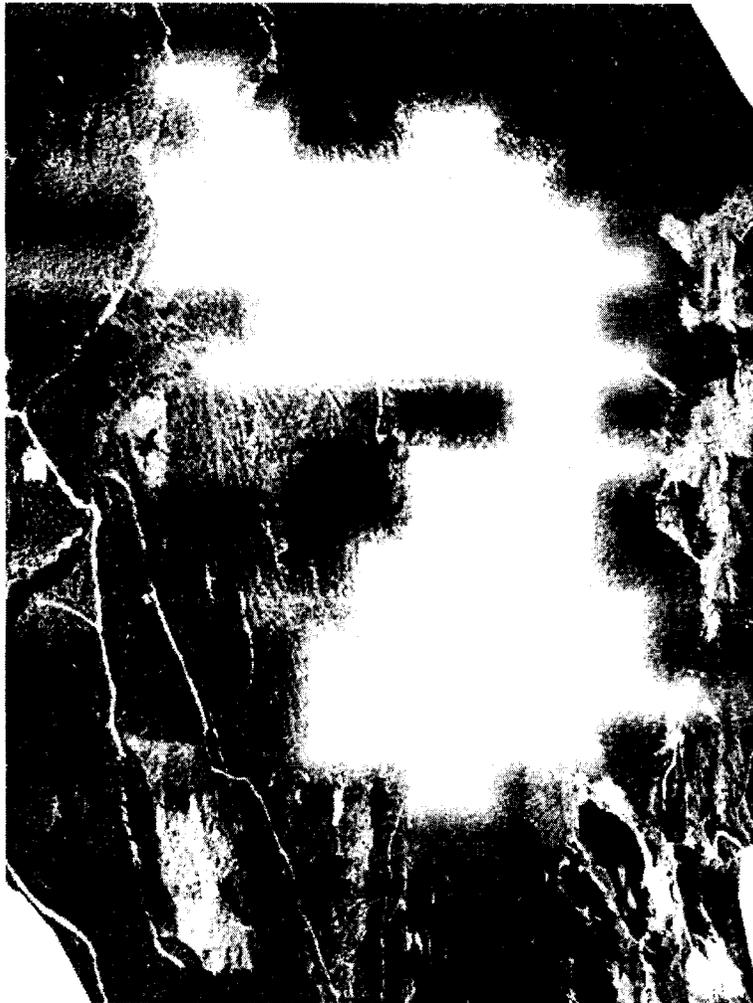


Figure 3.1  
Whistler Nordic Centre Site Aerial Photograph  
(source MacElhanney Consulting Services Ltd.)

## Science and Experience



Figure 3.2  
Plants are indicative of their environment



Figure 3.3  
Plant associations reflect soil formation

### Biogeoclimatic Zonation

The concept of biogeoclimatic zonation determines associations of characteristic vegetation, wildlife, soil, and climatic conditions specific to geographic areas. The determination of the ecosystem classification through the observation of vegetative associations provides a presumption of environmental site conditions. The dominant shade tolerant tree species of the forest habitats characterizes the classification of the zone. The common ecosystem zones of the Coast Mountains are Western Hemlock, Mountain Hemlock, and Alpine Tundra (Meidinger, 1991).

### Indicator Analysis

The concept of indicator analysis identifies specific plant species as site condition indicators, adapted to a range of environmental conditions, and restricted to sites within this range. Knowledge of the ecology of plant species allows the inference of site conditions from the vegetation present. Plant species possess the potential to indicate one or more site attributes that represent environmental gradients or certain qualities. Plant species are considered good indicators of climate, soil moisture, soil nitrogen, and ground surface materials (Klinka, 1989).

### Soil Classification

Soils are products of their environments, reflective of climate, geology, physiography, and vegetation. The slope, aspect, vegetation, and elevation of the site determine soil type composition, variability, and distribution. The topography, climate, and vegetation of the Coast Mountains commonly produce thin acidic (Podzol) soils overlaying glacial till or accumulations of needles, twigs, wood, and bark (Folisol) overlaying very thin soil or bedrock (Valentine, 1978).

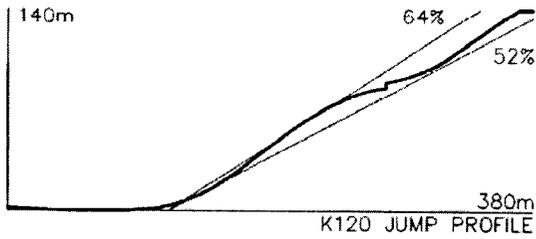


Figure 3.4  
Ski Jump Profile

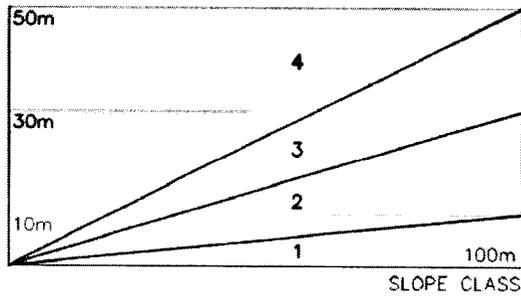


Figure 3.5  
Slope Class Profile

## Terrain Analysis

Terrain analysis establishes and investigates a range of site planning land use limitations with respect to site slope gradients. The examination of plan landscape topography allows the determination of drainage course networks and watershed boundary delineation, as well as the determination of steep slope categorization in relation to the intended purposes and constraints of the site, namely, facility placement, road alignment, vegetative growth, ski slopes, and avalanche hazards. The analysis of suitable terrain considers the fit of the ski jump profile to the natural topography of the landscape as a deliberate goal of the project.

## Air Photo Interpretation

The aerial view of the landscape allows visual identification of site condition, context, and change. The investigation of the site aerial photograph permits the identification and extrapolation of site conditions over time, namely, vegetative covers, landscape features, and land use patterns.

## SLOPE CLASSIFICATION

CLASS	SLOPE GRADE	TERRAIN	CIRCULATION	LAND USE	VEGETATION	ALPINE SKI	AVALANCHE	
3	5	gentle	fall line	intense	excellent	flat	rare	
	10	10:1	gentle	fall line	excellent	beginner	rare	
	15		moderate	cross slope	moderate	beginner	rare	
	20	5:1	moderate	cross slope	moderate	beginner	rare	
	25	4:1	moderate	cross slope	moderate	very good	rare	
	30	3:1	moderate	cross slope	moderate	good	intermediate	possible
	35		steep	cut and fill	limited	good	intermediate	possible
	40		steep	cut and fill	limited	fair	intermediate	possible
	45		steep	cut and fill	limited	fair	intermediate	possible
	50	2:1	sheer	cut and fill	limited	fair	advanced	possible
4	60		sheer	uncommon	uncommon	poor	advanced	common
	70		sheer	uncommon	uncommon	poor	advanced	common
	80		sheer	uncommon	uncommon	poor	advanced	common
	90		sheer	uncommon	uncommon	poor	advanced	common
	100	1:1	sheer	uncommon	uncommon	poor	poor	extreme

Table 3.6  
Project Slope Classification Criteria

**Experience is the name  
everyone gives to their  
mistakes**

**Oscar Wilde**

**Sensing is indispensable  
to being alive**

**Kevin Lynch**

**What we play is life**

**Louis Armstrong**

**Hypothetical Conjecture**

The consideration of hypothetical conjecture derives from the realization that we can learn from our mistakes. The theory of reason and experience assigns to rational arguments the modest and yet important role of criticizing our often mistaken attempts to solve our problems, and assigns to our observations the equally modest and important role of tests that may help us in the discovery of our mistakes. The theory stresses that knowledge can grow and that science can progress (Popper, 1963).

**Phenomenology**

The common philosophical approach to the concept of place is phenomenology, the study of consciousness and the objects of direct experience. The site investigation of phenomenological experience and behaviour means to expand the basis of knowledge and understanding as to the relationship of the individual, the group, the environment, and the project. The consideration of phenomenological experience derives from the realization that the analysis of behaviour and experience are frequently technical and abstract, simplifying the world into easily represented structures or models that ignore much of the subtlety and significance of the everyday experience (Relph, 1976).

**Landscape Narrative**

The landscape narrative attempts to weave the nuances of scientific and experiential observation into a more fluid vision and description of the project. The consideration of the landscape narrative derives from the realization that conventional documentation, mapping, and surveys, or even the formal concerns of design, limit the breadth and subtlety of the imaginative landscape experience. Insights from literary theory, cultural geography, and visual art inform fascinating ways of knowing and shaping landscapes not typically acknowledged by conventional means of scientific inquiry (Potteiger, 1998).

## Process and Procedure

### Project Selection

The seed of an idea for the planning and design of the Whistler Nordic Centre as a graduate thesis project in Landscape Architecture developed from the familiarity and interest in alpine design and the opportunity to participate in the project of a lifetime, the Vancouver 2010 Olympic and Paralympic Games. The consideration of the project began in the winter of 2002, and developed into a passion after watching the Salt Lake 2002 Winter Games continuously for the duration of the events, a significant statement for an individual who neither owns nor watches television.

### Site Investigation

The site investigation began the summer of 2002, and extended into the fall season, until the winter snowfall impeded access to the site. The preliminary investigations consisted of general terrain familiarity, observation of site condition and features, and the determination of broad biogeoclimatic zonation. The detail scientific investigations of the site, namely, the determination of vegetative communities and their landform, ecology, moisture, and soil relationships, developed a significant understanding of the site condition and constituent processes for the purposes of landscape planning and design. The contextual and experiential investigations of the site expanded the scope to include the perspective of the Callaghan Valley and its relationship to the surrounding environment. The familiarity with the Coast Mountains and the alpine recreation experience was afforded by a 7 year Whistler residency and a passion for the outdoor experience. Site expeditions to the abandoned Northair Mine site, Alexander Falls, Callaghan Lake, Madeley Lake, Mount Callaghan, and Rainbow Mountain provided grounding in the present recreation perspective of the valley.



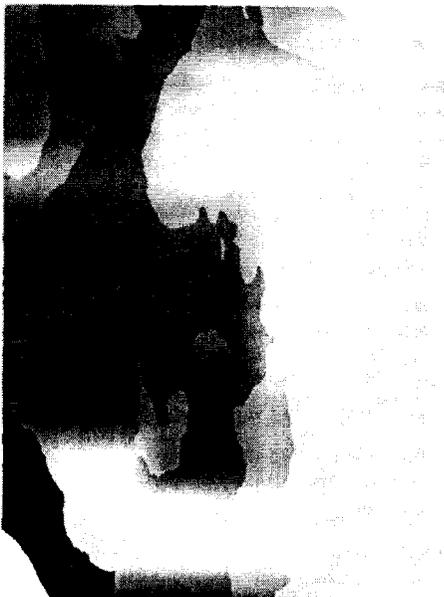
Figure 3.7  
Impact of snow movement on cedar trunk



Figure 3.8  
Common Podzol soil profile of the forest



SLOPE CLASSIFICATION			
Color	Range Beg.	Range End	Percent
■	0.00	10.00	23.4
■	10.00	30.00	38.8
■	30.00	50.00	23.9
■	50.00	100.00	12.8
■	100.00	1000.00	1.0



ELEVATION BANDING			
Color	Range Beg.	Range End	Percent
■	650.00	750.00	4.1
■	750.00	850.00	34.6
■	850.00	950.00	29.3
■	950.00	1050.00	28.3
■	1050.00	1150.00	3.6
■	1150.00	1250.00	0.1

Figure 3.9  
Slope and Elevation Digital Terrain Maps

### Computer Generation

Visual photographic analysis and digital terrain surface modelling were produced with a site aerial photograph and a 2-metre contour interval overlay derived from site aerial mapping by McElhanney Consulting Services Ltd, dated December 2000. The visual analysis of site contour data in conjunction with the aerial photograph informed the identification of drainage courses and landscape features. The terrain analysis, using AutoCad Land Development Desktop software, produced a digital surface model, a digital elevation banding map, and digital slope classification maps for the purposes of facility placement and road alignment propositions. The production of specific topographic sections was derived from the digital terrain surface model to aid in the analysis and design of the site, while a three dimensional model informed the production of the Callaghan Valley and Whistler Nordic Centre aerial perspectives.

### Narrative Vision

The exploration and production of landscape narratives followed the investigation and accumulation of conventional site information. The experiences of Callaghan Valley explorations and investigations informed the creation of landscape narrative visions in order to enlighten the conception of multiple site proposals. The landscape narrative subsequently served as a basis for the description and evaluation of these site proposals.

### Proposal Conjecture

Three plausible design proposals were suggested following the accumulation and assimilation of site analysis information. The official Vancouver 2010 proposal was one of the three suggestions. The advancement of simple yet comprehensive criteria were developed in order to subject the design proposals to thorough evaluation and comparison. The results of the process were adjusted and integrated to conceive the final design proposal.



The Callaghan Valley watershed is the primary planning unit

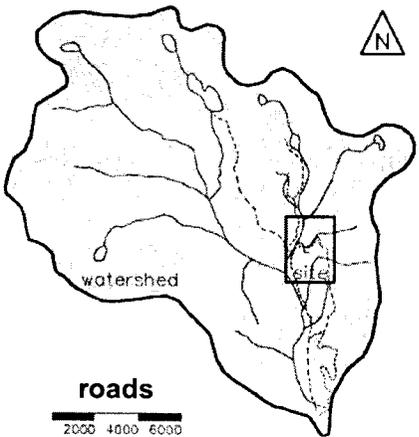
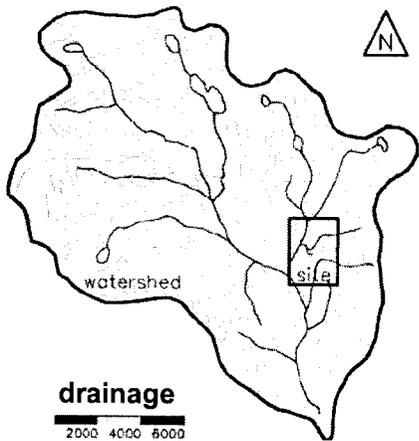
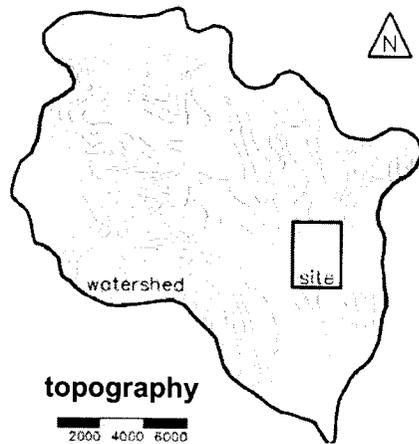


Figure 4.2  
Callaghan Valley Watershed Schematics  
solid line – drainage    dash line - road

## Physiographic Setting

### Geology

Geology is the foundation of natural history. The moving continents, rising mountain barriers, vast volcanic eruptions, and continental ice sheets shaped British Columbia's Coast Mountains. The Callaghan Valley terrain displays typical geologic formations of the Coast Mountains, namely, intrusive granitic rock, and layers of basaltic lava flows. In this broad context, the Callaghan Valley emerged as an area of high mineral and geothermal resource potential (Miller, 1979).

### Landform

Continental glaciation scoured and shaped the present landscape formation, in a slow sequence of erosion, transportation, and deposition of surficial glacial till, punctuated by spontaneous volcanic eruptions and flows of lava. The retreat of the glaciers provided the basis of landscape form, vegetation, in response to climate, terrain, and drainage characteristics. The Callaghan Valley site is comprised of several typical Coast Mountain landforms, namely, the lowland riparian corridors, the stepped upland plateaus, the mounded bedrock outcrops, the steep valley walls, and the jagged alpine peaks. The surface materials of the site consist of exposed bedrock, thick glacial drift deposits, and accumulations of granular alluvium deposits and colluvium rubble (Miller, 1979).

### Climate

The Callaghan Valley is representative of the moist maritime climate of the Coast Mountains. The high mountain ranges, deep valleys, and westerly winds from the oceans along the Coast Mountains produce a climate of extreme rainfall, snowfall, and winds. The western slopes of the mountains receive the brunt of the climatic assault, recording some of the heaviest rainfalls and deepest snowfalls in North America, while the eastern lee slopes of the mountains receive little precipitation. The Coast

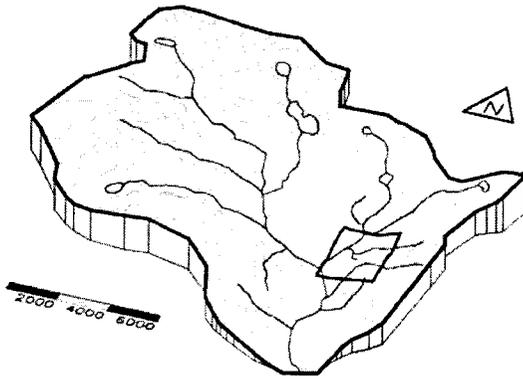


Figure 4.3  
Callaghan Valley Watershed Isometric

Mountain climate is characterized by limited periods of sunshine and heavy seasonal precipitation. In winter, a succession of low-pressure systems of moist air rises in contact with coastal slopes, to produce cloudy, wet conditions, and vast quantities of snowfall that linger into mid-summer at higher elevations (Cannings, 1996). The site elevation (900 m) and location (lat 50 N long 123 W) produces consistent winter snow depth (average 184 cm / 10 yrs), mild winter temperatures (average high  $-1.0$  C / 2 yrs), and gentle local wind movement (2.4 to 4.1 km / hr) travelling up the valley in the morning, and down the valley in the evening (Vancouver 2010, 2003).

### Drainage

Callaghan Creek and its tributaries drain the Callaghan Valley. This drainage system originates from Callaghan Lake (elevation 1200 m) at the base of Mount Callaghan (peak elevation 2400 m) and flowing south (length 18 km) to join the Cheakamus River (elevation 600 m) above Daisy Lake, delineating the extents of the drainage watershed and primary zone of analysis. A Callaghan Valley branch follows the Madeley Creek drainage, originating from Madeley Lake (elevation 1000 m) and flowing south (length 5 km) to culminate at the dramatic Alexander Falls (height 60 m), where the drainage joins Callaghan Creek (elevation 700 m) midway along its course. The central valley location of the Alexander Falls marks the entrance to the site, perched atop an upland plateau (elevation 900 m) at the western base junction of Rainbow Mountain and Mount Sproatt. A central site ridgeline separates two small drainage courses flowing west from two small lakes (elevation 1500 m) on the flanks of Rainbow and Sproatt. The Rainbow drainage course meanders across the rolling site terrain, through wetland marsh, to join Madeley Creek (elevation 800 m) above Alexander Falls, while the Sproatt drainage course travels south along the base of the steep mountain slopes to join Callaghan Creek (elevation 700 m) below

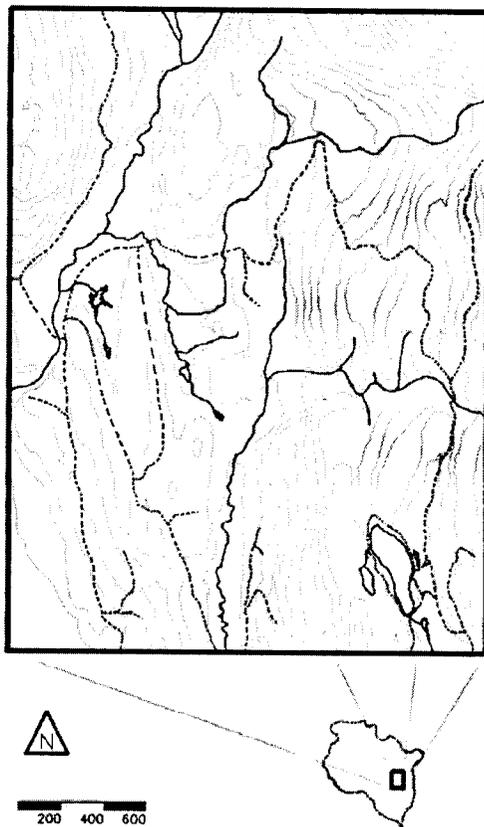


Figure 4.4  
Whistler Nordic Centre Site Analysis Zone  
solid line – drainage      dash line - road

the falls. (Note: elevations and distances are approximate)

## Environmental Framework

### Environment

The environmental setting of the western Coast Mountains produces three distinct climatic and vegetative ecosystems, the Western Hemlock zone of the lower elevations, the Mountain Hemlock zone of the mid elevations, and the Alpine Tundra zone of the highest elevations. The Callaghan Valley (range 600 to 2400 m) transitions through all three ecosystem zones, while the mid valley site location (elevation 900 m) falls within the lower range of the subalpine Mountain Hemlock zone of the coastal subalpine climate, where a short vegetative season is the result of the lingering deep winter snowpack slow to disappear in spring (Meidinger, 1991).

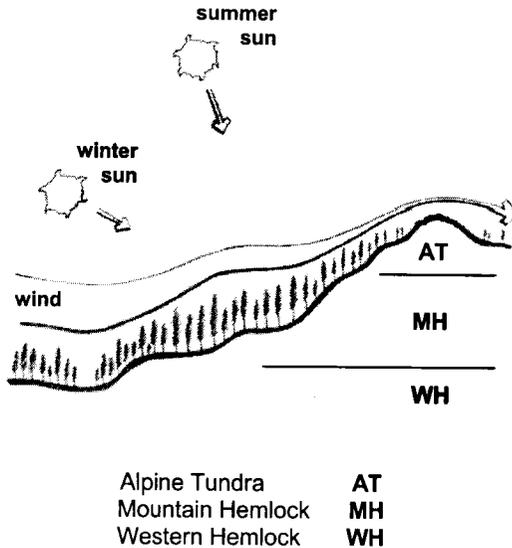


Figure 4.5  
Callaghan Valley Ecosystem Schematic

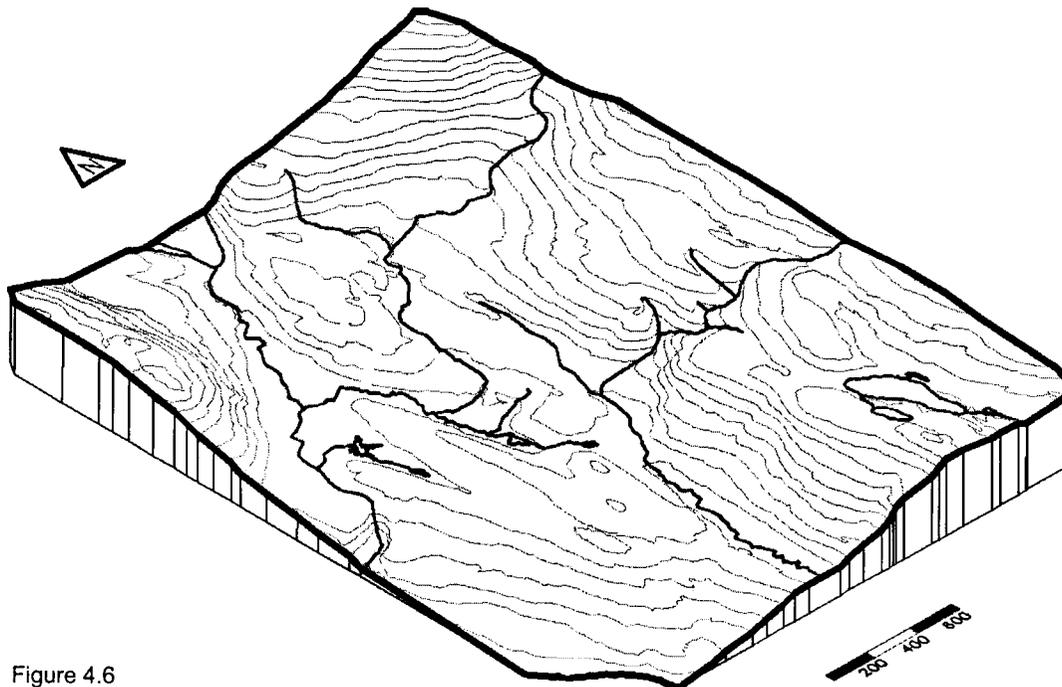


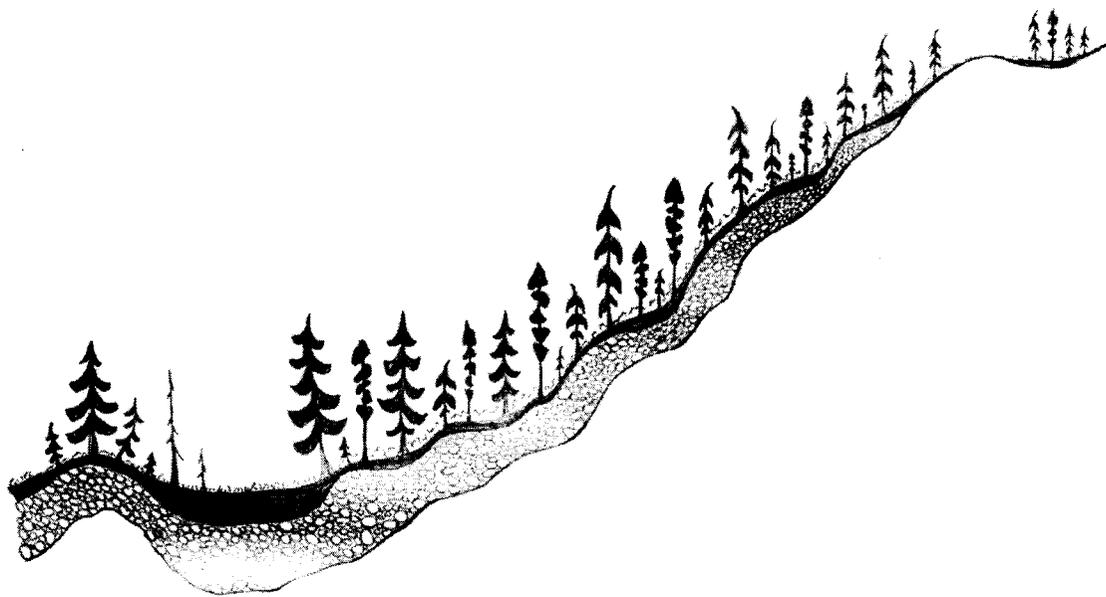
Figure 4.6  
Whistler Nordic Centre Site Isometric



Figure 4.7  
Image of Callaghan Valley wetland bog, forest slopes, and alpine peaks

### Elevation

As elevation increases above the site boundaries, a shorter growing season results in a transformation of the ecosystem, influenced by an increase in wind exposure winter snowpack depth, and a cooler temperate climate. The elevation of the valley, reflective of geologic, topographic, and climatic conditions determines the distinct vegetation and soil characteristics of specific site locations. In the Coast Mountain environment, an increase in elevation generally results in a decrease in forest productivity, with shallow less developed soil profiles, and slow stunted vegetative growth at higher elevations (Meidinger, 1991).



lowland	plateau	slope	ridge
wetland	forest	forest	parkland
yellow cedar mountain hemlock skunk cabbage	Pacific silver fir mountain hemlock twistedstalk	mountain hemlock Pacific silver fir blueberry	mountain hemlock Pacific silver fir mountain heather
thick wet organic	moderate moist	moderate moist	thin dry litter

Figure 4.8  
Schematic Mountain Hemlock Ecosystem associations of landform, ecology, vegetation, and soil

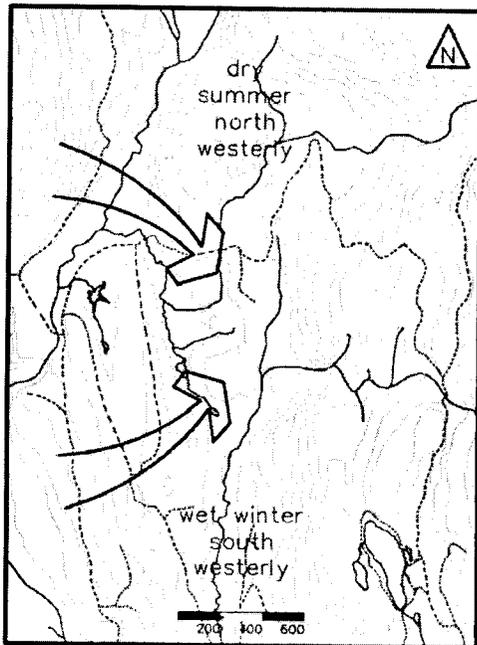


Figure 4.9  
Schematic Seasonal Wind Patterns

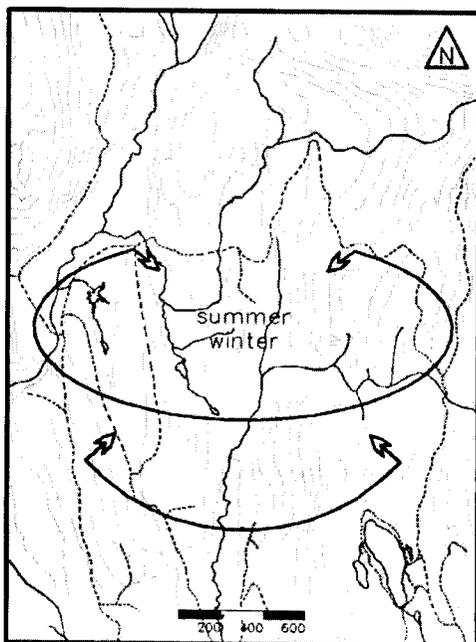


Figure 4.10  
Schematic Seasonal Solar Exposure

## Exposure

The microclimate of the site may exhibit surprising temporal and spatial variation due to the form of the topography, the surface material, the vegetative cover, the location of structures, and the proximity to water. The exposure to wind speed and temperature, and the exposure to solar radiation in the native forest, will vary dependent upon the exposure aspect and material of the ground surface, and the size, density, and type of vegetative cover (Lynch, 1997). The forested site, nestled in the valley at the toe of western slopes, receives heavy precipitation while afforded wind protection from the proximity of the surrounding hillsides. The impact of wet winter south westerly winds, while moderate along the valley floor, protected by the extensive tree canopy and valley topography, increases with elevation along the western exposed slopes of the site. The evidence of random windfall and tree topping at 30 metres displays the predominant southwest winter storm direction and the height of the forceful wind shear line. The location of the site at the toe of western slopes shades the area from early morning sun, with full exposure to midday and afternoon solar radiation. The solar geometry of the site ranges from a low winter solstice solar altitude of 17 degrees to a high summer solar altitude of 64 degrees. The temporal range of solar exposure varies seasonally from a minimal 8 hours of daylight at winter solstice to a maximal 16 hours of daylight at summer solstice.

## Vegetation

The Callaghan Valley landform displays the typical dense riparian vegetation and moist wetland bogs of the mountain valley floor, the heavily forested steep valley walls, and the high alpine rocky meadows of the Coast Mountain Range of British Columbia. The primary tree species of the moist maritime Mountain Hemlock ecosystem are yellow cedar, predominant in wetlands, pacific silver fir, predominant in lower moist slopes,



Figure 4.11  
Image of the dominant mountain hemlock tree species

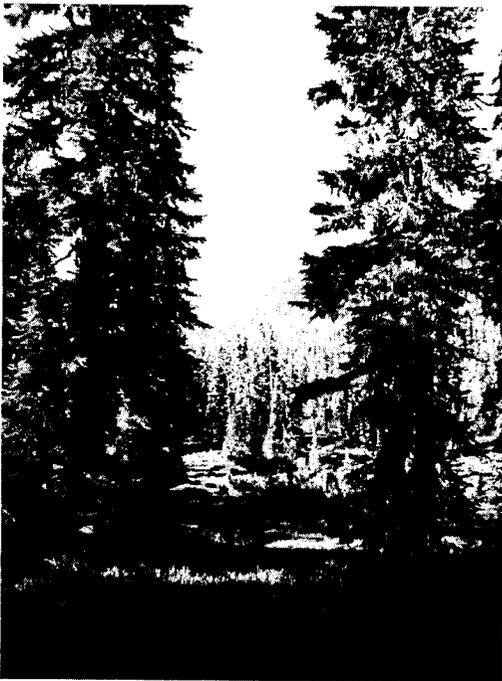


Figure 4.12  
Image of the mosaic parkland landscape

and mountain hemlock, the climax species of the zone, predominant in dense stands of old growth forest. The predominant shrub species of the site ecosystem, abundant in forest clearings, are oval-leaf blueberry, Alaskan blueberry, and black huckleberry, while deer fern and moss dominate the forest floor. Scarce tree species of the site ecosystem, found at lower elevations, are western hemlock, western red cedar, Douglas fir, and western white pine, with succession tree species, of black cottonwood, and red alder found in areas of disturbance. The representative vegetative site associations consist of yellow cedar, mountain hemlock, and skunk cabbage in wetlands, mountain hemlock, pacific silver fir, and blueberry in forests, and mountain hemlock, pacific silver fir, and mountain heather in parkland. Mountain Hemlock forests are generally confined to the lower elevations of the zone, where increasing elevation thins the forest into a parkland mosaic of isolated and irregular tree patches along ridge crests, interspersed with subalpine heath, meadow, and fen vegetation (Meidinger, 1991).

#### Soil

The mountain landform, coniferous vegetation, high precipitation, and moderate temperature of the Coast Mountains generally produce very thin wet acid soils, with intense chemical and biological transformations. The Callaghan Valley soils display the characteristic sequence of bare rock or thin organic forest debris (Folisol) and thin mineral layers of high elevation slopes and ridge crests, the free draining moist acid soils (Podzol) and considerable glacial till deposits of the dense mid elevation coniferous forest, and the thick damp organic acid peat (Fibrisol) or the thin unstable alluvial sand and gravels (Regosol) of the low elevation valley floor wetland bog or riparian floodplain. The soil distribution within the valley and the site displays a pattern recurrence at multiple scales of observation, where the broad soil distribution pattern of the ecosystem is



Figure 4.13  
Views of Callaghan Lake and Mount  
Callaghan from Callaghan Provincial Park

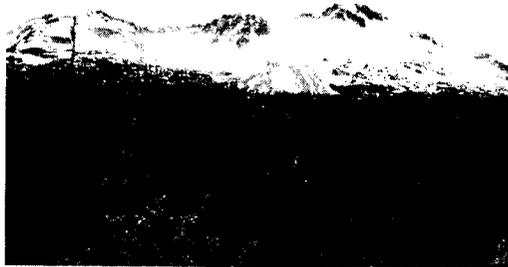


Figure 4.14  
Views of Brandywine Mountain and Metal  
Dome from the site location



Figure 4.15  
Views of the abandoned Northair Mine site  
and Mount Callaghan

reflected in the local terrain variability of the site.

### Wildlife

The Mountain Hemlock zone supports fewer and less frequent wildlife species than the diverse and abundant habitats of the lower elevation Western Hemlock zone. The site combination and presence of old growth forest, streams, marsh, and bogs increases the potential wildlife value of the site ecosystem. Common wildlife species typical of the site ecosystem may include Black-tail Deer, Cougar, Black Bear, Snowshoe Hare, Northern Flying Squirrel, Douglas Squirrel, Great Horned Owl, Great Grey Owl, Blue Grouse, Northern Flicker, Pileated Woodpecker, Hairy Woodpecker, Common Raven, and potential species at risk of Grizzly Bear, Mountain Beaver, and Tailed Frog (Meidinger, 1991).

## Character Basis

### Context

The Callaghan Valley land, owned by the provincial government, rests within the traditional territories of the Lil'wat and Squamish First Nations, serving the purposes of resource and recreation commercial activities under a crown land tenure system. The heart of the site, once considered as a potential alpine ski area base, displays the remains of high grade logging practices, with the select removal of yellow cedar, leaving the scattered stands of the native mountain hemlock species. The surrounding environment displays large clearings of more recent forest resource extraction, and the industrial remnants of the abandoned Northair Mine, at the southern extents of the site.

### Recreation

The mid mountain elevations of the Mountain Hemlock zone commonly supports the potential for recreation activity growth of hiking and skiing trails, ski resorts, provincial and national parks. The commercial

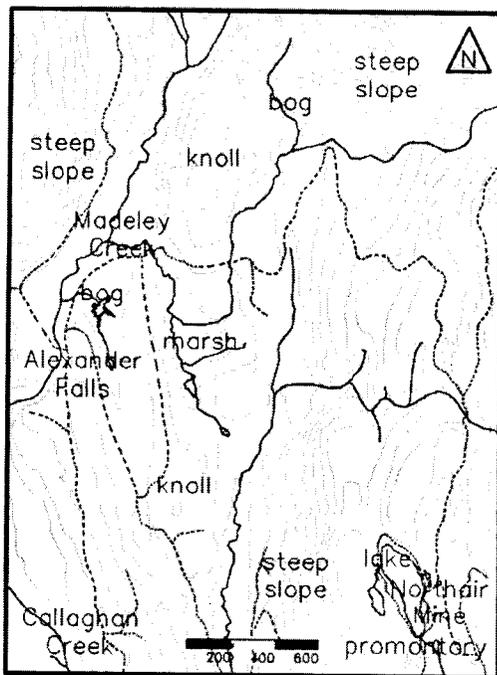


Figure 4.16  
Schematic of Landscape Features

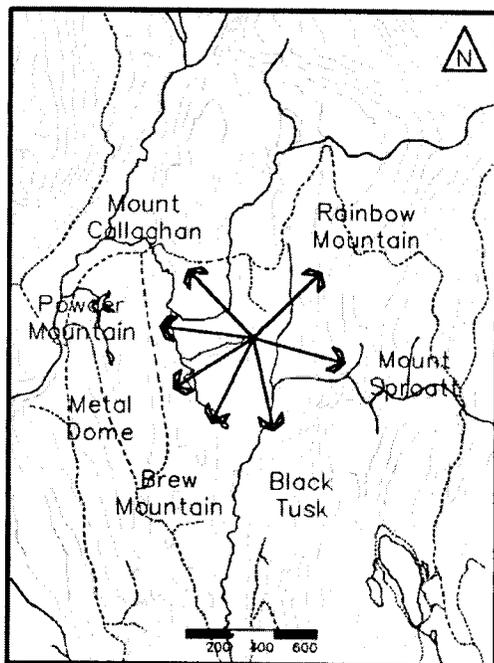


Figure 4.17  
Schematic of Surrounding Mountain Peaks

recreation activities of the Callaghan Valley consist of ski touring and lodging, heli-skiing, snowmobile and all-terrain vehicle tours, and fishing expeditions, with supplemental informal activities of cross country skiing, snow shoeing, hiking, canoeing, and camping. The presence of Callaghan Lake Provincial Park, Madeley Lake Forest Recreation Site, and Alexander Falls Forest Recreation Site demonstrate the quality and suitability of the Callaghan Valley as a recreation area.

### Character

The inherent character of the site derives from the particular associations of ecology, morphology, and climate, dependent upon one another, and the human perception of the landscape. The essential harmony and character of the living community displays a common pattern, a common history, and associations of common details. The landscape is an equilibrium of surface, drainage, cover, and purpose, a natural balance of form and function. The decisive separation of transitory or disappearing features from more permanent or emergent characteristics favours and distinguishes the nature of the site. The aesthetic beauty of the landscape, areas of noteworthy ecological importance, and remnant patterns of cultural significance provide elements of intrinsic site atmosphere (Lynch, 1977). The Callaghan Valley mountain landscapes of old growth forests, wetlands, and streams, punctuated by the thunderous Alexander Falls, create a site of impressive innate diversity and interest.

### Experience

The behaviour and interaction of human beings toward one another and in response to the landscape is a critical aspect of the site analysis. The conceptual and experiential boundaries of space and time form the basis of human adaptation between physical landscape and behaviour response. The sights, sounds, and scents of



Figure 4.18  
View of Alexander Falls



Figure 4.19  
View down the gorge from Alexander Falls

the site influence the sensuous form of the place, while the history, context, and future vision instill meaning to the landscape (Lynch, 1977). The aural quality and experience of hidden rippling stream water creates a complex mental image and air of mystery to the dense forest landscape. The bog and marsh clearings alter the spatial context of the forest, creating an open expanse of space, with a distinctive vegetative texture, a definitive visual forest edge, and a complementary scenic background vista of snow-capped mountain ranges. The majesty, scale, and girth of the hemlocks, firs, and cedars, and the sparse vegetative understory of blueberry, fern, and moss, of the native old growth forest provides a unique sense of spatial enclosure and continuity below the soaring dense vegetative canopy.

#### Clearing

The select clearing of forest trees creates a visual complexity and diversity of space and light, extending visual access to significant features, distant landmarks, and open sky, recalling the experiential sensation of the natural parkland landscape of higher coast mountain elevations. The large open expanses of commercial forest cultivation, unsightly in visual and ecological aesthetic, provide opportunities for wide visual access to the vast mountain terrain, and regions of ecological disturbance readily available for mitigation, restoration, or facility development.

#### Material

The delight of the natural surface textures of rock, water, and plants, set a harmonious visual character that unifies the scene. Rock, the primary base material, in the form of cliffs, and outcrops, communicates a sense of mass and a feeling of connection to the surface of the earth, expressing strength and permanence. Water, the elemental fluid, simple in nature yet extremely varied in effect, present in features of streams, lakes, and bogs, altered in forms of mist, rain, and snow,



Figure 4.20  
Image of the wetland marsh

mobile in actions of trickle, ripple, and surge, and perceived in senses of sight, sound, and touch, communicates an intimate connection with life. Water evokes feelings of joy, serenity, sorrow, mystery, majesty, contentment, and sheer voluptuousness, creating a centre of interest in the landscape. Trees, shrubs, and herbaceous plants, the basic natural components of landscape composition, complement the organization of outdoor space with a variety of colour, texture, and form, providing site structure, enclosure, and shelter in harmony with the surrounding landscape (Lynch, 1977).

## Chapter 5

### Site Evaluation

The Olympic Narratives will serve as a tool to critically examine three site proposals, Whistler, Callaghan, and Northair, through the eyes of an Olympic spectator. The power of the narrative thread lies in the ability to weave the nuances of site form, function, and experience into a sequential story that is more readily comprehensible by all observers, in conjunction with a conventional plan presentation. The comparison of the proposals will further consist of description, evaluation, and selection in order to inform the successful planning and design of the Whistler Nordic Centre.



**The land unit map, informed by the site analysis, identifies broad landscape planning zones suitable for the placement of venues and their supporting facilities**

Figure 5.1  
Land Unit Map

## Landscape Narratives

Imagine, the year 2010 of the Vancouver Olympic Games...

The 2 hour travel from Vancouver on the Olympic busses to witness firsthand Olympic history seemed short due to the anticipation and jubilation of my fellow sport enthusiasts and the magnificent scenic display of the Coast Mountain landscape. The boisterous atmosphere increased as we turned off the Sea to Sky Highway to approach the Whistler Nordic Centre, site of all four Nordic events, Cross Country, Biathlon, Ski Jump, and Nordic Combined. We saw glimpses of the Whistler Olympic Village, temporary home of the Olympic athletes, as we pulled up behind the Finnish National Team van starting the winding 8 km road up the Callaghan Valley. The athletes would endure a much shorter commute from the Whistler Olympic Village located at the highway junction, a short 12 minute drive from the Olympic Nordic facilities.

The concept that with a single ticket we could witness several events in one day had us very excited, since most of us would only get one chance to see these popular events during the Olympic Games, and we wanted to see it all. We had planned our day to see a little of all three events. First, to see to the daring ski jumpers propel themselves into oblivion in the morning, second to watch biathlon trials while we ate lunch in the grand outdoors, and finally to watch the cross country athletes in a freestyle event. We began

to observe our scenic surroundings as we travelled through glistening snow draped coniferous forests, catching postcard glimpses of majestic mountain peaks in the distance. The rising sun beamed rays of light across the vast forest valley floor as it crested the winter white alpine ridges of Mount Sproat and Rainbow Mountain. My companions on this journey began to stir anxiously as we knew we were now so close to the much-anticipated Olympic spectacle of our lives...



Figure 5.2  
Whistler Proposal

Imagine, the Whistler proposal

The bus slowed to take a sharp uphill corner, when the sight of parking stalls lining the approach road and a mass flurry of people in the street alluded to the proximity of the Olympic site. The bus proceeded up the winding 2 km road and pulled into a large parking lot atop what seemed to be an elevated plateau against the western flank of Mount Sproat. The bus pulled up

alongside a sea of similar busses, where thousands of anxious spectators were milling about. We followed the flow of the crowds towards a massive gathering at the north end of the parking facility. We were now facing the gates to the Cross Country Stadium, and were informed the Ski Jump and Biathlon Range were a short walking distance north along the access road.

We proceeded to undertake the walk towards the Ski Jump, along a forested access road, where vans meandered through the marching crowd, driving past with athletes and officials on board. The road, lined with towering coniferous trees, followed the toe of Mount Sproat, crossing below a skier bridge, where the looming hillside shaded our walk on that cool winter morning. The promised short walk seemed to drag on as 20 minutes passed until we finally caught a glimpse of the Ski Jump facility in the distance. We had heard of the impressive design of the Ski Jump that was carved from the steep mountain terrain. The Ski Jump was a sight to behold. The jump ramps fit the natural terrain of the hillside, seamlessly blending with the surrounding old growth forest slope. We passed a fork in the road that led toward the Biathlon Range, noticing, in the distance, another skier bridge road crossing, but no skiers were to be seen since the events had not yet begun. We walked towards the looming ski jumps for another 5 minutes until we approached the hoards at the gates to the jump venue.

Once we had crossed the security gates, we immediately proceeded up the slope to reach the coveted hillside seats along the flanks of the ski jumps, where we sat in amazement at the flying flashes of human daring. The mountain vistas to the west were spectacular, aglow in the late morning sun that began to warm us as we sat against the hillside. We were surprised at the lack of wind at this elevation and exposure, likely due to the bowl shape of the surrounding slope. We opened our site map to locate the Biathlon Range, our planned lunch destination. We observed how the range was nestled tightly against the toe of a southern slope aspect, to provide a backdrop for the shooting range and a favourable northern direction for target sighting. Although, after enduring a cool shady morning, a long walk to the Ski Jump, and pondering our present favoured location sitting along the sun drenched jump flank, we decided that the walking distance and north-facing spectator stands were unappealing on this cool winter day. We summarily decided to stay at the Ski Jump venue, and eat our pack lunch, basking in the warm winter sunshine.

We were more than happy we chose to watch the K120 Ski Jump Final. The hometown crowd was euphoric to watch history unfold as two Canadian jumpers finished in the top three, with the ever-powerful Norwegian jumper winning gold. The jubilant crowd began shuffling from their seats, and started the long half hour journey down the access road, in anticipation of the afternoon 10 km Cross Country event. The return journey was more pleasurable than the dark morning march, as we were now walking south, and the sun was shining through the overhead forest canopy. If the distance were not so great, we would have loved to watch a little of the Biathlon event, since we had never seen the sport live, let alone the Olympic Biathlon. As we reached our original morning arrival point, next to the bus parking lot, once again we were subject to waiting in line for security searches, as we made our way through the Cross Country security gates towards the stadium.

We observed the separate athlete entrance behind the security gate in the background, with vehicle access to the small international village of team huts located along the outside of the stadium, where skiers were warming up for the big event. At this point we

decided to wait in line once more for the portable 'blue box' washroom facilities prior to making our way into the stadium. We noticed how the long stadium and trail loop clearing in the forest occupied an exceptional broad linear plateau in the midst of the surrounding rolling landscape. We proceeded to our seats, which faced due east, placing the broad western flank of Mount Sproat as a scene backdrop with the sunshine at our backs. We decided to make our way to the very top of the stadium, where we could look back towards the beautiful western mountain vista and the glaring warm sunshine, between forward glances at the Cross Country event. The eastern viewing direction was great for placing the athletes in the best sunlight exposure, although unfortunately we were not allowed to bring our camera to the event. Once again the crowd went crazy as our Canadian Cross Country Queen, Becky Scott, won the gold medal in the 10 km event, and her third straight Olympic podium finish.

Once the crowd subsided, we thought it would be great to crown this special day and spend the rest of the afternoon on a sun soaked patio enjoying the warm winter sunshine in celebration of our victories. The reality sunk in when we realized all that was left to do was board the bus for the long journey back to Vancouver, with the strict prohibition of alcohol en route, enforced by the security officers aboard each bus. Our celebrations would have to wait for the evening indoor medal ceremonies at BC Place Stadium. As I look back now in fond memory of the day, the Ski Jump venue stood out

as the premier Olympic facility at the Whistler Nordic Centre, and I only wish the facilities would have been a little closer so I could have seen all three events.

#### Imagine, the Callaghan proposal

Ahead in the distance, we could see a glorious timber park lodge through the semi frozen bus windows. We slowly approached the lodge, following a train of busses into a terminal drop off zone, where we would disembark, and the bus would continue on to an offsite parking facility. As we stepped from the bus, onto a wide platform, we could hear the thunderous roar of the nearby Alexander Falls, and quickly ran to the edge to have a look at the cascading frozen spectacle of myriad colours glistening in the sunshine. Several ice climbers were balanced on the shear ice face in a slow meticulous display of perseverance towards the top of the falls, a demonstration sport for the amusement of the

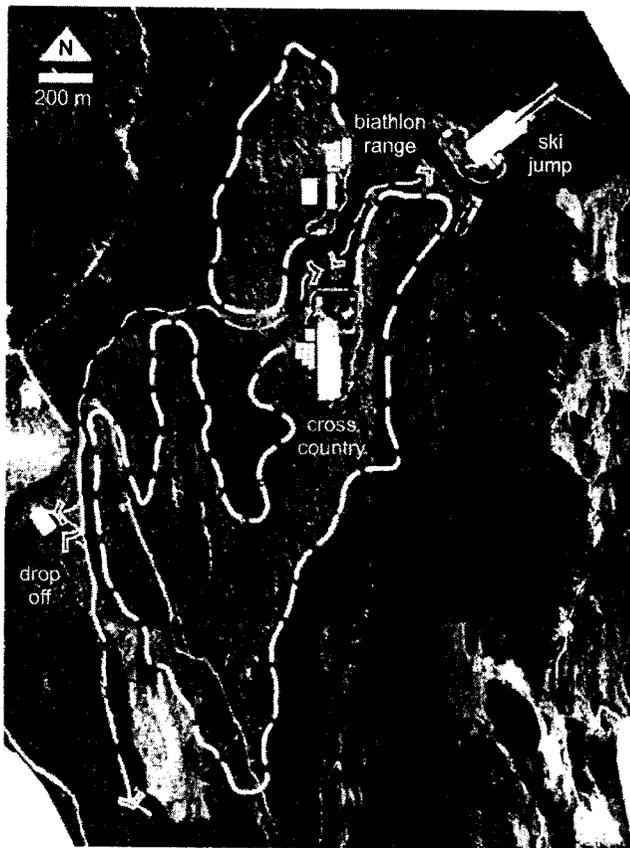


Figure 5.3  
Callaghan Proposal

awaiting crowds. To the west, a wonderful vista of snow capped mountains spread forth before our eyes, in full morning glory. While scanning the surrounding environment, in the far distance, through a clearing in the majestic trees, we observed the top of the Ski Jump venue to the northeast, clinging to the side of Mount Sproat. To the north, the wonderful lodge at the end of the short cliff top walkway, perched high atop the waterfall gorge, would be the central gateway and security checkpoint to the Whistler Nordic Centre.

Once we cleared the security gate, we were free to partake in the festive lodge facility and activity distractions. The provision of complimentary warm coffee and tea was a welcome addition to our cool morning escapade, and we proceeded to the shuttle service that would ferry us the 1.3 km distance up to the multiple Olympic sport venues. Along the short meandering drive, we noticed a forest clearing with standing dead trees and a group of curious crows, obviously a marsh habitat that allowed a short glimpse of the mountains in the background. The road began to climb steeply along an exposed cliff face, rounding a corner to arrive at our destination atop a perched hillside plateau. From the central drop off, all venues were in close proximity, and we proceeded to cover the short 10 minute walk toward the Ski Jump looming powerfully in our midst. We immediately proceeded up the slope to reach the coveted hillside seats along the flanks of the ski jump, where we sat in amazement at the flying flashes of human daring. The mountain vistas to the west were spectacular, aglow in the late morning sun that began to warm us as we sat against the hillside. We were surprised at the lack of wind at this elevation and exposure, likely due to the bowl shape of the surrounding slope.

We were more than happy we chose to watch the morning K120 Ski Jump Final. The hometown crowd was euphoric to watch history unfold as two Canadian jumpers finished in the top three, with the ever-powerful Norwegian jumper winning gold. The jubilant crowd began shuffling from their seats, and started the short ten minute journey down the brightly sunlit access road, in anticipation of the afternoon 10 km Cross Country event. Many people chose to board the shuttles to the main lodge for lunch, while we decided to watch Biathlon trials, with pack lunch in hand, basking in the warm noon sunshine at the Biathlon Range. The Biathlon Range was carved into the east face of a knoll as a backdrop for the shooting range, with a favourable morning sun exposure for target sighting, while the stadium seating faced west favouring an afternoon sun exposure for spectators. Although there were no official Biathlon events today, we were glad to watch our national team members train, and we even got the chance to meet the reigning Russian world champion, since he was feeling unrestrained at the moment, and there were very few spectators present. He was a great fan of our wild BC Sockeye salmon, and sequestered recommendations from the crowd for their favourite Whistler restaurant, to which we responded without hesitation, Nirvana.

We walked the short 5 minute distance toward the Cross Country Stadium in great anticipation of the 10 km ski event. Along our journey, we decided to use one of the portable 'blue box' washroom facilities, conveniently located adjacent to all the venues, prior to making our way into the stadium. Upon our entrance to the stadium, we noticed how the long stands and trail loop clearing in the forest occupied an exceptionally broad linear plateau in the midst of the surrounding rolling landscape. We proceeded to our seats, facing due west, with an outstanding visual composition of glistening white snow in the foreground, a majestic middle ground of towering mountain hemlock and silver fir, and a stunning alpine background vista of high alpine peaks and limitless blue sky. Across the stadium field lie the international village of white team huts, strewn the length

of the course along the tree line, with a bustle of human activity as athletes prepared themselves for the big event. We immensely enjoyed our afternoon in the stadium stands, basking in the late winter sunshine, and the thrill of international competition. Once again, the crowd went crazy as our Canadian Cross Country Queen, Becky Scott, won the gold medal in the 10 km event, her third straight Olympic podium finish.

The jubilant crowd spilled from the stadium in festive fashion, in the determined direction of the sunny streamside lodge and its grand patio facility. The crowd flowed as one down the bright hillside access road to partake in an impromptu victory parade, past soaring cliff faces, expansive wetland clearings, to culminate at the thunderous Alexander Falls, and the adjacent Alexander Lodge. The alpine lodge featured an extensive outdoor lookout deck, which served as the VIP lounge for officials and athletes, overlooking the makeshift ground level winter patio for spectators. We thought it would be great to crown this special day and spend the rest of the afternoon on a sun soaked patio enjoying the winter sunshine in celebration of our victories. Upon the appearance of Becky Scott on the upper level deck, the crowd burst into cheer and a moving rendition of the national anthem, which brought tears of joy to the eyes of all.

Later that afternoon, the crowd slowly began to dissipate as people started to board the return busses for Vancouver, while we gazed at the spectacular red-orange sunset

between the peaks of Brandywine Mountain and Metal Dome. We boarded the last bus for Vancouver in the waning daylight, with fond memories of the day's events and a renewed appreciation for the spectacular natural winter bounty of the British Columbia landscape.

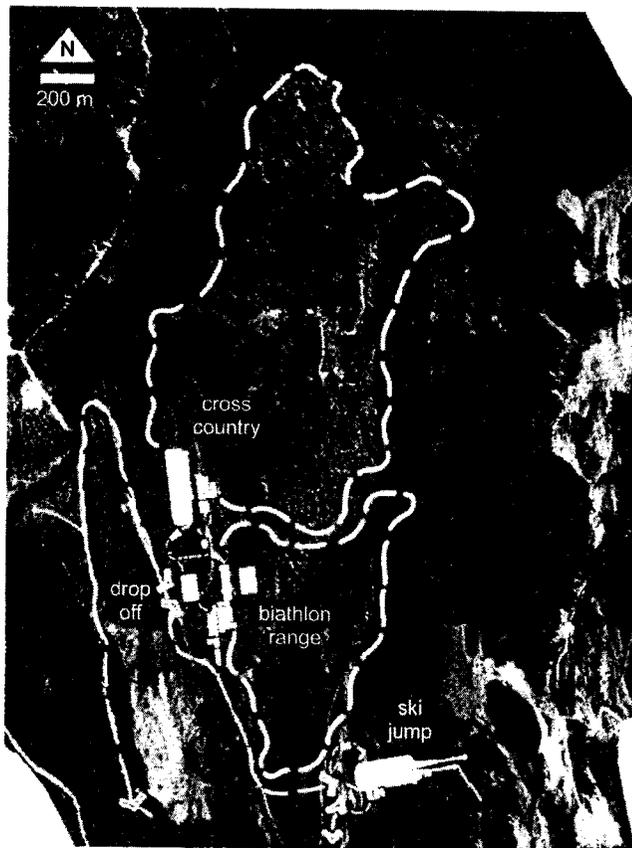


Figure 5.4  
Northhair Proposal

Imagine, the Northhair proposal  
As we travelled the winding forest road, we glanced uphill catching a glimpse of the soaring Ski Jump venue, and shortly following, another glimpse of a rustic alpine lodge atop a clear promontory. The bus slowed as we rounded the corner to begin the ascent towards the Olympic sport facilities, and the drop zone at the central Northhair Lodge, serving as the primary site destination and security checkpoint. The bus would continue a little distance beyond the lodge to a parking terrace cut along a lower western flank of the site, the location of a previous massive forest clearing devastated by the commercial

logging industry. As we made our way off the bus, the brush of a cool winter breeze, and the expanse of the mountain landscape vista before us, awoke our spirits in anticipation of the marvellous day ahead. To the southeast, we could clearly see the extent of the Ski Jump nestled snugly against the western flank of Mount Sproat. With our first event destination in sight, we proceeded to take our place in the long queue before the security gates at the lodge entrance.

Once we cleared the security gate, we quickly made our way through the lodge, with its souvenir vendors and food stalls, to the vast open plaza beyond. The Olympic Plaza was a bustle of activity, with thousands of spectators enjoying the early morning sunshine and a warm cup of coffee. Directly ahead of us to the sunny east, lie the entrance to the Biathlon Range, while to the north, lie the entrance to the Cross Country Stadium. In the distance, the Ski Jump lie to the southeast of the lodge, in full view of all spectators of an early morning sunrise. With Ski Jump in sight, we began the kilometre long journey toward the sport facility. The access road followed the top of a natural ridge in the landscape, between the primary drainage course of Callaghan Creek and a smaller riparian corridor at the base of Mount Sproat. Broad visual distractions to the surrounding mountain landscape, and side glimpses of jump training in the distance, perceptually shortened the twenty-minute walk along the exposed linear ridge road.

Upon our arrival to the jump facility, we immediately proceeded up the slope to reach the coveted hillside seats along the flanks of the ski jump, where we sat in amazement at the flying flashes of human daring. We marvelled at the range of vision from our seats, while we pulled a blanket from our bag to warm our bodies and shield us from the cool southeast winter breeze. After watching the preliminary jump training, we decided to warm up by hiking the thousand-step walkway to the top of the knoll above the Ski Jump. At the top of the mount, is a dramatic lookout promontory of idyllic position in the landscape. We thought we could see to the ends of the earth, or at least to the mouth of the valley at Howe Sound. To the south, lie the striking peaks of Garibaldi Provincial Park, and the arresting volcanic cinder cone, known as the Black Tusk. Behind us were the remnant ruins of the Northair Gold Mine and tailings pond, casually hidden under a fresh blanket of snow. After absorbing our majestic surroundings for a while, we returned to our seats at the Ski Jump venue.

We were more than happy we chose to watch the morning K120 Ski Jump Final. The hometown crowd was euphoric to watch history unfold as two Canadian jumpers finished in the top three, with the ever-powerful Norwegian jumper winning gold. The jubilant crowd began shuffling from their seats, and started the twenty-minute return journey along the sunny ridge road toward Northair Lodge, in anticipation of the afternoon 10 km Cross Country event. The open flanks of the slope below us served as the massive stepped parking facility, where the sea of cars created an interestingly colourful mosaic in the foreground, although somehow oddly out of place from the surrounding alpine vista. We returned to the Olympic Plaza, where gargantuan barbeques were in full blazing heat, roasting an Olympic fare of wild salmon and goose for the ravenous crowd. The adjacent skating rink, and demonstration figure skaters, provided casual entertainment for interested spectators. We decided to take our lunch with us, and proceed to the Biathlon Range, a mere skip and a jump away. The Biathlon Range occupied a natural depression in the terrain, providing an opposing steep slope for the firing backdrop, a compact lowland area for the skier range, and an adjacent natural slope for proper seating placement and spectator viewing. The eastern aspect of the range allowed us to enjoy the remaining late morning sunshine as we ate our lunch in

the cool outdoors. Although there were no official Biathlon events today, we were glad to watch our national team members train, and we even got the chance to meet the reigning Russian world champion, since he was feeling unrestrained at the moment, and there were very few spectators present. He was a great fan of our wild BC Sockeye salmon, and sequestered recommendations from the crowd for their favourite Whistler restaurant, to which we responded without hesitation, Nirvana.

We traversed the short distance across the Olympic Plaza toward the Cross Country Stadium in great anticipation of the 10 km ski event. We decided to quickly return to the Northair Lodge to use the washroom facilities prior to making our way into the stadium. We observed the small international village of team huts located along the outside of the stadium, where skiers were warming up for the big event. Upon our entrance to the stadium, we noticed how the long spectator stands and trail loop clearing in the forest occupied a broad linear ledge between adjacent steep slopes. The rising eastern slope provided the natural topographic setting for the stadium stands, facing due west, with a stunning alpine view to the mountain peaks in the distance, while the fading western slope dropped to the edge of a glistening white clearing punctuated by sparse yellow cedar, a beautiful wetland bog setting. We immensely enjoyed our afternoon in the stadium stands, basking in the late winter sunshine, and the thrill of international competition. Once again, the crowd went crazy as our Canadian Cross Country Queen, Becky Scott, won the gold medal in the 10 km event, her third straight Olympic podium finish.

The jubilant crowd spilled from the stadium into the nearby Olympic Plaza for the festive celebration of Olympic achievement. People were overcome with joy for the momentous accomplishments of our national athletes. We thought it would be great to crown this special day and spend the rest of the afternoon at the Olympic Plaza. The sound of music from the lodge filled the plaza with life, as people danced with excitement in the glow of a warm afternoon sun. National flags of the victorious athletes were hoisted high above the plaza, to the thunderous cheers of the restless crowd. Upon the appearance of the Canadian flag, the crowd burst into cheer and a moving rendition of the national anthem, which brought tears of joy to the eyes of all.

Upon recent visits to the Northair Lodge, the fond memory of past Olympic glory burns bright in my heart. The kids, too young to remember the events, stare in awe at the scale of the Ski Jump, and love the steep ascent to the Northair Lake summer swimming hole and winter skating centre. The greatest thrill for the kids is to stare down the axis of the jump, and imagine, for a brief moment, I can fly...

## Proposal Description

The preliminary design proposal configurations will serve as a tool to critically examine the strengths and weaknesses of three site proposals, Whistler, Callaghan, and Northair, in order to evaluate and compare plausible alternate design proposals for the purposes of landscape planning and design. The power of the proposal evaluation procedure rests in the ability to critically assess comparative site form, function, and experience through the use of simple criteria indicative of broad imperative and program goals.

### Whistler Proposal

The Whistler Proposal reflects the official Vancouver 2010 Bid Corporation site layout for the proposed Whistler Nordic Centre. The optimal site placement for each event venue was considered in the careful selection of facility locations by individual sport organizations and specialists. The resultant site planning generates a linear sequential progression to the site in response to individual sport venue placement, with extensive site distance between facilities, and multiple conflicts between site access and sport facility networks.

### WHISTLER PROPOSAL

STRENGTH	WEAKNESS
facility protection from wind ski jump topographic fit cross country stadium plateau location biathlon range aspect and slope backdrop	access and facility conflict lack of site image and identity long length of access road long venue walking distance lack of central lodge facility
preservation and restoration of valley international sport legacy valley recreation legacy	biathlon range susceptibility to drainage course difficult summer program success lack of tourist attraction interest level and proximity of commercial forestry extent of motorized recreation distance to village location
OPPORTUNITY	THREAT

Table 5.5 Whistler SWOT Analysis

### Callaghan Proposal

The Callaghan Proposal reflects the desire to address the issues of site efficiency, connectivity, and experience while maintaining the approximate venue locations of the original proposal. The consideration of the site as a whole was central to the theme of the proposal, relocating the site entrance road, and adjusting the locations and orientations of the cross country and biathlon venues to increase positive climatic exposure, venue proximity, visual connectivity, and ecological sensitivity. The Callaghan Proposal extended the boundaries to encompass the Alexander Falls as an entrance gateway and visual axis to the site in linear extension of the ski jump alignment.

## CALLAGHAN PROPOSAL

<b>STRENGTH</b>	<b>WEAKNESS</b>
facility protection from wind ski jump topographic fit cross country stadium plateau location site visual identity and entrance lodge facility venue alignment to mountain viewscape central site access and venue proximity spectator venue aspect and solar exposure recognition and connection to Alexander Falls	long length of access road lack of central lodge facility disturbance of wetland ecosystem
integration of aesthetic wetland habitat exposure and interest for Alexander Falls preservation and restoration of valley international sport legacy valley recreation legacy	difficult summer program success lack of tourist attraction interest level and proximity of commercial forestry extent of motorized recreation distance to village location
<b>OPPORTUNITY</b>	<b>THREAT</b>

Table 5.6 Callaghan SWOT Analysis

## Northair Proposal

The Northair Proposal reflects the desire to imagine a completely alternate configuration in connection to the cultural heritage of the abandoned Northair gold mine at the southeast extremity of the site. The proposal imagined the ski jump venue as the bridge to the promontory of the gold mine site and the potential hilltop lake amenity, where extensive vistas to the surrounding mountain landscape provided an imageable headland position for the jump towers. The location of the cross country and biathlon venues to disturbed landscapes in close proximity to the site entrance afforded an efficient road access and sound ecological use of brownfield sites.

## NORTHAIR PROPOSAL

<b>STRENGTH</b>	<b>WEAKNESS</b>
ski jump topographic fit proximity of biathlon and cross country venues site visual identity and promontory lodge facility venue alignment to mountain viewscape efficient site access and direction spectator venue aspect and solar exposure recognition and connection to Northair Mine site	facility exposure to wind long venue walking distance visual exposure to forestry clearcut lack of central site identity -schizophrenic ski jump base encroachment on riparian corridor
exposure to broad view corridor integration of cultural mine heritage preservation and restoration of valley international sport legacy valley recreation legacy	expansion or activation of mine site difficult summer program success lack of tourist attraction interest level and proximity of commercial forestry extent of motorized recreation distance to village location
<b>OPPORTUNITY</b>	<b>THREAT</b>

Table 5.7 Northair SWOT Analysis

## Criteria Selection

The mountain setting, of unique ecology, geology, climate, and character, creates specific limitations to land use including transportation networks and structures, infrastructure source and supply, and building location and design. The central challenge in mountain planning is the relation of design concepts to the natural landscape, with primary concern for the facilitation of movement and the retention of landscape quality (Dorward, 1990).

The main components of the site program include sport facility location and design, circulation systems and parking, access routes and arrival points, the arrangement and connections of activities, and the sequencing of sensory experience. The conceptual plan evolves from the inventory and analysis of the program requirements and terrain constraints. While the path is rarely linear and the solution rarely apparent, the clarity and comprehension of site constraints informs the creative process towards site concept proposals. The derivation of multiple plan concepts involves a design process of learning, testing, rejection, and revision in the production of the master plan (Dorward, 1990).

The comparison of concept alternatives involves the satisfaction of criteria for sport and program development, landscape ecology and geology, site climate and character, and economic efficiency. Common approaches to criteria development include the consideration of site density and layout, the extent of site disturbance, visual and environmental impacts, and the relative costs of construction (Dorward, 1990).

### Landscape Criteria

The site ecology criteria consider the sensitivity and susceptibility of natural ecosystems for the preservation or restoration of landscapes. Wetland ecosystems, riparian corridors, and old growth forests are crucial to the natural function, ecological diversity, and wilderness perception of the site landscape. The sustainability of landscapes demands the preservation or mitigation of sensitive or valuable ecosystems, minimal consumption or disturbance of land base, and potential mitigation of previous landscape disturbance.

The site geology criteria consider the capacity and constraint of surface deposits, soils, and rock formations. Soil bearing capacity, slope gradient, and slope stability are crucial to the structure and performance of site venues and facilities. The sport venues require the confidence of durability and economy in consideration of ground settlement and slope failure possibilities.

The site watershed criteria consider the capacity and constraint of surface, subsurface, and channel drainage systems of the natural landscape. Riparian course profiles and vegetative habitat are crucial to the natural function of site drainage and the preservation of water quality. The preservation of valuable water resources requires the preservation of riparian habitat and natural drainage patterns in consideration of site water quality and facility susceptibility to erosion or flood damage.

The site climate criteria consider the seasonality and intensity of solar, wind, temperature, and precipitation exposure and variability of the site. Slope aspect, vegetative cover, and natural topography are crucial to the performance, comfort, and vulnerability of site facilities and occupants. The site occupants prefer exposure to warm

winter sunshine, protection from cool winter winds, and favourable viewing aspects with background source lighting. The potential exposure to high winds and tree windfall is a critical component of the ski jump facility placement. The temperature and precipitation capacity and predictability is a critical component of the sport facility quality and success.

#### Program Criteria

The site sport criteria consider the suitability of the natural terrain for the development of sports venues and facilities. Site extent and grade variability are crucial to the strict guidelines for individual sport trails and structures. The ski jump requires a fit to the natural slope of the site in consideration of ecological and visual disturbance, response to microclimate, and economic constraints. The Vancouver 2010 Bid Committee site selection process determined the general suitability of the site terrain and climate for the purposes of Olympic Nordic sport requirements.

The site program criteria consider the proximity and connectivity of individual sport venues and facilities, the availability and effectiveness of site safety, accessibility, and services, and the quality and quantity of access roads and parking facilities. Venue proximity and accessibility are crucial to the appreciation and comprehension of the site as a whole. The site layout and design requires a central site focus, minimal distances between venues, and minimal conflicts between vehicle access, and sport and pedestrian trail facilities in consideration of site efficiency and experience, ecological and visual disturbance, and economic constraints.

#### Place Criteria

The site place criteria consider the sequence, imageability, and sensory experience of site components and entirety. Spectacular site features, imageable landscape vistas, and memorable cultural characteristics are critical to the sense of site identity and place. The impressive site experience requires the physical exposure to natural water, vegetative, geological, and cultural features, visual extension to distant landmarks and glacial mountain peaks, sequential continuity and proximity in facility design and layout, and capacity to project a distinct memorable image of the site and landscape context.

#### Cost Criteria

The site cost criteria consider the quantity and complexity of site venue design and facility provision. The comprehension of opportunities and constraints of landscape and program criteria are critical in the economic efficiency and performance of the site. The economic benefits of site construction and maintenance require the proper landscape placement of sport venues, the efficiency of site access and mobility, and the effective provision of site infrastructure and sport services.

## Proposal Comparison

The effective and efficient comparison and evaluation of site proposals requires the selection of particular indicator criteria reflective of broad landscape, program, place, and cost characteristics. The specific criteria determinants developed for the comparison and evaluation of the site proposals were the fit of the ski jump profile to the natural terrain, the site quantity of road construction, the physical distance between sport venues, the area of facility space consuming wetland, stream, and old growth forest ecosystems, and the qualitative assessment of physical feature and visual landscape connections.

it

PROFILE section	WHISTLER	CALLAGHAN	NORTHAIR
AREA cut	1850 m <sup>2</sup>	1850 m <sup>2</sup>	2000 m <sup>2</sup>
AREA fill	1250 m <sup>2</sup>	1250 m <sup>2</sup>	1600 m <sup>2</sup>
<b>PROGRAM total</b>	<b>3100 m<sup>2</sup></b>	<b>3100 m<sup>2</sup></b>	<b>3600 m<sup>2</sup></b>

CRITERIA section area measurement of jump profile cross section discordance with natural topographic cross section

### ECOLOGY disturbance

VENUE plan	WHISTLER	CALLAGHAN	NORTHAIR
AREA stadium	3.0 ha	3.0 ha	3.0 ha
AREA ski jump	7.0 ha	7.0 ha	2.8 ha
AREA range	3.5 ha	2.5 ha	2.5 ha
<b>ECOLOGY total</b>	<b>13.5 ha</b>	<b>12.5 ha</b>	<b>8.3 ha</b>

CRITERIA plan area measurement of venue disturbance of natural ecosystem habitat

AREA maximum plan venue area disturbance of 6.0 ha ski stadium, 7.0 ha ski jump, and 5.0 ha biathlon range

WEIGHT ecosystem weighting of 100% wetland, riparian, old growth, 50% high grade, and 25% second growth

### COST access road

STRUCTURE type	WHISTLER	CALLAGHAN	NORTHAIR
ROAD distance	3.8 km	1.8 km	1.7 km
ROAD bridge	6 ea	4 ea	1 ea
<b>COST total</b>	<b>\$2,450,000</b>	<b>\$1,450,000</b>	<b>\$675,000</b>

CRITERIA access road distance from site entrance to all sport venues, access road bridge requirement

COST cost estimate of \$250,000 per access road kilometre, \$250,000 per access road bridge requirement

### TIME venue loop

PEDESTRIAN distance	WHISTLER	CALLAGHAN	NORTHAIR
DISTANCE stadium - jump	1.2 km	0.7 km	1.1 km
DISTANCE jump - range	1.1 km	0.5 km	1.0 km
DISTANCE range - stadium	1.5 km	0.3 km	0.2 km
<b>TIME total</b>	<b>76 min</b>	<b>30 min</b>	<b>46 min</b>

CRITERIA pedestrian distance to complete one loop between ski stadium, ski jump, and biathlon range

TIME distance conversion based on average pedestrian walking time of 20 min/km

### PLACE natural amenities

FEATURE type	WHISTLER	CALLAGHAN	NORTHAIR
CHARACTER landscape	1 ea	1 ea	1 ea
CHARACTER climate	1 ea	3 ea	2 ea
CHARACTER viewscape	1 ea	3 ea	2 ea
<b>FEATURE total</b>	<b>3 ea</b>	<b>7 ea</b>	<b>5 ea</b>

CRITERIA landscape - waterfall, wetland, stream, lake, cliff / climate - solar exposure / viewscape - mountain view

Table 5.8 Proposal Evaluation

## Proposal Comparison

The evaluation and comparison of site criteria determines that two alternate proposals, Callaghan and Northair, emerge as strong contenders for the preferential arrangement of the site. The power of the proposal evaluation rests in the questions and lessons developed as a product of the process, allowing the evaluation to transcend the quantitative comparison and return to the final qualitative assessment. The final assessment considers the key location and fit of the ski jump to the natural terrain and the central configuration and venue proximity of the Callaghan proposal to outweigh the lesser economic savings in road construction and ecological disturbance of the Northair proposal. In the final judgment, the Callaghan proposal provided the best balance of economic costs, quality of experience, and ecological harmony of the group, and was selected as the starting configuration for the planning and design of the venue placement, orientation, and connections.

### PROPOSAL final evaluation

CRITERIA indicator	WHISTLER	CALLAGHAN	NORTHAIR
PROGRAM jump topographic fit	3100 m2	3100 m2	3600 m2
ECOLOGY disturbance	13.5 ha	12.5 ha	8.3 ha
COST access road	\$2,450,000	\$1,450,000	\$675,000
TIME venue loop	76 min	30 min	46 min
PLACE natural amenities	3 ea	7 ea	5 ea
<b>EVALUATION overall</b>	<b>6</b>	<b>12</b>	<b>11</b>

EVALUATION total of criteria score - 3 pts first place, 2 pts second place or draw, 1 pt third place

Table 5.9 Proposal Comparison

## Chapter 6

### Site Planning

The site planning portion of the project will attempt to integrate and elaborate on the ideas, concepts, insights, and knowledge gained from the processes of analysis and hypothesis and design. The functional aspects and experiential sequences of the events and their settings surface as key factors in the development and determination of essential site specific planning concepts and design imperatives. The major moves of the site planning process consist of the realignment of the site access road, the relocation of the cross country and biathlon venues, and the provision of a central site lodge as an essential feature of the project.

### Planning Concepts

#### Site Opportunity

The conception of the final project leads one to examine the presumptions of use and function inherent in the multiple perspectives of the project. At this point, it is once again essential to consider the lifespan, possibilities, and opportunities of multiple site designs with distinct visions of the site as a host to international sporting events, as a place for international athletic training, as a destination for international tourism, and as a complement to community recreation facilities. As an Olympic site, the planning and design for international competition overwhelms the consideration and manifestation of the project in its myriad future possibilities. All this to say, the level and extent of planning and design for the Olympic Games will ensure the success of the venue for that purpose, but the future success of the site may not be so certain. With this thought, it is essential to remember that the appearance and experience of the site will weigh heavily in the final judgement as to the quality and success of the Olympic Games. The proper site layout and design will enhance the sense of place and visual connections to the surrounding landscape for visitors to the site and virtual spectators around the globe. The sight and experience of the Olympic Games, transcribed from visual imagery and narrative sound bites, will greatly influence the global perspective of the events and the venues. Ultimately, the proper layout and orientation of the facilities will not only enhance the experience of the visitor, but also provide the proper aspects and backgrounds for media coverage. In our haste to design for the Olympic Games, we must not forget the legacy of the site, for the proper layout and design also has the potential to encourage aspiring athletes and international visitors to choose to experience the site in its memorial grandeur. A wide spectrum of legacy site possibilities ranges from the simple dereliction of the nearby abandoned Northair Mine to the outstanding tourism success of Whistler Village. Obviously, the scope and scale of the final site planning and design, the extensive details of the opportunities, and the multiple considerations of program choices are beyond the scope of this thesis project. The final determination of the proper site form and function will require the input of multiple stakeholders and consultants to decide on an appropriate solution to the problem. Instead, this thesis project intends to inform the range of possibilities for the site planning and design, and suggest ideal venue locations, more efficient site connections, better economic benefits, superior site experiences, and appropriate program considerations.

## Site Program

The nature of the sports encourages a strong visual and experiential connection with the landscape, as one glides through the forest and clearings over rolling mountainous terrain. As a winter event, a blanket of fresh white snow layers the landscape with an image of purity and freshness, disguising imperfections in the detail and finish of the site. In contrast, the summer exposure of the site reveals all the blemishes in the natural landscape, more difficult to restore due to the short growing season and steep slopes of the site. The summer program remains an essential component to the planning and design of the site. It is simple to suggest, the consideration of the summer appearance and use of the site will greatly influence the long-term prospects for success of the project. It is more difficult to suggest the appropriate response to that statement, as a range of plausible opportunities awaits the exploration in design. The natural attractions of alpine vistas, towering forests, serene wetlands, and rushing waters play an important role in the image of the site. The extensive trail networks and spectator venues provide an opportunity to host summer sporting events of mountain biking, cross country running, and biathlon, while the natural forest environment of the valley may appeal to more traditional excursions of hiking, swimming, and camping. The location of the Whistler Nordic Centre, at the base of Rainbow Mountain, provides an ideal day hiking (Rainbow Pass) or cycling (Flank Trail) destination from Whistler Village, where a day lodge facility would certainly encourage the journey. The provision of a lodge facility could support both summer and winter events and training at the site and further tourism potential as an alternate and complementary holiday experience to the Whistler product. Although, the summer vision of the Whistler Nordic Centre might require the imagination of a simpler product, perhaps, a summer camp for groups of lower mainland children, or maybe, a camping destination for families, or even, the location of an international boy scouts jamboree. The connections to Alexander Falls, Madeley Lake, Callaghan Lake, and the artificial Northair Lake would certainly require consideration, as swimming and fishing are essential summer pastimes. The provision of a local swimming hole, in proximity to the lodge facility, would be a certain draw, where kids could swing from a rope or jump from a bridge. Likely, the addition of a swimming pool, and possibly tennis courts, adjacent to the lodge, with good solar exposure, would be a beneficial addition to the program of the site. The connection between rolling cross country terrain and a golf course is an obvious outstanding match, although the present context of the valley questions the expense and the possibility. The magnificent vistas and recreation activities might serve as an exceptional location for corporate retreats or conferences in close proximity to Whistler and Vancouver. The winter legacy of the site, more secure in its vision, obviously offers extensive facilities for skiing, jumping, and biathlon that could easily consider additional training jumps, and a possible snow sliding area to make use of the lift and appeal to more modest winter recreation enthusiasts. The consideration of a permanent lodge facility and team cabins might serve as athlete lodging for competition events, training camps, and general tourism, while the ability to stay at the site, in a rustic winter cabin, holds a charm in keeping with the heritage of the Nordic sports. The diversity of the site might also consider the frozen surface of a nearby pond as a skating surface, where a sunset skate in a natural forested area might be considered romantic for some and a novelty for others.

## Design Components

### Site Access

The relocation of the road access to the centre of the site creates a visual and functional axis that considers efficiency, image, and experience as key factors for the chosen alignment. The ability to create a lasting first impression is paramount to the memory and legacy of the Olympic Games, and the future success of the site. The road access develops a magnificent sense of arrival to the site by meandering through the rolling terrain of the landscape, past mysterious bogs and marshes, majestic rock outcrops, and clandestine rippling creeks, reinforcing the natural drainage spine of the site. The justification of the change in road location lies in the use of the existing forestry road for much of the alignment, although a steep section along the cliff face may require slope moderation. The strength in the new road alignment lies in the improvement to sense of arrival, the economic reduction in road length, and the more efficient access to all venues with no conflicts between roads and facility trail networks.

### Site Integration

The consideration of the site in its entirety remains essential to the success of the Olympic Games and its legacy. The quality of the experience derives from the feeling of the site as a whole, where the individual events are considered components of the complete site product. The relocation and orientation of the individual sport venues considers spectator and athlete connections as key design determinants for the final selection of locations. The quantity and profile of the athletes, officials, and spectators, with distinct site requirements and expectations, create a difficult situation of site integration. The spirit of the Olympic Games creates a festive feeling and impression of unity, while the reality requires strict separation of athletes, officials, and spectators, for reasons of safety and security. The successful integration of visitor experience requires consideration of all scales in the layout and details of the site and facilities, while this thesis project merely begins this daunting task. The strength in the new site venue layout lies in the enhancement of site mobility, the increase in proximity of site venues, the siting of a central site lodge, the strengthening of visitor experience, and the improvement to sense of place.

### Site Mobility

The accommodation of the rapid flush of visitors for the Olympic Games remains a difficult task to the planning and design of the site. The excessive demands for parking and visitor mobility through the site quickly overwhelm the scale and consideration of the legacy facility. The provision of multiple mobility networks for the games remains the largest contributing element to the creation of a potential legacy landscape out of proportion with the reality of the program. The enormous parking requirements for the Olympic Games demand a massive clearing of land to accommodate the volume of a scale that will likely never be repeated. The temporary nature of this parking facility requires the careful consideration as to permanent legacy parking demand and a proper solution for the excess of that demand. From this understanding, the smaller permanent parking facility locates in proximity to the lodge facility, with easy access to all venues, while the larger temporary parking facility locates on an extensive natural plateau in the landscape at the entrance to the site. The conception of the temporary parking facility envisions the post-games restoration of the landscape, with the moderate maintenance program of a grassy meadow. The meadow would emerge as a naturalized field that

could host a large gathering space for the purposes of fairs, expositions, camping, or perhaps, even the site of an international boy scout jamboree. The future potential would always exist to use the meadow as an overflow parking facility in the event of a large international competition at the site. The consideration of additional parking for spectator busses along the extensive access route to the site, or at offsite lots at Alexander Falls and the surrounding valley, may alleviate the expense of construction and disturbance to the environment. The strength of the parking facility approach lies in the adaptation of the large flat form requirements to the natural topography, the savings in construction expense from design decisions, and the consideration as to the legacy potential of the landscape disturbance.

### Ski Jump

The ski jump venue emerges as the anchoring element of the original design consideration, and the final design proposal, where the fit of the ski jumps to the natural terrain remain a central decisive factor and organizational element of the site. The contemplation and exploration of alternate jump venue locations reinforced the choice of the original location as the most suitable in terms of profile match, with a startling revelation that a good fit may still require a substantial (rough estimate 100,000 m<sup>3</sup>) volume of slope grading. The scale and difficulty of the ski jump component of the project will undoubtedly prove to be the most significant and costly feature of the Whistler Nordic Centre. The discovery of the positive visual jump aspect in alignment with the entrance to the site at Alexander Falls, the distant alpine peak of Metal Dome, and the direction of winter sunset encouraged the selection of the final jump location and alignment. The ski jump, in its prominent visual and terminal prospect location, stands as a key landmark for the site, and likely the most significant feature attraction for the legacy and tourism potential of the project. The base of the ski jump sits atop an elevated plateau in the landscape with outstanding vistas to the southwest, overlooking the extents of the site and the valley, with a background of mountain ranges. The advantageous natural features and landmark status of the location encourages the placement of a site lodge at the base of the jump, creating an ideal Olympic facility and legacy opportunity.

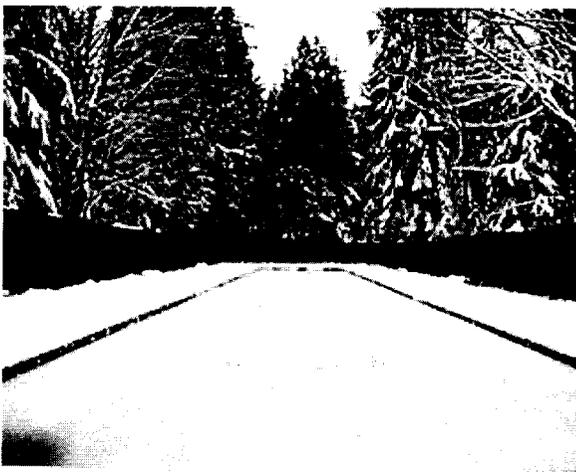


Figure 6.1  
Reflection Garden (The Bloedel Reserve)  
The sensitive juxtaposition of the geometric form and the natural environment creates a stunning sense of place

### Cross Country

The vision for the cross country venue imagined a stadium carved from the landscape, in harmony with the natural form of the site. The undulating terrain of the site and the linear plateau features seemed ideal as a location for the fit of a classic stadium form reinforced by the natural shape of the ground profile and the spatial enclosure of the surrounding forest. From this vision, the cross country venue emerges as an elongated classic stadium form in perfect fit and alignment to the linear plateau and central depression of the natural landscape. The proper fit to the landscape minimizes the

disturbance of the site and the impact of construction and maintenance costs. The positive axial alignment to the southern aspect ensures the beneficial solar exposure to the venue for the enjoyment of both spectators and athletes. The combination of fit and orientation to the natural landscape encourages the intrinsic comfort of the visitor by providing a surrounding environment in harmony with the landscape. The choice of a stadium form encourages the legacy use for multiple summer sporting events since the shape encloses the spatial requirements for a football / soccer field. The strength of the new cross country venue lies in the decrease in the cost of construction, the strengthening of the visitor experience, the alignment to positive landscape and solar aspects, the enhancement of the sense of harmony with the landscape, and the increase in the simplicity of mobility and proximity between the multiple site venues.



Figure 6.2  
Red Rocks Amphitheatre (Red Rocks Park)  
The fit of the theatre to the natural terrain demonstrates the creativity and adaptability of the design solution

### Biathlon Range

The vision for the biathlon stadium imagined a depression in the landscape where a natural side slope would serve as the range backdrop at one extremity and the opposing side slope would serve as an elevated spectator vantage point to the range and the athletes. A depression amongst the protruding knoll features of the site seemed ideal as a location for the fit of a biathlon range reinforced by the natural spatial enclosure of the surrounding landforms. From this vision, the biathlon stadium emerges as an

exceptional formation bridging the gap between two natural mounds, where the soaring building structures span the entrance to the northern site venue while reinforcing the sense of spatial enclosure for the range. The positive orientation of the facility to the northwest aspect considers the proper exposure for the range, while aligning the venue to natural background mound formations and the Madeley Creek riparian corridor. The fill requirements to bridge the gap will materialize from the massive excavation of the ski jump venue, serving as a site location for excess material disposal, while greatly benefiting the economic and experiential aspects of the project. The complete enclosure of the biathlon range considers the safety aspects of firearm conduct and the physical barrier to sound travel across the landscape, while providing an important threshold aspect to the facility by transforming the ridge into a gateway through which the spectator travels. The landmark position of the judges tower atop the entrance ridge serves as an excellent promontory for sport officials and as a visual locator for the hidden facility. The strength of the new biathlon venue location lies in the adaptation to the natural surrounding landforms, the economic benefits of excess site fill usage, the alignment to positive landscape and solar aspects, the enhancement of the sense of place through the use of the ridge as a threshold, the imageable promontory location of the judges tower, the decrease in the exposure of the facility to drainage and land stability risk, the preservation of sensitive riparian and bog landscapes, and the improvement in the simplicity of mobility and proximity between the multiple site venues.



Figure 6.3  
Jasper Park Lodge (Fairmont Hotels and Resorts)  
The harmony of the lodge and the landscape  
demonstrates a genuine fitness of form and function

and biathlon venues, and a prospect point to the distant mountain vistas. The favoured position of the lodge in close proximity of the jumps recognizes the visual presence and attraction of the ski jump towers as site landmarks to the majority of site guests. The slightly elevated position of the lodge allows positive visual aspects to the entire range of the jump profile, from jump tower to run out. The position of the lodge creates an enclosure of space at the base of the ski jump, providing the scale and identity for an exceptional Olympic gathering space capable of accommodating all visitors. The provision of the lodge facility considers the ideal location for the Olympic events and the legacy opportunities of the site. The lodge becomes the central arrival destination for guests with effortless connections to the multiple site venues. The legacy of the site lodge considers the ability to provide services and maintenance for the facilities, a source of food and shelter for visitors, and a potential accommodation facility for training athletes and guests. The strength of the addition of a lodge to the Whistler Nordic Centre lies in the provision of a visual focal point, the strengthening of site image and memory, the creation of a site gathering space, the enhancement to sense of place and guest experience, the improvements to the legacy of the site, and the ability to create a hinge point around which the sport venues relate.

### Site Lodge

The vision for the site lodge imagined a rustic alpine facility, in the tradition of national park lodges, acting as a central gathering point and visual focal point to the site. The high ridges of the stepped landscape seemed ideal for the location of a lodge facility sitting proudly in a prominent position overlooking the landscape and distant alpine vistas. From this vision, the site lodge emerges as a key focal point for the site, atop a ridge at the base of the ski jump, where the ideal location provides a favoured visual connection to the ski jump, a close connection to a nearby rippling creek, a promontory position overlooking the cross country



Figure 6.4  
Chin Cabin (Miller Hull Architects)  
Simplicity and adaptability in contemporary cabin design

### Team Cabins

The vision for the team cabins envisions rustic alpine cabins in the landscape, nestled in the native forest along a landscape ridge, with a prospect viewpoint to the mountain vistas. The rolling forest landscape of the site seemed ideal for the team cabins to occupy prominent landscape positions in close proximity to the sport venues, and perhaps, with prominent views to the individual sporting events. The temporary nature of the Olympic team cabin

requirements considers the functional aspects of the cabins in support of the events. The legacy of the site might consider a more permanent solution to the placement of the team cabins, where proper relationships to the venues, the site, and the surrounding environment play an important role in the layout and design of the facilities. The simple and economic design of the team cabins might consider rustic provisions of minimal services, and a layout in support of Olympic athlete requirements and accommodation potential. The vision of permanent team cabins may follow two courses, a village option that clusters the cabins around the lodge facility to create a concentration of development, or a legacy option that places cabins in ideal support of the sport venues. The legacy of the team cabins may serve as accommodation for training athletes and destination tourists, where the memory of the Olympic Games and the athletes who participated could be preserved. The strength of the team cabin vision lies in the enhancement to the sense of place, the improvement to the legacy of the site, the support of the legacy athlete training initiative, the economic benefits of destination tourism, and the lasting image and memory of the Olympic Games.

### Site Adaptation

The haste and complexity of the bid process lead one to provide an expedient solution to the project design guidelines with regards to the numerous technical and program requirements of the individual events. The result is often a site that satisfies all the requirements of function, with little or no regard to the character and experience of the place. The findings of this thesis project confirm the appropriate preliminary selection of venue locations, while slightly teasing and adjusting site connections, orientations, and operations in order to enhance the image, function, and experience of the site as a whole. This observation of the process leads one to believe that we possibly disregard the questions in order to ignore the possible solutions in favour of the status quo. In response, this thesis presents not only the site design layout, but also visions of alternate layout scenarios in reaction to the multiple program requirements. The Olympic Layout demonstrates the amount and position of temporary space requirements as a possible solution for the Olympic Games. The temporary nature and scale of the events demand a large amount of disturbance to the site environment in light of the post-games capacity requirements. An attempt to consider the legacy situation of the project provides two alternate visions of the site, the Legacy Layout and the Village Layout, that respond to issues of athlete training and destination tourism. The Legacy Layout attempts to address the issues of permanence for some of the facilities and cabins in order to provide a better integration of the Olympic Games memory and the legacy of the site. The Village Layout attempts to concentrate and integrate the athletic support facilities in order to create a sense of community for the games and the legacy of the site. Both scenarios demonstrate a potential alternate vision for the site legacy that ultimately enhances the image and experience of the Olympic Games. In the end, one hopes to inform the planning and design of the Whistler Nordic Centre through the adoption or adaptation of the visions presented in this design thesis project.

# Site Plan

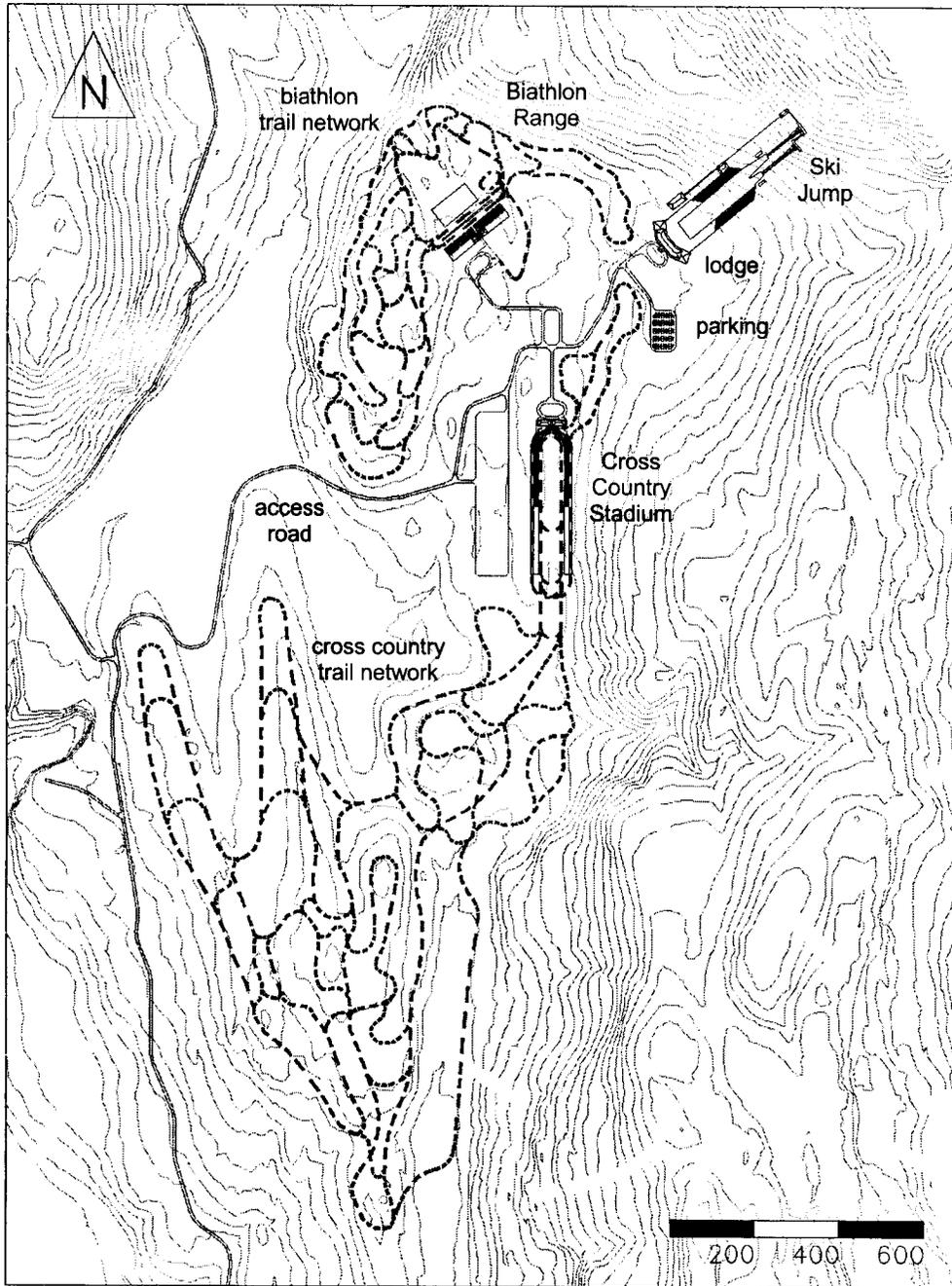


Figure 6.5  
Whistler Nordic Centre Plan

# Olympic Plan

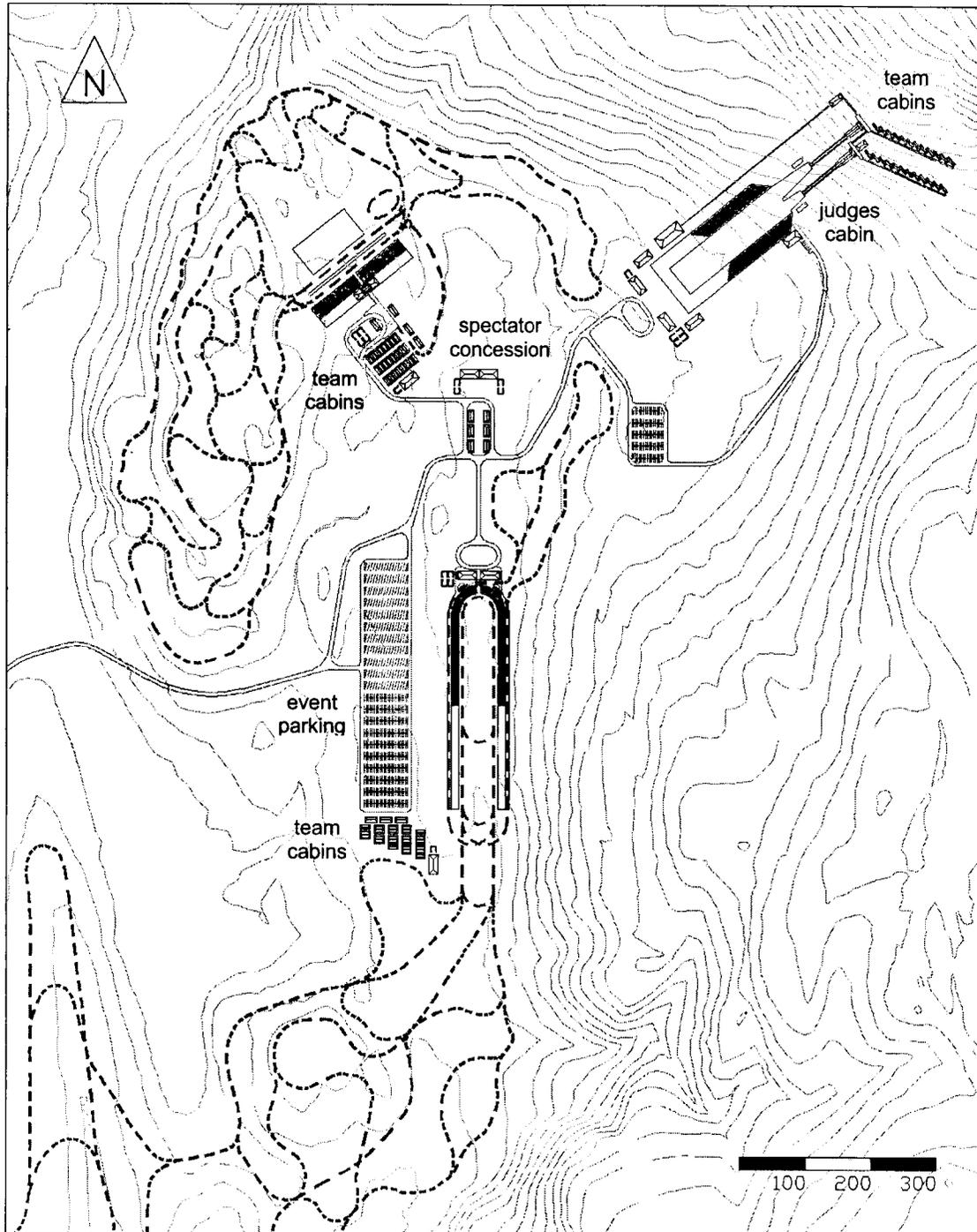


Figure 6.6  
Olympic Layout Plan

# Legacy Plan

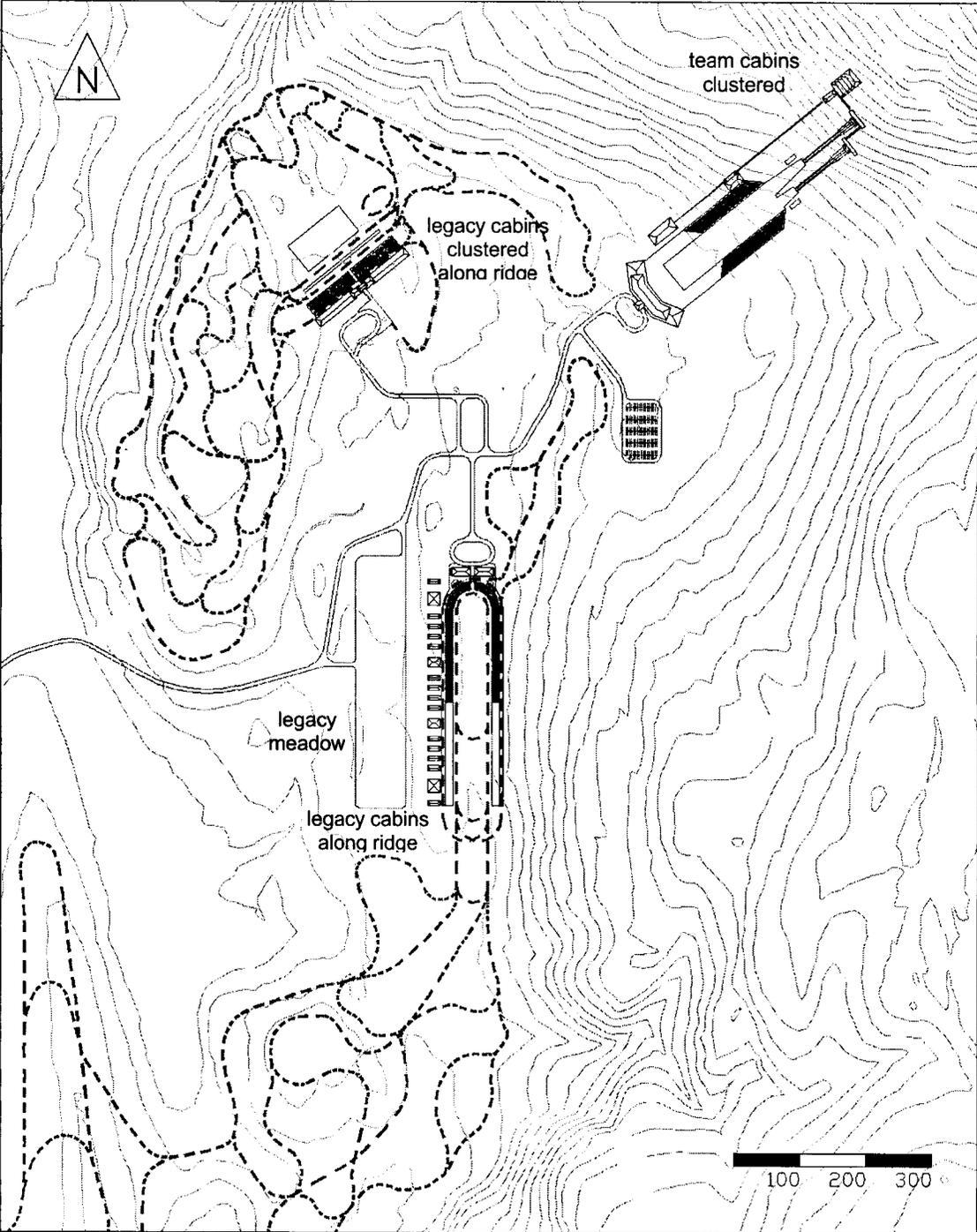


Figure 6.7  
Legacy Layout Plan

# Village Plan

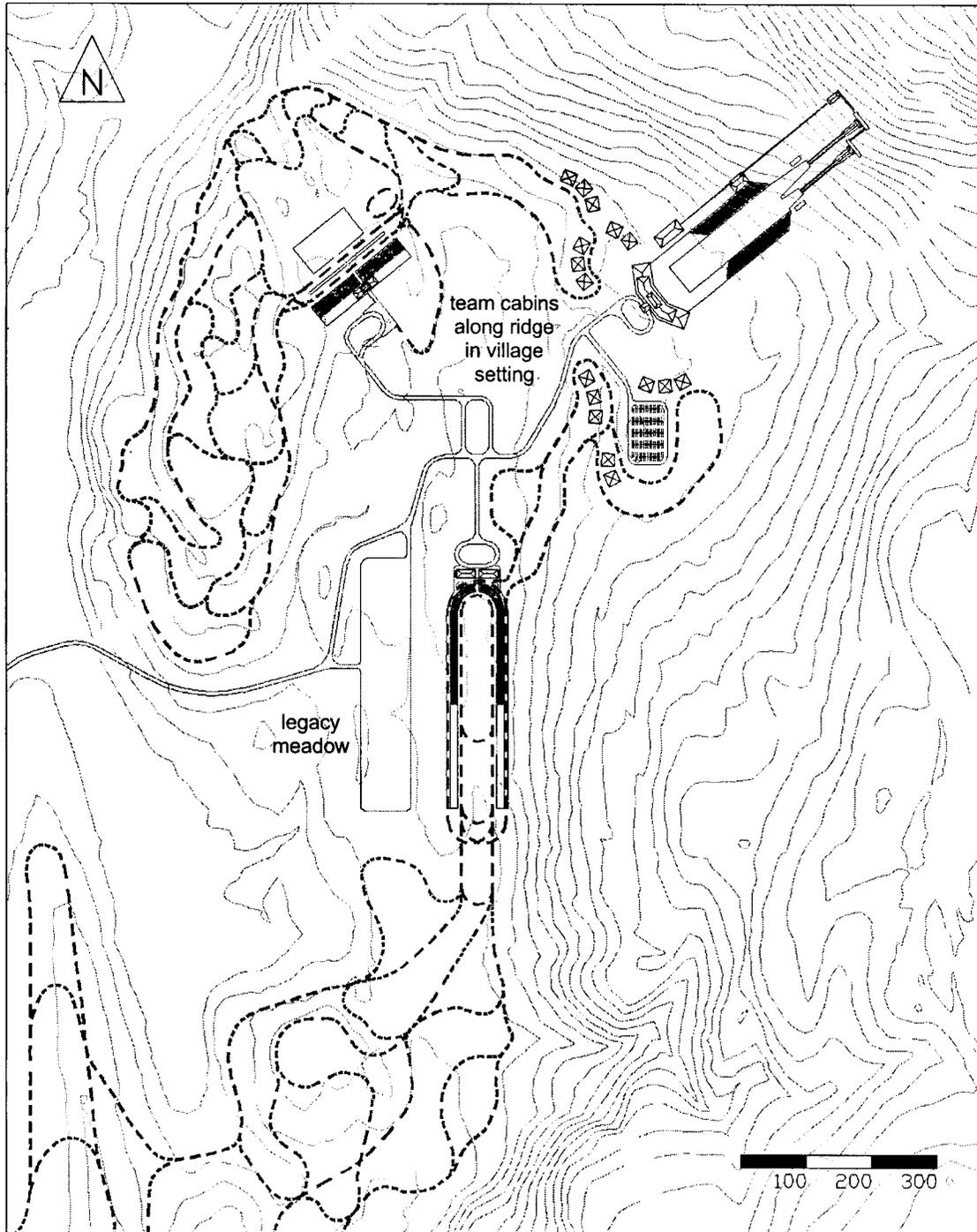


Figure 6.8  
Village Layout Plan

## **Design Imperatives**

The functional and experiential aspects of the design imperatives serve as a summary of essential considerations for the successful planning and design of the Whistler Nordic Centre.

### **Sense of Arrival**

The sense of arrival derives from the realization that first impressions are tremendously important to the image and identity of the location. The meandering access drive follows the natural terrain of the environment, providing visual glimpses of the site constitution and character. The native mountain hemlock forest, wetland bogs and marshes, soaring rock faces, and prominent ski jump towers generate key components to the experience of arrival.

### **Experience of Place**

The identification and enhancement of site sensation adds to the experience of place. The subtle nuances of sun and wind exposure, the visual and aural sensations of trickling water and snow falling, the spatial, tonal, and textural character of the surrounding environment, and the careful selection of site location and orientation enhance the experience of the dweller.

### **Experience of Events**

The complexity and scale of the Olympic Games and Events demand the insightful design of venues with meticulous regard to the multiple experiences of the athletes, officials, and spectators, as well as the extent and function of the post-event legacy. The safety and security of the events, participants, and spectators require the consideration of independent site access and facility provision, while maintaining the positive unified spirit of the Olympic Movement. Separate and Unite.

### **Preservation of Nature**

The preservation and enhancement of the natural site balance in terms of water, soil, vegetation, and wildlife are concerns in the scope and scale of the project. The choice of a site fully indicative of human disturbance, by select logging practice, allows a minimal intrusion to the natural valley ecosystem with an optimal preservation of standing timber as parkland character. The identification and preservation of the quality ecosystem components, of wetlands and native forest, informs a planning system in harmony with natural site potential.

### **Preservation of Character**

The preservation and enhancement of the natural site character in terms of native vegetative communities, inherent aesthetic aspects, and natural terrain characteristics are concerns in the imperatives and programs of the project. The possibility exists to design venues and facilities that reflect and enhance the character and culture of the site and the events.

### **Vision of the Whole**

The concept of the site as a unique and distinct facility, in complement to the context of the site, the valley, and the region, are concerns in the program and legacy of the project. The physical and visual proximity and connectivity of the individual venues and

events within the site are essential to the acceptance and comprehension of the cohesive whole. The selection of the ski jump as the key legacy component of the site informs the scale, location, and orientation of the lodge proposal, in consideration of access to all sport venues.

#### Image of the Games

The image and collective memory of the site and events is key to the judgement as to the quality and success of the Olympic Games. The knowledge and interpretation of site information and character is essential to the successful design and planning of the site form, function, and experience. The recognition as to the exceptional visual resources and surroundings of the site, in conjunction with the advantageous siting of venues, allows the opportunity for the creation of lasting memories.

#### Seasonality of Use

The seasonality of the mountain environment alters the perceptions and perspectives of the site, with regards to the changing exposure to sunlight, the level of the ground surface due to snowpack, and the means of terrain mobility and access. The sensitive summer terrain of the wetland ecosystem, carefully delineated and preserved from summer activity, is fully accessible in winter on skis without visible trace or measurable damage to the environment.

#### Response to Climate

The severe climate of the coast mountain environment demands the wise adaptation, in planning and designs, to the conditions of the site. The consideration of the volume and mass of snow in the design of structures, the direction, impact, and accumulation of snow shedding from venue roofs, the exposure of facilities and occupants to wind impacts and tree fall, and the location, capacity, and direction of natural drainage courses are potential risks in the siting and design of venues.

#### Legacy Opportunity

The tremendous facility investment, planning effort, and event exposure provide an exceptional prospect for the promotion and expansion of the site legacy opportunities. The consideration of athlete training, competition venue, and tourism lodging potential in the latent planning and design of the Olympic Games is essential to the legacy prospects of the site. The mere appropriate placement and design of the lodge facility has the potential to elevate the site to the ranks of great park destinations in British Columbia, and successfully complement the global attraction of Whistler.

# Chapter 7

## Project Summary

The project summary presents the observations and conclusions of the planning and design processes, as well as the recommendations and imperatives of site program consideration and vision.

## Summary Conclusions

### Method of Analysis

The conclusions of the project are direct products of the multidisciplinary iterative approach of thorough scientific and experiential planning and design site investigations, observations, conjectures, and refutations in consideration of the intrinsic site conditions and intended site purposes. The careful site investigations are essential to the comprehension and speculation of the site purpose feasibility and possibility. The holistic approach to multidisciplinary observation expands the realm of information and knowledge available to the planning and design process, attempting to consider a broad range of site characteristics, integrating the domains of personal site experience and partial scientific perspectives. The process of conjecture and refutation, in planning and design, allows rigorous assessment of hypothetical proposals, by specific site and purpose criteria, in order to determine appropriate responses to the site specific situations. The complementary evaluation of criteria enlightens the process of design through the clear identification of concerns and objectives of the site planning and design process, allowing the design progression to proceed in confidence of the analysis procedure and results.

### Evaluation of Criteria

The conclusions of the analysis are direct products of the vigilant consideration and selection of appropriate evaluation criteria, in consideration of the intrinsic site conditions and intended site purposes. The effective and efficient comparison and evaluation of site proposals required the selection of particular indicator criteria reflective of broad landscape, program, place, and cost characteristics. The specific criteria determinants developed for the proposal evaluations were the fit of the ski jump profile to the natural terrain, the site quantity of road construction, the physical distance between sport venues, the area of facility space consuming wetland, stream, and old growth forest ecosystems, and the qualitative assessment of physical features and visual landscape connections. The simple quantitative descriptors of site performance and experience masked the breadth of reach as to the implications and considerations for the planning and design of the site, ultimately acting as significant key determinants to the imperatives of landscape design.

### Imperatives of Design

The development of the imperatives of design is an indirect product of the analysis methods, the criteria evaluation, and the exploration of site design solutions, in consideration of the intrinsic site conditions, difficult program requirements, and potential site opportunities. The meticulous planning and design considerations enlightened the range of appropriate design imperatives to consider sense of arrival, experience of

place, experience of events, preservation of nature, preservation of character, vision of the whole, image of the games, seasonality of use, response to climate, and legacy opportunity. The imperatives of design exemplify the level of detail consideration envisioned for the eventual successful design of the Whistler Nordic Centre.

#### Imperatives of Vision

The conservative ideas of the site potential severely hinder the imaginative and successful visions of the facility and program possibilities. The simple concept of a learn to jump program in light of the extensive sport facility production, with possible participants from around the globe, easily substantiates the conception of a lodge facility in support of the ski jump venue. The further concentration of three international sport venues into a united concept of a unique and distinct Whistler Nordic Centre destination, beyond the vision of individual day use facilities, certainly supports the central lodge concept. The tremendous international successes and experiences of Banff National Park and Whistler Village demonstrate the possibilities of imaginary community visions in support of wilderness and recreation tourism.

#### Completion of Project

The planning and design of a project leads to a degree of ownership and enthusiasm for the product, in consideration of the level of involvement and the depth of personal attachment to the project. The experience of the project process provides recommendations for the importance of the vision of the project as a whole, through the provision of a central lodge facility, the deliberate consideration of tourism planning and opportunities for the site, and the careful consideration as to the location and proximity of the Olympic Village. The completion of this project permits and encourages the consideration and criticism of the results and conclusions, on the sincere personal belief in the merit of the product, and in the anticipation of the exceptional design and manifestation of the Whistler Nordic Centre. One hopes that this is the beginning, and not the end...

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# Appendix A

## Solar Geometry for Vancouver

### SOLAR GEOMETRY

TIME	WINTER SOLSTICE		SPRING EQUINOX		SUMMER SOLSTICE	
	altitude	azimuth E of N	altitude	azimuth E of N	altitude	azimuth E of N
0:00						
0:30						
1:00						
1:30						
2:00						
2:30						
3:00						
3:30						
4:00						sunrise 4:07
4:30					2.4	55.5
5:00					6.5	61.0
5:30					10.8	66.4
6:00			sunrise 6:14		15.4	71.7
6:30			2.1	91.8	20.1	76.9
7:00			6.8	97.5	24.9	82.3
7:30			11.6	103.3	29.7	87.7
8:00	sun		16.3	109.3	34.6	93.4
8:30	2.6	131.1	20.8	115.6	39.5	99.5
9:00	6.0	137.0	25.1	122.3	44.2	106.2
9:30	9.1	143.2	29.0	129.4	48.8	113.6
10:00	11.8	149.6	32.6	137.1	53.2	122.2
10:30	14.0	156.3	35.7	145.4	57.1	132.1
11:00	15.7	163.2	38.1	154.3	60.3	143.7
11:30	16.8	170.2	39.9	163.7	62.8	157.3
12:00	17.3	177.4	40.9	173.4	64.0	172.4
12:30	17.2	184.6	41.1	183.4	64.0	180.3
13:00	16.5	191.8	40.3	193.2	62.7	203.3
13:30	15.3	198.8	38.8	202.7	60.2	216.7
14:00	13.4	205.6	36.6	211.8	56.9	228.3
14:30	11.1	212.2	33.7	220.3	53.0	238.2
15:00	8.2	218.6	30.3	228.2	48.7	246.7
15:30	5.1	224.7	26.5	235.5	44.1	254.1
16:00	1.6	230.6	22.3	242.3	39.3	260.7
16:30			17.9	248.8	34.4	266.8
17:00			13.2	254.9	29.5	272.5
17:30			8.5	260.8	24.7	277.9
18:00			3.7	266.5	19.9	283.3
18:30					15.2	288.5
19:00					10.6	293.8
19:30					6.3	299.2
20:00					2.3	304.7
20:30						sunset 20:22
21:00						
21:30						
22:00						
22:30	latitude	longitude				
23:00	W 123° 10'	N 49° 15'	vancouver			
23:30	W 122° 50'	N 50° 07'	whistler			

adapted from United States Naval Observatory data