C06110

PORTERS

PROPOSED Ski Area Expansion

Assessment of Environmental Effects

TO ACCOMPANY APPLICATION FOR PLAN CHANGE

Prepared for Porters Ski Area Limited
By Boffa Miskell Limited • July 2010

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1.0 INTRODUCTION

This Assessment of Environmental Effects (AEE) is intended to be a summary document. It provides an overview of the proposal and key issues that are likely to arise in its consideration under the provisions of the RMA. This assessment should be read in conjunction with the proposed Plan Change document and the Section 32 Report.

The AEE contains sections which describe the proposed development, the values of the existing environment, the nature and significance of any potential effects of the development on those values, potential benefits and proposed mitigation or remediation. It draws upon the technical reports which are attached in full to this Summary document as follows:

Appendix 1 Geotechnical Summary Report (prepared by URS)

Appendix 2 Ecology Assessment (prepared by Boffa Miskell Ltd)

Appendix 3 Landscape Assessment (prepared by Boffa Miskell Ltd)

Appendix 4 Archaeology (prepared by Underground Overground Archaeology)

Appendix 5 Transportation Assessment Report (prepared by Traffic Design Group Ltd)

Appendix 6 Architectural Concept (prepared by BDA Architecture Ltd)

Appendix 7 Engineering Feasibility (prepared by Eliot Sinclair & Partners Ltd)

Appendix 8 Infrastructure Options- Assessment Report (prepared by CPG NZ Ltd)

Appendix 9 Erosion and Sediment Control Plans

Appendix 10 Regional Council Consents - Assessment of Effects

Appendix 11 Economic Impacts (prepared by Butcher Partners Ltd)

Appendix 12 Market Demand Assessment (prepared by Tourism Resource Consultants)

Appendix 13 Masterplan

2.0 THE PROPOSAL

The proposal is to rezone land for the purpose of:

- recognising the existing infrastructure and amenities at Porters Ski Area and providing for its maintenance and up-grading,
- providing for its expansion into the adjoining Crystal Basin;
- enabling access to the Ski Areas by alternative means to vehicles;
- enabling the development of an alpine village at the base of the Porters and Crystal Basins.

It is intended that the existing Porters Ski Area and the expanded terrain in Crystal Basin would provide for all of those activities generally associated with ski and snow based recreation including trails, tows, day facilities and snow-making capability. In addition, other outdoor recreation (such as mountain-biking, hiking) and tourist activities would be provided for to enable year-round recreation at this location.

The proposed village would provide for a variety of accommodation facilities including apartments, backpackers, hotels and private chalets. This would comprise up to 3,500 visitor beds which is aligned to the skier capacity of the expanded Ski Area. A range of commercial and tourist related activities and facilities, complementary to the Ski Areas and mountain-based recreation are also provided for as part of the Plan Change.

The location of the proposal is described in Section 3.0.

The rationale/reasons for the proposal are set out in Section 4.0.

The vision and objectives of the proposal are set out in Section 5.0.

The details of this proposal are set out in Section 6.0.

3.0 THE SITE

The site location is shown in Figure 3-1 and can be described as encompassing:

- the existing Porters Ski Area accessed from State Highway 73, just north west of Porters Pass;
- land adjoining Porters skifield to the north west. This is identifiable as a geographically distinct feature known as Crystal Basin;
- land at the base of the Porters and Crystal Basins, which is a distinguishable as a gently sloping to flat river terrace adjoining the Porter River; and (already occupied and used as part of the Porters Ski Area for infrastructure, services, staff and club accommodation);
- a similar river terrace to the north of the confluence of the Porter River and Crystal Stream.

The boundary of the site is shown in Figure 3-2 and is also the boundary of the proposed Ski Area Sub-Zone.

The total land area is approximately 616ha and is legally described as Part of SI SO 1313 (Korowai Torlesse Tussocklands Park) and Part of Pt RS 39658 CTCB11B/614. The 616ha is comprised of:

- Village Base Area – 21.2ha
- Porters Ski Area – 328.6ha
- Crystal Basin Ski Area – 232ha
- Wastewater and Treatment Disposal Area – 34.3ha

Descriptions of the landforms, features, ecological and landscape values of the site are provided in Section 7 the Existing Environment. They are also fully described in Appendix 1 the Geotechnical Summary Report, Appendix 2 the Ecology Assessment and Appendix 3 the Landscape Assessment.

Figures 3-3a, 3-3b and 3-3c identify the key physical features of the site which are referred to throughout this AEE. It also identifies the main development areas and roads.

4.0 RATIONALE FOR PROPOSAL

Background to the New Zealand Ski Industry

New Zealand is comprised of three major ski regions. These are the Central North Island, Southern Lakes and Canterbury. In terms of skier numbers, New Zealand experiences an annual average of approximately 1.28 million skier visits. Of these visits approximately 52% are in the Southern lakes, 14% in the Canterbury region, and 36% in the Central North Island.

The Canterbury region currently has approximately 160,000 skier visits a year. Of these approximately 75% go to Mt Hutt and 15% go to Porters. The balance ski at the club fields Mt Olympus, Craigieburn Range, Mt Cheeseman and Broken River.

Growth of the domestic ski market is perceived as relatively flat and is tied to the variability of snow conditions that occur from year to year. The market profiles for Queenstown and Wanaka Ski Areas show that they are supported by a younger market and enjoy a longer average stay than the Ski Areas in Canterbury. The Australian market to New Zealand has however grown in recent years. This is a result of ski industry marketing, growing awareness of the better snow conditions in New Zealand, cheaper travel and wider economic and tourism trends which have seen an increase in Trans-Tasman travel.

Between 2006 and 2009 there were an average of 386,000 skier days by Australians in New Zealand and of these 324,000 were in the Southern Lakes Region. It is relevant to note that 50% of international visitors to the Southern Lakes region pass through Christchurch Airport and visit Canterbury as part of their stay in New Zealand.

In terms of alpine accommodation, this is limited in Canterbury to traditional club or lodge style facilities, which is not favoured by international visitors. Two of the Southern Lakes Ski Areas (Cardrona & SnowPark) offer limited on-mountain accommodation but nearly all skiers stay in either Queenstown or Wanaka and travel up the mountain each day. By comparison all Australian ski resorts have developed on-mountain accommodation - there are approximately 25,000 on-mountain beds in Australia. This reflects in part the considerable travel times from population centres to the Australian resorts[1] as well as Australian's expectation to be able to stay on the mountain in modern accommodation. This is not a unique expectation. On-mountain accommodation is available in all major Ski Areas in the world with the exception of New Zealand.

Accordingly, one of the main distinguishing factors between New Zealand and Australia and other international Ski Areas is the lack of on-mountain accommodation. In addition, New Zealand mountain access roads are routinely identified as the worst part of the visiting skiers' experience, particularly where visitors are not used to driving in the conditions experienced on New Zealand roads.

Visiting skiers complain that their visit is not a true alpine resort holiday where they park the car for the week and simply ski or relax with their families and friends. Rather, they are required on a daily basis to drive from where they are staying to travel up the mountain to the Ski Area and then back to their accommodation in the evening. This can mean early starts as well as coping with variable and at times extreme weather conditions on the

[1] Brisbane – 3 hours + flight or 2 days drive/Sydney – 2 hour flight or 5-6 hours drive/Melbourne – 2 hour flight or 2-4 hours drive

mountain roads. Unfortunately there have been a number of fatalities on NZ Ski Area access roads over recent years.

An analogy has been used that skiing in New Zealand is like staying in a Fijian resort where your accommodation is inconveniently based on the top of a mountain and each day you have to drive down a very rough mountain road to enjoy the beach before having to return up the same mountain road each night. This scenario is not commercially sustainable in a competitive international market

Further description of the current New Zealand market is available in Appendix 12, Market Demand Assessment prepared by Tourism Resource Consultants.

Canterbury

Porters Ski Area has been in operation since 1968. At that time it represented the first commercial Ski Area to be established in the Canterbury region.

From the 1960s up until the mid 1980's, Canterbury was considered to be the major ski destination for both New Zealanders and visiting Australians. Since then, Canterbury's position has significantly eroded as capital was consistently injected into the Southern Lakes ski fields to improve the ski infrastructure, accommodation base and associated tourism services.

This decline is reflected at Porters, where since its establishment, ownership has changed several times. Each group of new owners has, to varying degrees, identified the potential to improve the business but been unable to consolidate an economically viable case to fund either major improvements (such as chairlifts) or expansion to the size of a large commercial area. This has resulted in a progressive deterioration of the ski infrastructure to a point where many key elements such as the existing T-Bar lifts can be considered to be at the end of their useful life. This scenario makes it even more difficult to attract investment capital, particularly where there is uncertainty about the landuse status of the Ski Area and the ability to efficiently consent new infrastructure.

By comparison, Mt Hutt as the only other commercial ski area in Canterbury has invested capital into upgrading its mountain infrastructure to current market expectations. It is noted however that the owners who made some of the key capital investments (such as the original chairlifts and snowmaking system) subsequently sold the business at a significant loss, allowing the asset to be acquired at a level that provided potential to return a profit in the short to medium term.

The result of these market movements is that Porters has been left in a position between the two primary categories of ski areas being (a) 'club fields' that rely primarily on voluntary resources or small family operated ski areas and (b) large commercial ski areas that provide highly efficient lifts and automated snow making systems. This position is not commercially sustainable for a range of reasons.

The nature of Porter's terrain means that it has a high fixed cost to operate each year. As a result the option of being a small profitable family or club-owned business does not exist. In addition, the more challenging terrain of the existing Porters Ski Area means it is directly competing with Queenstown and Wanaka for the younger, more adventurous skiers as well as missing out on the family component of the market which requires more moderate terrain as dominates the Australian ski industry.

A commercially viable future for Porters therefore relies on its expansion into the neighbouring Crystal Basin. This offers the potential to significantly increase the essential intermediate/family ski terrain and the opportunity to develop an on-mountain village to support this expansion. This would make Porters the first in New Zealand to offer a destination Ski Area where there are no access road issues and there is a bed base consistent with market standards and expectations at the bottom of the mountain.

Porters Ski Area

Since 2006 Porters has undertaken three significant work streams of investigation and analysis to inform its decision-making on the future of Porters Ski Area. These areas of investigation have included:

1. An assessment of the accessible and skiable terrain in the locality (including land beyond the boundary of this Plan Change). This assessment has informed understanding of the nature of the terrain that could be developed, the skill level of skiers/boarders who would be attracted to and able to ski the terrain and the capacity of the terrain in terms of skier numbers.

2. Environmental investigations to understand the values of the environment. These investigations commenced in 2006 with analysis of the wider locality and then refined to concentrate on the Plan Change area in 2010.

3. Comprehensive local and international market analysis to identify the essential characteristics for the creation of a commercially sustainable and integrated ski village. This exercise flowed into extensive financial feasibility modelling to ensure that the proposed master plan was viable.

Having regard to:

- the current deficiencies of New Zealand ski fields (difficult access roads and lack of on-mountain accommodation);

- the particular features and locational attributes of Porters; and

- environmental investigations;

The current owners have developed what they consider to be a commercially viable and sustainable Master Plan to guide the future development of Porters. Porters Ski Area has a number of significant locational advantages and physical attributes which will underpin the success of the Master Plan and its implementation.

These are:

- proximity to a significant metropolitan population base (over 400,000 people within one hours drive),

- proximity to the South Island's major international airport;

- the opportunity to significantly expand the intermediate/family terrain that Porters can offer by expanding into Crystal Basin;

- the presence of a suitable building platform at the base of the Ski Area for an alpine village;

- the opportunity to remove the use of the existing mountain access road;

- and the ability to install mountain infrastructure at a standard that meets market expectations for efficiency and convenience;

- the ability for visitors to use the Village as a year-round base for enjoying the amenities of the Craigieburn Ranges.

While the current owners did not purchase the business with the expectation of a reliable profit, it is now understood following the experience of the past three ski seasons that a reliable profit is not possible from the current operation. The establishment of an on-mountain cafe has had a positive impact on patronage but this is not of sufficient scale to make an overall impact on the future of the business. A positive return on investment capital is only possible if there is a major expansion of ski terrain with a focus on family skiing along with the modernisation of the infrastructure plus the provision of an adequately scaled on-mountain bed base.

5.0 VISION AND OBJECTIVES

The Vision is to make Porters the most family friendly and environmentally sustainable ski area in Australasia.

The Vision draws from the following:

New Zealand and Australian Family Market

Porters is currently identified as a family focused Ski Area. Porters wishes to retain this market and expand its appeal and accessibility to a much wider population, being the whole of Australasia.

To achieve this Porters must be expanded in a way that makes it popular and relevant for a new generation of families. This requires an emphasis on family-friendly terrain, convenient access and greater choice in facilities.

Convenient Family Access

While families may now have more choice for holiday destinations or recreational activities they also have less time available. Convenience and ease of accessibility is therefore a key element.

Porters has the locational advantage of being the closest Ski Area in Australasia to an International Airport. This makes Porters attractive to Australian families and visitors. The Ski Area is also only an hour on a tar sealed road from the airport and Porters will offer dry, covered underground carparks beneath the Village. Alternatively, it is likely that shuttle services will be established to take people from and to the airport every day so they do not even need to hire a car.

Accessibility to the actual ski field will also be enhanced with the installation of a gondola to Crystal Basin and at a later stage via a chairlift to Porters Basin. Access back to the Village and carparks will be provided for by return gondola or lift trips as well as trails created with enhanced snowmaking infrastructure. The removal of the drive up and down the Ski Area Road will remove a significant impediment to mountain access.

Accessibility will also be enhanced through the development of an on-mountain village. Visitors will be able to ski from the Ski field directly to the Village plaza.

Great Family Terrain

The design of the trails is governed by the need to achieve gradients suited to beginner, novice and intermediate level skiers as these skiers dominate the skier population. In addition, the area of the terrain must be in proportion to the skier numbers anticipated at that level to avoid a mismatch between available terrain and skier numbers.

Choice in Winter and Summer

The proposed Village amenities will provide choice for visitors who do not wish to ski or snowboard all day as well as provide activities and a destination for summertime visitors. Out-of-ski season use is important to enable the facilities to be used in associated with

activities such as mountain-biking, walking, or for the hot pools and spas. It may also be attractive for weddings or as an event venue.

A range of accommodation options are proposed in order to appeal to a wide market of visitors and recreationalists. The accommodation will be supported by services and commercial activities such as cafes, restaurants and a convenience store as well as activities such as hot pools, ice skating, snow tubing, a film theatre and outdoor entertainment such as festivals.

Friendliness

Porters prides itself on being one of the friendliest ski areas in New Zealand. Its business is based on a desire to share the alpine environment with as many people as possible and to leave them with lasting memories of the experience.

Porters is determined to maintain this reputation as a cornerstone of its expansion.

Environmentally Sustainable

Porters is committed to an ethos of environmentally sustainable business in its broadest sense. The company is concerned that its activities are conducted in a way that avoids, minimises or mitigates adverse effects on the physical environment.

Porters is involved in a number of environmental initiatives including wilding pine control on an annual basis, financial support of the NZ Kea Conservation Trust as well as protection of Keas within the Ski Area. The company is also committed to a significant native replanting plan to establish beech forest that has not been present in the Upper Porter River Area since its burning some 600-800 years ago.

Porters propose that buildings are constructed to a high standard of energy efficiency and that electricity is sourced from renewable sources. It will also ensure that wastewater is only disposed of to land.

Porters is also concerned with the social and economic elements of sustainable business providing people with employment as well as recreation opportunities. From a cultural perspective the company is also committed to establishing a relationship with Te Runanga o Ngai Tahu and this is reflected in the commissioning of a Cultural Values Report for this project.

Village Master Plan

The Village Master Plan has its own set of design objectives. These have been developed in accordance with, and as a more detailed expression of, the overall Ski Area Vision. The objectives are set out in Appendix 6, Architectural Concept.

In summary, the layout of roads and buildings and the connections to the mountain trails, lifts and gondola illustrates how accessibility will be achieved. Principles for sunlight penetration, views, year round use, defined building footprints etc all demonstrate environmental responsiveness and the intention to create a mountain village which has a New Zealand alpine character.

6.0 DETAILS OF THE PROPOSAL

6.1 Master Plan

A plan showing the layout of activities for the overall Ski Area Sub-Zone is attached as Appendix 13.

This is a compilation of two separate Master Plans being the Village Master Plan and the Mountain Master Plan.

6.1.1 Ski Area Sub-Zone

The first plan provides an overview of the full land area subject to the Plan Change. It shows the relationship between the existing Porters Ski Area, the proposed Crystal Basin Ski Area, the Village Base Area and the wastewater treatment and disposal area. The overview provides the sense of scale and identifies where and how the connections between these areas will be achieved with a gondola, lifts, trails, the existing road to Porters Ski Area and a new track connection between Porters and Crystal Basins.

6.1.2 Mountain Master Plan

This plan provides an indicative illustration of how ski trails and mountain infrastructure and amenities may be developed on the mountain. This plan is based on detailed design by Brent Harley Associates (Whistler, British Columbia), together with experts within the New Zealand Ski industry and Porters own staff. It is also based upon preliminary engineering investigations undertaken by URS on the geotechnical features and conditions of Crystal Basin (as described in Appendix 1) and the feasibility report undertaken by Eliot Sinclair (as described in Appendix 7).

6.1.3 Village Master Plan

This plan provides an indicative layout for village roads and buildings. The Village Master Plan has been developed as a result of detailed site analysis and study of successful international ski villages by Brent Harley Associates, BDA Architecture, Boffa Miskell and Porter's Australian shareholders. Further detail is provided in Appendix 6, the Architectural Concept and Appendix 3, the Landscape Assessment which in combination provide details of how the buildings and landscape will be integrated.

6.1.4 Wastewater Treatment and Disposal Area

This area of land is a river terrace to the north of the Village. It is separated from the Village by the Crystal Stream and its use is limited to the treatment and disposal of wastewater as described in Appendix 8 the Infrastructure Options Report prepared by CPG. The terrace will retain a natural appearance to be enhanced by indigenous re-vegetation planting of alpine beech forest.

Details of Development Features – As Enabled by the Plan Change and Shown in the Master Plans

6.2 Roads

6.2.1 Access from the State Highway to the Expanded Ski Area Village

The Ski Area is currently accessed via a local, unsealed road from State Highway 73. This road lies outside the Plan Change boundary and is vested in the District Council. The Council and Porters take responsibility for the maintenance of different sections of this road.

Although not falling within the Plan Change boundary, it is relevant to note that as a consequence of the proposed development that this intersection would require up-grading to achieve an improved sight-line for vehicular traffic.

The final detail of the intersection up-grade will be subject to a detailed design process and approval by both the NZTA and the Selwyn District Council through processes subsequent to this Plan Change.

The Preliminary Engineering Report (Appendix 7) notes that as the Ski Area Access Road gets closer to the proposed Village Base Area, it will be required to be re-graded and lifted to ensure that the road gradients are driveable during winter conditions.

6.2.2 Village Roads

The layout, design and features of the proposed Village Roads are described in the Preliminary Engineering Report (Appendix 7) and the Architectural Concept (Appendix 6).

The Village Master Plan illustrates the proposed roading layout. The key features of the layout are loop or circular roads which will encourage traffic circulation in and out of the main car parks and the Village Centre with cul-de-sacs serving the more distant Porters Chalets, Crystal Chalets, Slopeside and Hotel/Visitor Accommodation destinations. This roading pattern has been locked into the Plan Change ODP and therefore largely controls the layout of buildings and activities within the Village Base Area.

As two of the primary principles underlying the concept of the Ski Area Sub-Zone relate to convenience and accessibility, it has been a key feature of the Village to ensure that all of the roads have a driveable gradient for the majority of visitors, particularly those driving in cars from the State Highway to the main public car park areas. Care has therefore been taken to design a roading layout that not only provides for accessibility across the Sub-Zone but also ensures that roads will be constructed with gradients generally not exceeding 10%. Accordingly, the roading pattern has been largely influenced by the need to work with topography. This has resulted in a more sinuous or organic pattern of roads and generally avoids the needs for steep cuts.

The main axis road across the Sub-Zone will likely be a public road in order to provide a legal frontage or connection for the purpose of subdivision. The balance of

roads in the Sub-Zone may however be retained in private ownership with a slightly more relaxed design standard.

Although not yet subject to detailed design, it is likely that the Village roads will be generally 7.5m wide with parking bays to be identified and provided in appropriate locations at the time of detailed design. Kerb and channel is to be required in the Village Centre.

6.2.3 Village Base Area to Porters Basin

The existing Skifield access road to Porters Basin is to be retained until such time as a gondola is installed to provide an alternative means of access. At that point, the existing road will become known as a Ski Area Service Road and will be limited in its use to maintenance, staff and emergency access purposes. Rather than having service vehicles drive through the Village, the Service Road will connect with the main Ski Area Access Road (to the State Highway) by a new alternative route to the south west of the Porters Chalets. This will be an informal access with very low traffic usage.

6.2.4 Porters to Crystal

A new track is proposed between Porters and Crystal Basin. This is to provide access for construction and maintenance activities in Crystal Basin, as well as act as a ski trail in the winter between the two Ski Areas. It will also be used as the preferred route for any services that are required between the two basins.

6.3 Infrastructural Services for the Village

Appendix 8 Infrastructural Options Assessment Report describes the infrastructure options for the Village.

6.3.1 Potable Water Supply

There are three existing potable water supply systems within the Porters Ski Area. These include a domestic take for the cafe (sourced from a spring), a take from the Crystal Stream for the Ski lodge and a third take for snow-making purposes from a subsurface gallery.

CPG has calculated estimates for water use based upon demands for snow-making, potable water within the Village and fire-fighting. The assumptions underpinning the water calculations assume normal individual water demands and fire fighting requirements as well as demands for commercial and service activities related to hotels, restaurants, retail and pools and spas. The design water requirements are based on full development of the Ski Area Sub-Zone and account for average daily demand, peak daily demand and peak hourly demand with 24 hour demand occurring over 5 hours.

Assuming a maximum daily number of people of 7,600 in winter (120 days) and 1,700 in summer (245 days) the potable annual volumes required based on average

daily demand are 63,487m^3 in winter and 76,396m^3 in summer with a total of 139,883m^3 and an annual peak useage of 203,695m^3. The overall water take requires 40L/s for snowmaking (but limited to the three months of the skiing season) leaving a requirement of 30L/s for potable water supply over the whole year.

This volume of water is not able to be supplied from existing consents and new consents for water takes are being applied for. Treated water storage will also be required to provide cover for the peak hourly demand periods during the day, to provide emergency storage, fire-fighting reserves and adequate chlorine contact time (if chorine is used) before water enters the reticulation. CPG recommend a total volume volume of 550m^3 to accommodate these requirements with water storage located to the west of the Village Base Area on top of a rounded ridge.

This water is to be taken from the Porter Stream at one of two possible take points. Flow metering downstream of the final take point will be undertaken to ensure that minimum ecological flows are maintained.

The final method of any water treatment is still to be determined and is in part dependent on the final take point.

6.3.2 Ecological Flows

Minimum flows have been established to maintain the existing ecological values of the Porter Stream. Based on existing measurements there is sufficient water to ensure ecological values are retained and supply the water demands of the expanded Ski Area and the Village Base Area.

6.3.3 Wastewater Treatment and Disposal

In selecting a preferred wastewater treatment and disposal option, consideration was given to consistency of treatment under intermittent loading, varying temperature conditions and general reliability.

Visitation to the Ski Area is currently limited to the ski season, however this proposal will broaden visitation across the year with up to 604,000 people estimated to visit the Porters Ski Area annually. CPG produced a table which sets out the number of visitors to the Ski Area overnight in winter, as winter day visitors, non-winter over-nighters, non-winter day visitors and permanent residents. These figures show that peak visitation will occur in July and August with a smaller summer peak in December, January and February.

In calculating wastewater flows and volumes consideration was also given to some minor infiltration into the system during peak wet weather and to account for any pipe deterioration over time. This ensures that a conservative estimate has been made of possible flows. The quality of the wastewater has also been calculated taking into account the proposed commercial activities.

Wastewater treatment is to involve three stages. This will be a combination of at-source primary effluent treatment, community secondary treatment and soil/plant treatment). This combination will result in a higher quality of effluent, that when

discharged to the land does not produce the same range of effects as alternative treatment systems.

Primary treatment will be achieved by passing the sewage into a sedimentation tank near the source allowing solids to settle out and effluent to proceed to further treatment where it is filtered for grease, solids and contaminants. Each sedimentation tank typically has at least 24 hours of storage depending on the size of the dwelling being served and will need to be pumped out on average every 10 to 15 years.

The effluent is then to be conveyed to the secondary treatment plant located in the land treatment area on the north terrace. The use of pumps and gravity pressure will allow small diameter pipes to be used and will involve crossing of the Crystal Stream. There are several options for this crossing e.g, the pipe could be thrusted or trenched across the bed of the stream or incorporated into an ecological weir that may be installed to protect up-stream native fish from introduced predatory species. It is acknowledged that the final method selected may involve further consents to be obtained.

A re-circulating textile packed bed reactor (rtPBR) is proposed as the secondary treatment. This system has features that enable shock variable loads to be managed. The treatment plant is approximately 50m x 50m with 24 hours emergency storage and may be located anywhere within the treatment area. A control shed up to $9m^2$ and 2.5m high will be required and this is to be appropriately screened with the use of landscape planting. UV treatment may also be required to further reduce faecal coliform numbers.

The land treatment area has been assessed by URS in terms of slope stability and useability for disposal purposes. Consideration was also given to the soil type, profile and its permeability for the quality of effluent proposed. The soils were test pitted and logged and the results indicate that the soils are fine sandy loams to sandy loams which are well to rapidly draining. On the basis of this information a subsurface drip irrigation system is proposed. An area of 21ha is required for the proposed peak daily discharge of 5mm/day.

The dripper irrigation is easy to install and can be configured to land contours. It can be self-draining and has been proven to be effective in other cold climate regions of New Zealand. It will be placed approximately 200mm underground to protect public health and minimise any risk of frost damage. The wastewater treatment and disposal system will require approval from Environment Canterbury and will be subject to an Operation and Maintenance Manual.

The dispersal area is to be planted with Mountain Beech and Red Tussock, the growth of which will be enhanced by higher nutrient levels in the discharged water. Access to this treatment area will be required for bi-monthly inspections and maintenance.

6.3.4 Stormwater

The objectives of the stormwater management is to minimise the pollution of receiving waterways by contaminants carried in road derived stormwater, prevent erosion of slopes where discharges are directed and to attenuate peak flows where necessary from additional run-off derived from increased impervious areas.

Accepting that the final layout of buildings is likely to be staged over time, the proposed stormwater management system uses the Village Master Plan as the final and best example of how development may occur. The design of the stormwater infrastructure has been designed based on a number of assumptions relating to rainfall, rates of surface infiltration and deep soakage, which have determined that discharge to ground is a technically feasible solution.

Village Centre

The Village Centre hardstand and roading is divided into two sub catchments.

The south-western end is to be directed via kerbs, channels and inlet sumps and will be discharged into an infiltration basin. Coarse sediments and litter will be filtered out from the flow and water will then be directed to a soakpit. Secondary flow, in excess of the system capacity, will be directed to the Porter River via the entrance road stormwater system.

Stormwater at the north eastern end of the Village will be directed via kerbs, channels and inlet sumps to treatment and discharge via a raingarden with an underdrain. This will terminate in soakpits. Once again, secondary flow would be directed to the Porter River via the entrance road stormwater system.

Run-off from all buildings would be discharged directly to ground via soakpits.

Run-off from the carpark building will be treated and discharged via raingardens with under drains terminating in soakpits.

Overland run-off above the Village Centre will be intercepted by a cut-off drain and directed to a naturally occurring spring outflow channel (the Red Tussock Gully) with a surge chamber.

Chalets and Slopeside Visitor Accommodation

The Crystal and Porters Chalets and Slopeside Visitor Accommodation will discharge runoff to ground. There will be a raintank for each roof with soakpits for overflow and hardstand runoff directed to soakage in a shallow depression excavated in the adjacent bare ground.

For the visitor accommodation and hotel near Crystal Stream the runoff will discharge from roofs to on-site soakpits and hardstand to adjacent raingradens with underdrains terminating in soakpits.

Roads

Within the Village Centre and a short section of the entrance road above the Porter River a full kerb and channel will be used with secondary flow directed for final polishing in shallow vegetated depressions at dedicated locations. All other Village roads will drain to a 150mm deep channel on the inside of the road. This will be armoured with shingle (sourced on-site) with sumps excavated to the underlying silty gravels. Siphons will direct overflow to a drain discharging to the nearest waterway via ephemeral gullies. Rip rap armouring will be installed at the head of the gullies.

On-Mountain

In defined locations e.g., the Day Lodge stormwater from roofs and hardstand will be discharged to ground via soakpits.

Maintenance

Best practice operation and maintenance procedures are proposed. These include:

- regular inspection of infiltration basins, raingradens and sumps
- the removal of accumulated sediment visible hydrocarbon, litter and debris within a minimum time period of inspection
- replanting vegetation
- emergency spillage procedures

Construction will be subject to a detailed Stormwater Erosion and Sediment Control Plan

6.4 Village

The key features of the proposed Village are described in detail in Appendix 6 Village Architectural Concept.

The Village is located at the base of the Porters and Crystal Basins where there is a natural building platform on the terrace above the Porter River. This platform offers a discrete building platform of sufficient scale for a Village and is largely hidden from public view. The form and shape of the Village has been purposefully designed to respond to the topography and natural contours of the site. This is evidenced by the road layout (as described in Section 6.2.2 above) which follows a north/south alignment parallel to the Porter River. The main road axis generally travels around the base of the ridge that extends down from the Basins above. The roads in general however, have a sinuous pattern in response to the natural contours.

The proposed Village is divided into 5 development areas. It has a compact centre but otherwise the intensity of built development reduces at the outer edges of the Village boundary. Appendix 6 provides detailed schedules of the key calculations and activities for all buildings, including the following. It must be acknowledged that these

calculations are theoretical and are provided to give an indication of how development within the Village may proceed.

- building footprints,
- building heights
- gross floor area
- retail and service net lettable area
- density in terms of beds and bedrooms
- beds
- car parking

6.4.1 Village Centre

The centrally located commercial hub of the Village offers benefits not only in terms of visually concentrating built density but also optimising pedestrian accessibility from the surrounding accommodation to the commercial and entertainment hub.

The Village Centre occupies 5.5ha of land. The main Ski Area Access Road from the State Highway connects directly with the Village Centre into an underground carpark. The roof of this carpark forms the ground for the Village buildings and it is intended that the carpark will be connected to the Village by stairs, escalators and lifts. A drop-off point will also be nominated, but is likely to change between winter and summer when the number of visitors to the Ski Area drops.

The Village Master Plan shows 18 buildings within the central area (including the car park). These are quite dense in terms of built form but provide the opportunity to create well defined public spaces such as squares, plazas, lanes and a “main street”. The objective is to create a sense of community and activity with restaurants, shops, tourist services etc.

From the drop-off point or carpark, pedestrians wanting to access the mountain will take a short walk through the main street to a skiers plaza. This will be the base or terminal for taking a gondola or chairlift ride to the Ski Area.

The buildings of the Village Centre are intended to be of variable height, ranging between 2 and 6 storeys. They will be architecturally designed and finished in materials and colours complementary to the values of the surrounding environment.

6.4.2 Slopeside Visitors Accommodation

This area sits to the south west of the Village Centre. It is approximately 4.3ha of land on north facing slopes overlooking the Porter Stream. It is proposed to locate visitor accommodation in this area with views across the Porter Stream and a snowplay area at the base of the Porters ski field. The proposed buildings would be of variable height and footprint.

Car parking is to be provided in basements or at grade with pedestrian paths connecting to the Village Centre.

Closer to the Porter River, the Master Plan shows a cluster of recreational hot pools.

6.4.3 Hotel and Visitors Accommodation

This area sits to the north of the Village Centre. It is approximately 3.4ha in area and overlooks the confluence of the Crystal Stream and Porter River and out towards Castle Hill. A total of 8 buildings are proposed within this development area to for visitor accommodation and related commercial activities. Of the 8 buildings, one of these is a single large hotel with an attached wellness centre.

Vehicle parking is to be below-ground with easy pedestrian access via paths back to the Village Centre.

Porters Chalets

This area of the Village is approximately 2.8ha and broadly covers the top of a rounded ridge above the Porter stream and Porter River. It is proposed to locate 12 individual chalets in a clustered arrangement within this development area, all of which would obtain views to Castle Hill, the Porters and Crystal Basins.

An inclinator is proposed to provide direct access for residents of these chalets to the Village Centre.

Crystal Chalets

The Crystal Chalets are located on a rising slope overlooking the Crystal Stream. A total of 33 chalets are proposed, and like the Porters Chalets will have their own garaging. The building footprint for the Crystal Chalets is however more restrictive than that provided for the Porters Chalets, where there are fewer buildings proposed.

The road serving the Crystal Chalets will have a zig zag alignment as it follows the contours up the slope.

6.4.4 Vehicle Parking

Car parking will be provided throughout the Village. The basement car park under the Village Centre will provide a total of 1,125 cars. Car parks will also be co-located with visitor accommodation, apartments, chalets and hotels. Open parking will be provided between the Village Centre and the Porter River, but is more likely to be used for over-flow due to the extra distance from the Village Centre relative to the Village Basement car park.

A total of approximately 2,000 carparks have been accounted for on the Master Plan.

There is also provision for a helipad.

6.4.5 Landscape Treatment

It is intended that the Village Centre will be a built environment however the buildings in the Hotel/Visitor Accommodation, Slopeside, Porters and Crystal Chalet areas will sit within a natural setting with no suburban fencing or gardens.

The landscape planting within the Village will be limited to a specific list of indigenous species. The detail of this planting will be subject to later resource consent processes however an Outline Planting Plan has been prepared with which future planting must generally conform. This plan provides for six planting patterns where the combination and proportion of species is prescribed within a pattern. The purpose of these planting patterns is to replicate naturally occurring patterns and ensure that the planting integrates and blends with the surrounding vegetation beyond the Ski Area Sub-Zone boundary.

6.5 Mountain Facilities

6.5.1 Village/Mountain Connections

The Village will be connected to the Ski Areas via:

- A gondola from the Village Centre to the Base Station in Crystal Ski Area
- A gondola from the Village Centre to the Porters Ski Area (the existing access road to become a service road only)
- Return trail from Porters Basin to the Village Centre/Slopeside Visitors Accommodation
- Return trail from Crystal Basin to the Village Centre/ Crystal Chalets
- In summer, trails may also be used for walking or mountain biking.

These connections are shown in Figure 3-3b.

The return trails will be up to 12m wide and will require excavation and filling to form. The trails also provide the route for underground services that require connection between the mountain and Village e.g., power, water.

6.5.2 Ski Area Trails – Crystal Basin Ski Area

A network of trails is proposed for Crystal Basin Ski Area. The Mountain Master Plan provides an indicative layout, illustrating how the trails could be developed (see Figure 3-3b). It is noted that all trails will require earthworks and will therefore be subject to more detailed design and later consent processes.

The design of the trails is based on the need to achieve gradients suited to beginner, novice and intermediate level skiers. In addition, the length or extent of trails available needs to be aligned with the proportion of skiers at those levels. For the

skiers it is important that trails dedicated to a particular skill level do not change to a higher skill level which may compromise either the enjoyment or safety of the experience.

Excavation and filling will be required to form the trail network.

As noted above in Section 6.2.4 a 6m to 7m wide trail is to be constructed form Porters Basin to the Day Lodge in Crystal Basin. This will provide a ski trail between the two Ski Areas as well as summer access, a route for power and communications cables, water and sewage pipelines.

6.5.3 Lifts – Crystal Basin Ski Area

Three lifts are proposed within the Crystal Basin Ski Area (see Figure 3-3b). These lifts will provide access from the Day Lodge and the bottom end of the trail network to different locations within the north and south bowls of the Crystal Basin.

6.5.4 Day Lodge

A Day Lodge is proposed for the Crystal Basin Ski Area. This building would provide the main skier amenities/facilities on the mountain. It would typically include:

- Cafe
- Toilets
- Day Storage
- First aid
- Gear hire
- Ski school
- Ski Area management and operations control

The location and design of the building would be subject to a later resource consent process but would require a lower, flatter location within the Crystal Basin as indicated on the Mountain Master Plan.

6.5.5 Snowmaking Reservoir

A new snowmaking reservoir to service both Porters Basin and the expanded terrain in Crystal Basin is proposed. The new reservoir is to be located in the South Bowl of Crystal Basin as shown in Figure 3-3b. The existing snowmaking reservoir in Porters Basin is to be decommissioned and replaced with a new snow

The concept design is for a bunded and lined earth reservoir with a capacity of 90,000m^3. The maximum filled embankment height would be approximately 9.5m

with a nominal 1m freeboard, 5m crest width and 1.5H : 1V batter slopes. The detailed design and final location will be subject to later consent processes. It is however proposed that the reservoir will be located away from obvious surface water features and will have features to prevent water ingress.

The reservoir is to be pump-filled from a water take in the Porter Stream with provision for emergency overflow. The elevated location of the reservoir will allow gravity feed to the snowmaking system in Crystal Basin.

6.5.6 Snow Play Area

On the slopes immediately above the Village (at the base of Porters), it is proposed to excavate a Snow Play area. This is intended to be a readily accessible area from the Village where children and non-skiers may choose to play in, or experience, the snow.

6.5.7 Porters Basin

The proposed Ski Area Sub-Zone provides the opportunity for recreational facilities and amenities and the trails within the Porters Basin to be up-graded or changed. No proposals are shown as part of the Mountain Master Plan other than a combined chairlift and gondola, re-contouring and realignment of existing ski trails and a return trail providing direct access between the Village and Porters Basin.

Any such future proposals would need to comply with the provisions of the proposed Ski Area Sub-Zone and resource consents would be required for buildings and earthworks.

6.6 Areas of Protection and Ecological Care

6.6.1 Crystal Basin Alpine Flush

An indigenous habitat associated with an emerging spring has been identified towards the bottom of the Crystal Basin (see Figure 3-2). This is described in the Ecology Assessment (Appendix 2) as a lush cover of alpine herbs and the most diverse vegetation community in Crystal Basin. This small and vulnerable habitat is to be protected in perpetuity from Ski Area activities through a covenant to be registered on the title.

6.6.2 Red Tussock Gully – Village

An ephemeral stream traverses the Village Centre, travelling from the higher ridge above the Village towards the Porter River. This depression is an important wetland feature that is to be kept free of buildings and hardstand.

6.6.3 Porter Stream

The margins of the Porter Stream are to be kept free of built development and through the proposed Plan Change provisions will be subject to a future management plan to ensure the maintenance of in-stream and riparian values.

In addition, a residual flow regime has been developed to identify the minimum water flows required to maintain existing aquatic habitat. This residual flow is to be implemented and monitored through Regional resource consent conditions.

6.6.4 Crystal Stream

The Crystal Stream sits outside the Plan Change boundaries. It is however acknowledged as an important natural feature and habitat that should be maintained and enhanced as part of this proposal. It is proposed to develop a management plan for the enhancement of Crystal Stream through the provisions of the Plan Change. This management plan may include actions to prevent exotic fish species from entering the Stream (acknowledging these would be subject to additional consent processes).

It is intended to remove the Ski Club's existing water takes from the Crystal Stream. These service the Alpine Lodge and would be replaced by an alternative supply from the Village water supply.

6.7 Future Visitation Projections

As described in Section 4.0 Rationale for the Project, Porters has undertaken considerable market, commercial and environmental investigation to inform its decision-making on the future of Porters Ski Area. This has included international expertise in the assessment of skiable terrain within Crystal Basin and its skier capacity.

Based on that investigation the future visitation projections for the Ski Area are set out as follows. These projections are based on the assumption that the ski season extends from mid-June to mid October or 120 skier days and full utilisation of the available terrain in Crystal Basin and Porters Basin Ski Areas. It is noted that it may take some 10 to 15 years for full utilisation of the terrain to be achieved.

It is noted that Appendix 12, Market Demand Assessment indicates more conservative visitation numbers but also acknowledges that there is potential for significant growth above the assessment up to full mountain terrain capacity. Sound resource management should however be based upon and reflect the maximum visitation numbers to ensure there is a full understanding of effects and to avoid ad hoc and incremental planning decisions. A well prepared Master Plan based on full development is a more appropriate basis for planning for the longer term.

Of the 120 days referred to above, 6 days would be closed leaving a balance of 114 available skier days.

Ski Area daily carrying capacity based on full terrain capacity:

Terrain Comfortable Carrying Capacity	6,000 skiers per day

Average Forecast Skier Usage	2,722 skiers per day
Peak Skier Usage Capacity	6,900 skiers per day
Average Winter Non-Skiing Visitors	480 daily
Annual Visitations (rounded)	300,000 skiers

Preliminary analysis has been based on Porters historical visitation patterns and the ability to extend the season with improved snowmaking capacity. The anticipated pattern indicates:

- 60% of all visitation will occur in winter (June to October) with 40% of visitors spread over the balance of the year
- Of the winter visitation 80% will occur in July and August (39% in July and 34% in August)
- The average number of skiers per day: June = 3,507; July = 4,513 and in August = 3,939
- Of the non-winter visitation December, January and February are the busiest months
- The average number of non-winter visitors per day: December = 1,408; January = 1,408 and February = 1,357

6.8 Staging and Construction

The expansion of Porters Ski Area into Crystal Basin along with the development of the Village is an integrated development package. Some development within the Village is necessary contemporaneously with the expansion into Crystal Basin in order to provide the required capital as well as create a base level of facilities and amenities that visitors would anticipate.

Porters acknowledges that the community will require some level of commitment that the enhanced terrain and facilities proposed for Crystal Basin will be implemented.

Having regard to these matters Porters proposes a staged development plan which allows for development in the Village up to a specified limit. Prior to any further additional village development a specified amount of development and infrastructure must be established in Crystal Basin.

The initial phase of Village development will proceed in accordance with market demand. Accordingly, there is no timeframe specified for the initial development stage of the Village.

6.8.1 Initial Village Development

Development within the Village shall be limited as follows:

- Subdivision and construction of up to half the residential allotments in both the Crystal Chalets and Porters Chalets.

- Construction of up to 50% of the buildings in the Village Centre, Slopeside and Hotel/Visitor Accommodation "sub-zones". There is a maximum number of buildings proposed in each of the "sub-zones" by the proposed Plan Change.

6.8.2 Initial Ski Area Development – Crystal Basin

The following development must be achieved before any further development can proceed in the Village:

- Formation of access track linking Porters Basin to Crystal Basin

- Construction and commissioning of a snowmaking reservoir

- Construction and commissioning of a gondola from the Village Centre to Crystal Basin

- Installation and commissioning of a chairlift providing skier access to the top of the Crystal Basin

- Construction of a Day Lodge

- Formation of ski trails within Crystal Basin with daily capacity for up to 1,500 skiers

It is anticipated that the development of Crystal Basin Ski Area and any up-grading to the Porters Ski Area will be on-going in response to market demands.

6.8.3 Final Development – Village

On completion of the Initial Ski Area Development Stage the balance of the Village development can proceed.

6.8.4 Construction Management

All subdivision, earthworks and building within the Ski Area Sub-Zone will require resource consents from the Selwyn District Council. Additional consents are also likely from the Canterbury Regional Council.

The methodology, techniques and best practice protocols for construction will be detailed and approved as part of those processes.

7.0 EXISTING ENVIRONMENT

This Section of the AEE summarises the key features of the Existing Environment as described in the technical reports. This Section is intended to provide an overview and reference should be made to the full report for more detail.

The individual reports from which this information is taken are not individually referenced. Other sources are referenced where used.

Figure 3-3 shows the named topographic features of the site and its surrounds.

7.1 Geology and Landform

Key features of the existing environment

The geology and landforms of Porters Ski Area are typical of the Craigieburn Range

The Ski Area comprises two large alpine basins comprising scree slopes with occasional rock outcrops above less steep slopes with more recent windblown and alluvial deposits

The rock glacier landform in the North Bowl of Crystal Basin is one of at least 8 along the Craigieburn Range and a landform found at other locations along the eastern side of the South Island

No geomorphic evidence for active mass movement was observed on the rock glacier

No significant slope stability constraints have been identified to the development of the proposed Village Base Area or Crystal Basin Ski Area.

Deeply incised waterways (Porter River, Porter Stream, Crystal Basin) are flanked by terraces

The risk posed by avalanche hazard in the Ski Areas is and can continue to be managed by conventional engineering design and ski area management

The technical information summarised in this section can be found in Appendix 8. CPG 2010: *Porters Ski Area. Wastewater, Stormwater, and Water Supply Infrastructural Options Assessment Report,* and Appendix 1. URS 2010: *Geotechnical Draft Summary Report.*

Porters Ski Area lies at the southern end of the Craigieburn Range on the north-west side of the Porter River. The range is aligned north-east/south-west. Past glaciations and periglacial activity have resulted in steep to precipitous mountain slopes which have been modified by post glacial erosion. Cirques, containing moraine or rock glaciers, are common above 1400m. Rock outcrops and bluffs form sharp ridgelines and steep cirque walls (Shanks *et al* 1990)[2]

[2] Shanks *et al* 1990: *Coleridge, Craigieburn and Cass Ecological Districts. Survey report for the Protected Natural Areas Programme.* New Zealand Protected Natural Areas Programme. No 10.

Published geologic mapping shows that the Porter River Basin is comprised of a "Torlesse" greywacke made up of sandstones and mudstones typical of most of the Southern Alps. Greywacke is often highly fractured and forms extensive scree deposits of angular gravel. The bedding orientations are variable, but typically moderately steep and into the slope – this limits the potential for land sliding on bedding.

The greywacke basement strata are overlain by a sequence of Tertiary volcanic sediments, sandstones and (in places) limestones. These are overlain by various alluvial, glacial and windblown surficial deposits infilling the valley floors. Upslope the surficial deposits generally comprise eroded scree and active and rapid soil formation. These are all characteristic features of an alpine environment. The area has resulting topography typical of Canterbury intermontane ranges comprising steep, east-facing mountain slopes, high alpine cirque basins and deeply incised river valleys.

The highest parts of the area subject to the Plan Change ("the site") are around 2000 asl, and the level at the Porters River is approximately 900 asl. On this site, the terrain is largely bare rock screes above the 1200m contour line. Two large cirques (Porters and Crystal Basins) dominate the upper slopes. Crystal Basin (in which the proposed expansion to the ski terrain would be located) is made up of north and south bowls the bases of which are covered by gravel, cobbles and boulders. The slopes are active talus deposits with occasional rock outcrops and rise to around 2000m. Several groundwater springs are present at around 1500m and these contribute to Crystal Stream which flows out of the basin down to Porter River.

A rock glacier landform suite was identified within Crystal Basin north bowl. Rock glaciers are masses of poorly sorted, angular debris resembling small ice glaciers. They form at the base of cliffs or scree slopes and move downvalley under the force of gravity when interstitial ice melts or deforms. Their occurrence depends on temperature (affected by aspect and altitude) and precipitation combinations.

Investigations were carried out for Porters to:

- Assess the distribution and frequency of rock glaciers in the area; and
- Assess whether the rock glacier in Crystal Basin is actively moving.

The work confirmed that rock glaciers are found widely along the eastern ranges of the South Island, including at least 7 in the Craigieburn Ranges. Analysis of aerial photographs and field observations were carried out to note that the landform is likely to be an undifferentiated rock glacier landform of both glacial and periglacial origin, comprising a mass of poorly sorted, angular talus. The weathered appearance of the landform feature and the presence of lichen and vegetation also suggest that it has not been recently active.

The steeper sides of Crystal Basin consist of scree with occasional rock outcrops. The scree slopes are dynamic surfaces; however in winter the stability increases due to the stabilising influence of snow and ice.

Investigations were also made to:

- Assess the constraints placed by active faulting, slope instability, flooding and snow avalanche on development proposals
- Confirm the geotechnical suitability of the land for development

The Porter River Valley is bounded by the Cheeseman Fault to the north and the Torlesse Fault to the south and lies in an area of high seismic hazard. However, the risk posed by surface faulting to development in the Village Base Area is deemed acceptably low. Further, no evidence for active faulting has been identified within the proposed Crystal Basin Ski Area.

Porter River cuts through glacial outwash and on its northern side has a series of terraces and scarps characteristic of other rivers in the area (e.g. Broken River). The 1 in 100 year flood hazard for Porter River, Porter Stream and Crystal Basin has been defined and mapped to provide a base-line for defining flood-avoidance zones for infrastructure.

No significant slope stability constraints to the development of the proposed Village Base area or the proposed Crystal Basin Ski Area have been identified.

Avalanche data is still being assessed, but Appendix 1 observes that the Crystal Basin is less likely to be affected by avalanches than the existing Porters Ski Area.

7.2 Soils

Key features of the existing environment

Soils are typical of those found throughout the South Island in mountain environments.

The soils have poor water retention qualities, low nutrient status and are susceptible to erosion when vegetation cover is disturbed

Soils have high rates of surface and sub-surface infiltration

The technical information summarised in this section can be found in Appendix 8. Porters Ski Area. Wastewater, Stormwater, and Water Supply Infrastructural Options Assessment Report and Appendix 2 Ecology report and assessment of effects.

The main soil groups on site are Upland High Country Yellow-Brown Earths on hill and steep land, which are mainly of either the Kaikoura or Tekoa sets. These soils are very extensive throughout the South Island. They are formed on schist and greywacke rocks on slope deposits (talus and colluviums) and in places on a very thin cover of loess. All these soils have poor water retention qualities. Generally this soil grouping is categorised as being of low nutrient status, with a high susceptibility to erosion when vegetation is burnt or grazed.

Test pits were used to assess the infiltration rates of soils in the proposed Land Treatment Area (LTA) on the Northern terrace. The soils there are classified as fine sandy loams to sandy loams, weakly to massively structured. The average infiltration rate across the three sites tested was over 300 mm/hr which indicates that the soils are well-drained to rapidly drained. Sub-surface infiltration tests were also conducted on the areas in which buildings will be constructed (and where stormwater discharge to ground is proposed) - rates of between 110 and 226 L/sec/m^2 were recorded across the site.

7.3 Climate

Key features of the existing environment

25% precipitation above 1000m falls as snow

Snow pack at Porters Ski Area develops during May/June, peaks in September and thaws rapidly until mid-January

Frosts can occur throughout the year; frost heave is common on exposed soils

North-west winds are a common feature

Porters Ski Area has an alpine/montane climate, typical of the Craigieburn Range and Craigieburn Ecological District. The District has a cool, wet climate with a precipitation gradient from west to east influenced by the Main Divide. The upper slopes receive up to 2000mm rain per annum and 25% of the precipitation above 1000m falls as snow – the snow pack develops from mid-May to late June, peaks in September then rapidly thaws any time between September and mid-January.

There is no permanent snow in the Ecological District, and the depth and duration of the snowpack varies according to wind and local topography. Frosts can occur throughout the year, and frost heave effects on soil are common.

In summer the District experiences frequent strong, dry north-west winds which cause low humidity and high evapo-transpiration rates. The winds and temperatures have a high diurnal range.

7.4 Waterways and Hydrology

Key features of the existing environment

The permanent waterways on/adjacent to the site are Porter River, Porter Stream and Crystal Stream.

Springs and groundwater feed these and ephemeral waterways on the site.

Water quality is high; nutrient status is low.

The flow in Porter River upstream of the site is approximately the same as that in Porter Stream and Crystal Stream.

The technical information summarised in this section can be found in Appendix 8. CPG 2010: Porters Ski Area. Wastewater, Stormwater, and Water Supply Infrastructural Options Assessment Report, Appendix 10 Regional Council Consents AEE, and Appendix 2 Ecology report and assessment of effects.

The site is partially bounded along the south-east by Porter River which flows from its source in wetlands near Coleridge Pass to its confluence with Broken River (total of 14km) downstream of the site (approximately 10km). Within the site there are only two permanent surface tributaries to Porter RIver: Porter Stream which flows down from below the existing

car-park/facilities area and Crystal Stream which flows out of Crystal Basin. Other small, ephemeral waterways flow to the Porter River at times of high rainfall but the only one of size within the Plan Change area runs north of, and almost parallel to, Porter Stream which it joins just upstream of the point where the existing Ski Area Access Road crosses Porter Stream. (See Figure 3-3)

Estimates of mean flow have been made (T Hughes, CPG pers comm.) as follows:

Porter River: 240 L/sec

Porter Stream: 208 L/sec

Crystal Stream is estimated to have a flow of a similar order just above its confluence with Porter River.

Water quality in these three waterways is typical of a natural-state waterway in this location. They have low nutrient status, and high quality as shown by the macroinvetrebrate fauna sampled (see Section 4.7). They run clear except at times of extreme rainfall events when they may carry a high sediment load. No evidence of mineralisation or other irregularities was observed during field work by ecologists or hydrologists working on investigations.

Snowmelt and rainfall on the upper slopes of the Porter River Valley percolate into scree and emerge as discrete springs at lower levels (e.g. Porter Stream). There are two distinct springs on the site. One, the source of Porter Stream, emerges below the access road. The second discharges into the depression that forms the red tussock gully on the Southern Terrace (see Figure 7-4).

Groundwater appears to be to responsible for the majority of streamflows on the site and flows up to 30 L/sec have been recorded near the existing ski area car park.

7.5 Landscape

Key features of existing environment

The site is located in what is currently an Outstanding Natural Landscape in the District Plan which encompasses the Craigieburn, Torlesse and Big Ben Ranges.

Natural character value is high in Crystal Basin, Crystal Stream/Valley and the upper reaches of Porter River.

Modifications (for existing ski area activity) reduce the natural character of Porters Basin, Porters Basin lower slopes and the Southern terrace

Aesthetic values are high in Crystal Basin, Crystal Stream/Valley and Porter River

Amenity values are high or relatively high in the Porters lower slopes, Southern Terrace, and Crystal Basin

Visual diversity is highest in the lower slopes of Porters Basin and Crystal Stream/Valley

The visibility of the entire project area is comparatively low

The technical information summarised in this section can be found in Appendix 3: Assessment of Landscape Effects and Appendix 2: Ecology report and assessment of effects. Appendix A of the Assessment of Landscape Effects contains detailed methodology and descriptions of landscape character units, with photographs (to illustrate the characteristics which are not repeated here).

The main landscape types and features surrounding the proposed Plan Change area are shown on Figure 7-1 and are:

7.5.1 Landscape Values

Wider Landscape Values

The wider area around the site comprises typical landscape features of the Canterbury foothills, such as erosion prone, apparently bare scree slopes; alpine basins with distinctive ridgelines; low lying vegetated fans; and incised watercourses.

A large area of land around Craigieburn, Torlesse and Big Ben Mountain Ranges has been identified as an Outstanding Natural Landscape in the Selwyn District Plan[3] and in the Canterbury Landscape Study (BML and Lucas, 1993[4]). The High Country has outstanding landscape values compared to the more intensely farmed and settled plains areas in the Selwyn District. However, it is acknowledged that the High Country landscape has also been modified by human activities, particularly pastoralism as well as ski field development. The earthworks and structures associated with these activities have also led to a reduction in natural character, but they do not dominate this large-scale landscape or diminish its high aesthetic value.

The Craigieburn Mountain Range forms a relatively homogenous landscape with bare scree slopes along the tops, shrubland on fans and gullies, and mixed tussock grassland on low-lying river terraces. The dramatic High Country landscape does not provide a high level of visual diversity, but the ridgelines and basins form a distinctive pattern.

The mountain ranges surrounding Castle Hill Basin provide an impressive backdrop when experienced from State Highway 73. The area is well recognised by both New Zealanders and tourists passing through the area.

7.5.2 Natural Character and Landscape Values of the Plan Change Area

Access to the Ski Area is off SH73, south of the crossing of Dry Stream. After the turnoff the gravel road passes an operational limestone quarry before entering the

[3] Based on High Country Section- Landscape Recommendations, prepared for Selwyn District Council by Graham Densem (November 2001)
[4] Boffa Miskell & Lucas Associates (1993) Canterbury regional landscape study for Canterbury Regional Council (CRC)

Porter River Valley. The road runs parallel to the river, elevated more than 50m above the river for much of the way. Then it drops down to cross the river bed before climbing again and approaching the existing staff accommodation buildings (x3), lower workshop, outdoor equipment storage, the ski club lodge and generator shed. The river is crossed with a culvert and the road rises to the south terrace, where the existing six buildings and storage area are located.

The terraces, which have been built up with coarse fan material are now incised by Crystal Stream.

From the lodge buildings a gravel access road zig zags up to the existing ski field. The road crosses the lower, north facing slopes of Porters Basin. Below the car park a water storage pond is located for snow making purposes. The ski field is confined to the north-east facing slopes of Porters Basin.

The slopes of the ski field have been graded in some areas and access tracks are visible on the scree surface.

The proposed development will be located across 7 landscape character areas, each with distinctively different landscape characteristics and levels of modification (see Figure 7-1)

Landscape character attributes (visual and cultural attributes, connections and transitions) and landscape values (natural science values, legibility and aesthetics) are described for the following units:

- Porters Basin
- Porters lower slopes
- Southern Terrace
- Crystal Basin
- Crystal Stream
- Porter River
- Northern Terrace

Porters Basin

Porters Basin is the cirque basin which contains the existing Porters ski field.

It is located east of the main ridge of the Craigieburn Range (1980masl) and is visually contained by the spurs to its north and south. Similar to other hanging glacier basins in the area, it flattens out along the shoulder of the mountain range at an altitude of approximately 1300masl. The tops of the primary ridges and the upper slopes of the basin are bare, while the lower slopes have low shrub vegetation. Some rock outcrops along secondary ridges of the basin add visual diversity to the otherwise homogenous scree slopes which dominate the landscape character area. A secondary ridge forms a landscape feature within the Basin and extends down into the Porters Basin Lower Slopes character unit.

The Basin is modified by ski area tow bar lifts, trails and tracks including the unsealed ski field road, which zig zags across the slopes below the Basin and a 4 WD track to the top ridge. The existing ski field facilities (buildings, main car park and the lift base station) are minor in scale. In the absence of snow the existing structures visually blend in with the environment due to their design, colour and scale.

A water storage lake for snowmaking is situated below the carpark. When viewed from below, the small dam of the lake cannot be distinguished from the surrounding scree slopes, and the contrasting colour of the water surface is highly visible only when viewed from above.

The natural character of the Upper Porters Basin has been modified by the existing ski field facilities. However, they are comparatively small in scale and the distinctive ridges and bare scree slopes of the mountain basin still dominate the landscape and the erosion processes are highly legible in this landscape.

The ski field access road on the lower slopes has affected the visual amenity more than the ski field in the upper basin while seasonal changes such as snow cover on the tops are transient values that are an integral part of the landscape character of the Craigieburn Range.

Porters Lower Slopes

The slopes below Porters Basin drop relatively gently towards the Porter River and are dissected by a secondary ridge which separates two small creeks on either side. The southern creek is Porter Stream which flows throughout the year, while the stream north of the secondary ridge is ephemeral. The two join forming a wetland. Below this ridge the lower slopes are flatter and are covered with dense alpine scrub and snow tussock particularly in the area ofhigher soil moisture around gullies.

The ridge between the Porters and Crystal Basins flattens out before terminating above the toe slope fans (South Terrace), where the existing ski field lodge is situated. The lowest slopes are located in a very contained visual catchment and the views out towards Castle Hill are very limited due to the prominence of the ridge dividing Crystal and Porters Basins. The ski field access road cuts across the lower part of these slopes, which has led to very obvious scarring.

The visual contrast between the bare scree ridges and the vegetated parts of the inner slopes is significant and produces a higher level of visual diversity within this landscape character unit than in the more alpine parts of the study area. Porter Stream has been largely unmodified except for the ski field road and associated earthworks.

The visual amenity value of the lower slopes is relatively high, but the existing ski field road detracts from the naturalness and visual intactness.

Southern Terrace

The Southern Terrace consists of relatively flat land bounded to the north by the deeply incised terraced stream bed of Crystal Creek and to the east by the Porter River.

The staff accommodation block is located close to the Ski Area Access Road while the ski lodge site is located near to the top of the true right terrace above Crystal Stream. A short gravel road runs along the flat top of the fans.

The elevated nature of the terrace leads to very low visibility of the existing structures in this landscape area from the Ski Area Access Road.

Distinctive alpine shrubland vegetation covers most of this landscape character area. Some wetland vegetation has established around the confluence of the branches of Porter Stream. A few beech trees, planted approximately 20 years ago, are located close to Porter Stream. The fans are the most densely vegetated part of the project area.

The visual amenity of the South Terrace is high. However, the lodge buildings, associated car parks and access road have substantially modified the natural character of this landscape unit.

Crystal Basin

Crystal Basin contains two separate hanging glacier basins (North Bowl and South Bowl) separated by a rocky ridge with a distinctive rock outcrop/knob, located at the bottom. The Basin then flattens before steepening above the deeply incised Crystal Stream.

The ridge, which forms the skyline at the head of valley, is rockier than the ridge in Porters Basin. The scree slopes appear smooth and contrast with the rocky outcrops on the skyline. Some flatter parts of the basin retain humidity in the soil and patchy vegetation in these areas adds visual diversity. The biophysical, aesthetic and natural character values of this landscape character area are considered to be higher than the more modified Porters Basin.

Crystal Stream

Crystal Stream forms below the Crystal Basin, at the confluence of two minor streams that drain the North and South Bowls and flows at a gentle gradient towards the Porter River. The slopes and banks on both sides of the stream show signs of ongoing erosion forming impressive steep scree slopes that visually define the boundary of the stream and contrast with the meandering path of the waterway. The visual diversity of the upper reaches of Crystal Stream is considered to be high. And no human change is apparent, indicating high natural character.

In its lower stretches, Crystal Stream widens into a terraced valley and the stream cuts through deposited fan material. Abundant exotic vegetation such as Lotus grows adjacent to the lower reaches, whereas the upper reaches mainly support native species. The steep terraced ravine shows signs of its formative processes and above the confluence with Porter River several channels cut through the small fan.

The stream has relatively high legibility and aesthetic values but two small-scale pump sheds reduce the natural character.

Porter River

The size of the Porter River increases below the confluence with the streams draining Porters and Crystal Basins. The Ski Area Access Road runs more or less parallel to the river along the true right slopes at a relatively constant level, while Porter River drops in elevation. Incrementally the distance between the road top of the true right terrace and the river increases, reducing its visual impact on the riverbed.

The vegetation in the riverbed of the Lower Porter River is predominantly exotic. The limestone quarry near SH 73 and the access road have left visible scars above the River's true right banks. Hence, natural character along the lower reaches of the river is considerably lower than closer to its source.

Northern Terrace

The Northern Terrace is located on the true left of Crystal Stream. It has a high level of naturalness. The land on the top of the terrace gently slopes to the east and is dissected by a number of apparent overland flow paths which fall towards the Porter River. These depressions appear to be dry most of the time and do not contain any different vegetation to the remainder of the terrace. A number of young kanuka and manuka are present.

7.5.3 Visibility

The visibility analysis methodology is described in Appendix 3 and is based on a computer generated 3D model (K2Vi Software) and site investigations. Screening vegetation in and around the Plan Change area is almost non-existent and the computer model proved to be representative of actual views on site.

The West Coast Road (SH 73) provides the major public access through the area. The main viewpoints for this analysis are public places located along West Coast Road, adjacent DOC conservation areas and more distant elevated viewpoints, such as mountain peaks located on public land. Figure 7-2 shows viewpoints described in the visibility assessment and indicative viewing distances.

Description of visibility from key locations

State Highway 73 –West Coast Road

Most people experience views of Castle Hill Basin and the Craigieburn Mountain Range while travelling along State Highway 73. From Porters Pass (VP 1) the top ridge of Porters Basin and Crystal Basin forms the skyline behind Mt Lyndon and Cloudy Hill when travelling on SH73 from Christchurch. The road then drops down from Porters Pass to Lake Lyndon and any views to the Ski Area are blocked by the intervening mountain range between Red Hill, Mt Lyndon and Cloudy Hill. Views into the Porter Valley continue to be blocked by landform until passing Dry Stream (VP 2) north of the ski field road turn-off.

When approaching from the West Coast, the prominent ridge that forms the northern boundary of Crystal Basin first blocks views to the existing Porters Ski Area. The

straight section of road between Castle Hill village and Porter River bridge does not provide any views in, other than to the prominent ridge between Porters Basin and Coleridge Pass. The outer north-facing slopes of Porters Basin are perceived as part of this ridge, which forms the skyline. Where SH73 drops down to Porter River bridge (VP 3a and b), the river terrace escarpments block views to the lower areas and the perpendicular ridgelines partially obscure the Upper Basin areas. This means that only the ridge tops and north-facing upper slopes are visible, while the basins and low-lying fans are hidden by landform.

Fleeting glimpses of the view described above is all that most people will see of the existing Ski Area when travelling at permitted speeds along SH 73 from the West Coast in clear conditions. The partially rocky ridges on the skyline are the most important landscape features, which are perceived together with the homogenous, north-facing scree slopes below. Some of the graded slopes, roads and one of the existing T-bar lifts can be detected on the upper Porter Basin slopes at a viewing distance of about 5km. A short section of ski field road is discernable on the lower slopes, as it cuts across the scree slopes. The existing lodge buildings and the base of the Ski Area are not visible from viewpoints along the road, as river terraces and protruding ridgelines block views.

Korowai-Torlesse Tussocklands Park

The northern part of the Korowai-Torlesse Tussocklands Park is located east of Porters Ski Area. Some of the points along the adjacent mountain range, extending from Cloudy Hill to Red Hill, provide elevated views into Porter River Valley and Porter and Crystal Basins at a distance of 3 to 4 km. From Cloudy Hill the elevated nature of these viewpoints allows for clear views of the entire Ski Area and lodge sites, while a protruding ridge blocks views from Mt Lyndon to the lower access road and lodge site. The existing Ski Area Access Road would visually dominate the upper part of the Porters Basin slopes from this viewing angle.

From Red Hill and Coleridge Pass at the south eastern end of the Conservation Area Porters Basin is out of sight and views are only possible into the northern part of Crystal Basin, while the southern part is out of view. From Red Hill the Basins are generally out of view behind protruding ridges and the lodge sites can only be partially seen at an oblique angle.

The Torlesse Mountain Range on the eastern side of SH 73 forms part of the Conservation Estate and is considerably more accessible and frequented by the public. However, it is located at a distance of around 8km from the site. Foggy Peak provides views to the existing ski trails and is in the line of sight to proposed lifts in Crystal Basin. Views to the lodge site and access road are blocked by the mountain range in the foreground. From Castle Hill Peak the northern and western parts of Porters Basin are visible, while the top of the ski field is partially obscured by an intervening ridge. The northern part of Crystal Basin is hidden by the ridge to its north.

From the Rakaia-Lake Coleridge visual catchment the existing Porters Ski Area is not visible. When viewed from this visual catchment, the main feature visible within the site is the top ridge between Porters and Ryton Basins, which forms the skyline for views from Coleridge Pass.

Due to extensive viewing distances and surrounding mountain ranges, the visibility of Plan Change area is comparatively low. SH 73 is the most frequented public view point. However, views into the site from this key tourist route are very limited. Much of the land around the Porters Ski Area is public conservation land. In these conservation areas visitor infrastructure, such as tracks or huts, are rare and user numbers are relatively low.

7.6 Ecosystems, Habitats and Species

Key features of the existing environment

The site is in an alpine environment that has sensitive physical and biological characteristics

The vegetation and habitats are modified in some areas by existing ski area activities, historic land uses, removal of forest cover, weeds and pests, and introduced fish. Natural disturbance occurs through erosion, land instability and climatic events.

Screes and rock formations dominate the higher basins. They support specialist native plants and animals.

At lower altitudes tall tussock grassland, and tall tussock-Dracophyllum shrubland mixes dominate and support characteristic alpine invertebrates.

Where there is high soil moisture, or greater disturbance history, exotic weed species have invaded and sometimes form the dominant cover.

When assessed against the SDC District Plan criteria, Porter Stream, Porter Stream Valley, Crystal Basin, Crystal Stream and Crystal Stream Valley are considered "significant". Other parts of the site may have locally important ecological values.

The technical information summarised in this section can be found in Appendix 2: Boffa Miskell Ltd (BML) 2010b: *Ecology Report and Assessment of Effects*.

The area subject to the proposed Plan Change lies within Craigieburn Ecological District (ED).

Natural vegetation in the ED is generally mountain beech at lower altitudes with alpine shrubland, tall tussock grasslands, scree and fellfield at higher altitudes. However, the vegetation cover throughout much of this ED has been modified by burning, farming and forestry so that now secondary shrubland and grasslands dominate the native cover. Aquatic habitats include lakes and rivers, with a limited range of native species and abundant trout and quinnat salmon.

Characteristic native birds are kea, New Zealand falcon and New Zealand pipit while common skink and common gecko are widely recorded. A nationally rare skink (*Oligosoma longipes*) has been recorded in the ED.

There are currently three large protected areas within the ED:

- Craigieburn Conservation Park
- Korowai/Torlesse Tussocklands Park

- Lagoon Saddle Ecological Area

An extensive PNA survey (Shanks et al 1990) was carried out and recommended four areas for protection.

For the purposes of describing the ecological features and values, the area subject to the proposed Plan Change has been divided into eleven management units based on a combination of topography, ecological features and proposed activities. These are shown on Figure 7-3.

Methods of ecological sampling and analysis are given in full in Appendix B of the Ecology Report and Assessment of Effects.

7.6.1 Terrestrial Vegetation, Habitats and Species

The higher altitude basins have only small amounts of vegetation cover, but provide habitats for invertebrates, lizards and birds. Below these on the more stable slopes, snow tussocks are abundant, and lower still intermix with shrubland dominated by *Dracophyllum acerosum* (see Figure 7-4). On the terraces, Dracophyllum shrubland dominates cover. In the valleys, increased moisture and former stock grazing have led to an increased presence of exotic weed species.

7.6.2 Descriptions of Terrestrial Vegetation Communities

Appendix 2: *Ecology Report and Assessment of Effects* gives full details of the areas of the different vegetation/habitat types within each management unit; including the total area of cover.

Overall, the area subject to the Plan Change has areas of modification on a gradient from significant historic actions (forest clearance) to ongoing human activities through to the nearly unmodified. It is considered that only Crystal Basin and the upper Porter River Valley currently have a low degree of modification, intact functioning and hence a high degree of naturalness.

The vegetation in the study area thus reflects natural and induced patterns and changes which include the influences of:

- Altitude, climate and soils
- Wet-dry gradients in ground conditions
- Stability and erosion processes
- Forest removal
- Historic tracking and landuses
- Introduced plants, animals and pests
- Ski Area activity

Porters Basin

The upper slopes of Porters Basin are loose screes and occasional prominent rock outcrops with little vegetation (141ha total). More stable slopes in Porter Basin show

extensive lichen development while more isolated screes and rock outcrops have occasional scree and rock specialist plants.

Over the ridge at the top of Porters Ski Area (and outside of the Plan Change boundary) lies the west-facing Ryton Basin. This Basin is notable in having only native plant species present.

Although modified by skiing activities, the Porters Basin side slopes have some snow tussock communities, most predominantly on the lower southern faces above the existing Café and parking area.

The Basin contains some examples of *Celmisia* fellfield communities; these are typified by mats of mountain daisies, prostrate shrubs and small herbs and grasses.

Beneath the looser/small screes of the northern face of Blue Hill ("Big Mama"), at the edge of the Basin and Valley, lies a zone of snow totara-tussock grasslands, inter-mixed with an assortment of grasses and herbs, which is common throughout the study area.

The transition from snow totara-tussock to relatively intact *Dracophyllum* shrubland occurs as a relatively well-defined point around 1250m to 1300m.

Porter Stream Valley

There are four basic land forms and related vegetation types within the valley - the steep scree and loose rock on the side slopes (26ha or 27% of the area); the deeper soils of the valley bottom; the riparian edges of the water ways; and depressions associated with the wetter soils in valley floor.

The upper valley is located around the existing water storage pond and parking area and has been highly modified. On the slopes above and to the north of the pond are areas of slim tussock (which includes both native species and an array of exotic weed. The south side is a continuum of the snow totara-tussock community.

Further down the Valley on the slopes, communities are subtle variations in dominance between tall tussocks and *Dracophyllum*. While relatively uniform in appearance at least 96 plant species exist in variable combinations. Generally the central ridge slopes are *Dracophyllym* dominated, the northern valley slopes are a mixture of *Dracophyllym* tall tussock and the southern slopes are tall tussock-*Dracophyllum*. Approximately 38 ha or 38% area in the valley is covered in shrubland/grassland.

The perennial Porter Stream and the ephemeral northern waterway meet just above the Ski Area Access Road crossing to form one of two wetlands on the site. These are described as a

Schoenus pauciflorus - red tussock wetland and a *Coprosma propinqua- Astelia-Polystichum vestitum*- wet shrubland.

The perennial stream riparian vegetation is a variation on the *Dracophyllum* shrubland being visually distinguished by the frequent and large fern cover, tall red

tussocks, and taller *Dracophyllum* shrubs and herbs. Exotic weeds are found near disturbed areas.

Porter River Valley

The vegetation in the broader, upper valley (upstream of the site, below Coleridge Pass) is a mosaic of tall tussock grasslands, *Dracophyllum* - matagouri shrublands and *Raoulia* - fescue - lichen stone fields. Throughout are small pockets of wetland with small sedges and rushes. The immediate riparian edge is intact and largely red tussock and *Dracophyllum* heath, but noticeable features are the abundant and large spaniards (*Aciphylla monroi*).

Moving down the valley, introduced species become more abundant and diverse; and downstream of the Ski Area Access Road crossing, introduced pastoral species are locally dominant.

On the valley floor, just upstream of the Ski Area Access Road crossing, tutu is prominent along with the exotic Lotus (*Lotus pedunculatus*). These species become increasingly dominant down the valley along with a wider array of "weed" species including *Hieracium* species and pasture grasses. Near the road crossing, the valley is still largely tall tussock grass increasing amounts of matagouri and small Coprosma. In the lower river valley, the river escarpments are tall and become heavily covered in matagouri while the valley floor becomes open and weedy.

Pinus contorta, grey willow, sweet brier and *Hieracium* (3 species) are the potentially most damaging weeds in the Valley. Lotus is abundant in the lower valley and gullies wherever disturbance occurs and it is a notable feature of the edge of Porter River and side tributaries below the Ski Area Access Road.

Porter Hillslope

The dominant vegetation type on the steep and eroding slopes is *Dracophyllum*-tall tussock shrubland (approximately 6 ha or 82% area). The vegetation cover is sparser than further up the valley and bare soil is common. Amongst the *Dracophyllum* and tussock clustered on soil islands amongst the eroding bare soils are the common herbs and grasses found in other *Dracophyllum*-tall tussock areas. Weeds are relatively common on this slope, particularly pasture grasses, *Hieracium* spp and occasional wilding *Pinus contorta*.

Southern Terraces (the Village Base Area)

The dominant vegetation type across this undulating area is the *Dracophyllum*-tall tussock shrubland (17 ha or 82% area) with a diverse assemblage of native mosses, herbs and small shrubs in the ground cover. Various ski facilities (lodges, staff quarters and associated tracks) are located here and the exotic component is associated with these and dominated by pasture grasses, *Hieracium* spp and occasional wilding *Pinus contorta*. A small number of mountain beech trees were planted here 30-40 years ago and they remain near the staff accommodation.

There are some areas of bare ground/exposed soil and these areas increase with altitude up the ridge starting west of the proposed Village Base Area. Most of the depressions across the terrace are dry throughout most of the year. However, one of the larger ones appears to arise from a central upper spring forms a gully in which red tussock is common together with sedges and rushes. Exotic species are also more common in this damper area.

Crystal Basin

In Crystal Basin there are steep tussock slopes grading upwards into highly mobile slopes of scree and shattered rock outcrops, large eroded guts and large boulder fields. A major component of Crystal Basin (164 ha or 92%) comprises bare rock and scree (some of which supports scree specialist plants and lichen vegetation). 30 hectares of more-recognisably vegetated habitat exists. These include approximately 2 ha of *Celmisia* dominant herbfields as a somewhat scattered, and relatively narrow band across the Basin. In addition there are numerous intertussock herbs and grasses and an Alpine watercourse flush created by two small steep cascading streams with a dense cover of alpine herbs.

Crystal Stream Valley

The vegetation of the Crystal Stream Valley has: steep scree slopes (30ha), loose rock slopes and steep chutes (6ha); rock outcrops (1ha); vegetated slopes; flat and bare stream terraces; and valley floor. The riparian community is relatively sparse (1.5ha) and extending only 2m from the stream itself. The general vegetation in the valley is either a mix of native grasses and herbs, exotic grasses and herbs (especially Lotus), shrubland or scree vegetation.

Along the western slopes of Crystal Stream below Crystal Basin are areas characterised by variously sized loose rock that are not scree or rock outcrop. Few plant species grow on this surface apart from species of the snow-totara community or slim tussock.

There are numerous “stable” large rock outcrop formations which have developed a distinct vegetation community. The communities of these outcrops are richer and more obvious than those in the higher altitudes of the Basin. In the lower Crystal Valley, both north and south sides are covered in *Dracophyllum*-tall tussock communities.

Northern Terrace

The Northern terrace has vegetation similar to that on the Southern terrace although there are more areas of bare ground with frost-heaved soil and rubble (especially on the lips of terrace risers) than to the south.

The majority of the area (40 ha or 97% of area) is a *Dracophyllum*-tall tussock mosaic on drier land with other prominent species including mountain daises and spaniards. Even the depressions and apparent water gullies are so dry as to contain no spring flush or different vegetation. A number of young kanuka are found on this terrace in the upper (western) area and two copses of manuka are present.

Exotic species (particularly pastoral grasses) are found throughout the Northern Terrace, but generally at low levels of abundance. Wilding *Pinus contorta* and Douglas fir occur here (and need control measures).

7.6.3 Non-vegetated habitats

On the screes there is a surprisingly large number of scree specialist plants whose natural distribution is sparse but nevertheless "cover" much of the scree slopes. The rocky outcrops are rarely without lichens and prostrate herbs and provide habitat for weta, lizards and other invertebrates. Even where no plants exist, habitats may exist for a range of invertebrates.

Birds

No formal bird surveys of the study area have been undertaken, but a range of information from reports related to conservation surveys and casual observations during site visits has been used to build up a picture of the terrestrial fauna. Bird species typical of the habitats found in the study area, and recorded in Coleridge ED, were observed on the property during field work as listed in Table 7-1. There are no significant areas of aquatic or wetland bird habitats in the Plan Change Area.

Table 7-1: Birds likely to occur or observed at Porter Ski Area

Species	Habitat	Observed on site
Australasian harrier	open country	✓
NZ Pipit	short shrub	✓
Skylark	open country	✓
Spur - winged plover	open country	
Yellow hammer	shrub	
Black backed gull	open country	
Blackbird	shrub	
Chaffinch	open country	✓
Grey warbler	forest	
NZ falcon	open country	✓
Magpie	open country	

Species	Habitat	Observed on site
Paradise shelduck	river valley	
Red poll	forest	
Riflemen	forest	
Silvereye	forest	
Song thrush	shrub	
South Island Pied oystercatcher	riverbed	
Kea	open country	>20

Invertebrates

Three recognisable and distinct zones with distinct invertebrate faunas (typical of Canterbury mountains) are recognised in the study area:

- *Chionochloa* tussock grassland, below 1000masl
- Rock scree and associated plants (eg. snow totara) between 1000 and 1600masl; and
- Bare rock, lichen and specialist plants zone; above 1600masl.

The various trapping methods recorded a number of indicator or iconic taxa including 12 moth taxa, three butterfly taxa, three grasshopper taxa, two weta taxa and several beetle taxa.

No taxon found is recognised as a threatened species (Hitchmough 2006). However, the mountain stone weta, the alpine cicada and the mountain ringlet butterfly are iconic of special alpine type habitats. Brachapsis 'lowland', recorded in previous work on lower pastoral lease land (DOC 20025), is a rare grasshopper that may be present on Porters Ski Area.

Reptiles

Five days of skink trapping were undertaken in February 2007 and supplemented by reptile habitat searches made during general vegetation survey work.

DoC records suggest two skink (*Leiolopisma nigriplantare and L."longtoes"*) and one gecko (*Hoplodatylus maculatus*) species were found in the habitats present within the local area (DoC 2002 (but records for the “long-toes” were in 1988)). Distribution records also suggest a third skink species (*Leiolopisma "otagense*" form) may also

[5]Department of Conservation (2002). *Castle hill Pastoral Lease Conservation Resources Report.* Released by Land Information New Zealand.

be present. In 1990 the PNAP survey team reported this species in Ryton Basin (Shanks *et al* 1990).

The surveys undertaken for this project confirmed the presence of *L.nigriplantare* but not "long-toes" The common gecko (*H maculatus*) is likely to be present, especially in the shrub covered gullies and Porter River Valley where shrubs are thickest and tallest. A less arboreal gecko, it is often found in clear areas on shingle banks and scree-shrub zones.

Of the four species potentially present, only *L."long-toes"* is considered threatened and likely to be found in the habitats of least abundance on the property, i.e. the middle and upper Crystal Basin.

Introduced species

Introduced animals have been observed in many parts of the study area, both in the course of ecological surveys 2007 and 2010 and by Ski Area workers and visitors. In the lower Basin where the tussock grasslands are flatter and more sparse, are “camp” grounds for red deer, chamois and feral stock. Mice are commonly reported in the existing Ski Area Lodge, staff accommodation and base buildings. Hares are also common but there is no other sign of mammals (such as hedgehogs).

Despite the periodic grazing pressure of ungulates and hares, weed species and induced disturbance are generally absent over most of the study area. The communities of plants and their distributions support this observation.

7.6.4 Aquatic Habitats

The Plan Change area includes only two permanently flowing waterways - Crystal Stream and Porter Stream. However, the Porter River and alpine seepages are also discussed within the study area, since they form the receiving environment for most potential discharges and tributary inputs while outside the core activity area. There will be work in the bed of the Porter River in relation to the upgrade of the Ski Area Access Road.

The AEE accompanying resource consent applications for activities relating to waterways contains more detailed information about aquatic environments and ecological values.

As reported in the Castle Hill lease report (DoC 2002) seven species of freshwater fish have been reported associated with the Porter River see Table 7-2

Table 7-2: Fish reported from Porter River catchment (DOC 2002)

Fish		Location
Canterbury galaxias	*Galaxias vulgaris*	P, W, T
Alpine galaxias	*G.paucispondylus*	P, D
Upland bully	*Gobiomorphus breviceps*	P, W
Long finned eel	*Anguilla dieffenbachia*	P
Rainbow trout*	*Salmo gairdnerii (Oncorhynchus mykiss)*	P, W
Brown trout*	*Salmo trutta*	P, D
Salmon*	*Oncorhynchus tshawytscha*	P

*Key : P = Porter River; W= Whitewater Stream; D= Dry Stream; T= Thomas River; *= introduced species*

Canterbury galaxias is considered "not threatened" but subject to "human induced" rarity, while alpine galaxias is considered "not threatened" in the "data poor" category.[6]

Water quality monitoring was carried out by CPG during 2009 and is fully reported in Appendix 8.

Porter River

Physical features

The length of Porter River mainstem aquatic habitat within the study area is approximately 2.0km.

Above the existing Ski Area Access Road crossing the river is relatively uniform in width (2-3m wide), has the form of a run and riffle system varying between 0.3 and 0.5m deep, with a generally half metre high bank.

The substrate is a mix of large cobble, small cobble and boulder with gravel in-between. The banks are relatively stable and have overhangs and potential salmonid spawning areas. Flow at a sample cross section was measured at 240L/S by CPG in May 2010.

Below the Ski Area Access Road crossing, the main stem increases in size but not velocity as additional tributaries enter. The River banks reduce in height and the

[6] Hitchmough *et al* (2007). *New Zealand Threat Classification lists – 2005.* Department of Conservation, Wellington 194pp.

lower valley widens to create a long riffle/run system with small boulder weir steps. Riparian influence decreases with stream widening and there is an increase in bank instability and an increasing predominance of Lotus and exotic grasses.

Three areas on the Porter River have been scored for physical habitat condition using the ARC index system (Maxted et al 2002)[7]. These produced high scores and indicate the natural condition of the morphology, bank and riparian systems.

Water Quality

General observations of clarity, sediment condition, algal quality and type, and any obvious oils, sheens, foams and odours were made. These observations, together with data from CPG (Appendix 8) suggest that water quality is very good – low nutrient status, high clarity and low (undetectable) hydrocarbon levels.

Riparian vegetation

Riparian vegetation is generally 100% intact providing good edge cover (20% stream shade) and is comprised oftall tussocks, spaniards and shrubs. Lotus and exotic grasses, bidibid and herbs are common throughout. The abundance of spaniards (*Aciphylla* spp) especially is a feature of the riparian zone of the Porter River

Periphyton

Algal cover varies through the seasons and has been recorded as "present in low to moderate abundance" up to a periphyton covering of 90% cover on boulders and larger cobbles. Recent sampling (April 2010) confirmed thick periphyton growth although a heavy rainfall event was reported during March 2010 (M Sleigh pers comm).

Fish

The only fish found upstream of the Ski Area Access Road culvert were small brown trout ranging in size from 8 to 25cm. It is possible some of the smallest specimens could have been rainbow trout. Brown trout appear to dominate the upper Porter River, perhaps to the exclusion of native fish.

Macroinvertebrates

Aquatic macroinvertebrate communities are relatively simple but have a strong EPT[8] component. The mayflies *Nesameletus* and *Deleatidium*, and the stonefly *Acroperla* are abundant and numerically dominant, with Elmid beetle larvae and Chironomid larvae associated with the increased long green filamentous algae.

Crystal Stream and its Headwaters

Physical features

There are approximately 1.8 km of waterway in Crystal Basin. Crystal Stream is a permanent waterway that rises from spring flushes in the upper Crystal Basin and

[7] Maxted *et al* (2002). *Quality control report for habitat data, summer 2002.* Auckland Regional Council unpublished report, 3 September 2002.
[8] EPT = Ephemeroptera, Plecoptera and Trichoptera (Mayfly, stonefly and caddisfly)

flows to a confluence with the Porter River. In the upper basin this stream has two branches (named True Left and True Right).

The main stream is a single stem except where the gradient is very steep and it is broken into 2-4 smaller channels. Flow in the upper TR branch is estimated to be around 150 L/sec. An estimated 100 L/sec is contributed by the TL branch in Crystal Basin, giving the lower Crystal Stream an estimated flow of 250 L/sec.

Water quality

General observations together with data from CPG (Appendix 10) suggest that water quality is very good. Crystal Stream can be considered a moderately stable system with very low nutrient base, and typically clean and clear good quality water and little embeddedness. Like other waterways in the area, Crystal Stream exhibits many traits assigned to the upper mountain class of Meredith and Hayward (2002)[9] – low nutrient status, high clarity and low (undetectable) hydrocarbon levels. In the late summer, long green filamentous algae were prominent in the upper catchment and there was heavy matting of brown algae in the flush zones.

Riparian vegetation

A narrow band (1m wide on average) of short riparian vegetation lines the stream from its confluence with Porter River for much but not all of its length. Only in the lower valley are there distinct banks and these are vegetated in exotic and native grasses and herbs The riparian vegetation in the lower valley is largely exotic and offers little shade and has little value as a source of organic matter.

The upper valley, below the steep headwater flushes is less well vegetated. Centrally the riparian vegetation passes through a short tussock vegetation community before giving way to a largely barren rocky edge.

Periphyton

Periphyton cover varies through the year. In 2007 sampling, periphyton was visible as a thin film over 30-40% of larger cobbles and boulder surfaces (indicating a healthy quantity, in late summer). This score represents a good quality physical habitat in a mountain stream. In late April 2010 however, cover was as high as 100% in parts of the stream.

Fish

Sampling effort in 2010 in the upper Crystal Stream did not return any species. However, the 2007 lower valley sampling returned two species: small brown trout, and 12 alpine galaxiids (*G. paucispondylus*). Crystal Stream is noted as being an important source of native fish within the Porter River system, notably for alpine galaxiids (McIntosh pers com).

Crystal Stream has some ecological interest. Given the small size of the stream and the fish's behavioural adaptations, the alpine galaxiid is thought to be able to co-habitat with trout in this stream, although this may only be a temporary situation. It may be that the trout are not able to grow large enough (<150mm) to become

[9] AS Meredith & SA Hayward (2002): *An overview of the water quality of the rivers and streams of the Canterbury Region*. ECan Report no RO2/25

capable of predating on the larger alpine galaxiids. No other native fish are present within the stream.

Macroinvertebrates

In terms of the aquatic invertebrate fauna, all the upper Porter River tributaries, including the Crystal Valley, have excellent alpine, clean water communities. The mayflies Nesameletus and Deleatidium and the stonefly Acroperla are abundant and numerically dominant.

Porter Stream

Physical features.

Porter Stream runs from its spring-fed source just below the existing Ski Area ticket office area to Porter River just upstream of the Ski Area Access Road crossing. Its flows are modified by existing takes for ski-field activities, and a dam/weir (related to local hydro-electricity production) restricts fish passage. The stream falls steeply and comprises mostly riffles, cascades and small pools.

Flow at a sample cross section was measured at 208L/S (CPG May 2010)

Water quality

General observations together with data from CPG (Appendix 10) suggest that water quality is very good. Porter Stream (like Porter River and Crystal Stream) exhibits many traits assigned to the upper mountain class of Meredith and Hayward (2002)10 – low nutrient status, high clarity and low (undetectable) hydrocarbon levels. In the late summer, long green filamentous algae were prominent in the upper catchment and there was heavy matting of brown algae in the flush zones.

It is also of note, that no events of high sediment loading were captured by monitoring.

Riparian vegetation

The stream riparian vegetation is a variation on the *Dracophyllum* shrubland surrounding it but with taller specimens and frequent and large fern cover, tall red tussocks, taller shrubs and herbs. Near its headwaters below the storage pond the riparian zone becomes short tussock grasslands and, as the bank gets lower, flush edge species can also be found. Near the existing Ski Area Access Road crossing and existing dam the edges have a notable exotic component. The riparian zones and bank provide a substantial amount of shading cover, and this may be one reason why periphyton and algae levels were noticeably lower in Porter Stream than Crystal Stream.

[10] AS Meredith & SA Hayward (2002): *An overview of the water quality of the rivers and streams of the Canterbury Region*. ECan Report no RO2/25

Periphyton

Only a thin layer (2 mm) of brown periphyton (50%) was observed on stable boulders and cobbles amongst cascades and riffles. Much of the deeper run and pool reaches have sufficient shade that algae are restricted.

Fish

No fish have ever been sampled from the Porter Stream. While it would appear that the lower steep section of the stream and the dam are likely to exclude trout, those obstructions would not keep out juvenile native fish which have the ability to climb.

7.6.5 Evaluation and Significance of Ecological Features

The Selwyn District Plan, under Appendix 12 Section E12.1, recognises seven criteria - 5 primary and 2 secondary ones for determining whether a site is a "significant area of indigenous vegetation or habitat of indigenous fauna" under Section 6(c) RMA. The "management units" were assessed against the SDC criteria to assess their significance.

The assessments and the features considered in making the assessments are outlined below:

Porter Basin – Not significant:

- *Presence of kea (which use a very wide area) = at risk species category /naturally uncommon*
- *Modification by Ski Area activities and structures, so former cover is not represented here*
- *Low species and community diversity*

Porter Stream Valley including Porter Stream - Significant:

- *Good representative of successional vegetation following fire removal; vegetation types common in ED*
- *Good example of vegetation and habitat pattern in response to physical environmental gradients*
- *A high level of naturalness and quality of aquatic habitat in Porter Stream but no fish*
- *An excellent aquatic macroinvertebrate fauna developed in the apparent absence of predatory fish*
- *Well-developed riparian corridor different from the surrounding cover and linking Porter Basin with Porter River Valley*
- *Area modified by localised Ski Area activities and structures including dam/weir*

Lower Porter River Valley including Lower Porter River and Porter River hillslopes – Not significant:

- *Matagouri/short tussockland with high weed component now in place of former cover*

- *Lower valley modified by former grazing, and Ski Area Access Road crossing and operation; trout but no native species in River*
- *Susceptible to weed invasion*

Southern terrace – Not significant:

- *Representative of successional vegetation following fire removal; vegetation types common in ED*
- *High spp diversity, but low diversity communities*
- *Small amount of red tussock in gully one of few areas of red tussock in study area*
- *Vegetation has high proportion native species but weeds present*
- *Area locally modified by tracks and buildings associated with Ski Area; weeds, rubbish*
- *Significance difficult to assess due to being intact but secondary vegetation cover*

Crystal Basin- Significant

- *Communities that are not unique to the Craigieburn Range, but Crystal Basin appears to be one of the largest. Helicopter flights with short landings have confirmed that there are at least 20 other similar basins along the range which contain similar features to those noted at Crystal Basin*
- *Unusually high spp and community diversity for an alpine area*
- *Naturally uncommon scree and rock outcrop plants providing a distinctive element of the flora*
- *Schizeilema pallidum is a threatened species in the 'naturally uncommon' category (de Lange, 2009) and was recorded on a damp shady bank above the alpine watercourse (True Right Branch Crystal Stream)*
- *Highly specialised plants occupying this habitat that are sparse and cryptic and therefore require very large areas to sustain populations*
- *Alpine watercourse flushes/seeps that only occur in some of the cirque basins along the Craigieburn Range (There are no alpine flushes in the Porters Ski Area basin or the small, unnamed basin to the south of the Ski Area). This association occupies the most fertile sites in the alpine zone*
- *Very high level of naturalness*
- *Presence of kea (which use a very wide area) = at risk species category /naturally uncommon*
- *Fragile plant communities due to high altitude and other environmental stressors*

Crystal Stream Valley and Crystal Stream - Significant

- *Representative of likely former cover of stream /riparian at this altitude in ED; valley side representative of former cover*
- *High spp and community diversity reflecting gradients*
- *Presence of one of only two persistent native fish populations in the wider Porter River system*
- *A high level of naturalness with few introduced species in 50% (upper section); very few exotic plants in upper valley*

- *Emergent spring flushes with intact vegetation in specialist natives*
- *Unmodified waterway/riparian vegetation from alpine flushes at source to main stem Porter River*
- *Susceptible to weed dominance through natural flood disturbance and link into Porter River Valley*

Northern terrace – Not significant

- *Representative of intact successional vegetation following fire removal; vegetation types common in ED*
- *High indigenous species diversity (richness); low community diversity due to simple physical environmental pattern*
- *An abundance of young kanuka and manuka which is unusual (for the current location)*
- *A high level of naturalness following burning, with few introduced species, although Pinus contorta is present and needs control*
- *Significance difficult to assess due to being intact but secondary vegetation cover*

7.7 Historical and archaeological values

Key features of existing environment

The only potential archaeological site within the study area is a track which runs along the true right of Porter River from SH 73 to Coleridge Pass. This may have been used by Maori and/or gold miners

Porters Ski Area is on leased land that was formerly part of Castle Hill Station

The technical information summarised here can be found in Appendix 4: Porters Ski Area: An Archaeological Assessment.

Investigations into historical/archaeological values were carried out through reviewing many primary and secondary sources, recording schemes and a site visit. No previous archaeological work has been carried out in the Porters Ski Area and there are few historical records in relation to the area.

Castle Hill (Kura Tawhiti) is rich in Maori history but there is no known Maori history associated with the Porters Ski Area itself. A track alongside the true right of the Porter River and over Coleridge Pass (which is still clearly visible in places) may have been used by Maori travelling between the East and West coasts (although the route via Lake Lyndon is better known and would probably have been easier).

Porters Ski Area leases land that was formerly part of Castle Hill Station which was originally owned by the Porter brothers.

Results of investigations

One potential archaeological site has been identified – the track over Coleridge Pass (K35/3). This is shown on an 1882 map, which also shows a stone hut and stables (K35/15). Neither the hut nor stables is on land currently leased by Porters.

The track may have been used by miners travelling between the west coast and eastern goldfields. Part of the track has been destroyed by the existing Ski Area Access Road.

7.8 Cultural Values

Porters is cognisant of the heritage and history of Porters Pass area, including the ancient waahi taonga at Kura Tawhiti.

Porters has established a relationship with Te Rūnanga o Ngāi Tūahuriri (TNT) through its mandated resource management agency Mahaanui Kurataiao (MKT). This provides the opportunity for Porters to engage with TNT to identify and provide for cultural values.

In relation to the Porters Ski Area it is acknowledged that values likely to be of interest to TNT include:

- Water quality and mauri
- Mahinga kai
- Ki Uta ki Tai
- Kaitiakitanga
- Wāhi tapu and Wāhi taonga
- Cultural landscapes

A Cultural Values Report is being drafted to assist in the process of discussion.

7.9 Transportation

Key features of existing environment

Access to Porters from Christchurch is via SH73 and the Porters Ski Area Access Road (which is privately maintained but on legal road reserve).

The intersection is appropriately signed and graded given its position on an alpine section of the State Highway

Traffic volumes on the section of road around the intersection are typical of recreational trips with higher use in school holidays

Average speed of vehicles in the area of the intersection is in the 100 to 108 kph range

Based on available information, Porters generates approximately 600 vehicle movements per day at peak times

The expected rate of accidents occur on this stretch of highway

The technical information on which this summary is based can be found in Appendix 5: Transportation Assessment.

Figure 3-1 shows the location of the site ("the site") within the context of the wider area. It is located approximately 90km west of Christchurch, just off SH73. SH73 is an alpine highway and forms the primary roading route between Christchurch and the West Coast. In the vicinity of the site it runs with a generally north-south alignment. The nearest township to the southeast along SH73 is Springfield, some 25km away and to the northwest the nearest township is Arthurs Pass (approximately 55km distant). Castle Hill Village is 8km away.

The Porters Ski Area access road is formed within a legal road reserve although it is privately maintained by the Porters Ski Area in agreement with Selwyn District Council. Public access is restricted out of the ski season.

An alternative route from the southwest is via SH77 at Windwhistle, then Lake Coleridge and Lyndon Road to SH73 at Lake Lyndon. Lake Coleridge Road is an arterial road and Lyndon Road is a local road in the District Plan.

7.10 Transport Network

The Porters Ski Area Access road has a 6m wide gravel surface and a posted 50km/h speed limit. There is a 3m wide cattle-stop and lockable gate located 24m from the western edge of carriageway of SH73 to restrict access as required.

The access road forms a give way controlled "T" type intersection with SH73 and there is advance warning signage of the turn-off to Porters Ski Area. (see Photograph 1)

Photograph 1: SH 73/Ski Area Access Road Intersection

Sight distance towards the north is excellent, with visibility of approximately 800m available. The sight distance to the south is approximately 230m and is constrained by a vertical curve in the highway.

SH73 near the site generally has a road gradient of approximately 10% It is typically formed with two 3.5m wide lanes and sealed traffic shoulders varying between 0.5m and 1.5m wide. In the vicinity of the SH73 / Access Road intersection, there is localised widening of the sealed shoulders to 2.5m width on the western side of SH73 and 2.7m width on the eastern side.

Some 3.5km to the south of the Porters access is Lyndon Road, which provides an unsealed alternative route via Lake Coleridge from SH77 near the Rakaia Gorge. Lyndon Road is unsealed over a distance of approximately 30km, with a carriageway width of approximately 5m and a winding alignment. It links to Coleridge Road before connecting to SH77. At both the intersection with SH73 and on Lyndon Road itself, signage warns this is a “Fine Weather Road Only”.

7.10.1 Transport Patterns

Daily Traffic Volumes

Annual Average Daily Traffic (AADT) counts have been collated for the most recent published year of 2008[11]. Traffic growth has also been calculated for the most recent 10 year period as well as the percentage of heavy vehicles as a total of all traffic. These are shown in the Table 7- 3 below.

Table 7-3: State Highway Daily Traffic Volumes (** vpd - vehicles per day)*

Count Location	2008 AADT	% Growth p.a.	Heavy Vehicle %
SH73 Castle Hill Straight	1,404 vpd*	2%	13%
SH73 west of Springfield	1,629 vpd	2%	12%
SH73 north of Darfield	1,805 vpd	4%	10%

The traffic volumes show that SH73 carries fewer vehicles further towards the west, and in general the highway carries traffic volumes that are relatively low for a regional state highway. There has been moderate traffic growth recorded over the most recent ten year period, typically in the order of 2% per annum, and it can be seen that approximately 10-13% of traffic passing the site on SH73 is classified as heavy vehicles.

An analysis of the year-round traffic counts shows the seasonal traffic variations on both a daily basis and a weekly basis for the average of the full week (7 days). The patterns show seasonal fluctuations varying between average daily traffic volumes of 1,000vpd to 2,500vpd, representing 36% less than the AADT, and 49% more than the AADT (which is 1,684vpd). Such fluctuation is typically representative of the recreational nature of trips on a route during the summer and winter seasons, and of higher use during holiday periods.

A comparison with available seasonal data from the Castle Hill count site (west of the Porters turn-off) shows that surveys recorded in February, April and October have a close correlation with the pattern of daily traffic volumes recorded at Springfield, albeit with slightly lower values. However, the week recorded during July shows the Springfield site carries higher volumes than the Castle Hill site on the weekends, which it is considered will most likely be associated with the peak traffic to Porters Ski Area.

The Porters Pass area is subject to occasional road snowfall and NZTA applies travel restrictions as required. It is understood that the road is typically passable with chains, although it can occasionally be temporarily closed to towing or to all vehicles. Selwyn District Council records show that the Lyndon Road – Coleridge Road route between SH77 and SH73 carries low traffic volumes. The most recent recorded count for Lyndon Road west of SH73 was 90vpd (January 2006), with the Coleridge Road carrying 430vpd (March 2009).

[11] Source: NZTA

Hourly Travel Patterns

The main characteristics of the weekday hourly traffic patterns SH73 at Castle Hill, recorded by NZTA over a typical seven day period in February 2009 can be summarised as follows:

- Weekday directional flows of approximately 50-80 vehicles per hour (vph) throughout the day from 8am to 6pm.
- A gradual building up to an early afternoon weekday peak two-way traffic volume of approximately 150vph in the hour ending 1pm, followed by a gradual decrease.
- A slightly higher two-way volume on Fridays with up to 200vph recorded in the early afternoon.
- Saturday volumes being similar to a weekday but extending over a longer duration from 8am onwards. Sunday volumes are the highest volumes within the seven day period, with two-way volumes peaking at approximately 220vph in the mid afternoon.

A review of the patterns shows that peak winter weekday volumes are lower than those recorded in summer, although the winter weekend volumes are rather higher which would be consistent with travel associated with the ski fields in the area. The peak recorded winter traffic volume was 280vph on a Sunday during the hour ending 5pm.

Overall, the patterns are considered to be reflective of the road's function as an alpine highway linking regions and providing for weekend recreational travel.

Porters Ski Area

The Porters Ski Area typically has a season lasting from late June to late September, with season extensions or reductions occurring depending on snow conditions. Peak periods currently occur during the July school holidays, at which time there are approximately 850-1,000 visitors and approximately 600 vehicle movements per day (two-way). Of these it is expected that approximately 60% of the vehicles will arrive during the morning peak hour of activity, and 40% leave in the evening peak hour of activity.

The existing peak hour travel patterns are therefore anticipated to be approximately 180 vph in the morning peak, and 120 vph in the afternoon peak.

The existing ski field caters for day visitors arriving by private car, camper van, shuttle bus, and coach. Patterns at other ski fields shows that ride sharing and hitch hiking is common for this type of land use, and there are several commercial operators that provide shuttle bus transport from Christchurch, Springfield and the West Coast.

Speed Survey

A speed survey was undertaken on 13 May 2010. In accordance with Austroads Guide to Traffic Management Part 3, the 85th percentile speed of the survey was calculated as 104km/h with a 95% confidence interval of +/- 4km/h (ie an 85th percentile speed between 100km/h and 108km/h).

Road Safety

The NZTA Crash Analysis System (CAS) database has been reviewed to determine the occurrence of crashes within a 1km radius of the SH73 / Access Road intersection. Due to the relatively low traffic volume on SH73, the crash search has been extended from a five year analysis period to cover a full ten year period of 2000 to 2009.

Over this period, there have been four reported crashes, all occurring in fine and dry weather conditions. All of these crashes occurred at different sections of the highway, and there have been no reported crashes at the Porters Ski Area access road with intersection with SH73. The type of crashes reported are consistent with those typically reported for rural roads.

Levels of Service

SH73 through the Porters Pass area currently provides typical peak period levels of service of LOS C. During these busy periods vehicles are likely to follow other vehicles at some stage through the mountainous terrain. There are currently no formal passing lanes although the highway does provide several convenient locations for vehicles to pull over to let following vehicles pass.

Traffic volumes at the SH73 / Access Road intersection are generally restricted to the ski season. The peaks of the through traffic volumes do not coincide with the peak arrival time to the field and accordingly there are negligible delays to highway traffic. It is possible that there is localised queuing on the access road when the ski field closes, associated with a short-term peak in skier departures. However any vehicle queuing will take place entirely on the local road and there are no existing capacity issues at the intersection.

The available Safe Intersection Sight Distance (SISD) at the existing access[12] is 216m. The Approach Sight Distance (ASD) is measured as 126m. As the design speed of the intersection is approximately 100-108km/h the Austroads requirement is for some 305m of SISD and 215m of ASD, indicating an existing shortfall at the intersection.

Nevertheless, the sight distance deficiency has not resulted in any adverse safety issues as no crashes have been reported at this location within the last ten years. A contributing factor to this is that traffic emerging onto the highway is confined to a short time of day and only for part of the year.

[12] after allowing for grade correction (measured in accordance with Austroads Guide to Road Design Part 4A "Unsignalised and Signalised Intersections"

7.11 Market

The technical information summarised in this section can be found in Appendix 12: Market Demand Assessment.

7.11.1 New Zealand Ski Areas

The New Zealand ski market consists of three major areas:

- North Island fields – Dominated by Whakapapa and Turoa which are located on Mt. Ruapehu in the Central North Island's volcanic plateau.
- The Canterbury fields are dominated by Mt. Hutt Ski Area, with a number of smaller (mostly club) fields and Porters Ski Area. Mt Hutt dominates this region's ski market, attracting approximately 130,000 skier days per year. Domestic visitors also contribute the large majority (approximately 70%) of Mt Hutt's skier days.
- The four major ski areas in the Southern Lakes Region include The Remarkables, Cardrona, Treble Cone and Coronet Peak.

Table 7-4: Skier-Days in New Zealand and Estimated Breakdown by Ski Area[13]

	Domestic		**Australian**		**Other International**		**Total**
	%	**# ('000)**	**%**	**# ('000)**	**%**	**# ('000)**	**# ('000)rr**
North Island	91%	394	2%	10	7%	31	435
Canterbury	70%	138	26%	51	4%	8	197
Southern Lakes	52%	402	42%	324	6%	46	772
Total	**66%**	**934**	**27%**	**386**	**6%**	**86**	**1,405**

7.11.2 Porters Ski Area

Currently the Porters Ski Area offers a variety of skiable terrain and a terrain park in the Porters Basin. On-field facilities include gear hire and a cafe. Porters Ski Area has traditionally catered well to the intermediate to advanced Canterbury skier and snowboarder market - 85% of skier days at Porters Ski Area come from the local (Canterbury) market.

The Porters Ski Area is only open during the winter season, which is generally from early July to early October. The operational season fluctuates depending on snow conditions. It currently operates 5 ski lifts: 3 T-bars, 1 novice's platter lift and a beginners carpet lift. These lifts provide access to 206ha of skiable area within the Porters Basin. The base of the skiable area is at approximately rl1300 and the top of the mountain is at rl1980.

[13] Totals are correct at a national level and reflect average of 2006 – 2009 according to SAANZ data. Breakdowns by field are estimates based on available SAANZ studies (NZTRI 1999, NZTRI 2002, NZTRI 2005), adapted using estimates of growth of different market segments.

Currently Porters Ski Area has 30,000 to 35,000 skier days. A recent skier survey carried out by Porters (M Sleigh pers comm.) found that 88% skiers were from New Zealand with 8% Australian. Of the New Zealanders, 78% were from Canterbury with 4% from Wellington and 3% from the West Coast. Respondents had mainly stayed the previous night in Christchurch (57%), Castle Hill Village (11%), Springfield (5%) or Methven (5%).

Travel to Porters was 85% private car, 7% rental and 6% bus or shuttle. 45% skiers had car-pooled.

The age range of skiers in the recent survey was:

<19 years – 30%

<30 years – 50%

<49 years – 89%

Skiing ability range was:

17% beginner

44% intermediate

39% advanced

44% skiers were skiing with their family and 12% with partners. This contrasts with the other commercial ski areas where typically over 80% of skiers are in the beginner/intermediate range.

Perceived and actual barriers to Australians visiting Canterbury skifields are considered to be:

- Lack of quality intermediate terrain[14].
- Lack of non-ski related activities,
- Unsealed access roads on their ski vacations (with associated winter driving or use of chains)[15].
- Not being able to stay on the mountain in accommodation of high quality

Porters /Craigieburn Basin areas do not currently attract high numbers of visitors during the summer period although there is significant passing traffic on State Highway 73.

[14] Cardrona Ski Area has grown substantially by being the first and most effective field to attract the family market in the South Island. This includes having a large area of quality beginner and intermediate terrain. Tourism New Zealand research (1999) found that Australians perceived New Zealand as appealing more strongly to the younger and/or more advanced skier.
[15] New Zealand Ski Tourism Marketing Network (2008).

8.0 EFFECTS ON THE ENVIRONMENT AND MITIGATION

8.1 Geotechnical Effects

The *Geotechnical Summary Report* (Appendix 1), *Infrastructure Options Summary Report* (Appendix 8) and *Preliminary Engineering Feasibility Report* (Appendix 7) set out the potential geotechnical effects and mitigation methods.

The Engineering Feasibility and Infrastructure Options Reports identify the areas where earthworks will be undertaken:

- Southern terrace (Village Base Area) – roads, infrastructure and buildings
- Porters Basin and Porter Stream Valley – service road, ski trails, infrastructure, Ski Area facilities (e.g. buildings, lift towers)
- Crystal Basin – ski trails, infrastructure, Ski Area facilities (e.g. buildings, lift towers)
- Crystal Valley, Northern Terrace – infrastructure (for wastewater disposal)

Potential geotechnical effects relate to:

- Seismic hazards
- Active faulting
- Slope and rock glacier stability
- Flood hazards
- Snow avalanche risk

The Plan Change requires all earthworks will be subject to resource consent applications so that the detail of how and where the works are undertaken can be subject to conditions.

The risk posed by these hazards are deemed acceptably low so that the adverse effects can be mitigated through application of standards and recommendations made by suitably qualified engineers at the design, resource consent and building consents stages.

Seismic Hazard

The proposal is within a high seismic hazard area. This is however, similar to the whole of the Central Southern Alps. The hazard can be addressed through application of design standards for all structures (NZ1170).

Active Faulting

Detailed assessment of active surface faulting on the site, through desktop and site investigations concludes that there is no evidence of surface fault rupture in the Village Base Area or Crystal Basin. The time since any fault that may be present in

the area last ruptured is estimated to be > 12,000 years. The risk posed by surface faulting is deemed acceptably low.

Slope Stability – Village Base Area

In the proposed Village Base Area, there is a lack of disruption to the glacial surfaces that are >12,000 years old; nor is there evidence of landslides or slope failures that could have occurred during earthquakes. This indicates that the area is essentially stable on a large scale.

Small scale instability is indicated by the presence of localised unvegetated areas, especially at the top edge of the Southern terrace (above Crystal Stream and Porter River).These areas are created by a combination of soil infertility, vegetation type and frost heave. The river and stream systems are themselves relatively stable, as shown by extensive vegetation cover on the adjacent slopes, as the flows are much lower now than pre-historically when the valleys were formed. Stability is also maintained by the bed armour and relatively free-draining qualities of the gravel subgrade. The edges of the terraces may fail in localised areas during large earthquakes, but the extent of this is difficult to predict.

All buildings should comply with New Zealand Building Code B1/VM4 and for those on ground steeper than 15 degrees there should be specific geotechnical investigation.

A specific area of active erosion on the southeastern area of the Southern Terrace (Village Base Area) has been identified and here the following mitigation can be undertaken through conditions on either the subdivision or earthworks resource consents:

- a 5m setback will be defined within which any structures should be subject to individual geotechnical investigation;
- erosion protection measures will be put in place
- stormwater discharge will not be allowed
- regular inspection will be carried out (annually and/or following an extreme storm or earthquake event)

Slope stability – Crystal Basin Ski Area

There are no significant slope stability constraints to development and design that could not be appropriately addressed through compliance with the New Zealand Building Code and recommendations of suitably qualified engineers.

The sides of Crystal Basin consist primarily of active scree slopes formed by ongoing deposition of material that has fallen from above. While large scale mass movement is unlikely, the rolling/sliding and localised movement of individual rocks is a continual process. Extreme weather or earthquake events may cause localised movements, while snow and ice act as a stabilising influence in winter.

Roads in the existing Ski Area cut into scree, and ongoing maintenance is needed in summer. New trails or earthworks will require similar maintenance, and substantial cuts may require retaining structures.

Rockfall is likely to be minor (since there is limited exposed rock).

To minimise the effects of slope instability on people or infrastructure (especially lift towers or buildings) the naturally dynamic nature of scree slopes and rock outcrops should be considered in location during detailed design in both Crystal and Porters Basins.

Effects on Waste Water Discharge on Slope Stability

URS modelled the effect of applying wastewater at 5, 10, 15, 20, 30, 40 and 50 mm/day on slope stability at the proposed LTA. (URS report forms part of Appendix 10)

The report concludes that for application rates of 5 and 10 mm/day the discharge area can occur 5 m away from the banks of the Porter River and Crystal Stream without any effect on the slope stability. The LTA will be at least 20 m from the slope edges or banks of the Porter Stream and Crystal Stream. Therefore, the proposed discharge rate of 5 mm/day will have no effect on the slope.

Flood Hazards

A flood avoidance building zone is proposed following an assessment of flood hazard associated with Porter Stream. The zone is based on the 1 in 100 year flood of 10m3/sec with water depths between 0.4m and 1.0m (including a conservative 0.5m vertical buffer) and equates to a 5m setback. Critical structures or structures designed to accommodate people should be built outside this zone.

The existing water storage reservoir will be decommissioned once new facilities are in place, so no allowance of dam-break associated with that was included in the analysis.

Snow Avalanche – Village Base Area

The proposed Village Base Area is highly unlikely to be affected by the avalanches that might affect either the existing or proposed Ski Areas given its elevation and distance from likely avalanche paths.

Snow Avalanche – Crystal Basin Ski Area

Data on avalanches in Crystal Basin has only been collected more recently, but is on-going. In the winter seasons 2007, 2008 and 2009 Porters Ski Area staff reported 14 avalanches in Crystal Basin and these have been mapped. Differences in aspect, slope, potential starting zone and run out zone suggest that Crystal Basin will have fewer avalanches that Porters Basin.

In detailed design and building consents stages, all available information on avalanches should be used to locate facilities and infrastructure. Current snow management best practice is carried out at Porters and this would be extended to

Crystal Basin. Together design and management will be used to mitigate avalanche hazard.

Rock Glacier

The rock glacier area will be affected by earthworks to contour the Basin for appropriate skiability and construction of facilities and infrastructure. These works are not anticipated to affect the integrity of the glacier which is one of at least 7 in the Craigieburn Range, and a large number throughout the South Island. It is not considered to have scientific value and is not actively moving.

8.2 Effects on Waterways and Hydrology

The Infrastructure Options Summary Report (Appendix 8), Preliminary Engineering Feasibility Report (Appendix 7) and Resource consent applications - AEE (Appendix 10) set out the potential effects on waterways and hydrology, and mitigation methods in detail. Effects on aquatic ecosystems are addressed in Section 8.4 and Appendices 2 and 11).

8.2.1 Effects of Water Takes

The potential effects on the quantity of water in surface waterways on or adjacent to the site are:

- Change in flows /volume in Porters Stream following cessation of existing take and implementation of proposed new take
- Change to seasonal pattern of flows in Porter Stream
- Increase in flow in Crystal Stream downstream of existing small take
- Change in flows in Porter River downstream of Porter Stream inflow, and further changes downstream of Crystal Stream confluence.

Appendix 10 notes that currently there is no allocation regime set for the Porter Stream and Porter River through the WRRP; however the Porter Heights Ski Field is the only consented abstractor on the Porter River.

The applicant is currently permitted to take up to 19.6 L/s, with no restrictions on when in the year it can be taken; there is a minimum flow component on the existing consent. It is considered that if the same minimum flow is maintained, then there is no change in effect and the effect on surface water flows will be less than minor.

In addition, the taking of water (mainly during autumn, winter and spring) for snow making will result in water being stored, as snow, within the ski field. This will be released in late spring and early summer as snow melt and is thus synergistic to downstream summer flows and water users.

8.2.2 Effects of Discharge of Contaminants From Waste Water and Snowmaking

The potential adverse effects on waterways and hydrology that may arise from the proposed activities carried out as part of discharging contaminants from waste water to land or water which are assessed in Part A Appendix 10, are:

- Effects of the discharge on surface water quality;
- Effects of the discharge on groundwater;
- Effects from operation and maintenance issues; and,
- Additional mitigation.

Effects on Surface Water Quality

Appendix 10 discusses microbial contaminants, nitrogen, phosphorus compounds, surface water quantity, and ecology in relation to the effects of discharges. It notes that the ANZEEC (2000) water quality guidelines provide suitable standards to protect aquatic ecosystems.

Appendix 10 states that through using discharge to land on appropriate soils, and regular monitoring and equipment maintenance, effects on water quality from discharges are able to be managed and minimised.

Effects on Groundwater

Well K34/0015is consented to Castle Hill Village Ltd for domestic and stockwater use. It is approximately 8km from the site. Well K35/0008 is located around Lake Coleridge and is approximately the same distance away and upstream of the Land Treatment Area. There is no possibility of a direct hydraulic link between the discharge area and Well K35/0008. Similarly, Well K34/0015 is unlikely to be affected by the discharge of waste water at Porters Ski Area.

It is considered that the discharge will have negligible effects on the existing groundwater

Effects of Operation and Maintenance

A suite of resource consent conditions will stipulate the basic regulatory requirements designed to protect (amongst other values) waterways and hydrology. Other necessary performance requirements will be in-built into the design and installation of the system and the preparation of an Operation and Maintenance Manual. These will address, among other matters:

- Measures to reduce freezing of the wastewater pipes and infrastructure in winter.
- Automation of pumping units and level controls in storage facilities for safety reasons.
- A remote alarm system will be installed, to warn of any problems with water levels or failure in the treatment plant.
- Provision of at least 24 hours emergency capacity (combined at sedimentation tanks and the treatment plant) as a contingency plan should power supply fail or the system break down.

- A back up power supply source such as a generator will be installed. This will supply power in case of normal power supply interruptions.
- The development and use of an Operations and Maintenance Plan (the supplier of the system will provide this) for the proposed wastewater treatment system.

At this point in time it is not know if the infrastructure is to be vested in Council or privately owned. It will be designed to ensure that it meets the Council's standards and the option of vesting remains possible. Porters propose to adopt best practices for the sustainable operation and maintenance of the infrastructure.

The supplier of the technology will provide full training of basic operational requirements to an on-site person, although it is recommended that preventative maintenance checks are carried out by supplier approved contractors or maintenance staff to ensure optimal performance, particularly in the first few years of operation.

Additional Mitigation Measures

Porters will put in place a number of measures to mitigate any adverse effects on waterways and hydrology from the construction and operation of the proposed wastewater treatment system. They are:

- The installation of a best available technology treatment system that can handle shock loads and variable climate;
- Further treatment through the soil via a slow rate irrigation system;
- The development of a Management Plan for the discharge activity and this will include an operation and maintenance plan (the supplier of the system will provide this) for the proposed wastewater treatment system; and
- Trained personnel will manage and operate the wastewater treatment and dispersal systems.

Effects of discharge from snowmaking

Appendix 10 states that the effects of adding this quantity of Snowmax to the environment for snowmaking purposes is considered to be minor.

This product is consented for current use at Porters and is also used at a number of other ski fields.

8.2.3 Effects of Works in Beds of Rivers Associated with Waste Water and Potable Supply Infrastructure

The potential adverse effects on waterways and hydrology that may arise from the proposed works in beds of rivers associated with waste water treatment or potable water supply infrastructure are:

- Effects on water quality;
- Effects on the flood carrying capacity of the river and erosion of the bed and banks of waterways;

- A temporary effect on the water quality and ecology of the area around the crossing point due to suspension of sediments.

Effects of Water Quality

The installation of the pipe will have a temporary effect on the water quality and ecology of the area around the crossing points (both at Crystal Stream and Porter Stream) due to suspension of sediments.

The applicant also proposes to implement a number of mitigation measures to ensure that downstream water quality is not compromised. These mitigation measures include:

- Standard practices such as sediment traps and sediment barriers in stream beds during pipe installation;
- Only undertaking the works when the stream flows are low;
- Stopping work when rain is expected within a 24 hour period;
- Only undertaking the work during daylight hours;
- Minimisation of the amount of time spent on construction works within the bed of the waterways;
- By ensuring that sections under installation are completed and reinstated at the end of each day;
- Limiting refuelling activities and fuel storage to a minimum of 100 m from the waterways;
- Ensuring machinery is free of plants and plant seeds prior to use in the riverbed; and,
- Ensuring all activities are undertaken in accordance with the Canterbury Regional Council "Didymo Hygiene Protocols".

Given the short term duration of any works within flowing water, it is considered that any adverse effects on downstream water quality will be minor and limited to a short term increase in the volume of suspended solids. It is anticipated that the suspended solids will settle quickly and as such limit any adverse visual effects on downstream properties which are at least 8 km away at Castle Hill and on the ecology.

The contractor will also be required to prepare a Spill Contingency Plan as part of the Construction Management Plan that will specifically address the ways in which they will address the risks to water quality from construction activities.

Overall, it is considered that any adverse effects on water quality associated with the proposed effluent pipe installation works will be minor and transitory in nature and confined to short sections of the waterways.

Effects on the Flood Carrying Capacity and Erosion of the Bed and Banks of the Waterways

Works carried out in the bed of a waterway or adjacent to a waterway may result in adverse effects on the flood-carrying capacity of the waterway or erosion of the bed or banks of the waterway. This may occur when the flow characteristics of the waterway are changed.

As effluent pipes will be fully embedded in the bed of waterways, the flow characteristics of the waterway will not be compromised. With regard to the possible erosion effects from the activity, a condition relating to the erosion of banks will ensure that adverse effects on the flood-carrying capacity and erosion of the river will be minor.

8.2.4 Effects of Stormwater Management

The potential effects of the proposed discharge of stormwater are discussed in Appendix 10.

In relation to waterways and hydrology this covers:

- Contamination of groundwater
- Contamination of surface water

Due to the location (upgradient) of springs and the depth to groundwater under soils which act as filters, the risk of contamination is considered to be low.

The effects of sediment loading that might arise from the fully developed site can be mitigated through the design capacity of the stormwater system (involving treatment and discharge to ground). Development of the Village may actually reduce the contribution of the site to the whole catchment, since it will effectively armour areas of land surface against erosion.

8.3 Effects on Landscape Values

The Landscape Assessment (Appendix 3) sets out the potential landscape effects and recommendations for maintenance and enhancement of landscape values.

Landscape effects fall into five areas:

- Visibility of proposed development assessed from key viewpoints
- Ability of the landscape to absorb the proposed changes
- Effects of proposed development on natural character
- Effects of proposed development on visual amenity
- Effects of proposed development on landscape values

8.3.1 Visibility Analysis

From State Highway 73

SH73 is the most frequented public viewpoint – it is an important tourist and transport route which means there is a potentially large viewing population. The majority of the proposed Village will be hidden from view. Only the proposed upper Crystal Chalets and Porters Chalets will be intermittently visible from an approximately 2km stretch of highway extending either side of the Porter River Bridge when travelling from west to east. Viewing distance is 5-6 kilometres.

For a section of about 300m of the highway north of the Porter River bridge glimpses of parts of Porters Chalets will also be visible.

The proposed Crystal Basin Ski Area will have low visibility due to its orientation towards the southeast. A 500m long section of trail however, from Porters into Crystal Basin, will be visible where it cuts into scree and rock on the lower part of the ridge line south of Crystal Basin.

If the top station of the proposed Crystal to Porters chairlift is erected as indicated in the Mountain Plan it may be visible depending on its final design and location – however other lifts etc should not be visible from SH73.

From Korowai-Torlesse Tussocklands Park

Views into the site range vary according to position within the Conservation Area. From Cloudy Hill (at the North-western end) the entire proposal will be visible; form Red Hill at the eastern end only part of the Village and upper ridges above Crystal Basin will be visible. Some tracks and the proposed Gondola may be visible at a distance (for example from Castle Hill Peak).

User numbers are low in the Conservation Areas surrounding the site.

Summary

Due to the extensive viewing distances and surrounding mountain ranges, the visibility of the entire project area is comparatively low. Direct views onto the proposed development as a whole would only be gained from rarely-visited elevated viewpoints. Visual effects from the State highway are insignificant and will be perceived as part of the existing Ski Area.

8.3.2 Potential of Landscape to Absorb Change

Table 8-1 summarises the degree to which the landscape at and around the site can potentially accommodate change. Generally, the higher the visual prominence of an area, the lower the ability of the landscape to visually absorb development while still maintaining its existing visual character.

The following characteristics have been considered:

- Existing land use/ cover (naturalness and level of modification)
- Values of the existing landscape
- Patterns and scale of the landscape (visual diversity and character)
- Visual absorption capability:
    - Slope and susceptibility to erosion (Protection structures needed)[16]
    - Visual enclosure/openness of views (Visibility) [17]
    - Accessibility and viewpoints;
- Scope for mitigation which is in character with the existing landscape

Table 8-1: Summary of the ability to absorb change for each landscape character unit

Landscape character unit	Ability to absorb change	Comments
1. Porters Basin	High/Low	Low: Ridgeline and north facing slopes are sensitive to further change, despite existing modifications. High: Enclosed south facing slopes are modified and can absorb further change
2. Porters lower slopes	High/Low	Low: Ridgeline and upper north facing slopes are sensitive to change, avoid or minimise further cuts across slopes. High: low-lying south facing slopes are vegetated and not visible from outside Porter River Valley, the potential to mitigate and absorb change is high.
3. Southern Terrace	High	Landform blocks views to the true right bank of Crystal Stream, flat area has been modified and provides high ability to absorb change, vegetation provides mitigation potential. Removal of native vegetation should be kept to a minimum.
4. Crystal Basin	Medium/High	Floor of the Basin is flat and hidden from most viewpoints. Natural character value is high, but landform could visually absorb some change. High visibility of top ridgeline which confines basin. Development would have high impact on this ridge.

[16] The need for extensive earthworks and protection structures on steep slopes increases their sensitivity to development.

[17] Ridgelines are generally sensitive to development, in particular where structures could break the skyline.

Landscape character unit	Ability to absorb change	Comments
5. Crystal Stream	Low	Steep erosion prone scree slopes have relatively low visual absorption capability; on north facing slopes cuts would be conspicuous from long distance viewpoints, such as SH73. Ridgeline between Porters and Crystal Streams is backdropped by ridge to the south and does not form skyline from SH73. Dynamic riverbed provides high visual amenity values and development would have to be set back appropriately.
6. Porter River	Low	Riverbed is deeply incised in lower section of river, and erosion prone banks would need sensitive engineering solutions to be integrated in landscape. Lower natural character and higher potential to absorb change in vicinity of lodge, where road crosses the river. Highly natural environment, where human modification would have adverse effects on landscape values
7. Northern Terrace	High/Low	This terrace is visible from the existing Ski Field Access Road but is not prominent from the State Highway. It is desirable to avoid built development from sprawling onto this side of Crystal Stream. The site has the capacity to support mitigation and enhancement planting and to absorb a waste water disposal system.

8.3.3 Effects on Natural Character

Natural character is a measure of the extent to which natural elements, patterns and processes occur and the nature and extent of modifications to the ecosystems and landscape or riverscapes. The existing Porters Ski Area has reduced the naturalness of Porters Basin and changes proposed in and adjacent to the Basin as part of the proposed development are consistent with those existing modifications and will not further detract from its values.

Crystal Basin has high natural character value and the proposed development of the Ski Area will have significant adverse effects on this.

The high natural character values of the Crystal Stream Valley should not be adversely affected by the presence of the proposed chalets and hotel on the Southern Terrace or the wastewater pipe crossing. The route and crossing point has yet to be determined, but undergrounding throughout the Valley and appropriate re-vegetation should avoid any potential adverse effects.

The Southern Terrace (proposed Village Base Area) is already modified and has a moderate level of natural character. The large scale of earthworks and removal of vegetation proposed will have a significant effect on this natural character.

The natural character of the part of the Porter River close to the proposed development is already reduced by the modification by the Ski Area Access Road, culverts and weeds – further development in this area is appropriate. The Upper Porter River, which has high natural character values, will not be affected by the proposed development.

There will be considerable modification around Porter Stream, although there will be a setback of at least 5m form the stream edge. The stream is currently modified by a dam and take structures as well as the Ski Area Access Road crossing. The

earthworks for the “snow play” area will result in the complete removal of the ephemeral wetland located north of Porter Stream; although this wetland is not highly visible from localised viewpoints there will be a consequent loss in natural character.

8.3.4 Effects on Landscape Values

The proposed Ski Area Expansion will represent a small intense node of modification in a large-scale, vast landscape with relatively low levels of development. Relative to the wider locality it is preferable that further development occurs in association with an existing Ski Area and in that context the Ski Area expansion is considered to be appropriate development.

The proposed earthworks, structures and trails in Porters Basin are complementary to the existing Ski Area facilities and will not detract from existing landscape values.

In Crystal Basin there will be some loss of legibility (in relation to the formative glaciation processes) through earthworks together with loss of natural landform and land cover. Other modifications will change the inherent landscape character of the Basin – there will be significant adverse effects on landscape values in the Basin. However, these modifications can be seen in the context of other ski fields in the Canterbury High Country landscape so should not detract from the outstanding landscape values of the wider area.

The proposed Village Base area (Southern Terrace) is well-vegetated but has some modifications (existing Ski Area facilities). However the scale of earthworks and removal of vegetation will be large. The adverse effects can be mitigated by careful design, choice of materials and colours and containment of disturbance. These factors can be considered following detailed design as all buildings and structures require a resource consent. Once the vegetation has re-established and construction scars healed, the comprehensive development will provide a homogeneous, high quality appearance.

Crystal Stream locally provides aural and visual amenity values in an otherwise dry landscape. The proposed development should not detract from these values.

8.3.5 Effects on Visual Amenity

Due to their location in the upper Porter Valley, Porters and Crystal Basins are visually more contained relative to SH73 than most parts of the Craigieburn Range. This means that much of the development in these Basins will be less visually obtrusive.

The ridge between Coleridge Pass and Porters Basin forms the skyline for SH73 views from the Castle Hill Basin, 5 – 9km away. The lower ridgeline separating Porters and Crystal Basins is less noticeable, because it is viewed against the more prominent ridgeline in the back. This means that possible development, as shown in the Indicative Mountain Plan, such as the proposed Ski Area access track and gondola into Crystal Basin, while visible along parts of its alignment, will not be seen against the skyline or interrupt the open views to the wider landscape.

The lower parts of the site are screened by the low ridges between Porters and Crystal Basins, so that even the higher parts of the proposed Village will be hidden from view from SH73.

The proposed Village is of a size and scale that will change the existing landscape character of this area significantly, when experienced from within. However, the development is well sited to be able to be successfully integrated into the landscape. The modification proposed will be of a scale that cannot be easily compared to the status quo. Earthworks will temporarily lead to significant adverse visual effects, but the potential to mitigate these effects through planting and restoration of vegetation cover is high.

Generally, the visibility and natural character of the Northern Terrace on the true left of Crystal Stream is higher than on the true right banks, where the two existing ski field lodges and access roads are located. The waste water disposal area on the Northern Terrace will require only one very small structure. This building will house the control equipment for the waste water disposal system. If necessary it can be buried underground, but there are gullies and depressions in this area that could accommodate a small building without disrupting the naturalness of this area.

The High Country landscape surrounding Castle Hill Basin is a large scale landscape with clear forms and patterns that are perceived as a whole. The uninterrupted long distance views are a key attribute of this landscape. Hence, the design, and location of the development aims to contain most structures in basins and valleys where they will not change the openness of the wider landscape.

8.3.6 Cumulative Effects on Landscape Values

Cumulative effects between the existing Porters Ski Area, including its structures and roads, and the proposed development will be greatest when they are seen together from one viewpoint.

Development in the Crystal Basin will occur in a separate visual catchment to the existing Porters Ski Area, and both Ski Areas will only be perceived together when viewed from the proposed Village or from selected viewpoints along the mountain range east of the Porter River. Due to the low visibility of the proposed structures and the trails in Crystal Basin from SH73 and the visual separation of the Basins, minimal cumulative effects will arise.

The existing Ski Area accommodation is to be incorporated into the proposed development. There will be a cumulative effect resulting from the proposed buildings within the Village, which will substantially modify the existing landscape character of this confined development area. However, it is considered appropriate to contain the proposal within a cluster area, where effects of the development would be predominantly experienced from within. The existing level of development has already reduced the landscape's sensitivity to change compared to other High Country areas which are in a more pristine state. In a landscape like this it is preferable to cluster development and to locate it in visually contained areas.

There is a significant distance between Porters Ski Area and the other ski fields along Craigieburn Range, such as Cheeseman, Broken River and Craigieburn club fields. The visual separation of the Upper Porter River Valley from the other ski fields,

which are located on the east facing slopes above Castle Hill Basin, avoids cumulative effects from the proposed expansion.

Effects on Amenity Values of Waste Water Discharge

Appendix 10 sets out the effects of activities for which consent from the Canterbury Regional Council is required. This notes that the treatment plant and land treatment areas will be constructed to blend with the surrounding land to reduce any visual effects. Neither the sewage treatment plant nor the irrigation system will be visible as both will be below the ground level. The treatment plant controls will be housed in a shed which will be surrounded by vegetation and will therefore not have any visual effects.

Effects on Visual and Aesthetic Values of Works in Beds of Rivers

Appendix 10 sets out the effects of activities for which consent from the Canterbury Regional Council is required. This notes that the contractor will be required to minimise the footprint of the crossings.

The effluent pipes will be installed sub-surface and will not be noticeable to people on the surface. After completion of the works, the site will be restored to its original condition as far as is practicable. Therefore there will be minimal adverse effects from installing the pipelines on amenity values, people and communities and those effects will be short lived.

There will be a short term reduction in water quality when gravel is disturbed and this will potentially result in discoloration of the water and as such temporarily affect the visual amenity of the rivers. The duration and extent of the work in the active channel will be limited to ensure that any visual reduction in water quality will be temporary.

Crystal Stream and Porter River experience high water turbidity after high rainfall events. Therefore the presence of occasional suspended sediments is not a new phenomenon for these waterways.

8.3.7 Recommendations to Address Landscape Effects

Under the proposed Plan Change Porters Ski Area would be removed from the Outstanding Natural Landscape identified in the District Plan. This is a minor reduction in the area of the ONL and is consistent with other Development Areas in the Rural Area which have been removed from the ONL in order to provide for strategic and controlled development in appropriate locations. The Landscape Report recommends further considerations and guidelines for the detail of earthworks, buildings and landscape treatment through resource consent processes. These have been incorporated into the proposed Plan Change.

8.4 Effects on Ecological Values

The Ecology Report and Assessment of Effects (Appendix 2) sets out the potential ecological effects and recommendations for mitigation of adverse effects.

The activities and their potential adverse effects on ecological values occur in various locations across the site (as provided for in the Plan Change). The types of activities which may potentially affect ecological values and the nature of those effects are summarised as follows. They are concerned with water takes and discharges, works in the beds of rivers, snow management, earthworks, construction, occupation and use of the land:

Water takes/ discharges

Water takes and discharges would be subject to resource consents and are described in detail in CPG 2010.

It will be necessary to take more water from permanent or ephemeral watercourses than is currently taken for Porters Ski Area activities. In selecting the location(s) and quantities of takes aquatic ecological values have been considered, so that adverse effects have been minimised. There will be no takes from the Porter River or Crystal Stream.

There will be no direct discharge to water.

Effects on Aquatic Ecosystems From Works in Beds of Rivers

Appendix 10 sets out the effects of activities for which consent from the Canterbury Regional Council is required. This notes that due to the localised nature of this effect, the impact on the ecosystems within the disturbed area will not be minor. However, above and below the disturbed area, the effect on the ecosystems is expected to be insignificant. It is proposed to keep the disturbed area to less than 2 m above and below the disturbed area.

There are no areas of significant terrestrial or aquatic vegetation that will be affected by the proposed works along the proposed pipe routes across both the Porter Stream and Crystal Stream.

During the installation of the pipelines stream flow will be temporarily partially blocked (less than 8 hours at a time); and the clean water will be separated from any sediment laden water There are no fish in Porter Stream and low numbers in Crystal Stream so no effects on any fish populations are expected.

Effects on Soil Structure, Cover and Pattern

The indigenous vegetation and habitats found on the site reflect underlying soil characteristics and patterns. Any changes to soils will affect invertebrates within the soils as well as vegetation and habitats. In particular activities which result in:

- Increased instability
- Reduced soil cover/soil loss
- Breakdown of structure and/or
- Compaction

could have an adverse effect on vegetation, habitats and the species using them.

Effects on Indigenous Species or Populations at Specific Locations

While much of the proposed expansion will affect ecological values at the landscape, habitat or vegetation-cover scale, some activities will have effects on specific species of plant or animal. These may be as a result of the nature of the activity, its location or the sensitivity of the species.

In particular activities which result in:

- Indigenous species loss or reduction in local population size
- Threat to health of individuals or populations of indigenous species and/or
- Weed or predator competition

could have an adverse effect on species/populations. Conversely activities which increase indigenous species numbers/populations, improve their health or reduce weed competition have beneficial effects.

Kea are commonly seen in Porters Basin and there are existing management protocols for care of Kea. These will be continued and in addition, there should be strict control on the storage of construction and waste materials with a particular focus on plastics and fibre glass batts and avoidance of lead in construction generally.

Kea management should be part of a broader Environmental Management Plan for the Ski Area which integrates the management of habitats, weed/pest control, hazardous substances, wastewater, water quality monitoring, snow management activities, re-vegetation and erosion and sediment control.

It is proposed that pre-construction surveys for lizards should be carried out on selected routes and at selected locations. Such a survey may confirm the presence of “long-toes” and a trap and transfer programmes could be initiated

Effects on the Quality/Condition of Habitat or Vegetation

The quality of vegetation cover or habitat is related to level of naturalness. This is indicated by factors such as low level of introduced plants or animals, unmodified processes (e.g. flow regime) and an intact area that is large enough to support healthy populations of the plants and animals that naturally occur there. It is not practical to measure “habitat quality” empirically, but it can be assessed during site surveys.

Quality of habitat or vegetation cover could be adversely affected by a range of construction and operational activities. However, positive effects on quality can be

obtained through restoration, enhancement and revegetation programmes, pest management and cessation of activities that have an adverse effect.

Earthworks to valuable existing vegetation should be avoided, by refining track/trail selection. Material from cut/fill along tracks should be deposited on bare scree, and in small amounts in different places to retain the existing scree slopes and form as far as possible. Existing tracks should be upgraded rather than new ones formed and track work should be done working along newly formed tacks or by helicopter, with excess material for removal or relocation taken out being taken back along the formed route. Where possible undergrounding of pipes and cables these should be along track or trail lines to minimise earthworks/disturbance.

Effects on the Quantity/Area of Habitat or Vegetation

The quantity or area of habitat or vegetation cover can be measured. Aerial photography and surveys can be used to map terrestrial areas while the physical characteristics of waterways can be assessed to determine the habitat types within any system. Loss of quantity of good quality indigenous vegetation or habitat for indigenous fauna is to be avoided.

Some vegetation and habitat loss in Crystal Basin cannot be avoided, remedied or mitigated. Mitigation is not possible since the effect is one of loss of landform and physical environment which form the substrate for plants and animals.

8.4.1 Potential Effects of Activities Proposed

The potential effects of activities are summarised on a geographical basis within the expanded Ski Area boundaries. These tables list the effects and recommended mitigation in summary form only and reference should be made to Appendix 2 where there is more detailed discussion.

Porters and Crystal Basins

Table 8-2: Potential Ecological Effects in Porters and Crystal Basins

Activities	Potential Effects	Proposed Actions
Soil disturbance Re-contouring, earthworks, location of spoil for new trails Installation of utilities Changes to existing water storage New buildings (inc. Crystal Basin day lodge) Construction of water reservoir Gondola and lift towers Stream crossing Snow making Snow grooming (compaction), People disturbance	Loss of vegetation Weed invasion Spoil covering habitat Kea disturbance/ interactions Habitat damage fragmentation and interruption of sequence (Crystal Basin) Soil disturbance and compaction Rubbish Vegetation change through compaction (change in freeze refugia) Trampling and recreational damage to vegetation Crystal Stream contamination	Refine route and site selection, use existing tracks for construction access Best Practice earthworks and stormwater operation - Erosion Sediment Control Plan (ESCP) Weed management (and Plan) Crystal Basin management (to integrate kea, weeds, recreation , snow making and grooming etc issues) Kea management, including choice of construction materials Land/habitats management (weeds and other general issues) Hazardous substances management plan Avoidance of key areas (as per plan) Covenants over avoided areas in Crystal Basin Retain veg/habitat sequence and minimise effects through route and site refinement Water quality monitoring (biological and chemical) Wastewater Management Pre-construction lizard and invertebrate surveys to finalise mitigation (trap and transfer programme if needed)

Porter Stream Valley and Porter Stream

Table 8-3: Potential Ecological Effects in Porter Stream Valley and Porter Stream

Activities	Potential Effects	Proposed Actions
Lift towers (spoil and soil disturbance) New ski return trails Installation new water reservoir Northern, ephemeral stream re-contoured, filled and piped partially Wetland area re-contoured, filled and removed (proposed Snow Play area) Increased water take Porter Stream New structures for take and delivery Bridge/culvert crossings Earthworks for buildings near to stream Stormwater runoff from impermeable surfaces Waste water pipe under bed	Loss of vegetation / habitat Soil disturbance Weed invasion Reduction in wider habitat integrity/ intactness Reduced aquatic habitat Increased aquatic ecosystem stress due to low flow Contamination from earthworks and stormwater Riparian habitat disturbance Complete loss of moderate value wetland habitat and vegetation	Refinement route and reservoir site selection Weed management (inc Plan) Land /habitats management plan Best Practice earthworks and stormwater operation - ESCP Ecologically designed residual flow regime in Porter Stream Ecologically appropriate crossings 5m riparian buffer – fenced during construction Fencing no-go areas around habitation Long-term demarcation of sensitive areas Leave Porter Stream open through Village Minimise infill and piping Revegetate road and track edges Retain and enhance Village red tussock gully as mitigation

Porter river, Porter River Valley, Porter Hill Slopes

Table 8-4: Potential Ecological Effects in Porter River, Porter River Valley, Porter Hill slopes

Activities	Potential Effects	Proposed Actions
Upgrade Ski Area Access Road crossing/culvert Indirect discharge stormwater, sediments, treated waste water New service road around main valley hillslope	Modified aquatic and riparian habitat Reduced water quality Loss of vegetation Weed invasion Sediment discharge to Porter River	Best Practice waste water, earthworks and stormwater operation ESCP Weed management (inc Plan) Ecologically appropriate crossings 5m riparian buffer – fenced during construction Revegetation programme

Southern Terrace (Village Base Area)

Table 8-5: Potential Ecological Effects in Southern Terrace area

Activities	Potential Effects	Proposed Actions
Building footprints Roading Stormwater runoff from impermeable surfaces Underground and surface infrastructure (stormwater treatment, wastewater treatment) Rubbish People disturbance (lighting, noise)	Vegetation clearance Habitat disturbance Contamination from stormwater run off (urban, metals, PAH etc) Kea disturbance/ interactions Trampling and recreational damage especially in summer Weed invasion including garden plants Pet and pest (predator) introductions Aquatic habitat stress due to warm water Light disturbance (especially of flighted mating invertebrates) Noise disturbance (birds)	Minimise vegetation clearance Revegetation of all sites not immediately built Weed management (inc Plan) Covenant red tussock gully and buffer it Prohibit introduced animals except working dogs Prohibit gardens and limit curtilage Lighting controls (low level, low intensity, screened), B.P. treatment train for stormwater, including cooling process for hot pools Kea management plan, , including choice of construction materials Recreational management plan Property covenants

Crystal Stream, Crystal Stream Valley

Table 8-6: Potential Ecological Effects in Crystal Stream and Crystal Stream Valley area

Activities	Potential Effects	Proposed Actions
Access road / trail construction Lift tower installation Wastewater pipe crossing Pipe laying for wastewater transfer from Crystal Basin facilities Possible wastewater pump installation Installation of trout barrier/weir	Vegetation loss Habitat disturbance and fragmentation Sediment discharge from earthworks to Crystal Stream Soil disturbance Weed invasion Removal of trout from upper reaches	Refinement route and tower site selection Weed management (inc Plan) Best Practice earthworks and stormwater operation - ESCP Enhancement programme Crystal Stream Crystal Valley Stream Enhancement Programme, including native fish return into trout free reaches

Northern Terrace

Table 8-7: Potential Ecological Effects on the Northern Terrace

Activities	Potential Effects	Proposed Actions
Wastewater irrigation Installation and operation of Infrastructure for release of treated waste water	Changes to soil nutrient status Soil disturbance Weed invasion	Plant through with *Dracophyllum,* kanuka, mountain beech and appropriate species Wastewater management plan Weed management (inc Plan) Removal pines

8.4.2 Cumulative Effects

It is anticipated that construction of the proposed expansion will be staged, so that construction effects are unlikely to occur across the whole ODP area simultaneously. However, the Plan Change does provide for a wide range of activities, and once they have been carried out the cumulative effects of all the activities described above would result in:

- loss of lower part of unmodified alpine Basin (Crystal Basin)
- loss of area of approximately 15 ha *Dracophyllum*-tussock in construction of the Village on the Southern Terrace
- gain of a lesser area of *Dracophyllum*- kanuka-tussock vegetation on the Northern Terrace
- gain of habitat for galaxias in Crystal Stream and reduction or removal of trout access to higher catchment
- covenanting/enhancement of the red tussock gully wetland through Village
- loss of wetland in creation of Snow Play area
- loss of vegetation and habitats under upgraded tracks and trails
- re-vegetation/enhancement/natural recovery of disturbed and undisturbed land with locally sourced shrubs, grasses and herbs
- introduction of more people into alpine environment during summer and winter
- weed and pest control
- additional kea management opportunities

Re-vegetation and pest/weed management effort will have to occur on all disturbed ground to prevent soil loss and weed incursion/spread. At higher altitudes few species will be suitable for re-vegetation and the emphasis will have to be on weed control. At lower altitudes, intact cover should be retained wherever possible. Where ground has to be disturbed a programme of planting, mulching and pest/weed control should be used. A list of plants which are found on or close to the site and which are suited to propagation and use for revegetation on this site is given in Appendix 2, and used in landscape recommendations in Appendix 3. Plants should be selected from this list for particular parts of the site and uses in consultation with an ecologist and plant nursery staff.

8.5 Effects on Historical and Archaeological Values

Porters Ski Area: An Archaeological Assessment (Appendix 4) sets out the potential effects and recommendations for mitigation of adverse effects.

Archaeological site K35/3 (track to Coleridge Pass) and an unregistered old stone hut lie west of State Highway 73 in the vicinity of the Ski Area Access Road. Neither will be affected by the current proposals so an archaeological authority from NZ Historic Places Trust is not required. However, an accidental discovery protocol should be put in place.

Should roading work take place to the west of the existing Ski Area Access Road (or any other location with potential effect on a site of value) Porters would apply for an archaeological authority from NZ Historic Places Trust.

8.6 Effects on Cultural Values

It is anticipated that a draft Cultural Values Report (being considered by the Te Rūnanga o Ngāi Tuāhuriri at the time of preparation of this AEE) will set out a process for Porters to engage with Runanga to discuss potential effects and the implementation of recommendations.

8.7 Effects on Transportation

The Transportation Assessment Report (Appendix 5) sets out the potential transportation effects and recommendations for mitigation of adverse effects

8.7.1 Traffic Generation and Distribution

Permanent residents

The Plan Change provides for 45 chalets (residential dwellings). Given the remote location of the Ski Area, the use of the dwellings as holiday homes and the self-contained nature of the Village a traffic generation rate of 4 vpd/household is considered to be appropriate for assessment purposes.

There will be approximately 200 people permanently staying within the various visitor accommodation buildings elsewhere in the site. Assuming an equivalent household size of 3 people, this is the equivalent of a further 66 households for the purpose of traffic generation calculations.

The calculated traffic generation associated with the permanent residents is therefore 450vpd throughout the year.

8.7.2 Resort Visitation Patterns

Transport Mode Split

There is an expectation that buses and coaches will form an important mode of transport for visitors to the expanded Ski Area and this has been factored into the traffic generation calculations accordingly.

Overnight Visitors

There is a general absence of data regarding traffic generation for accommodation facilities in remote Ski Area destinations. Visitor projections supplied by Porters that take account of the attractiveness of the site during the different seasons have been adopted for assessing the likely traffic generation of the site.

It can be assumed that at full development with the large range of accommodation facilities and providers on-site, the arrivals and departures would be relatively consistent across the week. Given the variation in stay lengths and options for flights, it is unlikely that there will be significant peak periods of visitor arrival and departure on any particular days.

Traffic generation calculations for overnight visitors have allowed for:

- The estimated average duration of stay (based on Statistics NZ data for Queenstown)
- The assumption that the visitation on any night will be spread across the accommodation types, based on a pro rata of the various capacities
- A mode split between private car and bus, dependant on accommodation type
- An assumed occupancy per vehicle (taking into account the Statistics NZ guests per stay unit data for Queenstown)
- Allowance for a proportion of visitors staying multiple nights to undertake day visits into the surrounding area.

The busiest period of activity will be in the winter when the daily traffic generation associated with the overnight visitors will be approximately 400vpd on average, with a peak of up to 650vpd.

Ski Area Day Visitors

The Transport Assessment assumes Ski Area day visitors will travel with 3.8 people per car on a weekday and 3.4 people per car on a weekend. Porters' own survey data (M Sleigh, pers comm) suggests that 85% of day visitors arrive by private car. Approximately 15% are expected to arrive by bus or coach.

Traffic generation has then been calculated, based on a season average day visitation of 1,400 visitors per day, and a design level season peak of 2,900 visitors per day representing a typical busy weekend. The weekend peak will result in daily traffic volumes of over two times the average, being 1485 vehicles (in and out) compared with 643.

Servicing

Ancillary traffic generation associated with servicing and maintaining the Ski Area will be less than 5% total in comparison to the overall traffic generation. The timing of these trips can also be managed to avoid peak patterns.

Net Traffic Generation

Table 8-8 shows the net traffic generation throughout the year for the expanded Ski Area at full development.

Table 8-8: Net Traffic Generation of Site

Trip Source	Summer		Winter	
	Average	**Peak**	**Average**	**Peak**
Permanent residents	450	450	450	450
Overnight visitors	328	614	351	650
Ski area day visitors	-	-	643	1485
Minus existing ski area operation	-	-	300	600
Total (in+out)	**778**	**1064**	**1144**	**1985**

This shows that peak traffic occurs during winter, when the 7-day average daily traffic volume is up to approximately 2,600vpd of which 1985 vehicle movements will be newly generated.

The traffic assessment has been undertaken based primarily on the patterns associated with the ski-field day visitors. An allowance has been made for 70% incoming trips to arrive and depart within a single hour period. This means that at the morning peak hour, around 560 vehicles will enter the site. The departures in the evening peak hour will however be more dispersed as the capacity of the lifts/gondola will limit the number of people able to exit the site. An allowance was made for 50% total departures to occur within a one hour period.

Traffic Distribution

The majority of traffic is expected to be associated with Christchurch and the International Airport being a major trip origin / destination point. It is likely that only a small proportion of traffic will be coming from or going to the west, although it is possible in due course that the Village could form a stop on longer coach tours through Arthurs Pass and the West Coast. The expected traffic distribution is therefore 90% to/from the east and 10% to/from the west.

8.7.3 Effects on the Transport Network

Porters Access Road

Following full development the Ski Area Access Road will accommodate on average approximately 1,100vpd. During the seasonal peak in the winter, this would increase to approximately 2,600vpd with the potential for occasional peak traffic volumes exceeding this level.

Such a volume will readily be able to be accommodated on the upgraded Porters Ski Area Access Road, which will be widened and sealed to provide for full two way traffic. It is anticipated that existing arrangements with SDC for maintenance of the road will be continued.

SH73 currently carries 1,500vpd, with annual growth currently at approximately 2% per annum. Allowing for a ten year development period and continuing growth at the historic growth rate, the future through traffic volume on SH73 would be approximately 1,800vpd.

Having regard to the net traffic generation in Table 8-8 above, a full left turn deceleration lane from the south will be required to accommodate the turning traffic at peak times. A right turn from the north would not be required under the current turn priority rules, although it would be appropriate if the rule changes (as recently signalled by the NZ Government).

During the evening peak, the Ski Area access road will have approximately 330vph turning right, and 40vph turning left associated with ski field departures. Through traffic volumes on SH73 may be up to approximately 150vph.

Modelling of these peak traffic scenarios at full development shows that the critical turning movements will be able to be undertaken with an acceptable level of service, with spare capacity still being available. The left turn into the site will effectively operate as a continuous movement with the low opposing movement. The afternoon right turn out of the site will operate close to its capacity, as vehicles are required to give way at the intersection. However, these queues will be retained entirely on the Access Road and given the nature of the facility, would not be unexpected.

SH73 /Access Road intersection

The existing SH73 access to Porters Ski Area will be upgraded to accommodate the additional traffic that will be generated by the proposal. Both right and left turn deceleration lanes will be required in order to satisfy and efficiently accommodate the increased levels of traffic. Porters will, provide seal widening to allow for the future marking of the lanes.

The sight distance for emerging drivers is limited in one direction; this can be mitigated by improvements prior to the full development of the site.

SH73 Route

The LOS during the busiest hour will be approximately LOS D/E in the peak hour of activity when day skier traffic is travelling to the field. This represents relatively heavy

traffic flows for a mountainous region. However this would occur for only several hours each year, and as most of the traffic is related to the resort Ski Area, effects on other road users will be minimal.

The increase in traffic will result in increased crash exposure on the Highway and potentially additional road crashes, particularly over the mountainous Porters Pass section of road. Applying the increased average traffic volume to the route's current crash analysis rates there is the potential for an additional 1.5 injury crashes per year over the 21km section of road.

Emergency Access

Lyndon Road provides an alternative route to the site if SH73 is closed between Porters Pass and Springfield due to a road crash or snow, although it is also likely to also be susceptible to snow conditions. Similarly, SH73 via Arthurs Pass also provides alternative lifeline access if there is major closure of roads from the east. In addition, the site itself will have a helipad.

8.7.4 Parking Demand

Parking Demand for Day Visitors

Car parking at Porters will be in keeping with standard practice for major parking generators to provide formed spaces for a "design level" which will comfortably address the majority of peak parking demands, with occasional peaks accommodated in less formal overflow parking areas.

A first principles approach has been used to assess the demand for parking spaces by day visitors. The assessment has been undertaken based on the maximum person capacity of the expanded Ski Area. Using traffic count data, from another ski field in New Zealand, a breakdown of parking spaces required for cars, campervans and coaches was calculated.

Based on the visitation forecast, it is anticipated that planning for this a 95th percentile of 2,900 visitors per day which is a typical busy weekend for visitor numbers, will accommodate all but six of the busiest ski days in a year, at which time overflow parking management would be necessary.

The provision and design of car parking plus overflow provision will be considered in detailed design of the site. This will be provided over time as the Ski Area develops and builds its clientele base. From a traffic effects perspective, the precise location of parking is not a significant issue.

8.7.5 Parking Provision for Accommodation

The Transport Assessment relies upon developments in the Queenstown Lakes District and car park rules in the Queenstown Lakes District Plan to provide guidance on appropriate parking standards. These are based on accommodation types and the types of vehicles that visitors will typically arrive by e.g., hotel visitors may typically arrive by coach. These provisions are recommended to be rules in the proposed Plan

Change with variable standards for the Chalets, Hotels, Backpackers/Lodges and Apartments. The location and design of this car parking will be determined as part of resource consents for built development within the Village Base Area.

8.7.6 Construction Effects

At this stage, details of the anticipated construction traffic, workforce numbers and duration are not available. Consequently, the construction-related traffic effects have not been addressed. These are to be addressed through resource consents for subdivision or earthworks which may require a Construction Traffic Management Plan to be prepared.

8.8 Effects on Market/Demand

The Market Demand Assessment (Appendix 12) sets out the potential effects of the proposed expansion on the local, regional and national skier market.

The proposed expansion will address the barrier to visiting described in Section 7. There has not been a significant new Ski Area developed in New Zealand since 1985 although updates to existing facilities are ongoing[18]. The "green-fields" nature of Crystal Basin and the proposed Village enables it to be designed in a way that integrates contemporary technology, facilities, slope design, and infrastructure. This will enable it to appeal to contemporary skier market tastes specifically by:

- Offering substantial areas of quality intermediate terrain.
- Incorporating a range of non-ski related activities, resulting in large part from the presence of the resort accommodation, but including shopping and restaurants, bars and other hospitality options.
- Maximising the potential for events, both on-slope and in the village. The accessibility of the Village and its facilities (such as accommodation and hospitality facilities close to the slopes) will enable more substantial snow sports events during winter than is currently possible in other New Zealand fields. These events have potential to attract skiers to the field[19].
- The Porters Village will have sealed road access from State Highway 73. The road from the State Highway to the field is not steep and will make Porters the most accessible field in New Zealand from a State Highway and the most accessible from a major international airport[20].
- Staying on the mountain (within walking, skiing or gondola/lift access of the ski field) offers a different alpine and ski-based holiday to what is currently available

[18] In 1985 the Remarkables Ski Area was opened. There have also been significant on-field investment in infrastructure at many resorts, notably Cardrona and Treble Cone in the Southern Lakes region and Whakapapa and Turoa in the North Island.
[19] Research on the 2006 Queenstown Winter Festival showed that for 57% of domestic visitors to Queenstown during the festival, the event was the main reason or an important reason for their visit. For international visitors 21% felt this way about the Festival (NZTRI 2007)
[20] Although Queenstown airport hosts international services, its capacity is restricted to narrow-body jets and arrivals during daylight hours.

in New Zealand[21]. Not being able to stay on the mountain is perceived as a negative by Australian visitors - both those who have and have not visited New Zealand[22].

- It is important to note, however, that simply having a slope-side Village is not, on its own, enough to appeal to visitors. Visitors will have experience of resorts of high quality and which provide excellent slope-side village après ski facilities, accommodation, and hospitality. This is likely to be critical in ensuring the appeal of the Porters Village.
- Accessibility of a ski field to its major markets is critically important. It will be possible for Auckland residents to travel to the Porters Ski Area in just over two hours, and for residents of Sydney, Melbourne or Brisbane to travel to Porters in roughly six hours. For many visitors this will be equal to, or less than, the time it would take to drive to domestic resorts. For the important local and existing Canterbury markets, Porters will be 30 minutes closer to Christchurch and North Canterbury than Mt. Hutt.
- Although the expanded Ski Area with a Village is likely to hold wide appeal, two broad consumer types for whom the competitive attributes described above are likely to hold particular appeal are the 'Destination-Skier" and the "family ski-group". The Destination Skier Market. Behaviour that identifies Destination Skiers can include travelling to a single destination regardless of the snow, and booking through travel agents as a 'package'[23].

Two scenarios were considered. In the conservative scenario, the demand assessment estimates annual winter visitation of 116,000 skier-days[24] after one year of full operation, growing to 130,100 skier days after ten years. The optimistic scenario begins with 121,900 in year one, with total demand growing to 167,200 skier days in year ten.

Under the conservative scenario domestic visitors comprise 63% of skier days in the first year of operation, and this declines to 53% as Australian and other international markets grow in importance. In the optimistic scenario, the growth in the Australian market is more significant.

It is expected that a significant proportion of domestic and international skier-days will be drawn from skiers who would otherwise have visited the Southern Lakes Region. Many of these 'Destination' and family skiers will be attracted by the Village facilities and activities as much as the snow and family-friendly terrain and atmosphere.

It is estimated that each skier-day in the expanded Ski Area will result in NZ$80 expenditure on the slope (including lift-passes). Most visitors will also stay at the Village, spending an average of NZ$240 per night. In total, in its first or second year the expanded Ski Area will generate at least NZ$21.7m, growing to NZ$26.3m per

[21] Apart from club fields and a handful of apartments on Cardrona and some club accommodation on North Island mountains, there is no significant on-mountain accommodation available on New Zealand ski fields.
[22] New Zealand Ski Tourism Marketing Network (2008).
[23] 33% of international visitors to Queenstown travel on a package (NZTRI 2005). 51% of Australians pre-booked some or all of their package, 37% were fully package-travellers (NZ Ski 2009).
[24] The terms "skier-days" and any reference to "skiers" includes snowboarders unless specified otherwise.

year after ten years. Under an optimistic scenario, expenditure will reach NZ$35.9m after ten years.

After ten years, it is estimated that the skiers at the expanded Porters Ski Area would be spending as much as NZ$10.4m per annum on services, goods and activities outside the Ski Area, not including international airfares.

After ten years under an optimistic scenario, skiers and snow boarders visiting the expanded Porters Ski Area will spend a total of NZ$46.4m per annum on their ski holiday. 27% (NZ$12.5m) of this will be the result of attracting a greater share of the Australian skier market to New Zealand and will therefore be extra money in the New Zealand economy and ski industry.

Summer markets although promising for the Ski Area are more difficult to estimate than winter markets. The analysis has estimated that the expanded Ski Area will receive 10,000 visitors during summer, a quarter of whom will stay for an average of two nights. These visitors would spend a total of just over NZ$1m during the summer period.

The Market Demand Assessment report notes that a range of opportunities are available for stimulating the summer market further, including investment in events, conference activity, and the development of one or more compelling attractions at the expanded Ski Area.

The analysis also assumes that the expanded Porters Ski Area is developed and run as one of the premier ski-resorts in Australasia, noting that it is vital that the on-slope facilities and village accommodation, entertainment and hospitality venues are comparable if not in size then in quality to those found in Australia.

It is noted that the demand and expenditure assumptions contained in the optimistic scenario are not an “upper-limit” but are estimates believed reasonable under an optimistic scenario based on current market, economic and environmental conditions. Changes in these conditions could result in much greater demand and resulting expenditure and there are some examples of this occurring such as the recent strong growth at Coronet Peak. The effects of such changes could potentially include much greater penetration into the existing New Zealand and Australian markets due to the unique nature of the product and/or new market demand from Asian countries such as India, China or Russia in the future.

8.9 Economic Effects

The potential effects of the proposal on Selwyn District, Canterbury Region and New Zealand are discussed in Appendix 11 Economic impacts. Impacts of construction and of visitor numbers/visitation are considered in terms of net impacts – that is, they incorporate any negative impacts that Porters may have on other businesses in the region of interest (by attracting business away). Non-use values associated with the project have not been included in the analysis.

8.9.1 Economic Effects of Operation

In relation to visitors/visitation the results of analysis suggest that from the perspective of Selwyn District, net output in ski areas and the Village is expected to increase by between $24 million and $34 million per year by year 10. This will rise to $70 million per year at full development. By year 10, the regional output (including multiplier effects) is expected to have increased by $31 - $44 million/year. Accompanying this increase in output by year 10 will be an increase of 240-340 FTE jobs and $16-$22 million value added (Regional GDP).

From the regional perspective, net direct output in the ski areas, skier accommodation and tourism is expected to increase by between $21 million and $30 million per year by year 10, and by $68 million at full development. Multiplier effects increase these values, and by year 10 regional output is expected to have increased by $41 - $59 million/year. Accompanying this increase in output by year 10 will be an increase of 310-450 FTE jobs and $20-$29 million per year in value added (Regional GDP).

These total regional impacts are greater than the district impacts because of the much larger multipliers associated with the more diverse economic base of the regional economy. At full field development, regional output will have increased by $130 million per year. Accompanying this will be 960 FTE jobs and $62 million per year of added value.

From the national perspective, net direct output in ski areas, skier accommodation and tourism is expected to increase by between $8 million and $15 million per year by year 10, and by $31 million at full development. These figures are much lower than the district and regional direct totals because of the proportion of Porters' business which is assumed to have been attracted away from other ski areas in New Zealand.

Multiplier effects increase these values and by year 10 national output is expected to have increased by $19 to $32 million per year. Accompanying this increase in output by year 10 will be an increase of 150 – 260 FTE jobs and $10 - $17 million of value added. At full field development, national output will have increased by $69 million per year. Accompanying this will be 550 FTE jobs and $37 million of value added

8.9.2 Economic Effects of Construction

The results of analysis suggest that construction associated with the Ski Area expansion will generate total output of $120 million plus $41 million value-added in Selwyn District (and $1030 million + $380 million in Canterbury Region; and $1250 million + $480 million at the national level).

Construction is likely to bring 650 job-years of work at the District level; 5,500 job-years work at regional level; and 6,600 job-years work at the national level.

These figures will vary depending on the rate of development.

9.0 AVOIDANCE, REMEDIATION, MITIGATION AND ENHANCEMENT

9.1 Introduction

In this section the proposed actions to avoid, remedy or mitigate significant adverse effects and enhance existing environmental values are summarised. The appropriate appendices contain full descriptions of proposed actions.

Where effects are unable to be completely avoided, remedied or mitigated, it may be appropriate to consider environmental compensation. The Plan Change provides for this.

9.2 Avoidance

The proposed expansion project which is subject to this Plan Change has been developed over an extended period. A range of site investigations have been carried out to enable many potentially significant adverse effects to be avoided and a more sustainable project to be designed. The most important "avoidance" actions are:

Geotechnical

- Locating the Village on Southern Terrace and confining structures to less steeply sloping ground
- Defining a "flood avoidance zone" around the Porter Stream within which no critical structures will be located
- Ensuring roads, trails and infrastructure avoid areas of potential instability through preliminary investigations.

Waterways/hydrology

- Avoiding takes from Crystal Stream and Porter River

Landscape

- Clustering buildings/Village Base Area structures to avoid adverse effects on visual amenity
- Locating proposed new lift top stations in positions that are visible from SH 73
- Avoid effects on natural character of waterways by defining set back for activities that may be inappropriate

Ecology

- Ryton Basin was excluded from the development area proposed initially for ecological and land management reasons. Ryton Basin has high ecological values, because it contains unusual plant communities and has no introduced plants.

- The Village layout and stormwater treatment system recognises the value of “red tussock gully” in the proposed Village area, and the opportunity to enhance vegetation cover it while creating a secondary flow path for stormwater.
- Buildings/structures in the Village will be set back from waterways by a minimum of 5m.
- No water takes are proposed from the Porter River. This recognises its importance as a system supporting native fish in the presence of trout – it is likely that if the amount of water in the River were reduced, native fish would not survive.
- No water will be taken from Crystal Stream recognising its importance as a source for native fish in the Porter River system; the existing take will be removed once an alternative source is established
- The hydro-electric system will be removed from Porter Stream
- A *Dracophyllum*-kanuka revegetation area has been identified on the northern terraces. This will reflect the former natural cover of this area, while assisting in nutrient uptake from waste water.
- The access track and ski trail into/out of Crystal Basin have been aligned to avoid alpine spring flush area
- There will be no private gardens or obvious marking of property boundaries in the village, so that the integrity of vegetation cover remains.

9.3 Mitigation/Remediation - Resource and Building Consent Processes

9.3.1 Geotechnical

The risk from potential geotechnical hazards has been deemed acceptably low, so that any residual adverse effects can be mitigated through the application of standards and recommendations made by a suitably qualified engineer at the design, resource consent and building consent stages. This would address concerns in relation to:

- Seismic hazards
    - compliance with NZ Standard NZ1170.
- Active faulting
- Slope stability
    - all buildings to comply with New Zealand Building Code B1/VM4;
    - buildings on ground steeper that 15 degrees to have specific geotechnical investigation
    - for small defined area of instability on the edge of the southern terrace/Village Base Area: structures to be 5m back from edge; erosion protection measures to be in place; stormwater discharge to be prohibited; and regular inspection to be carried out
- Flood hazards
    - building avoidance zone to be defined
    - existing water storage reservoir to be decommissioned
- Snow avalanche risk
    - data collection on-going
    - avalanche data to be considered when selecting location of all structures and facilities

9.3.2 Waterways and Hydrology

As part of the resource consent applications for water take, discharges related to waste water treatment, land uses associated with treatment and stormwater management, Appendix 10 sets out a range of proposed conditions. These will avoid, remedy and mitigate the potential adverse effects on waterways or hydrology from the proposed activities.

9.3.3 Landscape Values

Effects on landscape values will be addressed through the provisions of the proposed Plan Change as follows:

- Requiring built development to conform to an ODP;
- Rules which limit the scale of built development through the number of buildings, the building footprint and height;
- Requiring all buildings and structures to obtain a resource consent in respect of design and appearance. Comprehensive assessment matters enable Council to impose conditions and control matters such as materials, architectural style, site layout etc
- Restrictions on fences to prevent suburbanisation;
- Requiring all landscape planting to conform with an Outline Planting Plan and limited species list; s well as apply for a resource consent for all planting to ensure that planting is consistent with the principles underpinning the Master Plan and integrates with the surrounding landscape.

9.3.4 Ecosystems, Habitats and Species

Table 9-1 summarises the proposed actions to address potential adverse effects, discussed in Section 8. As for landscape, many of these actions are to be implemented through the proposed Plan Change. These provisions are also noted in Table 9-1.

Management Plans

Documentation specific to this site and development will be needed to set out the management required for the protection and enhancement of ecological values over the lifetime of the Ski Area.

A Porters Ski Area Environmental Management Plan may be an appropriate “umbrella” to integrate management of habitats, weeds and pests, kea, lizards, waterways and restoration.

Table 9-1: Summary of Avoidance, Remediation and Mitigation for Ecological Values

Location	Proposed Actions	Planning Mechanism
A Porter Basin	Refinement trail route and tower, building site selection Use existing tracks for construction access Best Practice earthworks and stormwater operation - Erosion sediment control plan (ESCP) Weed management (inc Plan) Kea management plan, including choice of construction materials Land/habitats management plan (weeds and other general issues) Hazardous substances management plan	The proposed Plan Change requires all earthworks to be a controlled activity. The matters over which Council has control are specified in a comprehensive list and Council may impose conditions in respect of these. The matters include the location of earthworks, appropriate Erosion and Sediment measures, protocols for clean machinery entering the site, conditions requiring the preparation and implementation of a Ski Area Environmental Management Plan which covers land and habitats management, hazardous substances, weed and pest management, erosion and sediment control. The consent process and proposed assessment matters enable Council to require as conditions of consent that existing trails are used. These provisions are replicated in the subdivision consent process. Accordingly, these considerations are "captured" for development either as part of a subdivision consent or independent of subdivision, but requiring an earthworks consent. In addition, ESCP will be required as conditions of Regional consents.
B Porters Stream Valley	Refinement route and fire tank site selection Weed management (inc Plan) Land /habitats management plan Best Practice earthworks and stormwater operation - Erosion and sediment control plan (ESCP)	As above.

Location	Proposed Actions	Planning Mechanism
C Porters Stream - perennial	Operate ecologically designed residual flow regime Best Practice earthworks and stormwater operation - Erosion and sediment control plan (ESCP) Build ecologically appropriate crossings 5m riparian buffer – fenced during construction Fencing no-go areas around habitation Long-term demarcation of sensitive areas Leave Stream open through Village	The residual flow regime will be implemented through Regional consent for water take. Will be monitored as a condition of consent and can be included in Ski Area Environmental Management Plan (SAEMP) by District Council through subdivision consent conditions requiring the preparation and implementation of a SAEMP. Ecologically appropriate crossings can be confirmed through conditions on resource consents and building consents. Proposed Plan Change has a 5m setback for all buildings. Construction setbacks would be determined through consents for earthworks and subdivision to District and discharge consents to the Regional Council. Long term demarcation of sensitive areas would need to be included in SAEMP.
C North Porters - ephemeral	Minimise infill and piping Revegetate edges Retain and enhance Village red tussock gully as mitigation for loss of vegetation	Covered through earthworks consents to District and water and discharge related consents to Region. Conditions would specify re-vegetation. Built development and hardstand is not permitted in the Red Tussock Gully as a rule in the Plan Change. Enhancement would need to be addressed through the SAEMP and enforced as a condition of consent.
C Porter wetland (Propose Snow Play area)	Enhance village red-tussock gully and expand to form new wetland in proposed stormwater "pond"	As above.
D Porter River Mainstem	Best Practice waste water, earthworks and stormwater operation - Erosion and sediment control plan (ESCP) Weed management (inc Plan) Build ecologically appropriate crossings 5m riparian buffer – fenced during construction	As discussed above.

Location	Proposed Actions	Planning Mechanism
E Porter River Valley	Erosion and sediment control plan (ESCP) Weed management (inc Plan) Revegetation programme	As noted above
F Porter Hill slopes	Erosion and sediment control plan (ESCP) Weed management (inc Plan) Revegetation programme	As noted above
G Southern Terrace (Village Area)	Minimise vegetation clearance Re-vegetation of all sites not immediately built Weed management (inc Plan) Protect red tussock gully from built development Prohibit introduced animals except working dogs Prohibit gardens and limit curtilage Lighting controls (low level, low intensity, screened), B.P. treatment train for stormwater, including cooling process for hot pools Kea management plan, , including choice of construction materials Recreational management plan Property covenants	As noted above in relation to vegetation clearance, stormwater, management plans etc. Night lighting of the Porters or Crystal Basin Ski Areas would require a resource consent for a Restricted Discretionary Activity. Covenants sit outside the District Plan process and will be the Ski Area owner's responsibility. Proposed plan change rules limiting the removal of indigenous vegetation to a small area without the need for a non-complying resource consent will limit cartilage. Lighting will need to be addressed as part of the SAEMP.

Location	Proposed Actions	Planning Mechanism
H Crystal Basin	Avoidance of key areas (as per plan) Covenants over avoided areas Retain ecological sequence and minimise effects through route and site refinement ESCP specific to the basin Crystal Basin Habitat management plan (to integrate kea, weeds, recreation , snow making and grooming etc issues) Water quality monitoring (biological and chemical) Wastewater Management Plan Pre-construction lizard and invertebrate surveys to finalise mitigation (trap and transfer programme if needed) Kea management Plan , including choice of construction materials	Alpine flush required to be covenanted for protection in perpetuity as pre-condition (through subdivision and activity rules) to development. Management plans required as conditions of earthworks or subdivision consents. Water quality monitoring required as condition of consent from Regional Council as well as being included in SAEMP by District Council. Wastewater management required as condition of consent from Regional Council
I Crystal Valley	Refinement route and tower site selection Weed management (inc Plan) Best Practice earthworks and stormwater operation - Erosion and sediment control plan (ESCP) Enhancement programme Crystal Stream	Enhancement of Crystal Stream could be required as part of SAEMP or secured through agreement with DOC outside RMA process.
J Crystal Stream	Crystal Valley Stream Enhancement Programme, including native fish return into trout free reaches Best Practice earthworks operation - Erosion and sediment control plan (ESCP)	As above.

Location	Proposed Actions	Planning Mechanism
K Northern Terrace	Plant through with *Dracophyllum,* kanuka and appropriate species Wastewater management plan Weed management (inc Plan) Removal pines	Can be implemented through conditions on earthworks/subdivision consents and the SAEMP.

9.4 Historical and Archaeological Values

Should any activity be planned to take place which has a potential effect on the registered site K35/3, Porters will apply for necessary archaeological authority.

Porters will develop an Accidental Discovery Protocol through its ongoing discussions with Te Runanga o Ngai Tuahuriri.

9.5 Cultural Values

Continued discussions with TNT through Maahanui Kurataio will address the recommendations in the draft Cultural Values report which is in preparation.

9.6 Transportation

Potential adverse effects on transportation can be addressed through design – both of the intersection of the Ski Area Access Road and SH73 and within the Village itself. In particular the Transportation Assessment (Appendix 5) recommends:

- Providing safe access to SH73 through deceleration lanes and achievement of sight distance. The proposed Plan Change requires these matters to be addressed as a pre-condition to construction or at the time of subdivision approval.
- Setting appropriate mechanisms within the District Plan in terms of parking requirements. The proposed Plan Change incorporates the parking standards recommended in the Transport Assessment.

9.7 Monitoring

A full monitoring programme will be developed as part of appropriate resource consent applications.

9.7.1 Regional Council Consents

Appendix 10 proposes monitoring during construction and over the long term. Monitoring is to include:

- Long-term soil monitoring from beds of public infiltration basins and raingardens (stormwater discharges)
- Waste water effluent prior to discharge into Land Treatment Area
- Infrastructure performance

Ecology

An ecological monitoring programme is proposed to set a baseline, assess changes to the environment and review construction or operation in response to any adverse changes resulting from the development.

Monitoring during earthworks will be addressed through earthworks consents.

For ecological aspects it is proposed that the long-term monitoring programme should cover:

- Vegetation – changes to vegetation at selected points on the site, to assess effects of snow management, success of the revegetation programme, success of weed management.
- Weeds – success of removal of pines etc; spread of new species
- Soil nutrient levels in wastewater irrigation field
- Aquatic habitat - changes to water quality, periphyton, macroinvertebrate and fish populations in Porters Stream, Porter River and Crystal Stream as well as residual flows.
- Stream enhancement programme success – in Crystal Stream, Porter River
- Invertebrates – terrestrial invertebrates at selected sites to assess long-tem changes resulting from introduction of lighting to the area.
- Lizards - population estimates at selected places to assess changes resulting from snow management, pest controls and recreational use.
- Kea – effects of additional visitors

A key feature of any monitoring programme is a system to review data and information from data, and feed that back into management. The system can be developed during preparation of Ski Area Environmental Management Plan.

10.0 STAKEHOLDER INFORMATION SHARING/ COMMUNICATIONS

Porters has had informal discussions with members of the community, regulatory authorities and stakeholders in respect of proposed expansion options since the current owners purchased the Ski Area in late 2006. Changes have been made to the Master Plan as a result of some of these discussions.

The majority of discussion has been led by Michael Sleigh, the Project Manager for Porters with support from Duncan Bull and Simon Harvey who are both Directors of Porters as well as various consultants for technical advice as required. Michael has made himself accessible by phone, email and in person to meet with parties on request and in a timely manner.

The proposed expansion has been publicly reported since 2007 as follows;

- 27 January 2007 – The Press – front of Business Section – purchase & general plans
- 26 August 2009 – The Press – front page – proposed masterplan
- 22 February 2010 – The Press - page 3 - land exchange agreement

When the proposed expansion concept was released in August 2009 it received extensive media coverage on radio, television, in national newspapers, specific interest magazines and websites.

A physical model of the proposed expansion was placed in the Porters Cafe in August 2009 until the end of the ski season and a large number of written comments were received in the comments box on it.

The proposed expansion is also described on the Porters website and frequent emails are received in response to this information, both in support and opposition. Michael Sleigh responds to all of these emails.

To date Porters has had informal discussions with;

- Selwyn District Council
- Environment Canterbury consents officers
- Department of Conservation
- Manager of the neighbouring Brooksdale Station
- Springfield Lime Company – owner of the Quarry located off the Ski Area Access Road
- Owner of neighbouring Glenthorne Station

- Various members of the local community
- Local accommodation suppliers and businesses
- Former owners of the Ski Area
- Porters own staff and former employees
- Ski Area customers
- Ski industry representatives
- Representatives of Te Runanga o Ngai Tahu
- Christchurch & Canterbury Tourism
- Christchurch International Airport
- Royal Forest & Bird Protection Society
- Porters Ski Club

Porters made a formal presentation of the project to the Mayor, Councillors and senior staff at the Selwyn District Council on 26 May 2010. This was a factual presentation of what the proposed Plan Change would include. Porters also met with the Malvern Community Board on 21 June 2010 to make a similar presentation.

Porters has consulted with the New Zealand Transport Authority in respect of access on to State Highway 73.

Porters is meeting with the Springfield Community at a information evening hosted by the Springfield Township community on 13 July 2010. Flyers are being sent out to all Springfield residents and 60 houses on the wider rural delivery network.

A meeting with the Castle Village Residents Association is planned for late July 2010.

Porters also propose to meet with;

- Emergency Services – police, fire and ambulance
- Neighbours – Brooksdale Station, Department of Conservation, Glenthorne Station and Castle Hill Station
- Other Ski Areas on the Craigieburn Range
- North Canterbury Fish & Game Council
- Te Ngai Tuahuriri Runanga
- Historic Places Trust

- Other interest groups, individuals and organisations as part of an organised information sharing programme being developed.

Post-lodgement of its application, Porters will place all the information on its website and provide copies of reports on request.

A full programme of public information – sharing is proposed to coincide with the notification process.