

# Buxton Gore Bay

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## ASSESSMENT OF ENVIRONMENTAL EFFECTS

*Prepared for*  
Buxton Gore Bay Limited  
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## **1.0 The Proposal**

This proposal is to rezone land for the purpose of enabling residential development in the Buxton Valley, which in combination with a mix of land uses – farming, conservation and recreation will provide a sustainable foundation for efficient and effective land management.

The proposed residences are anticipated to be occupied by both permanent residents (known as a primary home community) as well as holiday home owners. A total of 83 dwellings are proposed.

Complementary to the proposed housing are roads, walkways, protection of existing indigenous vegetation and in-stream values of Buxton Creek, areas of new indigenous vegetation planting for enhancement and mitigation purposes, farming and recreational activities including tennis, walking and cycling.

## **2.0 The Site**

The site is located west of the existing Gore Bay village in the coastal foothills. The site is contained within three separate titles and is legally described as follows (see **Appendix A**):

Section 23 Blk IX Cheviot SD and Part Section 7B Blk IX Cheviot (CT CB 35A/746)

Lot 2 DP 31008 (CT CB507/10)

Pt Section 20 Blk IX Cheviot (CT CB 15F/1021)

The 142ha property boundary runs approximately 1.2km along the terrace that fronts Gore Bay, and extends 1.8km inland. It is a well-defined site, essentially representing the catchment that feeds into Buxton Creek.

Buxton Creek divides the land into two main east-west oriented ridges. Minor tributaries flow into the creek down steep gullies from both the northern and southern ridges. The northern and southern property boundaries essentially follow the ridgetops. The highest point of the site is at Mt Cunningham (191masl), on the northern boundary.

The property has been historically, and is currently, managed for pastoral farming purposes.

## **3.0 Project Objectives**

In developing this project, Buxton Gore Bay Ltd (BGBL) has been committed to a philosophy of sustainable land use and the desire to be sensitive to landscape and ecology values and the relationship between this site and the Gore Bay community. BGBL has also been committed to adopting best practice for stormwater and wastewater treatment to ensure a high environmental outcome can be achieved in relation to water quality in the Buxton Creek. These underlying philosophies have provided the foundation for the master planning exercise that guided the layout and design of the proposal.

The project objectives set out by BGBL in the brief for the master planning exercise were to:

- understand and respect the natural character of the coastal environment
- enhance ecological and habitat values
- recognise archaeological, cultural, community and landscape values (part of the site has been identified as an Outstanding Landscape at a district level)
- recognise the sensitivity of different parts of the site and variability for capacity to absorb change
- have regard to visibility from Gore Bay, neighbours and public areas
- provide for public recreation and access within the site
- provide for sustainable rural land uses on those parts of the farm not developed for baches and dwellings
- provide desirable views and aspect for baches and dwellings
- incorporate principles of energy conservation into site planning
- realise the potential to physically and ecologically link to the adjacent DOC reserve

The master plan is to be complemented by performance standards in the District Plan which control the location, height, form and finish of buildings to ensure they are compatible with the rural coastal environment.

BGBL also propose to approve all architectural plans as well as promote energy conservation principles in building design. These two matters are not proposed to be part of the District Plan provisions and would be achieved through private agreement.

#### 4.0 Description of the Master Plan

The Proposed Master Plan is attached as **Appendix B**.

The Master Plan shows the outline of the property boundary, which is also the proposed boundary of the Buxton Valley Management Area in the Proposed Plan Change. The following are components of the Master Plan which are described in detail in the following sections:

- Dwellings - a total of 83 houses located within 6 defined building clusters
- Areas of protected indigenous vegetation
- Roads
- Walkways
- Enhancement planting

The area of land involved in these activities is as follows, with the balance of the 142ha maintained as open space (approximately 29.5ha).

Existing Indigenous Vegetation (to be covenanted)	Restoration Planting	Amenity Planting	Mitigation Planting	Farming	Building Clusters	Roading
63.6ha	6.73ha	0.98ha	3.16ha	34ha	14.35ha (maximum built footprint permitted by rules is 1.5ha)	2.28ha

#### 4.1 Building Clusters

A total of 83 dwellings are proposed.

The location of the building clusters and the number of dwellings within each cluster has been determined through a rigorous process of site analysis. The entire site has been modelled in 3D using K2Vi software and 1m contours and then draped with an aerial flown in 2007. Building forms have then been “tested” in various locations to analyse visibility and impacts on landscape values as well as the effectiveness of potential mitigation. The K2Vi model is a landscape assessment tool that enables the operator to “fly” around the site as well as nominated viewpoints beyond the site boundaries and provides a high degree of accuracy to determine visibility and to assist in development of rules such as maximum height in the proposed plan change.

This computer analysis has been complemented by numerous site visits to confirm the final layout proposed. The computer model identifies a number of locations where buildings could be located with limited or no visual effects. This visibility analysis has resulted in houses being clustered in discrete areas within the site and a more traditional, sprawling subdivision pattern has been avoided. The building clusters are located in the front half of the site, with the balance of the site area identified for conservation, open space, planting and farming purposes.

The total area of land identified for residential purposes is 14.35ha (approximately 10% of the total site area). The clusters are shown in **Appendix C**.

Cluster	Area (ha)	Max No. of Dwellings
Buxton Creek Terraces – East	0.71 ha	14
- West	1.28ha	17
Buxton Basin	6.6ha	28
South West Spur	1.63	6
South Spurs	1.58ha	6
South East Pocket	1.51ha	8
Eastern Plateau	0.99ha	4

The proposed plan change introduces different height and footprint controls for each of the building clusters, controlling the form and scale of built development. In addition, the proposed plan change introduces rules for a colour palette, reflectivity and materials.

#### 4.2 Rooding

The proposed development is to be accessed from Gore Bay Road, at the northern end of the Gore Bay village. The road intersection will be located just north of the Buxton Creek bridge and the access road will follow the alignment of an existing track traversing up a steep slope into the site.

The proposed road then follows a winding alignment through the site, following an existing farm track of approximately 3.5m width. The total length of rooding is approximately 3.8km of which approximately 60% is the route of the existing farm track. There are four cul-de-sacs running off the main road to access the different building clusters.

The proposed road carriageway will be generally 6m. In addition to the carriageway, the road reserve will need to accommodate 2m for a swale for the capture and treatment of stormwater and 1m for a common service trench. The total road reserve is anticipated to be approximately 10 to 12m wide with possible grades of up to 1 in 6 over some short distances. The road is to be chip sealed and vested in Council as legal road

There is only one crossing of the Buxton Creek proposed. This involves the construction of a bridge. Four culvert crossings are also required for ephemeral waterways which flow into the Buxton Creek. See **Appendix D** for the location of the proposed bridge and culvert crossings.

Some earthworks will be required for the road construction. There are three areas where retaining walls will be required. The total length of retaining walls, when combined, is approximately 350m.

### 4.3 Walking / Cycling Tracks

The proposal includes a network of walking tracks. These provide a number of circuits around the site of varying length. In addition the tracks provide a pedestrian link to the Gore Bay Village as well as Tweedies Gully (DOC reserve) which adjoins the south boundary of the site. It is anticipated that some of the tracks may be suitable for mountain-biking and horse-riding.

It is proposed that these tracks would be either vested in Council or subject to an easement securing public access.

### 4.4 Tennis Court

A tennis court and associated pavilion are proposed to be located adjacent to the road in the Buxton Basin Cluster. Discussions are proposed with Council to determine the potential to be vested as a public recreation facility.

### 4.5 Car Parking

Most site generated parking demand is to be accommodated within the residential allotments.

Seven public car parking spaces have been provided adjacent to the proposed tennis court for residents and visitors. These are available for general public use, including people who may arrive to use the walk and cycle tracks. Parking bays are also proposed in other parts of the road network to provide convenient stopping points for residents and visitors. The final location of the parking bays is to be determined at the time of detailed design and be subject to conditions of subdivision consent.

### 4.6 Conservation Areas

The Buxton Valley is characterised by an area of approximately 63.6ha of existing indigenous vegetation. The values and significance of this vegetation are described in the Ecology report in **Appendix E**. It is proposed that this vegetation will be fenced along its northern boundary and two sections of its southern boundary to prevent stock access and enable regeneration of the forest to occur without disturbance. This fencing is to be completed as part of the initial land development works and prior to the issue of any building consent for a dwelling.

BGBL intends to protect this vegetation by land covenant. It has investigated the potential for this vegetation to be protected in perpetuity pursuant to a QEII Trust covenant. The preliminary indications are that it would qualify and a report is being prepared by a QEII representative with a recommendation to support a covenant in principle. This report is to be presented to the May meeting of the QEII Board and it is understood that it is the Trust's preference that the covenant be registered after completion of the plan change process. A QEII covenant is a separate procedure from the Resource Management Act.

The areas to be fenced and conserved are shown on the Master Plan in **Appendix B**.

#### **4.7 Amenity Planting**

This is planting provided for throughout the building clusters for privacy and to create an attractive setting within the development. Approximately 0.8ha will be planted for amenity purposes.

#### **4.8 Enhancement (Restoration) Planting**

In addition to the covenanting and protection of the existing indigenous vegetation it is proposed to undertake further planting for restoration and enhancement purposes. It is proposed that kanuka/manuka will be planted in those areas identified on the Master Plan for enhancement purposes, covering an area of approximately 6.7ha (see **Appendix B**). This planting will assist in connecting the Buxton Valley vegetation with the Gore Bay Scenic Reserve.

Seeds/plants are to be sourced either from within the site or as close as possible within the locality and is proposed to be irrigated by the treated wastewater.

#### **4.9 Mitigation Planting**

Mitigation planting is identified in the Master Plan (see **Appendix B**) in areas where additional planting is required to mitigate particular effects arising from built development. This involves an area of approximately 3.16ha.

#### **4.10 Management of Covenanted and Revegetated Areas**

The management of the covenanted and revegetated areas is to be the responsibility of the Owners' Association. It is anticipated that the QEII covenant would set in place management conditions which would inform and guide on-going management. It is proposed that those practices would be extended to the restoration, amenity and mitigation planting, along with best practice techniques for care of the newly planted vegetation (which may not be addressed by the covenant management plan).

#### **4.11 Farming**

Those parts of the proposed Management Area not identified for planting, conservation or residential activities are to be retained for farming activities. This covers an area of approximately 34.5ha. BGBL proposes to use covenants to limit the range of permitted farming activities to avoid incompatible activities being established.

#### **4.12 Water Supply**

Water for the Buxton Valley is to be supplied from the same source as the existing Gore Bay village supply, the Waiau River. Currently this water is delivered to 3 x 4,000 gallon concrete tanks (approximately 54.5m<sup>3</sup>) above the houses in Gore Bay and then reticulated under gravity via a 100mm line. The water is not treated and is subject to a permanent boil notice.

The supply is allocated on a per lot basis for domestic purposes only and is restricted to 0.5 units (900L/lot/day) for allotments under 4,000m<sup>2</sup>. Each dwelling has a storage tank which is either elevated to supply by gravity or pumped into the house. Each house potentially stores up to 6 days of their water allocation.

The proposal is to supply Buxton Valley with the same volume of water per dwelling as the Gore Bay houses. This supply is to be reticulated to all sites within the proposed Management Area. This is to be a restricted supply and will require flow restrictors and on-site storage tanks. Average daily demand for the development has been projected at 75m<sup>3</sup> lots with additional water reservoirs for storage.

Water storage for the new Buxton Valley supply is to be provided for with 4 x 25m<sup>2</sup> tanks. These will be located beside the existing tanks due to accessibility, avoidance of extra lines from Cheviot, opportunity to interlink storage and to take advantage of existing cover which will minimise visibility.

The volume of water to be stored will provide for working storage (4hrs x peak day demand), emergency storage (8hrs x average day demand) and fire fighting (45m<sup>3</sup> and at a flow rate and duration that complies with the Fire Fighting Water Supplies Code of Practice, NZ PAS 4509:2003).

It is also proposed that all water, including the supply to the existing houses at Gore Bay Village, be treated. A treatment plant is proposed to be located alongside the storage tanks. A membrane treatment system is to be used, supplemented by an Ultraviolet treatment. The proposed treatment plant has a footprint of 15m<sup>2</sup>-17m<sup>2</sup>.

The full cost of installing tanks, a treatment plant and the water reticulation network is to be met by BGBL.

#### **4.13 Wastewater Treatment and Disposal**

The proposed wastewater treatment and disposal system has been designed for a peak population of 415 people or 430 full time population equivalents (a peak occupancy ratio of 5 people per 3 bedroom unit or an average off-peak occupancy of 3 per e-bedroom unit). Wastewater flows are expected to peak at approximately 80 m<sup>3</sup> d<sup>-1</sup> with a flow of 55 m<sup>3</sup> d<sup>-1</sup> for the balance of the year. This is a total of 22,320m<sup>3</sup> of wastewater generated annually.

The proposed system consists of the following:

- Primary treatment of raw sewage via individual or shared on-site interceptor tanks and filter systems;
- Secondary treatment of wastewater via a re-circulating textile packed bed reactor
- Tertiary treatment of wastewater via UV disinfection and
- Land treatment of wastewater via a pressure compensating drip line irrigation system at a maximum design irrigation rate of 2.5mm per day.

This system is designed to achieve a high quality treated effluent consistently throughout the year. It represents a sustainable disposal system and enables effluent to be re-used for irrigation purposes.

A STEP system is to be used which involves a reticulated main sewer line connecting dwellings to the treatment unit. The sewage passes into a sedimentation tank and primary treated, then screened through a filter and transferred to the treatment plant. The sedimentation tanks will need to be cleaned every 8 to 15 years.

The proposed treatment uses a re-circulating textile packed bed reactor, which has been consented and used on many sites throughout New Zealand.

Discharge is proposed to land via drip-line irrigation, enabling re-use of the water. In the Buxton Valley, it is proposed to irrigate the re-vegetation areas of kanuka/manuka with treated wastewater. If the drippers are located above ground these areas are to be signed and fenced off from the public and stock.

An area of 3.2ha has been calculated for the land treatment and approximately 4ha has been set aside on the Master Plan.

For further detail of the proposed wastewater treatment and disposal system, see **Appendix F** containing the application for discharge of domestic wastewater to land lodged with Environment Canterbury concurrent with this Plan Change application.

#### **4.14 Stormwater Treatment and Disposal**

A stormwater treatment and disposal system is proposed to:

- prevent erosion of the slopes where discharges are directed;
- minimise pollution of receiving waterway; and
- attenuate peak flows from additional runoff from increased hard surfacing and roofs.

Due to the relatively steep topography and slow draining soil within the Buxton Valley it is proposed that stormwater will be discharged to surface waterways.

Water from roofs is to be discharged to 9m<sup>3</sup> raintanks. Overflow from these tanks and other hardstand areas of paving on each allotment will then be directed to a driveway swale and from there to collective roadside swales. In the Buxton Creek East and West Terraces and the eastern half of the Buxton Basin Cluster, the stormwater will be directed from the roadside swale to a temporary retention basin (50m<sup>3</sup> storage capacity) and then over a control weir to Buxton Creek.

In the balance of the Buxton Valley catchments the stormwater will discharge from the roadside swale to vegetation within the Buxton Creek gully. Gully outfalls are to be armoured with rock riprap to minimise down slope erosion.

Swales are to be fitted with check dams of wood or riprap to reduce hydraulic grade, slowing the flow and reducing erosion within swales. The spacing and size of check dams and outfalls will be related to the location and frequency of suitable gullies.

The combination of retention of water within rain tanks, the use of swales and discharge of water to vegetated gullies and roadside retention basins will attenuate stormwater flows to ensure that post development discharge does not exceed the pre-development discharge generated by the site during a 2% AEP 10 minute (or 1 in 50 year) storm event.

Two erosion and sediment control plans have been prepared (see **Appendix G**). These documents set out the measures proposed for erosion and sediment control in relation to construction activities. The aim is to prevent sediment leaving the site by implementing perimeter and site outfall control, protect and minimise land disturbances at any one time with rigorous programming, and to separate clean and dirty water, controlling water movement. These mechanisms are all in accordance with best practice and Environment Canterbury's Erosion and Sediment Control Guidelines 2007.

For further detail of the proposed stormwater treatment and disposal system, see **Appendix H** containing the application for discharge of stormwater to surface water lodged with Environment Canterbury. This describes in greater detail the mechanisms proposed and how they are to be implemented.

#### **4.15 Lighting**

No standard street lighting is proposed. Intersections may be lit by low bollard lights and road signs back-lit with low level lights.

#### **4.16 Power**

Mainpower New Zealand Ltd has advised there is sufficient capacity in the existing lines from Cheviot to Gore Bay. The full cost of installation will be met by BGBL.

#### **4.17 Telecommunications**

A telecommunications provider is still being investigated. The full cost of providing services is to be met by BGBL.

#### **4.18 Management of Infrastructure**

Discussions are occurring with Council staff to vest the proposed roading, wastewater treatment, water treatment and supply and stormwater infrastructure are to be vested in the Hurunui District Council. It is proposed that BGBL would maintain the infrastructure for the first year before handing over to the Council for long term maintenance and responsibility.

#### **4.19 Waste Management**

BGBL propose that the Owner's Association will nominate a central collection point for refuse in the Buxton Valley. It is intended that the normal weekly Council collection for Gore Bay would be extended into the Valley, but residents would be required to drop-off the waste at a central location.

BGBL also propose that a refuse/recycling bin would be provided for general public use at a convenient point, such as the car park area next to the tennis courts. BGBL would also join with others in the community to lobby the Council for a recycling facility at Gore Bay.

## 5.0 Construction

### 5.1 Staging

Construction activities are proposed to be staged as follows:

Stage 1: Buxton Creek Terraces

Stage 2: Buxton Basin

Stage 3: South West and South Spurs

Stage 4: South East Pocket and Eastern Plateau

It is noted that staging can provide for construction activities to run concurrently in different parts of the site. The timeline for realisation of the Master Plan is dependent on market demand but is planned to be implemented over a 2 year programme. Should the market demand be restricted there may be delays between stages.

The Construction methodology would follow the steps outlined below:

- Produce erosion and sediment control plan for Council approval (already prepared as part of resource consent application to Environment Canterbury)
- Approval of engineering drawings
- Preconstruction joint inspection
- Identify and mark areas requiring protection
- Put in place erosion and sediment control measures such as silt fences and hay bales at truck entrance, stockpile areas and other vulnerable locations to stop the tracking of silts into Buxton Creek and Gore Bay Road. Construct stormwater ponds. These measures are to be monitored and maintained throughout the construction;
- Commence bulk earthworks for road alignment, stormwater swales and ponds;
- Construction of retaining walls;
- Undertake bulk filling
- Initial layer of road metals brought to provide a running course for construction traffic;
- Construction of bridges, and water and wastewater plants;
- Utilities installation. Dig service trenches for power, water, telephone and sewer services. Backfill, compact and revegetate;
- Complete roading, footpath and any parking areas;
- Remove accumulated sediment from basins etc
- Re-grade, topsoil and sow bare earth.

## 5.2 Earthworks

Bulk earthworks associated with the development will not result in any material being transported off site. Approximately 49,800 cubic metres will be moved in construction of the road and approximately 2,950 cubic metres for the construction of stormwater retention ponds. The maximum depth of any cut is associated with road construction and would not exceed 4m. A cut to fill plan showing the location of works is attached as **Appendix I**.

These earthworks are subject to the Erosion and Sediment Control Plans proposed in the application for discharge of stormwater to surface water (Appendices G and H).

## 6.0 Consultation

BGBL developed a comprehensive consultation programme. This is to be on-going with the community, interested and affected parties throughout the life of this project.

The consultation has been led by BGBL with support from consultants for technical advice as required. A director of BGBL, Blair Brown, has made himself accessible by phone and in person to meet with interested parties on request and in a timely manner.

Consultation was commenced in June 2007. BGBL first contacted immediate neighbours in permanent residence and permanent residents of Gore Bay, the Cathedrals and Manuka Bay, the Chairperson of the Port Robinson Informed Citizens group, the Gore Bay Ratepayers and Residents Association, the senior management and Mayor of Hurunui District Council, the Department of Conservation, Historic Places Trust and Te Runanga o Kaikoura.

The initial meetings with these groups were held prior to the development of the Master Plan and BGBL explained to parties its intention to undertake site investigations for a mixed use development on the site. Initial thoughts and local knowledge from these meetings were important for BGBL in developing briefs for technical investigations.

Following these initial meetings BGBL prepared a preliminary Master Plan as a basis for further consultation. BGBL widened the consultation stakeholders to include members of the Cheviot Ward Committee, Forest and Bird, the Canterbury Regional Council and land owners more generally in the locality. A site visit or “walk-over” of the site was arranged for permanent residents as well a specific on-site site meeting with members of Te Runanga o Kaikoura and Te Runanga o Ngai Tahu. Individual meetings were held with as many people and organisations as who were interested and available. These were very successful and enabled parties to ask specific questions about the site and to understand how the proposal may work.

To engage with landowners who may not be permanent residents, BGBL held two public forums. One hundred and forty letters were sent to landowners and interested parties inviting them to attend a presentation and discussion evening at either Cheviot or Christchurch in late November 2007. Approximately 19 people attended the Cheviot meeting and 35 attended the Christchurch meeting. Following these meetings two public “walk-overs” of the site were held on weekends in January and February (2008) to enable bach owners who may be resident at that time to have a look at the site and ask questions. Fish and Game have also been contacted as has the QEII Trust.

In addition to meetings BGBL has posted a CD copy of the consultation material to interested parties and placed this information on its website. Hard copies were also sent to all parties who attended meetings or requested them. Feedback could be made on the website as well as by post.

BGBL has also attended several of the District Council public forums relating to its Growth Strategy and at Easter BGBL propose to make a presentation to the Gore Bay Residents Association AGM on the project.

### 6.1 Summary of Matters Raised Through Consultation

The following matters have been raised during consultation by members of local communities. The matters have been grouped by topic.

Topic	Concern/Questions
Master Plan	<p>What is the size of the sections? Concern that people not be able to subdivide further at a later date.</p> <p>What land uses are proposed and what percentage of the site is proposed to be farm, reserve, housing?</p> <p>Would the Buxton Creek be bridged? Would this result in erosion?</p> <p>How long is the walkway?</p> <p>How was the number of houses derived? Concern that the number of permitted houses has gone from 29 with a rural zoning to 83.</p> <p>What views are available from the sites?</p> <p>Would this be a gated community?</p>
Design Controls	<p>What types of design controls would be imposed on housing? Would there be covenants?</p> <p>Would future landowners be able to have relocatable houses and caravans?</p>
Recreation	<p>Would horses be allowed?</p> <p>Would cats and dogs be allowed?</p> <p>Would tennis court be publicly available? Could more tennis courts be added?</p> <p>Who would own walkways? How would they be looked after? Would they be provided in perpetuity?</p> <p>Will the community be able to use the swimming hole?</p>
Visibility and Landscape Values	<p>What parts of the site would be most visible from Gore Bay?</p> <p>Does BGBL want to hide all the houses so they can't be seen?</p> <p>Has BGBL considered the coastal and landscape values?</p> <p>Would there be lighting of streets?</p> <p>What impacts would there be on the limestone knoll at entrance to Gore Bay village?</p>

Topic	Concern/Questions
Setback from cliff	<p>Gore Bay residents are concerned they will be looked down on.</p> <p>How close will houses be to the edge of the cliff?</p> <p>Concern there will be increased stormwater from Buxton Valley coming over the cliff. Already existing under-runners and slips.</p> <p>Concern expressed at seismic risk and cliff destabilising.</p>
Council Involvement	<p>Questions as to when the Council was informed?</p> <p>What is the Council's role in process?</p> <p>What is the relationship to Council's growth strategy?</p> <p>How can members of the public be part of the process?</p> <p>What would stop further development?</p>
Infrastructure	<p>How is water to be supplied? Where is water going to be stored?</p> <p>What are the implications for existing Gore Bay residents if BGBL also connect to the Council system?</p> <p>What is the form of water treatment proposed? Would existing Gore Bay residents be able to access treated water?</p> <p>What impacts would there be on water quality?</p> <p>Would the farming activities get access to the Council water supply?</p> <p>What wastewater treatment system is proposed? What height is the physical structure? Would there be noise generated? What happens if pumps fail or there is a power cut?</p> <p>Where would the wastewater treatment system be located?</p> <p>Where would wastewater be discharged? Would the nutrient up-take be different in winter, affecting water quality? Would there be odour generated?</p> <p>What opportunities are there for existing Gore Bay residents to connect to this system?</p> <p>Who will own and maintain the infrastructure?</p> <p>What impact would there be on rates?</p> <p>Would stormwater affect flooding?</p>

Topic	Concern/Questions
Pedestrian Connections	<p>Moody Street/Tainui Rise are very steep. How would the pedestrian access shown be facilitated? Who owns the land off Tainui Rise?</p> <p>Houses are already sited over allotment boundaries where walkway shown. How would this be resolved?</p> <p>Concern about impact of more pedestrians in Gore Bay.</p>
Real Estate Market	<p>Is the intention to sell lots or baches?</p> <p>Would the project be staged?</p> <p>How much would sections cost? Is there demand?</p> <p>Who would the properties be marketed to? Could locals purchase ahead of the general public?</p>
Archaeology/Cultural Values	<p>Are there any archaeological or cultural sites within the property?</p> <p>How would cultural and heritage values be recognised? Would interpretation be provided on the walkway? Are iwi being consulted?</p>
Impacts on Gore Bay	<p>Concern that 4 wheel motorbikes will become prevalent.</p> <p>Concern that proposal will attract many more visitors to Gore Bay and that local amenities would not cope e.g., car parking, toilets, changing facilities.</p> <p>Desire for management plan.</p> <p>Concern that the proposal does not enhance Gore Bay village.</p> <p>Concern that with a greater population people would want wharves and jetties.</p> <p>Concern about impacts on the Gore Bay community and the amenity values and character that people enjoy.</p> <p>Would there be better cell phone coverage and broadband connections?</p> <p>Concern that residents in Buxton Valley and Gore Bay meet together to avoid “them” and “us” scenario.</p>

Topic	Concern/Questions
Traffic	<p>Concern about increases in traffic volumes, speed, congestion and parking demand. This included Gore Bay Road and the Cathedrals Road.</p> <p>Would road treatments be considered to address speed and congestion be required? Could the speed limit be reduced? Would the road to Cheviot need to be widened?</p> <p>Questioned if public parking in the Buxton Valley would be provided.</p> <p>Where would the access road be? What alternative access points have been considered?</p> <p>What is the cost of roading?</p> <p>How would heavy vehicles associated with construction be managed?</p>
Commercial Activities	<p>Concern that there is no commercial development in Gore Bay.</p>
Geotechnical Stability	<p>Interest was expressed in any subsurface investigations and the stability of land generally.</p> <p>Are there “no go” areas within the Buxton Valley from a stability point of view?</p>
Ecology	<p>Is existing forest to be protected? Would stock be removed?</p> <p>Would forest be protected in perpetuity?</p> <p>Would locally sourced plants be used for planting?</p>
Earthworks	<p>Would cut material be all used on site?</p> <p>How would silt be managed?</p> <p>How visible would earthworks be?</p>
Applicant	<p>Interest in the background of the developer, experience, success, relationship to Gore Bay, other property owned and directorship of BGBL..</p>

## 7.0 Description of Existing Environment

BGBL has engaged technical consultants to investigate and report on the following aspects related to the proposed Plan Change:

- Geotechnical Report David Bell (**Appendix J**)
- Ecology Boffa Miskell Ltd (**Appendix E**)
- Landscape Boffa Miskell Ltd (**Appendix K**)
- Archaeology Underground Overground Archaeology Ltd (**Appendix L**)
- Cultural Te Runanga o Kaikoura (**Appendix M**)
- Traffic Urbis (**Appendix N**)
- Sewerage, Stormwater and Water Supply Duffill Watts (**Appendices F, G, H and O**)

These reports are attached in full and form part of the assessment. They contain assessments of actual and potential effects on the environment associated with specific aspects of the proposed development together with various mitigation measures to avoid or reduce such effects. A summary of those parts of the reports which describe the existing environment are presented in the following sections.

### 7.1 Geotechnical

The Gore Bay locality is characterised by weak sedimentary rocks of Miocene to Pliocene age (~5-15Ma old). These rocks outcrop extensively along this part of the North Canterbury coast and are comprised of weak friable sandstones and siltstones with some conglomerate and carbonate-cemented lenses. The bedrock in the Buxton Creek area dips gently (10-15°) to the south with an east-west synclinal axis mapped south of Buxton Creek where the dip flattens to zero. The cliffs above Gore Bay township are of the Greta Formation, which display no evidence of large-scale slope instability.

There are no active faults in the immediate vicinity, although the area is part of the North Canterbury Fold and Thrust Belt where relatively frequent earthquakes can be experienced.

Buxton Creek has incised through an intermediate elevation terrace that can be traced for several kilometres inland. The terrace surface is capped by ~1m of wind-derived loess and overlies loose clayey sands. The loess materials are of the Last Glaciation age (i.e. 20-25ka old), whilst the underlying clayey and silty sands (with rare gravels) have been reworked by river processes when the stream widened its floodplain. These processes took place as uplift was continuing and an older, higher floodplain system can also be recognised. On the spurs between the two main old terrace surfaces test-pitting has shown that loess silts typically exceed 2m in thickness over in situ bedrock.

Overall, the underlying geology reveals stable ground conditions. There is evidence of some minor, localised erosion associated with run-off, stream incision and deforestation e.g., tunnel gully development in loess soils and some stream bank and bare ground erosion. There is some subsidence associated with the tunnel gullies and slippage.

## 7.2 Rainfall

NIWA maintains a Climate Station in Gore Bay which has recorded the following mean monthly rainfall:

Month	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Yr
Rainfall (mm)	55	52	79	69	65	81	89	60	59	51	72	49	781

## 7.3 Water Quality

According to the Environment Canterbury GIS database, groundwater resources around the site are limited and not utilised. Consequently, there is little information on the hydraulics and quality of the groundwater. There are no existing groundwater bores present within the development site and the closest bore to the development area is approximately 300m to the north or 800m at a cross-gradient, with a second bore at 1,300m distance. The yield or water use of these bores is unknown.

There is currently no water quality data for Buxton Creek. The Ecology Assessment however, describes Buxton Creek as being in good condition considering the use of the adjoining land and uncontrolled stock access. This was evidenced by the presence of aquatic invertebrate communities that require clean water. Kick net samples were dominated by mayfly, caddisfly and dobsonfly species. This water quality has been attributed to the reasonably intact riparian forest, which provides shade and organic material inputs as well as intercepting and slowing surface water runoff.

## 7.4 Landscape and Natural Character

The coastline between the Hurunui River mouth and the Waiau River mouth is made up of a series of coastal cliffs and steep hill slopes up to 200m in height and separated by a few narrow sandy bays of which Manuka Bay and Gore Bay are the largest.

Gore Bay has an enclosed character. It is well defined by Manukau Bluff to the south, the Jed River mouth and steep coastal spurs of Mt Maccoinnich to the north. The steep bluffs that form a high terrace immediately behind the beach, visually contain the bay from the west.

At the convergence of Buxton Creek and Gore Bay Road there is an isolated limestone knoll. Although the formation is not highly noticeable due to extensive vegetation cover, its steep bluffs mark the entrance to Gore Bay.

### 7.4.1 Surrounding Landuses

The Buxton Valley is west of the Gore Bay village. The village is primarily made up of holiday homes and the permanent population is very small at only 11 households. The age, style and condition of the housing are varied with built development concentrated generally within 130m of the beach on the inland side of Gore Bay Road. This is within the Coastal Environmental Management Area of the District Plan where special care in relation to coastal values is required.

Over recent time there has been an increase in larger and new homes in Gore Bay, predominantly at the northern end of the settlement. There are two camping grounds and one bed and breakfast in the Bay, but there are no retail activities.

The geographic containment of the settlement has resulted in a distinct difference between those areas characterised by built development and those areas in the landscape which are unbuilt. The Gore Bay Scenic Reserve is valued for its vegetation, wildlife and the geological formation known as the Cathedrals. The reserve is administered by DOC and shares approximately 420m of its northern boundary with the Buxton Valley site.

The Buxton Creek Reserve is used as a camping ground and picnic area toward the northern end of the bay, at the mouth of Buxton Creek. The Gore Bay Camping Ground is approximately halfway along the bay, in the middle of the residential area. The South End Reserve is located at the southern entrance to the bay. The Jed River Reserve and cemetery are located at the northernmost end of the bay.

#### **7.4.2 Landscape Character Areas**

The Landscape Assessment has identified five different physical character areas (See **Appendix K**) within Buxton Valley. The key features and characteristics of these areas are identified as follows:

##### ***Buxton Creek and Tributaries***

The main stem of Buxton Creek has a narrow, twisting and generally incised form, cut into limestone. The tributaries/gullies are also steep and relatively deep-set. The creek flows from a height of approximately 60masl at the far western boundary, to less than 20masl at the seaward boundary of the property and in dry months, the stream flow is likely to reduce or even cease.

There are some larger pools in the lower and middle reaches, one of which is used by Gore Bay residents/visitors as a swimming hole.

The margins of the creek and tributaries are well vegetated in typical coastal forest, being most intact in the northern tributaries and more patchy in the southern tributaries. The vegetation is dominated by kanuka/manuka forest with remnant patches of Broadleaf species including ngaio, mahoe and five finger.

The key values of the Buxton Creek Landscape Character Area that affect its sensitivity and contribute to its capacity to absorb change are:

- high natural character and natural science landscape values associated with the creek and tributaries related to its riparian cover. The creek acts as a wildlife corridor and its tributaries provide important connections to external areas of bush including the Gore Bay Scenic Reserve.
- aesthetic landscape values associated with the meandering, incised creek set amongst native bush;
- amenity values associated with the informally accessed water holes;

### ***Coastal Influence***

The Coastal Influence Landscape Character Area is characterised by its location along the seaward boundary of the site, directly above Gore Bay. It is largely made up of steep slopes with some gentle spurs, ridges and terraces.

Existing built structures in this area include fencing, a farm shed, farm hut and watertanks.

The vegetation cover is modified and is predominantly grazed grassland. The upper slopes have a very open, exposed coastal character of varied visibility.

Key values affecting the area's sensitivity and contributing to its capacity to absorb change include:

- High coastal natural character values associated with this area's proximity to the coast; including minimal built modifications on the slopes and the domination of natural patterns and processes. These values are moderated by the modified grassland land cover of the site.
- Important landscape values; associated with identification in the District Plan as an Outstanding Natural Landscape. The rural slopes act as a backdrop to parts of the bay and small coastal settlement.
- Amenity values associated with the unbuilt slopes and skyline visible from parts of the beach, road and Gore Bay camping ground - including the Coastal Environment Management Area.
- Some areas may be viewed by adjacent residential properties at Point Gibson/Point Robinson (between 2-3km away)

### ***Basin***

This Landscape Character Area is a large, sheltered basin located on the south bank of Buxton Creek. It is a well-defined and north-facing amphitheatre dominated by open, grazed grassland.

A farm shed located at the eastern edge of the basin is the only prominent built structure in this Character Area.

There are limited seaward views through Buxton Creek gully and the basin is visible only from other areas within the property. Its gentle contours, limited visibility and modified land-cover contribute to its comparatively low level of sensitivity and accordingly it has a higher level of absorption capability.

The key values of this basin that affect its sensitivity and contribute to its capacity for change are:

- Natural character values limited to the creek margin that flows along its northern edge, with the balance of the area dominated by modified grassland vegetation cover, the farm shed and tracking associated with farming;
- Landscape values associated with the aesthetic coherence and integrity of the basin landform and its location within an Outstanding Landscape in the Plan

- Amenity values associated with its internal features such as its sheltered position and gentle contours, with some shading from the ridge to the north. The basin is not visible from outside the boundaries of the site.

### ***Open Spurs***

The open spurs include the open, grassed spurs that drop off the two main ridges into Buxton Creek. They are typically of a moderate to steeply sloping gradient however generally not as steep as the vegetated gullies that separate them.

Extensive views are available from much of this area.

There is low visibility of much of this area from beyond the property, although some elevated areas may be viewed from distant residential dwellings.

The key values of the Open Spurs Character Area that affect its sensitivity and contribute to its capacity to accommodate change are:

- Natural character values are reduced due to the predominance of modified grassland
- Although some of the spurs in this Character Area lie within the area of Outstanding Natural Landscape, there is the ability to absorb change by tucking development in against changes in slope and bush edges.
- Amenity values include attractive rural and seaward views, negligible visibility from Gore Bay or public areas, though some elevated areas can be seen from properties at Point Gibson/Point Robinson (approximately 2-3km away).

### ***Ridges***

The two ridgelines are distinguishable by their elevated broad, gentle slopes which form the 'walls' of the Buxton Creek catchment. They are characterised as open, grazed farmland. The northern ridgeline incorporates Mt Cunningham, the highest point on the site at 191masl.

The key values affecting the sensitivity of this Character Area and contributing to its capacity to accommodate change are:

- Natural character values are reduced due to the dominance of modified grassland
- The ridgelines are strong, well defined landforms and consequently they are exposed but also provide panoramic views. The ridges are not visible from Gore Bay, but some parts of the northern ridgeline can be seen from sections of Gore Bay Road.
- Some elevated areas can be viewed from properties at Point Gibson/Point Robinson (2-3km away)
- Some parts of the ridgelines lie outside the ONL

## 7.5 Ecology

The site lies within the Cheviot Ecological District (ED) in the Lowry Ecological Region. This Ecological District encompasses the coastal hills lying between the Conway and Hurunui Rivers and would have formerly been characterised by short tussock grassland with a mix of forest and shrubland types in the valleys and coastal areas. Most of the Ecological District is now highly modified by intensive and extensive farming, with any remnant or regenerating forests and shrublands concentrated in the coastal valleys.

The Buxton Valley is described as typical within the Ecological District, comprising relatively flat-topped ridges and spurs.

### 7.5.1 Vegetation

The main vegetation types of the property are:

- kanuka/manuka forest (c. 45 ha) and broadleaf forest (c. 10 ha) occupying the steep-sided gullies and slopes of Buxton Creek,
- exotic/pasture grassland (c. 78 ha) covering the main spurs and ridges, as well as some of the open areas near sea level near Buxton Creek Reserve;
- some patches of bracken/gorse (c. 10 ha), mainly on the forest edges
- remnant patches of broadleaf forest with a strong coastal element of ngaio, mahoe and five finger form a canopy in the deeper gullies and are surrounded by regenerating kanuka and manuka. The forest cover is most intact in the northern tributaries, and is more fragmented in the southern tributaries.

The valley floor of Buxton Creek supports a greater variety of trees including kowhai, mapou, rohutu, kohuhu and wineberry with occasional silver tussock, native broom and cabbage trees present in the grassland or forest clearings. The gully floors and stream banks are notable for the variety of ferns present. Several stands of raupo are growing in the pools in the lower reaches of the creek.

The property is grazed by sheep and cattle that have access to the forest and they have caused damage by trampling and browsing of young plants. This has resulted in a forest that is quite open under the canopy with little understorey or ground cover.

Few weeds are present within the forested areas. A small amount of blackberry, broom, tree lucerne, convulvulus (in the lower areas), and several boxthorn are present. Some pine trees have become established, their likely source being the pine plantation on the adjoining property to the west. These species could become a problem if allowed to increase.

### 7.5.2 Aquatic ecology – Buxton Creek

Despite stock intrusion, the types of invertebrates recorded (especially caddisflies and mayflies) and the clarity of the water suggest that Buxton Creek is in a relatively good condition compared to most lowland streams in Canterbury. This is likely to be because of its reasonably intact riparian forest, which provides important shade and inputs of organic material. The forest also contributes to stream health by intercepting and slowing surface water runoff thereby reducing nutrient enrichment and sedimentation.

During the site survey only one fish was captured (in a kick net sample). This is likely to have been a common bully (*Gobiomorphus cotidianus*) but a definitive identification was not to be made in the field. The NIWA Freshwater Fish Database shows only one record for Buxton Creek, dated in the 1950s, and it too was a common bully. Given the habitat conditions it is likely that Buxton Creek also supports banded kokopu (*Galaxias fasciatus*), koaro (*G. brevipinnis*), red finned bully (*Gobiomorphus huttoni*), long-finned and short-finned eels (*Anguilla dieffenbachia*, *A. australis*). The stream is likely to be too small to support trout.

Buxton Creek is intermittently connected to the sea and sometimes flows into a small coastal lagoon between the Gore Bay road and beach (which presumably drains to the sea through the permeable beach barrier). This is likely to limit access by juvenile native fish (whitebait and elvers), and may therefore limit the diversity and abundance of native freshwater fish in the stream.

### **7.5.3 Birds**

During the July site visit, a small number of native bird species was recorded. These were species that are commonly found in a wide range of open and forested habitats including bellbirds, grey warbler, fantail and brown creepers, New Zealand pigeon (kereru) and harrier. It is likely that more native birds are present during spring or summer.

Introduced bird species seen, mainly on the grasslands or at the forest margins include Australian magpies, goldfinch, dunnoek (hedge sparrow), and spur-winged plovers.

### **7.5.4 Other Fauna**

The forest and grasslands will support various indigenous invertebrates, although the diversity of these communities may be limited by the lack of understorey and ground cover. Common native skinks and geckos are also likely to inhabit the forest and rocky parts of the property, but these were not surveyed.

Pest mammals including possums, rats, mice, mustelids (e.g. ferrets and stoats), and feral cats are expected to inhabit or visit the property, especially the forest.

### **7.5.5 Ecological Significance**

The site is not identified as a Significant Natural Area in the Hurunui District Plan (2006).

For the purpose of this Plan Change however, the forest remnants and regenerating areas have been considered in terms of the seven 'criteria for identifying significant natural values' set out in Appendix E of the Hurunui District Plan. In summary, assessment in relation to those criteria is as follows:

#### ***Representativeness***

Examples of broadleaf forest in the Ecological District are uncommon (particularly in the coastal area) and are therefore considered to be important. The manuka/kanuka shrublands are not representative of former cover (since they are a stage in succession from exotic grassland to forest).

### ***Rarity***

Due to the relative absence of remnant coastal forest in north Canterbury, the site falls into the Government's list of National Priorities for protection. Kereru have been observed on the site and are considered to be "in gradual decline" (Hitchmough et al 2007).

No rare or threatened species are known to exist within the site.

### ***Diversity and pattern***

The site does contain diverse landform and vegetation patterns including regenerating and mature forest, shrublands, grasslands, stream, cliffs and gullies. It supports a moderate level of biological diversity given the underlying physical patterns.

### ***Distinctiveness/special ecological characteristics***

There is no evidence of distinctive ecological features on this site.

### ***Size and shape***

The forest on the site is large enough to be ecologically self-sustaining (55ha) although its shape and depth alongside the Buxton Creek means that it has a large proportion of edge to core habitat.

### ***Connectivity***

The site's proximity to Tweedies Gully and Gore Bay Scenic Reserve is important, as together they form a substantial piece of coastal forest/shrubland vegetation. As one of the few patches of coastal forest along the north Canterbury coast it is likely to be important for the movement of birds through the area.

### ***Long-term sustainability***

Although the site and its surrounds show the effects of past pastoral management, remnants of the former forest cover remain. Regeneration is occurring and with the exclusion of grazing (in association with weed management) native regeneration is anticipated to continue.

## **7.6 Traffic**

The road network servicing Gore Bay is comprised of four roads – Gore Bay Road, Farmer Street, Moody Street and Cathedral Road.

Gore Bay Road connects Cheviot township with the northern end of Gore Bay and is classified as a collector road in the District Plan. At the Cheviot end, the road is generally flat with a gently winding alignment, however on approach to Gore Bay the road becomes winding with a series of bends of varying severity. The road remains as two lanes with the speed limit reducing from 100km/h to 30km/h at a point 75m north of Buxton Creek.

Gore Bay Road crosses over Buxton Creek via a single lane bridge, with priority to the north-bound traffic. The road then progresses past the beach and over a number of speed humps (one of which is painted, while the other two have a vertical displacement).

There are no footpaths on Gore Bay Road and pedestrians generally use either the grassed areas alongside the road or walk on the road. A footpath is present along one side of Farmer Street and part of Moody Street.

Gore Bay Road eventually merges into Farmer Street, a local road providing access to a beach side parking area and tennis courts. Farmer Street then connects with Moody Street, another two-laned local road, and continues onto Port Robinson. Moody Street ultimately connects with Cathedral Road which provides an alternative route to State Highway 1.

Tainui Rise is a private road running off Moody Street providing access for 7 residences.

Traffic volumes on the local road network are very low. There are no morning and evening peak flows, with the majority of local traffic using Gore Bay Road to reach Cheviot or other parts of the district in preference to Cathedral Road. Traffic count data held by Council has been used to determine the number of vehicle trips per day. The daily generation per dwelling has been calculated at 2.6 trips per day or a total of 200 vehicles per day or between 15 to 20 vehicles per hour between 10:00am and 5:00pm. The rate of traffic growth is estimated at 2.5-3% per annum.

Parking demand within Gore Bay village is met by various beachside parking areas and on-street parking. The majority of residences in the village however keep their cars on – site. There has been strong parking demand experienced at the south end of Gore Bay and is likely to be created by visitors rather than residents of Gore Bay. It is understood that a Draft Management Plan for Gore Bay identifies improved management and up-grading of beachside parking.

The reported crash record reveals that there have been no serious road accidents in the locality.

## **7.7 Cultural Values**

The Cultural Impact Assessment describes the Ngai Tahu Whanui values associated with the Kaikoura coastline, between Kaikoura and Banks Peninsula. This coastline is known as Te Tai o Marokura and there are many Maori archaeological sites publicly recorded along this portion of the East Coast. These sites reflect the nature of previous occupation of the area and the use of the coastline for ease of travel. The Banks Peninsula coastline and the Kaikoura coastal marine area are identified as statutory acknowledgement areas, with Gore Bay being part of the connecting coastline between these two areas.

There are 8 publicly recorded Maori archaeological sites at Gore Bay including umu (cooking areas), middens, artefacts, clusters of karaka trees and burials. Analysis of the umu has revealed the variety and abundance of food that would have been available e.g., paua, shag, shells, fish, eels, mussel, seal bones, penguin and dosinia. Two burial sites have been found in the locality.

In February 2008 an accidental discovery was made within the proposed development area during geotechnical investigations. The find was the remains of an oven (see Section 7.8 below) and in accordance with correct protocol, both the Historic Places Trust and Runanga were advised.

The two karaka groves are considered to be significant cultural features. Evidence from other locations has suggested that these were deliberately planted in the prehistoric period and it is not unusual for karaka trees to be surrounded by prehistoric occupational evidence. Several artefacts have been discovered at Gore Bay e.g., flake knife, flint fragments, an adze portion. Buxton Creek is also considered likely to have been an important source of freshwater.

Cultural associations with the locality are therefore based upon Maori occupation and use of Gore Bay, particularly as a food gathering area and a safe stopping place whilst travelling along the coast. The groves of karaka trees and two burial sites also suggest there may have been some form of permanent occupation in Gore Bay and accordingly it is likely that Buxton Valley would have been used as part of that occupation.

## **7.8 Archaeological Values**

The Archaeological assessment involved research from official sources as well as consultation with previous landowners and locals. The eight recorded archaeological sites in the locality are concentrated along the coastal strip, around the mouth of the Jed River and in close proximity to the lagoon at the river mouth. The assessment concludes that having regard to the nature of those sites that these are indicative of a relatively permanent settlement in the area which would have been part of a network of sites scattered along the East Coast. This is consistent with local historical memory of a small settlement in the bay.

Although an archaeological survey of the site revealed no visible sites, an accidental discovery during geotechnical work in February 2008 revealed the remains of an oven on the banks of the Buxton Creek. The find included pieces of charcoal, charcoal-stained soil, fire-cracked rocks and pieces of paua shell.

## **7.9 European Heritage Values**

The first recorded European activity at Gore Bay is the shipping of wool in 1856. The Buxton Valley was originally part of a subdivision know as the Cheviot Hills Station and was owned by a John Scott Caverhill. This was later taken over by William Robinson until 1889 when it was purchased by the Government under the 1882 Lands Act and further subdivided. The land has been pastorally farmed over this time.

## **8.0 Assessment of Environmental Effects**

The anticipated effects of construction and on-going operation of the proposed development are discussed in the following sections.

### **8.1 Water Quality**

The assessments for stormwater and wastewater discharges, and works in a waterway (attached as Appendices F and H) have assessed the impacts of those activities on water quality. The effects are not anticipated to be significant for the following reasons:

#### **8.1.1 Wastewater**

- The wastewater is proposed to be treated to a high standard and is to be disinfected before it is applied to the land;
- Suitable land treatment areas have been identified and located well away from Buxton Creek;
- The maximum Biological Oxygen Demand loading following treatment is 0.4kg ha<sup>-1</sup> d<sup>-1</sup> which is well within the 600kg ha<sup>-1</sup> d<sup>-1</sup> able to be assimilated by a healthy soil. Odours and anaerobic soil slimes are therefore highly unlikely;

- A very low wastewater loading rate is proposed. The discharge would not therefore exacerbate drainage or create ponding and would not affect soil erosion risk on site;
- Following treatment the wastewater would be low in total suspended solids (15 g m<sup>-3</sup>) and unlikely to cause soil pore blockages;
- The sodium adsorption ratio is within the NZ Guidelines for the Utilisation of Sewage Effluent on Land;
- Most pathogenic bacteria and viruses would be removed through UV disinfection. The die-off of pathogens is further enhanced by the passage of wastewater through the soil. Studies show that up to 99.998% of pathogens are removed and that up 92% to 97% of the reduction in pathogens occurs in the top one centimetre of the soil. It is therefore unlikely microbial contaminants would reach Buxton Creek.
- Similarly, the total phosphates would be discharged at a low application rate and given the distance from Buxton Creek are likely to be readily absorbed by the soil and unlikely to migrate into Buxton Creek.
- With respect to nitrates, the proposed landuse activities combined with the proposed management systems would result in an overall reduction of -8% of nitrogen loading on the land. No adverse effects on nitrogen levels within Buxton Creek are therefore anticipated

### **8.1.2 Stormwater**

A Stormwater Management Plan has been designed specifically for the sub-catchments identified within Buxton Valley and having regard to the nature of proposed activities and development. This Plan puts in place mechanisms and practices to ensure that stormwater does not adversely affect the environment. These are recognised best management practices such as the use of domestic rain tanks, roadside and driveway swales, retention basins with capacity in excess of the storage capacity required for a 2% AEP 10min (1 in 50 year) storm event and check dams to slow flow and reduce erosion.

Calculations of the anticipated concentrations of pollutants from urban run-off indicate that the additional urban contaminants in Buxton Valley would almost certainly be diluted to negligible concentrations, having regard to the greater size of the unmodified balance of the property. In addition, there would be greater settlement of suspended material as a result of passing water through vegetated swales and gullies allowing adsorption by organic matter and up-take of nutrients and contaminants by swale vegetation.

The Stormwater Management Plan specifies a maintenance programme, with regular inspections on a six monthly basis and following storm events. Debris and blockages from the treatment system is to be removed and vegetation in swales maintained.

The Stormwater Management Plan also specifies an emergency response plan for accidental spills or contamination.

The Erosion and Sediment Control Management Plans (one for the overall site and one for house allotments) puts in place mechanisms and practices that would minimise or avoid sediment entering the waterways. For example:

- diversion of clean water away from works
- stabilisation of disturbed areas;
- controlling access points;
- use of sediment barriers;
- careful programming of works to minimise ground disturbance; and
- compliance with an inspection and maintenance programme

### 8.1.3 Other effects relating to water quality

In addition, BGBL propose to apply Environment Canterbury’s “Didymo Hygiene Protocols” and there is to be no storage or refuelling of vehicles on the bed of the creek during construction.

In relation to longer term water health, the bridge design ensures a continuous flow of water through/under the crossing and culverts are to be placed to ensure they capture the water flow in ephemeral streams. Riparian vegetation is to be protected in perpetuity. Continuous flow and retention of vegetation are fundamental to the quality of Buxton Creek as a water habitat.

## 8.2 Water Quantity

As the proposed development will access the existing Council owned and reticulated supply, the proposal does not affect existing ground or surface water resources in terms of water quantity.

## 8.3 Geotechnical

The Geological Assessment identifies a number of potential geological issues that need to be addressed. Although the underlying bedrock of Buxton Valley is stable, there is potential that localised erosion may occur as a result of concentrated water flows such as tunnel-gully or piping erosion. This is not an uncommon issue in Canterbury and with detailed and appropriate engineering design, the proposed roading and building clusters can be developed without any adverse impacts in relation to ground conditions and site stability.

The types of engineering measures anticipated include:

- Those measures identified in the Stormwater and Erosion Control Plan (see **Appendix G**)
- Stabilising cut and natural slopes with rock armouring;
- The use of cut-off drains around building clusters to intercept and control run-off to the valley floor;
- Site specific design of foundations for buildings and the Buxton Creek bridge;

- Retaining stormwater, including the use of roof water;
- Planting to stabilise ground;
- Use of lime-stabilisation in tunnel-gullies.

BGBL proposes to provide details of these engineering measures as part of a subdivision application and at the time of building consents for individual structures.

## **8.4 Hazards**

### **8.4.1 Flood Hazard**

The proposed bridge over the Buxton Creek is to be 2m above the bed of the creek. This height, combined with the bridge design which includes shaped and armoured abutments, will ensure that the structure does not impede flood flow. Inundation is not anticipated within any of the building clusters having regard to the measures proposed in the Stormwater Management Plan.

### **8.4.2 Falling debris, landslide, slumping hazard and soil erosion**

Falling debris has not been identified as a potential hazard within any of the building clusters and is to be avoided in relation to any cuts for roading by the use of rock armouring. Similarly, subsidence and tunnel gullies are not present within any of the building clusters and would be addressed by the use of lime-stabilised soils if encountered during road construction. There are no large landslide or slumping features present on the site, although localised, shallow landslips can occur. This can be addressed with appropriate design of stormwater and run-off control systems and re-vegetation.

A very low wastewater loading rate is proposed. The discharge would not therefore exacerbate drainage or create ponding and would not affect soil erosion risk on-site.

## **8.5 Landscape and Natural Character**

The Landscape Assessment (**Appendix K**) states that the character, qualities and values of the property do not provide absolute constraints on development of the site. The assessment notes however that given the values associated with the Buxton Valley landscape, it is important for any built development to integrate successfully with its environment. To achieve this outcome, site planning, design and mitigation measures have been built into the Master Plan and proposed Plan Change provisions. These include:

- Defining building clusters in terms of size, density and location of dwellings
- Defining the layout of roading and development within the property;
- The protection and enhancement of biodiversity;
- Staging of construction;
- Stormwater ponds with gentle batters so that margins can be planted with indigenous riparian planting;

- Activities (during and post construction) controlled by stormwater and erosion and sediment control plans;
- Restoration, amenity and mitigation planting;
- Improved pedestrian linkages.

These measures are supplemented by controls in the proposed Plan Change which specifically address landscape effects including limiting house numbers and locations within building clusters, requiring development to be in accordance with an Outline Development Plan and controlling the height, footprint size, colour and materials of buildings.

Having regard to these matters, the visibility of the proposed development has been assessed from nine representative public viewpoints. These include the Jed River Lagoon, the Buxton Creek bridge, the short right of way alongside the Buxton Creek, the beach near the campground, the village road, south beach, the reserve lookout on the Southern Gore Bay approach, the northern Gore Bay approach and the Port Robinson track.

Development in some of the clusters will be partially visible from some public places. In the majority of cases this visibility is limited to only parts of buildings and from only one viewpoint. The changing topography and existing vegetation would largely screen the majority of built development. Visual screening would be assisted by the mitigation planting which would be established to keep building bulk, form and finish subordinate to and complementary with the landscape. This is achieved through ensuring the planting appears natural in relation to the ground contour as well providing a vegetated context within which the buildings can blend by providing greater texture, shading and in some cases a backdrop. The ability to absorb development is made even more effective when the proposed planting is considered in combination with the building design and location controls which propose to keep the height, form and finish of buildings consistent with the rural environment and avoid significant contrasts.

The Buxton Creek Terrace cluster is the most visible from the road and beach area, however it has been specifically designed to be seen or read, as providing a logical and visual connection between the Gore Bay and Buxton Valley communities. These clusters are also located in that part of the site which, due to proximity, has the greatest coastal influence. The existing Coastal Management Area of Gore Bay is however already highly modified by housing, exotic plantings, roads and the camping grounds, all of which are visible from the beach. The terrace clusters therefore represent a managed extension to this existing development and should be viewed as a part of a wider, modified environment. The proximity of the Buxton Creek Terrace clusters also provides social benefits in terms of community and accessibility which are consistent with sustainable development principles as well as principles of connection and custodianship in the New Zealand urban design protocol.

The balance of the development is largely screened from the surrounding locality, with many parts not able to be seen from beyond the site. The internal roads are bordered by swales with soft vegetated edges which would maintain an informal and rural character. Post construction there is unlikely to be any scarring of the landscape due to the extensive planting proposed and the effect of the Management Plans in place for sediment and erosion control. Works at the site entrance in the form of roading and a stormwater pond are to be enhanced with appropriate planting while the additional water tanks are to be located in proximity to the existing tanks and would be screened by vegetation.

The nature of the proposed development is responsive to the character and values of the site, as well as the wider context. Although the character of part of the Buxton Valley would change from a rural, working backdrop to a visual extension of the Gore Bay settlement, it provides opportunities to secure a number of positive landscape related outcomes, relating to

protection of indigenous vegetation and enhanced public access. The proposed Outline Development Plan would keep the steep slopes free of built development and open farmland is retained over a large part of the site. Accordingly, it would not appear to be domesticated and areas of indigenous revegetation would provide landscape benefits by providing greater texture, pattern and colour to the natural backdrop.

The wider Gore Bay locality is also a modified landscape. Agricultural pasture, tracks, fencing and water storage tanks all exist within the Buxton Valley and within the Coastal Management Area of Gore Bay there are existing houses and associated infrastructure. In the proposed building clusters – the Buxton Basin, the South West Pocket, the South Spurs and South East Pocket, the impacts on natural character are negligible due to the modified grasslands that predominate in these locations. There are therefore overall landscape benefits created by the proposed mix of land uses combining planting with areas of defined built development.

The level of change to the natural character as a result of residential development in the Buxton Valley is therefore in the context of an existing modified environment with significant benefits that will accrue from the protection and enhancement of biodiversity within the Valley.

## **8.6 Terrestrial and Aquatic Ecosystems**

The Ecology Assessment (**Appendix E**) identifies the positive and potential adverse effects of the proposal.

Ecological effects have already been taken into account in the preparation of the Master Plan and resource consents. The key mitigation built into the Master Plan includes the layout of buildings, stormwater and wastewater treatment systems that ensure high quality water is discharged and the removal of stock from covenanted areas and fencing of those areas.

The Master Plan shows that all buildings are to be located on land currently in open grassland, avoiding any impacts on regenerating forest. The clustering of buildings is also beneficial in that it enables restoration planting to occur between built development areas and provide space for ecological corridors, or linkages, to be developed across the site. The proposed protection of the indigenous vegetation through a QEII Trust or an alternative land covenant and fencing, combined with the mitigation and enhancement planting is a major environmental benefit for the Buxton Valley. It is important that revegetation uses locally sourced native species and BGBL has included a rule to this effect in the proposed Plan Change.

These positive biodiversity effects are consistent with the sustainable objectives sought by BGBL for the proposed development. The road and walkway connections will result in some fragmentation, however the road is to follow a farm track which already exists on the property and the depth and extent of any fragmentation caused by roads and walkways is considered to be minimal. The protection of the Buxton Valley forest, combined with the enhancement and mitigation planting and the DOC reserve may create one of the larger continuous forested areas in the Ecological District.

Managed public access through the forest that provides a natural experience is a positive community benefit, providing a natural experience as is formalisation of the public access to the waterhole. The Ecology Assessment has considered the benefits of public access in relation to increased risk or threat from human disturbance. Overall, the assessment concludes that the number of visitors would not be high and provision for a formal walkway would discourage uncontrolled public intrusion into wider areas of the forest. The fencing of

indigenous vegetation to exclude stock is a key ecological benefit to achieving long term biodiversity benefits.

The desirability of making the Buxton Valley housing cat and dog free has been discussed. Due to the proximity of Gore Bay housing the Ecology Assessment does not make this a specific recommendation and the matter is recommended to be agreed by consensus of residents rather than regulation.

The Ecology Assessment has considered the details of the Erosion and Sediment Control Management Plan and the Stormwater Management Plan. Providing all works are carried out in accordance with these plans, contaminants are able to be collected and removed from discharge water and the impact on ecological values would be negligible.

Similarly, the proposed mechanisms for treatment and disposal of domestic wastewater should protect waterways, if constructed and operated to meet the requirements of Environment Canterbury. It is anticipated that effects of the proposed wastewater system would be no more than minor for those reasons specified in Sections 9.1.1 Wastewater above.

During construction, and once housing is established, it is unlikely that noise would adversely affect any fauna. Dust management would however be required during construction depending on the weather. Dust can adversely affect some plants, however due to the geographic spread of the housing clusters, the relatively narrow construction corridor for roads and the distance from the forest and shrublands, no significant adverse effects arising from dust have been identified. It is also noted that dust management mechanisms such as limiting ground disturbance and watering can be imposed as conditions on a resource consent for subdivision.

The Ecology Assessment has identified that weed management is an essential element of vegetation management and in particular in relation to the forest edges and areas disturbed by construction. BGBL is committed to the protection of indigenous vegetation and anticipates that the QEII covenant would provide a suitable management regime, including weed and pest management, for the Owners' Association to implement and monitor.

In conclusion BGBL is satisfied that the proposal generates negligible adverse effects on ecological values and provides significant biodiversity benefits.

## **8.7 Recreation**

The Port Robinson Walkway follows the coast from Hurunui Mouth to Manuka Bay. Until recently the track extended north to Gore Bay but this section is now closed. The proposal generates positive recreation benefits by formalising public access to the Buxton Creek swimming hole and providing a more comprehensive walkway / mountain biking circuit that links Gore Bay village with the DOC reserve.

## **8.8 Ngai Tahu Values**

The Cultural Impact Assessment identifies a number of positive features associated with this application. These include:

- Early engagement with Te Runanga o Kaikoura
- Commissioning the Cultural Impact Assessment

- Providing for site visits
- Making available technical advisors
- Commissioning an archaeologist to undertake an archaeological assessment of the property.

A number of the recommendations made in the Cultural Impact Assessment (CIA) have already been implemented by BGBL. These include:

- applying for an archaeological authority from the Historic Places Trust
- development of stormwater and wastewater treatment systems consistent with the policies in the Te Runanga o Kaikoura Environmental Management Plan
- facilitating a thorough consultation process with permanent and holiday home owners
- providing for rainwater collection tanks for individual dwellings

Further recommendations made in the CIA are to be addressed through processes related to construction and some fall outside the Plan Change provisions. These include:

- engagement of an archaeologist and a runanga representative during earthworks on the creek terrace and on land between the beach and the property (now expanded by the Archaeology Assessment to include land within 20m of the Buxton Creek following the accidental discovery in February 2008).
- training for staff and contractors for identifying archaeological material during construction;
- adoption of an accidental discovery protocol (attached as **Appendix P**) and able to be made a condition on subdivision consent.

The CIA supports applying for a QEII covenant and the fencing of native vegetation. It is also supportive of development of a management plan for indigenous vegetation and the replacement of any lost vegetation arising through property development. As described in Sections 4.6 to 4.10 BGBL proposes to adopt all of these measures within the proposal.

With respect to cultural impacts on landscape values the CIA seeks that dwellings be appropriately located with indigenous vegetation used to mitigate visual effects by screening houses. The CIA is also supportive of design controls on houses such as colour, materials and height.

The Buxton Valley Management Area will be subject to rules in the District Plan to address the visual effects of the proposed dwellings. With respect to the location of the housing clusters, the Master Planning process has involved the development of a three dimensional model which has enabled the location and height of dwellings to be tested in relation to landscape values and visibility. Compliance with the Master Plan is therefore an important control to be included in the District Plan along with complementary rules for height, colour, materials and building footprint (controlling the overall form and appearance of buildings).

The CIA recommends that BGBL consider using local Maori place names within the development and that the company initiate discussion with the Hurunui District Council, runanga and the Department of Conservation to review the resources and amenities of Gore Bay village. The CIA expresses concern that the proposal will place extra demand on the

amenities and infrastructure of Gore Bay village. Separate to this proposal, BGBL has already responded to this concern by organising and facilitating a meeting with local stakeholders. BGBL is now seeking to progress a preliminary landscape plan for the village identifying roads, walkways, visitor amenities and landscape treatments to assist community dialogue regarding infrastructure and amenities at Gore Bay.

A final recommendation in the CIA seeks that Buxton Gore Bay Ltd incorporate energy efficient initiatives into the design of the layout of the property and individual dwellings. BGBL propose that these initiatives are to be required through a covenant on the title, rather than rules in the District Plan.

## **8.9 Archaeological Values**

Following the accidental discovery of the remains of an oven, BGBL propose to increase the extent of on-site monitoring during earthworks to now include land within 20m of Buxton Creek (within the creek gully). The monitoring is to be undertaken by a trained archaeologist and a runanga representative and is additional to the monitoring proposed for the land between the beach and the base of the terrace. BGBL propose to adopt the accidental discovery protocol of Te Runanga o Kaikoura and have already implemented this during investigatory earthworks. This protocol can be made a condition of subdivision consent.

## **8.10 Traffic**

The traffic assessment attached as **Appendix N**, concludes that the proposed access to the Buxton Valley is in the optimum location. The sight distances can comply with relevant design requirements for the operating speed of the road and the sight distances required (without modification to the limestone knoll). It also provides the most direct access between the beach and the Valley and can be efficiently achieved.

Some seal widening is proposed to the east of the intersection with the Buxton Valley road. This is proposed to be designed to Diagram D standard, a technical standard that provides sufficient area and dimensions to ensure vehicles within specified vehicle counts can safely enter and exit a property. Internally, the proposed road network within Buxton Valley has been assessed as being capable of accommodating the level of traffic anticipated.

Although the proposal results in a doubling of traffic volumes on Gore Bay Road to both the north and south of the site, the actual numbers of vehicles on the road are already so low that a doubling of vehicle numbers does not raise any issues regarding the geometric capacity of the road or its safety. Full development of the 83 dwellings in Buxton Valley is estimated to generate up to 20 additional vehicles per hour onto Gore Bay Road to the north and 2 to 3 vehicles per hour onto Gore Bay Road to the south.

The one lane bridge at Buxton Creek already effectively slows traffic coming into the Village and for this reason the retention of the existing bridge is supported. The traffic assessment also suggests that the painted speed hump be replaced with a formed hump and that this could also be identified as a pedestrian crossing point on Gore Bay Road.

As cut to fill is to be balanced within the development site, construction traffic is anticipated to be largely internalised. Road metals and infrastructure components would therefore make up the construction traffic using the local road network and this is anticipated to be largely brought in via Gore Bay Road. It is expected that any traffic management requirements would be conditions on the subdivision consent.

With respect to walkways the traffic assessment concludes that a suitable level of pedestrian connectivity is achieved between Buxton Valley and Gore Bay village and the beach. It is considered unlikely that a second footpath would be required on Farmer Street to connect with Tainui Rise, but this is a matter that could be monitored. It is however recommended that the walkway connection with Gore Bay Road cross the Buxton Creek to the south side to avoid pedestrians using the one lane bridge. This is a matter that could be addressed through conditions at the time of subdivision consent.

Parking demand in Gore Bay could potentially increase if people choose to bring surf boards and other equipment to the beach in their cars from Buxton Valley. The traffic assessment concludes that parking demand is not high in Gore Bay and additional cars from Buxton Valley should not have difficulty parking. However, anecdotal evidence suggests there can be high demand from time to time at the south end of the bay. The Assessment concludes that this is a matter that should be monitored.

The Assessment concludes with recommendations for the following mitigation, which can be achieved through conditions at the time of subdivision approval. These matters are covered by existing Assessment Matters in the District Plan and additional assessment matters proposed in the Plan Change document:

- Roads constructed to a 6.0m roadway width for the major access road with a width of 5m for cul-de-sacs and seal widening on sharper bends.
- Additional width provided for parking bays
- Road design be based on a 35m *Approach Sight Distance* sight line with an operation speed of 40km/h.
- All of the road to be chip-sealed.
- The main intersection access with Gore Bay Road comply with the sight lines for *Intersections at Grade* for the measured operating speed on Gore Bay Road.
- Seal widening on both sides of Gore Bay Road be undertaken to provide a 5.5m minimum sealed width from the northern side of the Buxton Creek bridge to 35m north of the site access location and 15m south in general accordance with Diagram D of the updated Transit Planning Policy Manual.
- Replacement of the painted hump on Gore Bay Road with a vertically displaced hump.
- That any pedestrian connection to the Buxton Valley not require pedestrians to cross the Buxton Creek bridge.

### **8.11 Amenity Values**

The consultation undertaken to date has identified the concerns of the Gore Bay community. There are some people who are fundamentally opposed to change or to any increase in residential opportunities in the locality while others have expressed some uncertainty as to the potential impact on amenity values.

Due to the layout and location of built development and the low traffic generation from the proposed dwellings, the potential impacts on the amenity values of the locality are not anticipated to be significant. A large proportion of the development will be hidden from view and the only access point into Buxton Valley will be at the northern end of the village, from

which the majority of traffic will be approaching and be diverted before entering Gore Bay village proper..

Many of the concerns raised through consultation have been considered through the technical assessments with mitigation built into the project to ensure impacts do not extend beyond the site e.g., stormwater treatment and disposal, public parking for users of the walkways. In addition there are community benefits created such as water treatment, conservation of indigenous vegetation, walking tracks and the potential for wastewater to be treated and disposed of within the Buxton Valley at some point in the future.

Having regard to the conclusions of the Landscape Assessment, the coastal and natural environment will remain predominant at Gore Bay, retaining those natural or physical qualities and characteristics that people enjoy. The traffic assessment has concluded that the estimated increase in traffic volume is unlikely to result in any adverse impacts on people's enjoyment of the locality or ability to use the roads safely and efficiently. Although there may be some increased movement and activity in the area it will not be of such a scale or intensity or so different in nature from existing activities in Gore Bay that the existing amenity values would be fundamentally undermined.

The proposed activities are residential or rural in nature and therefore consistent with the current mix of activities which exist in the Gore Bay locality. No commercial, retail or other activities are proposed which represent a significant contrast in terms of impact on the environment from those activities which exist at present e.g., rural, residential and open space activities.

## **9.0 Summary of Effects**

In summary, the effects of the proposed Plan Change are positive in relation to biodiversity and recreation. Ecological enhancements also contribute positively to natural character and landscape values.

The development of residences will modify the existing landscape values in the environment. The potential impact of this change has been addressed by BGBL through the master planning process which has identified areas with potential to absorb change and provided for clustered housing within defined locations. A significant proportion of the proposed development will not be visible from Gore Bay. A deliberate decision has however been made to provide for a visual connection between some of the Buxton Valley residences and existing houses in Gore Bay. Visibility is not in itself an adverse effect, and the landscape assessment concludes that overall, balancing the landscape benefits and the level of change, that the effects on landscape values are not significantly adverse. It is acknowledged that some members of the local community may not support any level of change.

No significant adverse effects are anticipated in relation to the safety or efficiency of the road network.

Positive effects are also anticipated in relation to increased housing choice in the rural, coastal environment, provided in a comprehensive and planned manner.

The provision of services has been investigated to a level whereby consents from the Canterbury Regional Council have been applied for. The site is able to be efficiently serviced and no significant adverse effects on water quality have been identified. There are no geotechnical features of the site which should be avoided or would make development more challenging.