

Pegasus Town

Assessment of Effects on the Environment

Applications to Environment Canterbury for
Resource Consent

December 2005

Prepared by



Chapter 1 Introduction

1.1 Overview of Pegasus town project

The proposed Pegasus town development comprises a new town of some 1700 residential allotments and a commercial/business area. The town will also feature a 14 hectare lake, a school, parks and reserves and key conservation management areas.

The Pegasus town site also includes significant areas set aside for conservation management, including the Eastern Conservation Management Area (ECMA), the Mudfish Conservation Area (MCA) and the Western Ridge Conservation Area (WRCA).

The Pegasus town proposal is also linked to the adjacent Mapleham development, providing golf course recreational facilities and additional housing as well as being the location of the entrance and access road to Pegasus town from State Highway One.

The location of Pegasus town is included as **Appendix B**; the site plan as **Appendix C**; and the Master Plan for the proposed development is included as **Appendix D**.

1.2 Structure of this Assessment of Effects on the Environment

This assessment of effects on the environment focuses on the matters relating specifically to the consents being applied for. A separate Assessment of Effects on the Environment has been prepared to accompany the resource consent applications to Waimakariri District Council.

This Assessment is set out as follows:

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| Chapter 1 | Introduction |
| Chapter 2 | Existing environmental conditions - a description of the current state of the site and its values. |
| Chapter 3 | Project description - a summary of the features of the project relevant to these applications. |
| Chapter 4 | Construction - an outline of the construction process. |
| Chapter 5 | Assessment of environmental effects - a description of potential adverse and positive effects of the proposal on the environmental features and values described in Chapter 2, and details of how any adverse effects will be mitigated through design or operation. |
| Chapter 6 | Alternatives - a brief discussion on alternatives. |
| Chapter 7 | Consultation - a summary of the consultation process. |
| Chapter 8 | Mitigation and Monitoring - a summary of mitigation measures proposed in Chapter 5, proposed conditions and monitoring proposed. |
| Chapter 9 | Statutory considerations - a description of the statutory provisions relevant to these applications. |

Technical reports, figures and documents are attached as appendices to this assessment. These are:

Appendix A	Certificates of Title
Appendix B	Location Plan
Appendix C	Site Plan
Appendix D	Master Plan
Appendix E	Consultation Report
Appendix F	Hydrology Report
Appendix G	Construction Management Report
Appendix H	Cultural Impact Assessment
Appendix I	Eastern Conservation Management Area – Management Plan
Appendix J	Archaeological Report

1.3 Purpose of the Applications

The purpose of these applications is to provide sufficient information in relation to the manner in which any adverse effects may be avoided, mitigated or remedied in order to gain the necessary consents to carry out the proposal.

This Assessment of Effects on the Environment (AEE) is provided in accordance with the requirements of section 88 of the Resource Management Act 1991 and the Fourth Schedule to the Act. It is in support of applications for resource consent made by Pegasus Town Limited for development and use of the property known as Pegasus town.

In summary, the consents sought include:

To discharge water and contaminants during construction,

To discharge water into water,

To discharge water to land,

To discharge contaminants (stormwater) to land and water, and to land in circumstances where it may enter water,

Vegetation clearance and soil disturbance within a riparian zone,

Excavation within the bed or margin of a waterway,

The placement of structures within the bed of waterbodies,
 To carry out work in areas that are deemed to be wetlands or streams,
 Restoration of an existing wetland area,
 Excavation of land, and the construction of the lake, waterways/wetlands
 in the Eastern Conservation Management Area and Mudfish
 Conservation Area,
 To take and use groundwater,
 Taking and/or diverting surface water, and
 Damming of water.

The proposal has been given wide publicity and an extensive consultation process has taken place. Issues raised in consultation have been addressed in design and operational proposals, so that Pegasus Town Ltd is confident that potential adverse effects have been avoided, remedied or mitigated.

Applications for land use consent are being made concurrently to Waimakariri District Council. Further applications for subdivision and associated landuse activities will be made in the future.

1.4 The Site

The total application site is made up of a number of legal titles:

Legal Description	CT
RES4055	CB443/94
RS35652	CB134/39
RS35509	CB23F/1056
RS35487	CB30F/235
RS11319	CB30F/238
RS34931	CB30F/237
RS35503	CB10K/269
RS13758	CB443/10
RS11316	CB45C/1288
PT RS11317	CB45C/1288
PT RS34845	CB45C/1288
RS11318	CB45C/1288
RS19096	CB45C/1288

The total site has an area of approximately 285ha and is presently zoned under the Waimakariri District Plan for a range of residential, business and rural activities. These zonings have come about due to recent changes to the District Plan.

The Pegasus town site is located approximately 25 kilometres from the centre of Christchurch City. The site is located to the north-east of the township of Woodend, and approximately 1.5km to the east of State Highway 1. The Pegasus Bay coastline lies approximately 1km to the west of the subject

property. This area is zoned in the District Plan for the development of Pegasus Town. Kaiapoi Pa lies to the north of the site, across Preece Road.

The Pegasus town site is currently in a mixture of pasture and plantation forest. Other surrounding land uses are primarily agricultural and horticultural with associated residential activity.

Chapter 2 Existing Environmental Conditions

2.1 Introduction

Pegasus town and the proposed adjacent Mapleham development are situated on the southern floodplain of the Ashley River and approximately 1 km from the coast. The existing environment of the Mapleham site is described in detail in the AEE accompanying resource consent applications made in October 2005 (Mitchell Partnerships and Boffa Miskell).

The township zone is bounded in the west by a high dune ridge (on which is situated the significant Hohoupounamu site), to the south by Gladstone Road and Tutaepatu Lagoon, to the east by wet pasture lands and dunes managed by Te Kohaka O Tuhaitara Trust, and to the north by a dune ridge and Preece's Road. All parts of this zone are affected by these applications, either by the earthworks to shape the land, the stormwater management system or the enhancement works in the Eastern Conservation Management Area (ECMA) or Mudfish Conservation Area (MCA).

Under the Waimakariri District Council District Plan, Management Plans are required for the Eastern and Mudfish Conservation Areas at the time of applying for relevant subdivision consents. A preliminary Management Plan for the Eastern Conservation Management Area has been prepared to accompany these current applications to Environment Canterbury and Waimakariri District Council, and is attached to this AEE (**Appendix I**) because the ECMA is integral to the earthworks and stormwater consent applications.

2.2 Topography

The whole Pegasus town site (including the proposed Conservation Management Areas) lies on an area of dunes and interdune wetlands in the floodplain of the Ashley River. This is shown in Figure 2 of the Hydrology Report (**Appendix F**). It has been formed by coastal or estuarine processes.

A high undulating ridge on the secondary dune system forms the boundary between Mapleham and Pegasus town. Most of the developed town will lie on a high dunes area at levels between 6m and 10m RL. This slopes gently to the north and east into low dunes (which are between 2m and 4m RL) and to the east of these is an interdune area, which comprises predominantly wet land at 1.0m to 1.2m RL. This interdune area is the main component of the ECMA in Pegasus.

To the east of the interdune area (and outside the Pegasus town site) is the primary dune ridge along the coast.

The interdune area drains generally towards the north, with the exception of some local drains near Tutaepatu Lagoon.

2.3 Geology and Seismicity

The regional and site specific geology and seismic hazard were investigated as part of, and addressed in, the Plan Change documentation (Anderson Lloyd and Boffa Miskell 1997). To the west of the site, alluvial overbank and channel deposits (Springston Formation) dominate, while the eastern part of the site is underlain by dune and interdune deposits (Christchurch Formation).

Canterbury is an area of relatively high seismic hazard owing to its close proximity to the boundary between the Australian and Pacific plates and related active faults in the foothills of the Southern Alps.

2.4 Soils

The soils within the site are typically very fine sands with some discontinuous layers of silt.

The site is comprised of the following units:

Clean, fine to medium sand: most commonly underlying the central and eastern parts of the site. These are considered to be mainly dune or beach deposits.

Silt clay and peat: occur as thin layers beneath the central and eastern parts of the site but represent only a minor portion of the near surface geology.

Sandy gravel and gravelly sand: a relatively minor portion of the near surface geology but becomes more common at depths below 5m.

2.5 Landscape and natural character

The site lies in the coastal environment. Its coastal character is evident through the presence of areas of coastal vegetation (marram grass) on a remnant secondary dune and wetlands landform, with the sound of the sea audible in certain weather conditions. However, the land and waterways have been modified by forestry and farming land uses and parts of the site have lost the coastal feel. (Anderson Lloyd and Boffa Miskell 1997).

Modifications to the landscape include:

Removal of virtually all native vegetation cover, through grazing, burning and probably over sowing, pine forest planting and wetland drainage

Loss of wetland form, through construction and operational management of drains and stock ponds and lowering of groundwater table by takes upstream

Reduction in water quality through on-site grazing and off-site impacts on groundwater upstream

The site of the proposed township and wetlands is not visible from the beach.

2.6 Catchment Hydrology

2.6.1 Groundwater quantity and quality

The hydrology of the site and its surroundings is described fully in **Appendix F** (Hydrology report). That report is based upon the groundwater levels monitored during various bores and test pits excavated earlier in the project history.

Groundwater quantity

In general, groundwater flows in an easterly direction towards the sea in this part of the region.

Measured shallow groundwater levels are typically between 2.9m RL at the western high dunes of the Pegasus site, lowering to 1.1m RL in the interdune area to the east. The interdune area has some areas where groundwater is at the surface and Tutaepatu Lagoon, to the south of Pegasus Town, is also considered to be a reflection of shallow groundwater levels in the area.

It should be noted that Tutaepatu Lagoon is not immediately down-gradient of the proposed town although it is considered to be part of the same shallow groundwater system. It will therefore be unlikely to receive groundwater flows from the Pegasus site.

Groundwater quality

The table below (Table 2-1) summarises ECan water quality data from shallow to medium depth (less than 65m deep) groundwater bores located within 5km radius of the Pegasus and Mapleham site.

Table 2-1
Summary of Groundwater Quality

Parameter	Average	Maximum	Comparison with Recommended Guideline Values
Antimony mg/L	BDL	BDL	-
Cadmium mg/L	0.001	0.001	-
Chromium mg/L	0.002	0.002	-
Copper mg/L	0.012	0.350	<0.0014
Iron mg/L	1.41	13.00	-
Total Iron mg/L	4.41	12.20	<0.01
Lead mg/L	BDL	BDL	0.0034
Manganese mg/L	0.187	1.100	-
Total Manganese mg/L	0.632	1.210	0.01
Nickel mg/L	BDL	BDL	-
Selenium mg/L	0.002	0.002	-
Zinc mg/L	0.023	0.060	0.008
Arsenic mg/L	0.0193	0.1700	0.013
pH	6.8	8.0 (6.0 minimum)	6-9
Dissolved Oxygen mg/L	2.26	7.50 (0.1 minimum)	-
Dissolved Oxygen %	21.2	70.4 (1.1 minimum)	90%
Ammonia N mg/L N	0.14	1.60	0.05
Nitrate + Nitrite N mg/L N	0.75	6.00	0.44
Alkalinity mg/L HCO ₃	65	215	-
Bicarbonate Alkalinity mg/L HCO ₃	58	149	-
Calcium mg/L Ca	12	36	-
Total Hardness mg/L	43	152	-
Turbidity NTU	12.2	43.7	5.6
Water temperature °C	12.6	22.9	-

BDL =Below detection limits

In terms of general quality, the shallow-medium depth groundwater quality has elevated iron, manganese, zinc and copper. Other parameters, such as nutrient levels and turbidity can also be high.

The above results are of interest as they indicate that there is already a high level of contamination of groundwater, particularly with parameters of concern such as copper. Where this groundwater enters a surface water system then the surface water could become contaminated to a level that would have an adverse effect on the ecosystems and availability of fish and shellfish suitable for consumption. Contaminants may also have an adverse effect on the aesthetics of surface waters.

2.6.2 Surface water quantity

The surface hydrology of the site and its surroundings is described fully in Appendix F (Hydrology report). The main surface water systems relevant to the Pegasus site and the key features are:

Taranaki Stream and its tributaries (including those which lie on the Mapleham site). The lower reaches receive water from the interdune drains and floodgates control the outflows from the Taranaki into the Ashley during floods and high tides (ranging between -0.7m to + 0.6m).

Interdune drains (some of which flow into the Taranaki Stream) and **Ashley River**. The interdune area consists of a series of farm drains that collect ground and surface water and generally drain in a northerly direction towards the Ashley River. Flows from the interdune areas enter Taranaki Stream and from there, enter the Ashley River. When levels in Taranaki Stream are high (due to tide cycles and/or flooding) flows from the interdune will pond and, in more extreme events, may receive flows from Taranaki Stream, depending on how much the stream is backing up. As the groundwater in the interdune area is typically near the surface, frequent ponding can occur in short duration rainfall events as well as the area being subject to larger flooding associated with the Ashley River overflow and closure of the floodgates.

Tutaepatu Lagoon is thought to be primarily supplied from groundwater, although there may at times be some surface inflow from the north and west. It is understood that the levels within the lagoon have dropped in recent time, probably as a consequence of drainage of surrounding land and increased shallow groundwater takes in the area to the west. Discussions with local residents have indicated that, historically, the lagoon drained both to the south and to the north into the interdune area. The lagoon has been known to completely dry up occasionally – this is understood to have occurred as recently as 1998. Site visits have confirmed that the lagoon does have surface water connections – one outflow to the south via a large farm drain and another less direct link to the north into a farm drain on the eastern side of the interdune area. A small inflow is thought to be draining into the lagoon from the western side of the interdune area.

Flood risk to the existing area, from flows generated outside Pegasus Town, is discussed in the Flooding report (attached to the Hydrology Report in **Appendix F** to this application) and this should be referred to for details. In summary, there are many flood scenarios that have been considered in floodplain modelling completed by ECan (refer to Ashley River Floodplain Management Regional Plan - Technical Investigation, ECan, 1995). Most scenarios for Ashley River floods lead to ponding in the interdune area. The ECan models were used to identify flood levels, which are now part of the Waimakariri District Plan, and floor levels for Pegasus. In general, the low

dunes portion of the site is at risk of flooding in larger events, mainly due to flooding resulting from breaches in the Ashley River stopbanks.

2.6.3 Surface water quality

A review of Environment Canterbury's website has not indicated any water quality sampling results for the drains in the interdune area, nor for Tutaepatu Lagoon. Grab samples have been collected from the interdune drains at the discharge point from the site, from Tutaepatu Lagoon and from a trial lake that has been created on the site. The results from this are summarised in Table 2-2 below:

Table 2-2**Summary of Surface Water Quality Sampling Results**

Parameter	Trial Lake		Interdune Drain	Tutaepatu Lagoon	Guideline Value – ANZECC for Ecosystem Health
Sample Date	12/10/05	21/11/05	21/11/05	21/11/05	
Water temperature °C	Not tested	22	22.5	21.0	
Water colour and clarity	28	Not tested	Not tested	Not tested	
Turbidity (NTU)	200	21	25	27	5.6
PH	7.3	8.1	7.6	8.3	7.2-7.8
BOD (mg/L)	<2	<2	4	6	
Nitrate nitrogen (mg/L)	Not tested	1.0	0.007	0.059	0.444
Ammonia nitrogen (mg/L)	Not tested	0.061	0.030	0.076	0.021
Total nitrogen (mg/L)	3.4	2.6	2.9	3.8	0.614
Phosphorus (mg/L)	0.22	0.069	0.10	1.3	0.033
Iron (mg/L)	9.9	0.94	4.5	2.2	0.01
Manganese (mg/L)	0.12	<0.01	0.41	0.46	0.01
Arsenic (solution) (mg/L)	0.012	0.000004	0.008	0.039	0.013
Dissolved oxygen (mg/L)	9.3	8.9	4.4	6.1	
Dissolved oxygen (%)		102%	51%	68%	98-105
Faecal coliforms (CFU/100mL)	Not tested	130	730	230	100

The interdune water quality showed high turbidity and high total nitrogen (TN), iron manganese, low dissolved oxygen and high faecal coliform counts, when compared with guideline values. The water quality within the interdune drains is also expected to vary significantly with rainfall events and between different seasons.

The trial lake results initially showed very high turbidity, iron and manganese, although these were lower in the second round of water quality testing. Nutrient levels in the trial lake were also high.

The water quality within Tutaepatu Lagoon may be somewhat degraded with high levels of nutrients, iron and manganese, turbidity and high levels of faecal coliforms. Arsenic levels were also elevated.

2.7 Aquatic ecology and wetlands

2.7.1 Introduction

Fully aquatic habitats are located only in the eastern part of the Pegasus site, to the east of the dune ridge where groundwater is at or around ground level. All the aquatic habitats on the site are artificial, being a series of ditches constructed to drain grazing land in the interdune area and stock ponds. The drains take water north into Taranaki Stream and then to the Ashley River see **Appendix F**. Because of the nature of the boundary alignment between Pegasus land and Te Tuhaitara Trust land to the east, the drains run in and out of the two properties as they head north.

Tutaepatu Lagoon lies to the south east of the Pegasus site and the willow wetlands that surround it are contiguous with those of the southern part of the Pegasus wetlands.

Groundwater-fed wetlands also occur in the interdune area. An extensive area of wetland and open water comprises what will become the Eastern Conservation Management Area, as prescribed in the Waimakariri District Council District Plan. The District Plan requires that a certain amount of wetland (and dunes) enhancement work be carried out in the ECMA prior to issue of title for any residential allotment or for the allotment containing the conservation area; and also that this enhancement work be carried out in accordance with a Management Plan. Although it is not required for the consents currently being applied for, a Management Plan has been prepared and is attached to this AEE (as **Appendix I**). This provides more information about proposals for the wetlands in the ECMA relevant to wetland enhancement, stormwater and earthworks applications.

A small wetland is located on the eastern side of the proposed Western Ridge Conservation Area and is the location of the proposed Mudfish Conservation Area. This has been surrounded by pine forest until recent clearing operations, and is overgrown with pastoral weeds.

The Pegasus interdune wetlands are remnants of what would have been an extensive system of coastal wetlands along the Canterbury coast. The immediate area was once an estuary of the Ashley River, which through sedimentation and coastal drift transformed into a brackish lagoon and wetlands complex. The construction of the floodgates on the Taranaki Stream/Ashley confluence has reduced the saline intrusion while the large drain through the centre of the system has led to leaching of salt.

The pre-human vegetation of these coastal wetlands is likely to have been flax-dominated with areas of salt-marsh rushes in the more saline areas and raupo (*Typha orientalis*) and *Carex secta* in the more freshwater parts.

Today the wetlands and waterways of the Pegasus site are highly modified by:

Drainage channels which intercept ground and surface water and direct it north from the site, lowering the water table in wetlands

Management of drains to keep them clear of impediments to drainage, which means that habitat diversity is limited

Lowered groundwater levels due to the increased takes from the groundwater system upstream, leading to drying out of wetlands

Grazing by cattle and sheep on Pegasus site, causing siltation, eutrophication, and degradation or loss of riparian/wetland vegetation

Raised levels of nutrients in water, from agricultural activities in groundwater recharge zone upstream

Invasion by crack and grey willows (*Salix fragilis*^{*1}, *S. cinerea*^{*}), and to a lesser extent gorse and blackberry, leading to loss of habitat for indigenous plants, fish and birds.

The wetlands and waterways on the Pegasus site are not identified as “significant” in the NRRP Chapter 7. However, the drain to the east of the Pegasus site (running north to the Taranaki Stream) is identified as “Mudfish” habitat in the NRRP.

The wetlands and waterways are not identified as “Vegetation and Habitat Sites” in the District Plan.

2.7.2 Drains and stock ponds

Throughout the willow and pasture areas there are areas of open water and drains as well as stock ponds. The surface water hydrology of the site is described in the Hydrology report (**Appendix F**).

Surveys carried out over the last 8 years as part of Pegasus Town investigations have found very low numbers of fish in these aquatic habitats (including similar areas on land to the east and Tutaepatu Lagoon). The water is generally of poor quality due to high nutrient levels, anoxic conditions and siltation due to stock. Fish recorded in the late 1990s were (Anderson Lloyd & Boffa Miskell 1997²):

Shortfinned eel

Inanga

Canterbury mudfish

It is of note that in surveys carried out in April 2005 Canterbury mudfish were no longer detected in the drain and pond they occupied in 1997, but were

¹ * indicates that a species is introduced/exotic

² Application for a Plan Change to the Waimakariri District Council District Plan, Rangiora District Section. (Anderson Lloyd and Boffa Miskell, 1997)

found in marginal willow swamp. Mudfish are difficult to find and this limited sampling programme may be only indicative of their distribution. Discussions with Leanne O'Brien (pers comm.) suggest that all aquatic habitats found on the Pegasus site are marginal for mudfish, which prefer spring-fed clearer waters.

As part of the investigations into the aquatic habitats of the Taranaki Stream adjacent to the proposed Mapleham development, some fish surveys were carried out. The stream is reputed to have high inanga (*Galaxias maculatus*) numbers and these were caught along with common bully (*Gobiomorphus cotidianus*). Although not caught, numerous small brown trout* (*Salmo trutta*) were observed. The New Zealand fish database contains several records of fish captures from the Taranaki Stream and its tributaries downstream from the site (between 1981 and 2001) and these add giant bully (*Gobiomorphus gobioides*), Canterbury galaxis (*Galaxias vulgaris*), shortfin eel (*Anguilla australis*), longfin eel (*Anguilla dieffenbachii*) and black flounder (*Rhombosolea retiaria*) to the list for the Taranaki Stream.

The interdune drains to the east of the site drain into the lower reaches of the Taranaki Stream, so it is possible that some of these fish could move into them although water quality is not likely to be good enough for populations to become established.

2.7.3 Wetlands

The existing wetland vegetation of the Pegasus site lies in the eastern part of the Pegasus zone and will all be included in the Eastern Conservation Management Area. It is a highly modified environment, extensively grazed by sheep or cattle (until recently) and five broad vegetation types have been described: willow forest, damp pasture, *Carex secta* swamp, short rushland and tall rushland. The extent and location of these vegetation types is described in more detail in the Eastern Conservation Management Area Management Plan which forms **Appendix I** to this AEE.

The key features of these vegetation types are:

Willow forest.

Large areas of standing water dominated by grey willow (*Salix cinerea**) with areas of crack willow (*S. fragilis**) which is generally anoxic due to heavy leaf litter. Scattered throughout are *Rubus fruticosus** (blackberry), *Dryopteris filix-mas** (male fern), *Lotus pedunculatus** (lotus), *Prunella vulgaris** (selfheal) and *Veronica anagallis-aquatica** (water speedwell). Native species present include a range of ferns with occasional *Urtica linearifolia* (swamp nettle), *Carex secta* (purei), *Coprosma propinqua* (mikimiki) and *Cordyline australis* (cabbage tree).

Common native and introduced bird species (such as fantail, silvereye, blackbirds) use the willow forest.

At the edge of the willow forest along the boundary with Te Tuhaitara Trust land a population of Canterbury mudfish was discovered during site investigations.

Wet pasture

The area along the eastern boundary of the Pegasus site, and contiguous with Te Tuhaitara Trust lands supports wet pasture that is periodically flooded or saturated. It is dominated by exotic species and has been highly modified by draining, grazing and perhaps fire. Exotic grasses such as *Holcus lanatus** (Yorkshire fog), *Agrostis capillaris** (browntop) and *Anthoxanthum odoratum** (sweet vernal) dominate, yet many herb species such as *Plantago lanceolata** (narrow-leaved plantain) and *Trifolium repens** (white clover) are common. Native species are scattered throughout and include *Microtis uniflora* (onion orchid), *Potentilla anserinoides* (silverweed) and *Schoenoplectus pungens* (three square rush). The open drain that runs through this area supports abundant *Azolla filiculoides* in the warmer months.

Pied stilt, banded dotterel and other common waders visit this area.

Carex secta swamp

Large *Carex secta* plants dominate the character of this type, although they are sparse in places. Standing water is common in this area in winter months and following rain throughout the year. Inter-*Carex secta* spaces are dominated by common native and introduced rushes*, *Eleocharis acuta* (spiked sedge), *Myriophyllum propinquum* (milfoil) and *Glyceria fluitans** (floating sweetgrass). *Ranunculus macropus* (swamp buttercup) occurs in patches, *Urtica linearifolia* (swamp nettle) is present on *Carex secta* trunks and *Azolla filiculoides* and *Ricciocarpus natans* occupies open water in the warmer months. Grey willow is actively invading this vegetation type and is present as small trees and seedlings.

Pukeko and mallard use the open water and open parts of this area and the willow fringes, while bittern have been seen occasionally here. Recreational hunting takes place from time to time - few shooters have been encountered during site surveys but empty cartridges and the presence of decoy ducks on the water suggest that shooters do use the site.

Short rushland

This is a diverse vegetation type that occurs on the periphery of the willow forest and *Carex secta* vegetation types. Plants found in the *Carex secta* swamp occur here with the slightly raised, drier areas supporting *Schoenus pauciflora*, *Microtis uniflora*, *Carex flaviformis*, and *C. flagellifera*, as well as a variety of exotic grasses and herbs. Grey willow seedlings also occur throughout this vegetation type.

Tall rushland

The northernmost area of the ECMA is covered in a dense rushland dominated by *Juncus gregiflorus*, *J. effusus**, *J. pallidus* and *J. australis*. Many exotic grasses and herbs occur throughout.

Other fauna

Frogs were heard during some field surveys, but not investigated in detail. Dan Witter (pres comm.) reported finding a small brown frog during observation of recent logging operations on the west side of the site. Given

that this was in an area with no open water, only damp ground, this was likely to be a Whistling frog (*Litoria ewingii*). In open water areas the common Southern bell frog (*L. raniformis*) is likely to be found.

Western wetland

On the western side of the Pegasus site, adjacent to the high western dune ridge is a small wetland surrounded by pine forest. Currently, this area is dominated by exotic grass and herb species, although some native species, such as *Juncus gregiflorus*, occur. Grey willow (*Salix cinerea**) is present on the margins of the depression and appears to be spreading inwards, and broom is scattered throughout.

In winter and times of high rainfall, open water is present in the north-eastern corner in a shallow excavated pond and may also occupy some low lying areas outside of the pond; at other times groundwater lies at or just below the bed of the pond. In February 1998, however, there was a large area of open water in an area of tall pine trees and tussock sedge or grassland.

Important species

The wetlands of the Pegasus site currently support a number of important species as listed in Table 2-3 below.

Table 2-3

Summary of important species found in wetlands on the Pegasus site.

Scientific name	Common name	Status	Distribution/ Comments
Birds			
<i>Botaurus poiciloptilus</i>	Australasian bittern	Nationally endangered	Seen rarely
Fish			
<i>Neochanna burrowsius</i>	Canterbury mudfish	Nationally endangered	Uncommon, see text for details
Plants			
<i>Urtica linearifolia</i>	Swamp nettle	Gradual decline	Infrequent - In association with <i>C secta</i> and scattered in willow forest in fringes and open areas
<i>Ranunculus macropus</i>	Swamp buttercup	Gradual decline	Infrequent - In association with <i>C secta</i> and scattered in willow forest in fringes and open areas
<i>Lepidosperma australe</i>	Four square rush	Uncommon in Canterbury	2 small patches in dune hollows
<i>Baumea rubiginosa</i>		Uncommon in lowland Canterbury	3-5 plants near edge of southernmost willow forest
<i>Carex flaviformis</i>		Uncommon in lowland Canterbury	Rare - in association with <i>Schoenus pauciflorus</i> and <i>B rubiginosa</i> in wet grassland
<i>Nertera setulosa</i>		Uncommon in lowland Canterbury	Formerly single plant in dune hollow, not reconfirmed in 2005.
<i>Schoenus pauciflorus</i>	Bog rush	Uncommon in lowland Canterbury	Infrequent - scattered plants on slightly raised surfaces within wet grassland and reedlands
<i>Discaria toumatou</i>	Matagouri	Uncommon in Canterbury coastal dunes	A few scattered plants on dune ridge.
<i>Ricciocarpus natans</i>	(liverwort)	Uncommon	On open waterbodies

The presence of Australasian bittern and Canterbury mudfish is very notable as these species rank in the second most threatened category on the New Zealand threat classification system. However, whereas a breeding population of Canterbury mudfish is present, it is unclear whether bittern are breeding at the site or are simply transient.

Swamp nettle and swamp buttercup are also threatened species, although much less so than Canterbury mudfish and Australasian bittern. These species occur in association with *Carex secta* dominated areas, but also in the fringes of willow forest in places.

The remaining species are not threatened, but are uncommon in either Canterbury, the Canterbury lowlands or Canterbury coastal dunes.

Trapping for Canterbury mudfish was carried out in May 2005, in association with staff from DOC, North Canterbury. Further discussions with Leanne O'Brien (formerly University of Canterbury) have assisted in habitat recognition for the species at Pegasus. It appears that there is a low density mudfish population throughout most of the Pegasus wetlands, and it is preyed on by eels in accessible places - eels were found in traps throughout the site. The only place with a high density of mudfish is along the margin of the willow forest at the south end of the site, adjacent to Te Tuhaitara Trust land. This area appears to be deeper water and isolated from the main eel population. However, the fish do not appear to be growing well, suggesting that this is marginal habitat for them.

Reasons for low mudfish population numbers appear to include:

Lack of preferred habitat (clear, flowing open water with some marginal cover);

Predation by eels

Poor water quality

Trapping also took place at sites on Trust land that had previously been surveyed by NIWA (Anderson Lloyd & Boffa Miskell 1997). No mudfish were found in these.

2.8 Terrestrial ecology

The terrestrial habitats of the Pegasus site are dominated by two highly modified vegetation types: pine forest and dune tops. (See **Appendix C**)

Pine forest

The entire western part of the site has been used for pine forestry and until recently (spring 2005) was covered by Radiata pine of a range of ages. Beneath this was dense broom (*Cytisus scoparius**), gorse (*Ulex europaeus**) and blackberry (*Rubus fruticosus**). In spring 2005 progressive clearance of trees started from the south end of the pine forest.

Within and around the edges of the pine forest are tracks, huts and working areas from previous logging and farming periods. These are often associated with areas of pastoral grasses and weeds.

The western dune ridge (in which Hohoupounamu lies) is not being touched by the clearance and remains covered by pines and scrub weeds. The ridge will become the Western Ridge Conservation Area and be managed in consultation with Te Runanga o Tuahuriri.

Two stands of pine remain in what will become the Eastern Conservation Management Area, along the dune ridge identified on plans as the “Peninsula” on the eastern side of the site. These have been used for stock grazing and shelter, and have little ground cover.

California quail and a range of other introduced birds use the pine forests for shelter, nesting and feeding. Fantails were the most common native birds seen regularly there.

Dune tops

The central part of the site comprises secondary dunes with uneven topography. Marram grass (*Ammophila arenaria**) dominates the higher, drier areas, with occasional gorse bushes. Along the main eastern dune ridge there are scattered plants of matagouri (*Discaria toumatou*) and bracken (*Pteridium esculentum*).

In the extensive dune hollows throughout these dunes as well as the damper slopes adjacent to the wetlands, *Carex coriacea* is dominant. This common sedge is tolerant of grazing, which has occurred throughout the site. Near the main eastern dune ridge a few dune hollows support the uncommon four square rush (*Lepidosperma australe*) which is less tolerant of heavy grazing. In 1997 another uncommon herb (*Nertera setulosa*) was found with the four square, but this has not been relocated during recent surveys.

A similar dune top and hollows vegetation occurs on the “Peninsula” where the coastal rush *Juncus edgariae* is found

Although a lizard survey has not been undertaken, local records suggest that common skinks would be found in the dunes.

Important species

The terrestrial vegetation of the Pegasus site currently supports a number of important species, including:

Matagouri - *Discaria toumatou*. This is a common high country shrub in the South Island. It is representative of former shrubland communities on the older dune soils and in 1997 was considered as not occurring between Banks Peninsula and Amberley Beach (Anderson Lloyd & Boffa Miskell 1997).

Four square rush - *Lepidosperma australe*. This is the only known site for the species on the Canterbury Plains although it is common in the high country.

Nertera setulosa. This is uncommon in lowland Canterbury.

Summary of ecological processes and values

The Pegasus site has a long history of modification which continues today.

Except for a few isolated examples, the wetlands now support none of the native plant species that would probably have dominated the area prior to human arrival and the process of grazing, weed invasion and spread (especially willows) and lowering of water table are likely to continue in the absence of active conservation management. Grazing of grey willows seedlings does limit their spread onto drier areas but on balance probably has a greater adverse effect on valued species.

Since the initial vegetation surveys in 1997, at least one native plant species (*Nertera setulosa*) appears to have disappeared from the site.

Groundwater abstraction and land use over the recharge zone upstream influence the water quality in these wetlands. Continued grazing, especially by cattle would continue to degrade waterways, by adding to the nutrient load in the water as well as accelerate bank erosion and siltation.

2.9 Cultural values

A Cultural Impact Assessment (CIA) has been prepared and is attached as **Appendix H**.

This has been prepared through a review of existing information, and additional communications with members and representatives of Te Ngāi Tūahuriri Rūnanga, Te Rūnanga o Ngāi Tahu, and Te Kōhaka O Tūhaitara Trust.

The CIA describes the significance of the historic and close relationship between the iwi, the runanga and the Pegasus site and its surroundings, including with the Taranaki Stream, Taerutu Lagoon (adjacent to Kaiapoi Pā) and Tutaepatu Lagoon.

Water is of great significance within the rohe of Ngāi Tahu, being recognized as a taonga, an holistic resource, and a commodity which has many stakeholders, yet plays a unique role in the tradition of Ngāi Tahu. The local management of water is seen as an important requirement, recognizing those organizations that have a personal stake in its overall health and condition.

2.10 Archaeological values

The Archaeological values on the site are set out in detail in **Appendix J** which was prepared in support of a Section 12 Authority Application under the Historic Places Act (HPA) in July 2005. That application covered both the Pegasus Town site and the proposed Mapleham development. The application was approved in October 2005 and investigations and

observations have been made on the site during the clearance of pine forest from the western part of the Pegasus site.

The area to be developed is immediately south of Kaiapoi Pa (NZAA Site File M35/7) and the Kaiapoi locality is a highly significant place in Maori oral tradition. The whole area of Mapleham and Pegasus has revealed artefacts, ovens, middens containing shells and the remains of greenstone workings through active searches and accidental finds during farm work (Jonathan Scott, pers comm.).

Of particular significance is the large dune ridge which separates the Pegasus site from Mapleham. On this is located Hohoupounamu, the site of a large greenstone factory.

The key points of the history and tradition of the area can be summarised very briefly from the HPA Report to include:

Kaiapoi Pa was reputed as initially a Waitaha stronghold. On genealogical grounds the Waitaha have been projected to have emerged by roughly the 15th century. Hohoupounamu dates interpreted by Challis describe a first occupation probably in the seventeenth or early sixteenth century.

By about 1700 the Ngai Tahu led by Moki were dominant in North Canterbury from the Hurunui River to Lake Ellesmere.

Kaiapoi became a central collection point for food supplies from the forests of Kaikoura to the north, the coasts of the south and the plains and mountain ranges of the west

Underlying the importance of Kaiapoi as a Ngai Tahu political base was the manufacture of greenstone artefacts for distribution, presumably including trade to the North Island.

Turakautahi had to send a party over to the West Coast to learn greenstone working. This led to a series of conflicts and Moki took control of the greenstone source associated with the Arahura River. This was a type of dark green nephrite and was the best for tools, so that "Kaiapoi then became the greatest pounamu trading centre in the land"

Kaiapoi in the 1700s was thus established as the dominant greenstone manufacturing community with food being brought in from throughout the South Island to sustain the workers. This was under the protection of a very large and well-fortified pa which would discourage any other entrepreneurs from capturing it.

This status by the Ngai Tahu at Kaiapoi would have been enjoyed until 1791 when a large English sailing ship appeared at Akaroa and made iron axes and spike nails available (Evison 1997:32).

By the start of the 1800s the value of greenstone as a tool material must have been low, although it maintained its currency as an ornamental and specialised weapon material, and would have had currency for trade with Europeans. The impact of the loss of the tool market may have undermined the social position of the holders of Kaiapoi and their status among other Ngai Tahu especially.

The Historic Places Act Application Report identifies a number of areas within the Pegasus site according to the soil types, values and mitigation needed there. In summary these are:

Sand dune pine plantation: Zone A

- A1 Main plantation area - largest area of planted pines, and extensively disturbed during their planting. The known archaeology of this area consists of midden only with shellfish remains. This area is being observed further during current clearing activities.
- A2 Southern old growth area - older pines with evidence of middens; similar to area A1 although less disturbed during planting.
- A3 Western ridge - contains the outstanding greenstone-working area Hohoupounamu (which was partially excavated by Canterbury Museum) and is most susceptible to damage by tree roots or their removal.

Eastern Pasture Mitigation Zone C

- C1 Lake area - sand dunes area in which oven and midden sites may be located.
- C2 Central and eastern high ground - sand plain with few known sites
- C3 Eastern conservation area - wetlands with ovens recorded on higher ground. Would have been important for resource gathering in the past.

In summary, the archaeological values of the Pegasus Town site are concentrated around the western dunes and especially Hohoupounamu. However, the whole area has a long history of occupation and use, so that sites of daily use are scattered throughout. There have been occasional surveys, particularly related to the proposed development of Pegasus, and site investigations and observations continue.

Chapter 3 – Project description

3.1 Overview of Pegasus town

3.1.1 General Description of town

The proposed Pegasus town development comprises a new town of some 1700 residential allotments and a commercial/business area. The town will also feature a 14 hectare lake, a school, parks and reserves and three conservation management areas.

The Pegasus town proposal is also linked to the adjacent Mapleham development, providing golf course recreational facilities and additional housing as well as being the location of the entrance and access road to Pegasus town from State Highway One.

3.1.2 General Description of town development

The Waimakariri District Plan provides for staging of development works on the site, particularly in relation to staging of enhancement works, anticipating a staged development of Pegasus Town over a long period of time. However, Pegasus Town Ltd. proposes to carry out all stages in a relatively short period in line with a quicker development of the Town. All the works prescribed in the District Plan are anticipated to be carried out earlier than anticipated by the Plan, which has many advantages.

3.1.3 Principles for development

The development has been guided by the principles set out in Policy 18.1.1.10 of the Waimakariri District Plan, which sets the zoning for the site and the intentions for the development of the area. These principles are either observed in master planning or through compliance with rules. Some of the key principles as they relate to this application include:

- The subdivision and development of Pegasus Bay town shall reflect and enhance the land's natural characteristics and topography, natural vegetation, cultural heritage values, rural setting, and views (both to and from the site).
- The design, layout and development of Pegasus Bay town shall be sensitive to the site's topography, particularly the pattern of dunes and interdune hollows.
- The design, layout and development of Pegasus Bay town shall provide and enhance the visual and ecological connections between the wetland areas and the open space areas adjoining and within the residential areas.
- Protection of the significant heritage values of the town, particularly along the western boundary of the site, through the setting aside of a buffer strip of open space along this boundary of the town.

3.2 Layout and Design

The layout and design of Pegasus town is based around the concept of “Live, Work, Play”, aiming to cater for all needs of residents. The town areas are described below and can be seen in the Master Plan attached as Appendix D.

3.2.1 Residential Allotments

The development of the town is based around the three zonings within the District Plan – Residential 6, Residential 6A and Business. The Residential 6 zoned areas are a moderate density (averaging some 684m²), providing for single dwellings on each site. There will be some 1073 Residential 6 allotments and around 604 Residential 6A allotments.

The Residential 6A zoned areas are a higher density (averaging some 237m²), providing for terrace housing, apartments, town houses and multiple units. The density of development is concentrated towards the centre of the town containing the business zone. Within the Residential 6A area is proposed to be a retirement village providing a complex for elderly persons in surroundings with high levels of amenity.

The dwellings are encouraged to be two storeys with small setbacks from the roads, to provide a sense of enclosure to the streets and to encourage passive surveillance and a good community relationship. A consistency of lot sizes in each neighbourhood will strengthen the visual character. Where there are reserves, lot layout has been designed to maximise reserve and lake frontages.

3.2.2 Business and town centre

The business zone allows for mixed uses providing a town centre that is focussed around the lake lagoons and plaza area. This business zone provides for a range of facilities and activities including residential, retail, commercial, services, food services and other related activities.

Within the town centre will be all the necessary facilities to support the residents of the town including a supermarket, retail shops, restaurants, etc. There will also be additional facilities to attract visitors to the town including a hotel.

3.2.3 Lake

The lake is around 14 hectares in area and has two outlets to the ECMA, an island with bridges to each shore and two lagoons adjacent to the town centre.

The lake area is seen as a recreational space providing for non-motorised boating (yachts, kayaks, dinghies, windsurfers). The edges of the lake will be

reserves with areas of sloping grass extending down to a low rock retaining wall to provide edge control. There will also be some hard edges in the town centre, areas of wetlands on some stretches and some sandy beach areas.

The lake is an integral part of the overall stormwater system for the town (see section 3.3.3 below) and will be managed to ensure a high water quality.

3.2.4 Conservation Management Areas

The overall site contains three key conservation management areas:

- The Eastern Conservation Management Area which is the largest area and is located along the whole of the eastern boundary of the site. This area provides significant areas of waterways and wetland restoration and will provide major pedestrian and cycle links. The area is connected to the lake to the west.
- The Mudfish Conservation Area is located on the western side of the town and was identified as a sanctuary for mudfish from the drain systems to the east of the town area.
- The Western Ridge Conservation Area is located down the western boundary of the site and is intended to be land set aside for the protection of cultural and archaeological values and thus no earthworks are proposed within this area.

3.2.5 Reserves and open spaces

The key reserves and open spaces include the ECMA, MCA, WRCA, lake and its edge, the plaza, the school and the neighbourhood parks.

The neighbourhood parks are scattered throughout the development ensuring that they are in close proximity to all residential areas. The spread of parks is such that residents will not have more than a 5 minute walk to access a neighbourhood park. The neighbourhood parks will also be planted at the edges and will provide a variety of facilities.

The school grounds also provide a large (around 2 hectares) area of open space on the western side of the site. This space will include large areas of playing fields and areas of tree planting.

The reserves and open spaces are also an integral part of the stormwater system (see section 3.3.3 below), providing space for both treatment and storage of overflow stormwater.

Immediately adjacent to the site, to the south, is the Gladstone Park area.

3.2.6 Landscape design

The overall landscape design for the town is to be a new town with its roots in North Canterbury. To achieve this, it is proposed to use materials and landscaping to reflect the local environment where possible. This will include the use of limestone and blue stone paving to reflect local rock types and the street trees have been chosen to represent the North Canterbury area.

Parking areas and footpaths will be paved in different materials. Features such as streetlights, signage, tree guards and grates will continue the design theme and be specific to the site.

3.3 Infrastructure, Utilities and Facilities

3.3.1 Roading and access

The general roading layout for Pegasus is shown in the Master Plan (**Appendix D**).

The main access road provides a link through Mapleham to State Highway One. There will also be minor roading connections to Preeces Road to the north and Gladstone Road to the south.

The roading hierarchy is based on that provided in the District Plan and seeks to provide an easy graduation in the hierarchy from the main roads to the local streets and lanes. In general the roading layout is designed to slow vehicle speeds in neighbourhoods for safety and to reduce car dependence, while continuing to provide key streets for vehicle circulation.

Emphasis is also placed on the provision for pedestrian and cycling access with cycleways on all major roads and footpaths and walkways for pedestrians linking to the ECMA, MCA, WRCA and to the beach and coastal walkway. Within the ECMA it is also anticipated that there will be horse trails and kayaking. Non-motorised boats will be used on the lake.

Roadside drainage will be through swales and the treatment of stormwater run-off from roading as described fully in section 3.3.3 below, and in **Appendix F**.

3.3.2 Water supply and Sewerage

Water supply and sewerage options are currently being progressed and details of these (along with any necessary regional consents) will be provided as part of later subdivision consents.

3.3.3 Stormwater

Introduction

The stormwater system is described in detail in the Hydrology report attached as **Appendix F**, and should be referred to particularly for the appropriate detail and figures.

The stormwater system has been designed to have a high quality Lake, develop an ecologically viable ECMA wetland, protect the downstream receiving environment as a source of mahinga kai, and maintain groundwater levels in the area as much as practicable. The approach used for managing stormwater from Pegasus Town, is to:

Manage up to the 100-year storm and consider the implications of larger events.

10-year runoff discharged to ground for Roads and Residences.

Roads use planted swales to achieve full the level of treatment prior to discharge to ground, and treat the 'first flush' of stormwater with the highest potential load of contaminants.

Further quality enhancement is achieved for residential and road runoff as water moves through the ground, the Lake and/or the ECMA, and the ECMA wetland prior to discharge off-site.

Town Centre runoff is collected and treated using sand filters to achieve the full level of treatment before discharge to the Lake. Flows then are dispersed via a rock filter into a wetland entry area before discharging into the Lake.

Secondary flow is directed along roads, into the Lake or ECMA via small wetland pre-treatment areas.

The developed site will be discharging stormwater runoff from business areas, residential areas and residential roads to ground and to shallow groundwater, some of which will reach the Lake or ECMA. There will also be a discharge to surface water at the boundary of the site through the wetland and interdune drains.

Residential Road and Carpark Runoff

The main components of the stormwater management system for residential road and carpark runoff are:

Swales – used for collection and treatment of stormwater.

Coarse grit traps – used to take overflow from swales after the first flush of runoff.

Gravel soakage – used to store and infiltrate runoff for up to and including the 10-year event.

The swales will generally provide pre-treatment and capture coarse sediments. The shaping of the swale, however, will encourage the flows to pond in specific areas, which will then be planted appropriately to withstand more frequent and longer duration inundation. The runoff will then filter through the base of the swale, in a similar manner to an infiltration device such as a rain garden. The swale and the infiltration immediately beneath the swale will provide treatment to a level commonly accepted by Local Authorities, including WDC.

For runoff above the first flush volume, water will spill into the grit traps and then move directly to the gravel soakage. Grit traps will use an inverted siphon to avoid coarse sediments and litter from entering the gravel soakage.

The gravel soakage will then be used to store the volume of runoff associated with shorter duration, high intensity rainfall events that have a greater intensity than can be infiltrated. Water will soak out through the base of the soakage area and into the surrounding ground and shallow groundwater. The gravel soakage will be wrapped in geotextile to protect it from blockages from the surrounding sands. Once in the ground, water will flow towards the Lake. Modelling has indicated that this will take in the order of weeks and water will reach the lake via groundwater well after the critical storm duration, and over a similar time to that which currently occurs.

In higher flows, however, the longitudinal gradient over the entire length of the swale will still allow water to move along the swale and out into the road in events above the 10-year. Refer to Figure 8 in the Hydrology report attached as **Appendix F**.

Soakage has been designed using an infiltration rate of 10mm/hr and assuming that only the footprint of the swale is available for soakage underneath to avoid placing soakage underneath hardstand that will be difficult to access and maintain in future. The differing width available for soakage and contributing road widths result in different soakage depths required. Neighbourhood roads have the narrowest swales and therefore the soakage width is smallest and soakage depth is greatest. The soakage volume is based upon 30% porosity for the gravel beds and provides sufficient volume to store the critical duration storm for the 10-year event.

Lanes will not have any soakage beneath or alongside them and runoff from them will be directed into the roadside swales. This will result in a higher depth of soakage for those roads receiving lane runoff. In Residential 6A roads, however, as these roads are already constrained in width, the depth of soakage required becomes too deep to be practically constructed. In these areas, lane runoff will be piped to nearby small reserve areas. These reserve areas will be used for lane soakage only.

The primary one-way street system has a wide reserve area that runs through the middle of it and for this particular road-type, there are two options to deal with runoff:

Allow all runoff to pass through the base of the swale and into gravel soakage immediately beneath the swale (as for other road types).

Provide the swale as the primary soakage but allow flows above that to spill over into the reserve area and soak away naturally (no gravel soakage provided).

It is likely that the one-way street runoff will be allowed to drain away naturally (i.e. no gravel soakage within the reserve). The reserve will be used as an overland flowpath for events above the 10-year so runoff will drain naturally to the reserve.

Residential Property Runoff

The main components of the stormwater management system for residential runoff are:

Coarse grit traps – used to provide pre-treatment to protect the soakage and groundwater.

Gravel soakage – used to capture and infiltrate runoff for up to and including the 10-year event.

The use of gravel soakage for stormwater management is to allow for stormwater to be infiltrated into the shallow groundwater system. This will result in a more even discharge of stormwater to ground across the Pegasus site.

The coarse grit trap will be used to collect larger sized particles before the stormwater discharges into the gravel soakage. An inverted siphon on the grit trap will be used to ensure that coarse sediments and litter do not enter the gravel soakage. The gravel soakage will be wrapped in geotextile to minimise the risk of blockage.

The soakage for the residential properties has been calculated using the same approach as for the road soakage. The soakage areas and volumes required are set out in Table 5.2 of the Hydrology report attached as **Appendix F**.

Town Centre

The Town Centre has the highest potential for contaminant generation, and has a high level of imperviousness. In addition, as the Town Centre is located near the Lake, it would be difficult to drain water away from the site to soakage. To provide maximum opportunity for treatment, therefore, runoff from the Town Centre will be collected in a conventional piped system using catch-pits to collect coarse sediment and litter, and then passing flow through

sand filters. Refer to the Figures included in the Hydrology report attached as **Appendix F**.

For a total Town Centre catchment area of 114,280m², a total sand filter area of 1,640m² would be required to provide treatment. In practice, a number of smaller sand filters could be used to treat smaller portions of the catchment rather than one large device to treat the entire catchment. The exact location and size of the filters will be addressed during detailed design.

Secondary Flow and Management of Flood Risk

The secondary overland flowpaths for the catchment are shown in the Hydrology report attached as **Appendix F** and the details will be refined during detailed earthworks design. The general approach will remain the same, however, with flows being directed along roads to small pre-treatment wetland areas prior to discharge into the Lake or ECMA. Properties will be elevated above roads and roads will convey surface flows away in larger events.

Flood risk within Pegasus Town is achieved through controls on building platform levels as well as ensuring that shaping of roads provides controlled secondary flowpaths for events above the main discharge system capacity.

Lake and ECMA

The operation of the Lake will need to have a degree of flexibility to allow Lake levels and flows from the Lake to be varied as necessary. Based on the outcomes from the groundwater modelling and the flood attenuation modelling, the lake level would be expected to vary within a 250mm range with local flows, and but would increase up to 3.68mRL in a 100-year event when the Lake is receiving water from an Ashley breach scenario.

Stop-log control structures or a simple hand-operated overflow gate would be used to provide the opportunity to fine-tune the Lake levels, once the Lake is in operation.

The Lake edges will be susceptible to some erosion due to wave and wind action on the substrate. Stabilisation measures will be required to minimise the impact on Lake sediment loadings and could be achieved through a combination of planting, benching and hard edges around the lake.

Nutrient levels within the groundwater mean that there is a risk of high algal growth in the lake. As the level of nutrients in the groundwater cannot easily be limited, other options to control algal growth include minimising light penetration, minimising temperature increases, maximising the circulation and turnover of the water, maximising opportunities for aeration, and removing excessive plant and algae growth.

Management of Lake margins will be necessary for aesthetic as well as water quality reasons. Access to the Lake edges will need to be provided to allow

for maintenance access and removal of any accumulated debris and litter that may have been blown onto the site.

Wetland entry areas will be required for the outlets of all sand filters as well as at points where overland flows discharge into either the Lake or ECMA.

It is currently proposed to provide fish passage from the interdune area into the ECMA. Provision for small fish only (ie inanga) is desired for the flow control systems between the ECMA and the Lake. See the Hydrology report attached as **Appendix F** for more details.

3.4 Ownership and management

Pegasus Town Ltd will develop and manage Pegasus Town for up to 5 years following completion of development.

Infinity Investment Group (of which PTL is a part) has a history of developments in Wanaka where it has retained ownership of the infrastructure until initial “teething problems” have been sorted out and the site is established. This will be especially important at Pegasus Town, where innovative ideas for wetlands and lakes management are being pursued and where very high levels of water treatment are expected.

The long term management of the stormwater management system will involve some controls on source materials (for example on roofing materials) and regular maintenance and monitoring in order to maintain water quality.

The company is currently in discussion with Waimakariri District Council about arrangements for the long-term management of infrastructure systems. The District Plan provides for the eventual vesting of the lake and reserves in the Waimakariri District Council.

The Eastern Conservation Management Area will be managed by Pegasus Town Ltd throughout its early establishment phases. The ECMA Management Plan (**Appendix I**) sets out short term actions, as well as principles and guidelines which can guide the longer term work on the site. Although it is not a statutory Management Plan (as would be prepared under the Reserves Act 1977) it is envisaged that the Management Plan may be reviewed from time to time to take into account:

- Significant changes in the ECMA environment;
- Changes in planting or habitat enhancement proposals as the design is developed by Pegasus Town Ltd;
- Results of detailed site investigations carried out as part of enhancement;
- Results from monitoring activities;
- Outcomes of management which are not in keeping with expectations;
- Changes in management practice;

- Changes in ownership or responsibility for the Eastern Conservation Management Area;
- Changes in design for recreation or access in the ECMA;
- Growing involvement of the residents of Pegasus in the management of the ECMA.

It is also expected that community involvement in management of the Eastern Conservation Management Area (including that of the runanga) will grow as the population of the township grows. As this develops it is likely that the community will wish to have a role in review of this Plan.

Chapter 4 Construction

4.1 Overview of construction and development of township

4.1.1 General

Details of the construction process, for both earthworks and the stormwater management system are contained in the Construction Management Report, which forms **Appendix G** to this AEE. This includes a detailed staging plan and preliminary construction programme.

The earthworks for which consent is being sought will involve:

- Site clearance and stripping of topsoil
- Lake construction
- Vegetation clearance and shaping waterways in the Eastern Conservation Management Area
- Formation of a beach access road
- Cut to fill for residential areas
- Topsoil re-spreading
- Shaping required for stormwater management system

4.1.2 Staging

The Waimakariri District Plan provides for staging of development works on the site, particularly in relation to staging of enhancement works, anticipating a staged development of Pegasus Town over a long period of time. However, Pegasus Town Ltd. proposes to carry out all stages in a relatively short period and therefore intends to progress earthworks across the whole site quickly. This will minimise disturbance to new homeowners who occupy the early stages, and the community in general. The earthworks will be undertaken more or less continuously until finished, starting at the south end and working north.

Stage 1 involves construction of the main access road from SH1 and the sections in the southwest corner of Pegasus. Subsequent stages will then proceed progressively east and north. Development will be constructed in a number of discrete stages of between 60 – 130 sections, to allow sections to be released for sale progressively.

4.2 Site works

Site clearance will proceed ahead of earthworks. This involves removal of trees, fences and other features that are not to be retained, generally using excavators and trucks.

The western half of the site (west of the proposed lake) is currently in pine plantation of variable quality and maturity. Beneath the pine trees, gorse, broom and other scrub cover the site.

Removal of the pine plantation began in October 2005. This work is being carried out by specialist forestry contractors. The scrub beneath the trees is being carefully removed using root rakes. The trees will then be felled and milled for timber or firewood, and minor branches will be burned or mulched. All work is being carried out in accordance with a NZ Historic Places Trust Authority and under supervision of an archaeologist and Tuahuriri Runanga representatives. This work will be completed before construction of Pegasus proceeds.

The dry parts of the eastern half of the site are generally covered in exotic grasses and sedges, predominantly marram and pastoral species. This vegetation will generally be stripped with the topsoil when earthworks begins.

Within the eastern area of the site there are also areas of open water and wetland now overgrown with willow and other (mainly exotic) species. These areas are to be cleared and planted as part of habitat restoration.

There are a number of pockets of significant vegetation that will be fenced for protection. These are more fully described in The Eastern Conservation Management Area – Management Plan (**Appendix I**).

Cleared vegetation will either be milled for timber, disposed as firewood, recycled as mulch material to be used on site, burned or disposed of away from the site. Should the Contractor wish to burn some of the cleared vegetation, they will be required to arrange any necessary resource consents and permits from the relevant authorities, which would only be issued if appropriate controls were put in place.

Following clearance surface vegetation and topsoil will then be stripped from the works area and moved to a stockpile or its final position, to expose the sand beneath. This usually involves plant such as motor scrapers or bulldozer and scoop, although in confined areas excavators might be used.

On the western half of Pegasus (the area currently covered in pine plantation), no topsoil is present, while approximately 200 mm of topsoil covers the eastern half of the site.

Away from the lake and ECMA, the remainder of the site needs to be generally re-contoured to allow construction of roads and building platforms. This will generally involve relatively shallow cuts and fills, most likely carried out using motorscraper or bulldozer and scoop.

Following earthworks completion in any one area, topsoil will then be respread on building platforms, again with motor scraper or bulldozer.

As soon as possible on completion, each area will be revegetated, generally in grass, although extensive other planting is proposed in the Eastern Conservation Management Area, as described in the ECMA Management Plan (**Appendix I**).

The contractor will be required to complete areas of earthworks in a staged manner and each area will be re-vegetated as soon as practicable. This will stabilise areas of the site and reduce the area “open” at any one time. The majority of the site will be planted in grass, although extensive planting of appropriate species is to be carried out in places including native species in the ECMA.

4.3 ECMA

Construction of the ECMA will be carried out in accordance with the ECMA Management Plan. Generally the key construction and site development tasks that are addressed by the Management Plan are the construction of new waterways and ponds, in particular:

- installation of silt traps for protection of waterways during construction;
- trapping of any fish to be removed off-site for protection during construction;
- construction of new, meandering waterways;
- control of existing drains to the north;
- construction of new ponds (avoiding significant vegetation);
- installation of variable weirs at outlets of lakes (ensuring fish passage);
- planting of all riparian edges;
- controlling weeds in and around all newly constructed areas.

This work involves clearance of existing vegetation (where required) and following clearing, the wetlands will be created by shallow “scraping” to enlarge and enhance the existing wet areas. A deeper channel will also be formed. Given the wet and more sensitive nature of this area, this work will most likely be carried out using long reach excavators to carefully “peel” back the soil before loading into trucks or motorscrapers.

The order of works required to form the ECMA are:

1. Transplant selected vegetation and transfer animals (if needed)
2. Fence vegetation and habitats that cannot be moved
3. Install sediment control devices
4. Remove willows
5. Dig and shape main channels and waterways
6. Plant; construct pathways/boardwalks

More detail on the work proposed for the ECMA can be found in the ECMA Management Plan attached to this application as **Appendix I**.

4.4 Western Ridge Conservation Area

No earthworks are proposed to be undertaken within the area identified as the Western Ridge Conservation Area as part of this application.

4.5 Lake

The development includes a lake with a water surface area of approximately 14 ha. This lake will be constructed by excavating below the existing water table, to allow inflow from groundwater for fill and recharge.

Subject to further engineering design, it is envisaged that the lake will have gently sloping edges down to a water depth of 3.5 m. The treatment of the lake edges will vary around its perimeter, from low retaining, higher retaining (near town centre), beaches and planted wetland. The edge treatment is subject to engineering design and subsequent WDC approval.

Excavating the lake is likely to involve motorscrapers or bulldozer to scoop above the water table, and excavators and trucks for excavation below the water table. Depending on the rate of groundwater flow into the excavations, a dredge may be required to complete the excavations below water table. A small (500 m²) trial lake was excavated in early October 2005 and this indicated that much of the excavation of the main lake may be feasible using only excavators.

Sand from excavation of the lake will generally be placed as compacted fill to the north and east of the lake to raise these areas above flood levels.

If dredging is required, dredge material will be pumped to containment bunds for drying, before being placed as compacted fill.

4.6 Construction of Infrastructure

Other construction such as drainage, roads and services installation would generally begin during earthworks. Again these operations would follow the staging plan contained in **Appendix B** to the Construction Management Report.

4.7 Beach access road

The proposed beach access road extends from Pegasus, east across the Tuhaitara Trust land to the coast. The road traverses wet ground and it is likely that soft organic material will first need to be removed to stockpile, before a low fill platform is placed for the road. Culverts will be installed under the road in appropriate locations.

4.8 Hazardous substances

Bulk fuel storage will be limited to one location, not within 50 m of a watercourse, external site boundary or the Conservation Management Areas. The fuel storage area will be banded to prevent and spillage contamination. All dispensing units shall have drip trays and drip containers in place at all

times. Sealed waste bins will be provided for the collection of waste drums, oily rags, oil filters etc.

A spill management procedure shall be developed as part of the Contractor's Environment Management Plan.

The storage of small quantities of dangerous or hazardous substances shall be comply with the Dangerous Goods Regulations and any other relevant legislation. This includes obtaining the relevant licences.

Chapter 5 Assessment of Environmental Effects

5.1 Benefits of Pegasus township

The long-term benefits of the development of Pegasus Township, including the wetlands and dunelands enhancement, were addressed during the Plan Change process which established the Pegasus Town Zone in Waimakariri District Council's District Plan.

In relation to the earthworks and stormwater management system subject of these applications, the long-term benefits are:

The earthworks enable the development of the township (including the Conservation Management Areas)

The major earthworks will be undertaken in a comprehensive manner, minimising the time period over which disturbance occurs.

The stormwater management system is an integrated system, which will be constructed by the developer in a comprehensive way from site to point of discharge, so that the system is integrated and built and operated to high standards

The stormwater management system design, infrastructure, operation and management set standards above the norm for the area, and provide an example of best practice in a sensitive environment.

The enhancement work in the wetlands and waterways will provide for long-term indigenous biodiversity benefits to the coastal area and to the whole Region.

The management of the reserves, lake and infrastructure will remain with Pegasus Town Ltd in the short/medium term, and its long term management will be agreed with Waimakariri District Council.

5.2 Description of effects of activities

5.2.1 Introduction

Potential effects of the activities associated with the earthworks, stormwater system development, and conservation management area construction include:

topography – earthwork changes to the site

geology/seismicity

landscape changes due to earthworks and development

effects on groundwater quantity and quality

effects on surface water quantity and quality

effects on aquatic ecology and wetlands – including construction, operation and enhancement

effects on terrestrial ecology

effects on cultural and archaeological values

community issues and how these are addressed

cumulative effects

5.2.2 Topography

The earthworks and stormwater management system will affect the existing topography of those parts of the site on which development will be carried out. One of the purposes of the earthworks is to enable the proposed stormwater management system to work, including the shaping, and the horizontal and vertical alignment of swales.

Earthworks involve the general clearance of vegetation and topsoil stripping, followed by general recontouring to provide the basis for the layout of the township lots and infrastructure. These effects were recognised in the rezoning of the land, and are provided for in the policies and rules in the Waimakariri District Council District Plan.

The recontouring in this area includes cut (from the proposed lake area) to provide fill which will raise the lots and building platforms above the 1:500 year flood levels.

The beneficial effect of changing the topography in the residential areas is prevention of inundation of residences during extreme flood events. This is discussed in detail in the Hydrology Report (**Appendix F**).

The wetlands and dunes that will become part of the Eastern Conservation Management Area will be affected by earthworks in places where:

willows are removed;

minor recontouring is needed to accommodate planting, footpaths, boardwalks, lake outlets and the Beach Access Road, as provided for in the District Plan;

existing artificial drains are modified in accordance with the District Plan provisions to create meandering waterways and open water areas;

These are all beneficial changes to enable the enhancement of the wetlands and dunes systems.

The form of the main dune ridges running roughly north to south through the site (the Western dune ridge, the ridge along the western edge of the ECMA, and the “peninsula” ridge inside the ECMA) will not be affected by earthworks.

5.2.3 Geology/seismicity

Liquefaction has been identified as a potential adverse effect for the site. This issue is being investigated and modelling carried out to understand the potential for liquefaction and lateral spreading.

Recommendations for foundations for any new buildings and for treatment of materials adjacent to excavations will be made as part of detailed design work.

5.2.4 Landscape

The effects of the long-term change from rural to township on the Pegasus landscape were addressed through the Plan Change process and taken into consideration in the re-zoning for Pegasus Town. This also took into account the short term construction effects of earthworks and development of the stormwater management system.

5.2.5 Groundwater

Quantity

The runoff of stormwater and the management of this water, has the potential to alter the quantity of groundwater both within the site and in the surrounding area. This can impact on the ability of water to be taken and used, such as that needed to maintain water levels in the lake.

One of the objectives for the design of the stormwater management system was to ensure that stormwater runoff discharge to ground is distributed across the site to allow for even recharge of the shallow groundwater. This has been achieved through the proposed discharge of the 10-year runoff to ground and by provision of gravel-filled soakage trenches across the site.

Ground water modelling (see **Appendix F**) has been used to demonstrate that the impact on groundwater levels in the interdune area will be less than minor as there is capacity for infiltration, and to confirm that soakage is a practical option regardless of the high groundwater table currently within the area. The modelling shows that the design of the stormwater system uses a conservative infiltration rate and that groundwater levels will be at least 1.35 metres below building platforms for residential developments. Therefore, it is expected that the effects on the quantity of the groundwater receiving environment will be less than minor.

Quality

Groundwater quality has been considered within the Hydrology Report (see **Appendix F**). There is already a high level of contamination of groundwater (see section 2.6.1 of this report), and thus it is important that the activity on the site does not further contaminate groundwater. This is particularly important as the groundwater in the area is shallow and impacts on surface waterbodies such as the lake and wetlands.

Shallow groundwater quality will be protected through the use of treatment devices (planted swales and infiltration areas for potentially contaminated runoff from roads, and coarse grit-traps for residential properties prior to discharge), and by minimising contaminant discharge to the groundwater at source. Stormwater runoff from the development will be captured where possible and treated to WDC Code of Practice (i.e. ARC's TP10 requirements), at a minimum. The treated stormwater will enter the shallow groundwater system and will generally enter the Lake and ECMA.

Based on the high levels of runoff treatment and the monitoring and maintenance of the swales and infiltration devices (as proposed in the conditions, see section 8 of this report), the effects on the groundwater quality from the development, are expected to be less than minor.

5.2.6 Surface water

Quantity

The potential effects of earthworks and stormwater management at Pegasus on surface water hydrology are discussed in **Appendix F** (Hydrology Report). This particularly addresses the potential for impacts on surface water leading to flood risk.

The Lake provides sufficient storage to offset the loss in storage associated with filling in the interdune area, and the increased runoff volume from the town. The overall development earthworks (such as the creation of the ECMA) combined with formation of the Lake means that the Lake can provide sufficient attenuation to local flows while still providing additional flood storage capacity to the interdune area.

The combination of requiring the 10-year discharges to go to the ground and using the Lake and ECMA to buffer against peak flows will mitigate any potential effects associated with the development and increases in peak flows resulting from increased impervious areas.

By providing additional storage that is available to the interdune area, the risk of flooding to the interdune area will not be increased as a consequence of the Pegasus development. As such, there will be no increase in the risk of flooding to developments to the south (such as Waikuku Beach) or to the north (Pines Beach and Woodend Beach) of Pegasus town.

Based on the storage capacity of the Lake and the disposal of stormwater to ground, it is expected that any effects on the quantity of the surface water receiving environment will be less than minor.

Quality

The quality of the surface water is an essential aspect of the development of Pegasus town as this will influence the water within the lake and wetlands which are key features of the site. This issue is covered in detail in the Hydrology Report (see **Appendix F**). It is noted that there is a strong relationship between groundwater quality and surface water quality.

The level of treatment of stormwater proposed for Pegasus town is well in excess of industry standards and provides multiple barriers for surface flows from urban land. Grass swales designed in accordance with ARC's TP10 standard (as required by WDC Code of Practice) are proposed to treat the runoff from the residential road and carpark areas within the proposed Pegasus Town development. Literature states that the 'first flush' of

stormwater runoff has the highest contaminants loading, and therefore in accordance with WDC Code of Practice, the first 25mm of runoff is taken as the water quality volume. The grass swales have been designed to treat the first 25mm to ARC's TP10 standards, and the provision of soakage for up to the 10-year event means that a higher level of treatment will be provided as water moves through the ground towards the Lake and ECMA.

Residential property runoff is treated using coarse grit traps for pre-treatment and infiltration (through gravel filter) to ground to provide treatment.

Residential roads and carparks will be treated through swales (over gravel filter) and infiltration to ground.

Treatment of the Town Centre runoff will use catchpits, sand and rock filters that are sized in accordance with industry standards but will also include a pre-treatment wetland entry area to provide a higher level of treatment before flows discharge into the Lake.

For overland flows above the 10-year event, pre-treatment is provided in the form of wetland entry areas to the Lake and ECMA that will be used to slow and disperse flows. This will provide opportunities for any coarse sediment in surface flows to be settled prior to discharge into the Lake or ECMA. This exceeds the normal requirements in stormwater treatment systems.

The runoff from Pegasus Town will receive further treatment through the biological and chemical processes and aeration as the water travels through the Lake (where applicable) and ECMA (effectively all runoff from the town).

It is considered that the level of contaminants discharged into the receiving surface water environment will be generally better than the existing situation and where levels of contaminants could increase (such as metal loadings) these are likely to be well below the guideline values for the health of the receiving environment.

Based on the high levels of runoff treatment and the monitoring and maintenance of the swales and infiltration devices (as proposed in the conditions, see Section 8 of this report), the effects on the surface water quality of the site and area, are expected to be less than minor.

5.2.7 Aquatic ecology and wetlands

Introduction

The activities subject to this application that have potential effects on the aquatic ecological and wetland values on the site are:

Construction:

- Earthworks for layout and development of township and infrastructure
- Construction of the lake
- Enhancement of waterways and wetlands

Long-term/operational:

- Operation of stormwater management system
- Presence and uses of lake
- Presence and use of enhanced waterways (which also form part of stormwater management system)

The potential effects of these activities on aquatic habitats and species together with proposed mitigation (discussed below) are:

Construction:

- a. Silt and sediment entering existing waterways and wetlands, then moving into waterways and wetlands off-site
- b. Disturbance of animals
- c. Disturbance of vegetation

Operation of the stormwater management system:

- d. Effects of contaminants in stormwater on lake, wetlands and waterways

Lake

- e. Pests and/or weeds in the lake and connected wetlands and waterways

Enhancement of waterways and wetlands:

- f. Long-term increase in indigenous plants, animals in the area
- g. Long-term enhancement of ecological processes in coastal environment
- h. Encouragement and support for neighbours and wider community to carry out enhancement projects
- i. Improvement in amenity values of waterways and wetlands for residents and visitors

Construction effects

a. *Silt and sediment*

Silt and sediment entering the wetlands and artificial waterways downstream of the earthworks could have an adverse effect on aquatic and riparian plants and animals. If sedimentation levels were high, this effect could extend off site.

However, intensive mitigation is proposed (as described in detail in the Construction Management Report, attached as **Appendix G**). This involves:

Constructing a low bund along the entire boundary between the township part of the site and the Eastern Conservation Management Area prior to any earthworks starting. Run-off is not likely to occur, because of the pervious nature of the sandy soils. However, the bund will prevent run-off into the wetlands during extreme rainfall events.

Constructing sediment ponds inside the wetlands (at points selected in discussion with an ecologist) to contain silt disturbed by removal of willows, contouring for planting, or any other works within the wetlands. This is described in more detail in the ECMA Management Plan (attached as **Appendix I**).

Identifying setbacks from waterways and wetlands within which no temporary construction buildings (e.g. portable toilets), structures, hazardous materials (including fuels) or activities associated with these will occur.

Using the lake as a settling pond for earthworks in the township area during its construction, and not opening the connection between lake and wetlands until lake conditions have stabilised.

It is considered that the potential for runoff from the site is very low due to the prevailing climate, the site's gentle gradient, free draining soils, and the nature of the earthworks to be carried out. The effects of run-off from construction works will be managed by the various sediment control devices described above and it is expected that the effect of construction run off will be minimal. The Construction Management Plan (see **Appendix G**) covers the necessary methods for controlling sediment within runoff.

b. Disturbance to animals.

Invertebrates, frogs and fish in the wetlands and waterways are potentially adversely affected by the construction/earthworks in those areas carried out as part of the enhancement programme. This includes temporary loss of habitat and effects of silt release into the water. Details of the work proposed in the area are described in the ECMA Management Plan (**Appendix I**).

Steps proposed to mitigate these effects are:

- Sediment and silt control downstream of all in-stream working areas, as set out in the Construction Management Report;
- Site survey in advance of construction works to confirm key fish habitat areas;
- Trap and transfer of mudfish from the areas of willow removal in advance of works (in liaison with DOC);
- Ensuring that connections to undisturbed areas of suitable habitat remain during construction, so that fish can move into these areas.
- Carrying out works in the waterways and wetlands at times that avoid mudfish spawning times, as set out in the NRRP Chapter 7.

Pegasus Town Ltd believes that in the longer term these habitats will be enhanced and extended in area, so that the long-term benefits will outweigh the short term adverse effects of construction.

c. Disturbance to vegetation

As part of the wetlands enhancement proposed much of the existing vegetation will be removed from the Eastern Conservation Management Area wetlands area. As set out in the ECMA Management Plan (**Appendix I**) this focuses on the removal of willows but will inevitably involve removal of understorey and ground cover.

Steps to avoid damage of significant species or areas or vegetation and minimise damage to other vegetation will be:

- The location of significant species will be confirmed prior to earthworks, and these will be fenced or marked to be avoided or transferred as appropriate. This is expected to identify *Ranunculus macropus*, *Urtica linearifolia*, *Schoenus pauciflorus*, and *Baumea rubiginosa*.
- Plants will be transferred to the southern part of the ECMA (Sanctuary) or off-site as appropriate.
- Willow management methods will be tailored to the density of willows, existing values associated with different locations and the habitats with which it is proposed to replace them. That is, mechanical methods of willow removal will be only be used in areas of low existing value. In other places trees will be felled and thinned to avoid disturbing the understorey, with follow up poisoning and felling of regrowth.

Damage and loss of instream vegetation in the artificial drains cannot be avoided, but all species recorded in these habitats are common invaders of wet areas and will quickly return to the site after construction and enhancement work ends.

Operational effects

d. Effects of contaminants in stormwater on lake, wetlands and waterways

The presence of a township with its associated stormwater run-off has the potential to affect the waterways and wetlands in the area if untreated, or inadequately treated, stormwater enters the aquatic system.

The operation of the stormwater system, including the parameters set for its treatment to ensure high water quality, is described in detail in **Appendix F**. Essentially, the stormwater system has been designed to best practice standards to ensure levels of treatment that are well in excess of normal requirements.

The components of the system contributing to water quality aspects are

- 10-year runoff discharged to ground for Roads and Residences.
- Roads use planted swales to achieve the level of treatment required by WDC, and treat the 'first flush' of stormwater with the highest potential load of contaminants.
- Further treatment is achieved for residential and road runoff as water moves through the ground, the Lake, and/or the ECMA wetland.
- Secondary flow is directed along roads, into the Lake or ECMA via small wetland pre-treatment areas.
- Town Centre runoff is collected and treated using sand filters to achieve the level of treatment required by WDC. Flows then are dispersed via a rock filter into a wetland entry area before discharging into the Lake.

The Hydrology Report thus shows that:

Run-off from roads in the northern two thirds of the township will be treated to normal, accepted standards by the time it has passed to ground through swales. The gravel soakage area under the swales and the sand matrix in which it sits then provide further treatment. This deals with the first flush of contaminants.

Further run-off during larger rain events (after the first flush) will then pass into constructed wetland filter areas, the lake (which will have marginal wetlands), and rock/wetland filters at the lake outlets before entering the ECMA wetlands as surface flow. It will receive further treatment there before leaving the site through the enhanced drain/waterway system.

Run-off from residences in the northern two thirds of the township will be treated to normal, accepted standards by the time it has passed through a sediment trap to ground.

In the southern part of the township run-off from roads and residential areas has similar treatment, but does not pass through the lake stage.

In the town centre, where the swale system is not practical, runoff will be piped into a sand filter where it will be treated to accepted first flush standards. Further treatment will then occur as it passes through a rock filter, a constructed wetland entry point to the lake, rock/wetland outlets, and the ECMA wetlands before leaving the site.

Given this high level of treatment the effects of stormwater quality on the lake habitats, and the waterways and wetlands on the site and downstream are expected to be less than minor.

Lake

e. Pests and/or weeds in the lake and connected wetlands and waterways

Given the urban setting of the lake, waterways and wetlands, there is a high potential for unwanted plants and animals to occur.

Fish

There is a risk that a fish species that is considered a pest may occur in one of these areas. It is possible that some-one may deliberately introduce an unwanted fish (e.g. by emptying an aquarium there).

To minimise this risk, residents and visitors will be made aware of the amenity and ecological values of the lake, and the consequences of pest species. The presence of problem species should be detected during regular lake management and maintenance operations.

In addition, the lake outlets will be constructed in a way which restricts fish passage out of the lake into the wetlands.

Birds

The lake will attract birds, especially ducks and geese which could become problems if they occur in large numbers. Canada Geese have been pests at some lakes in Canterbury, particularly those associated with golf courses. However, part of the attraction of these areas is the large expanse of mown grassland there. This will not be present around the Pegasus lake. Reserve edges will be varied, including constructed edges in the town centre and parts of the western shore. There will be trees and wetlands, as well as intensively used recreational facilities and human activities. All these factors are likely to deter Canada Geese from settling in large numbers.

One of the purposes of the wetlands enhancement is to attract birds. Should any species become a problem, it will be dealt with in accordance with the Eastern Conservation Management Area Management Plan and any relevant legislation relating to management of wildlife.

Plants

Some plants can also become pests in waterways and wetlands and many can easily spread downstream. No plants which are on Environment Canterbury's register of pest plants will be used in public plantings anywhere on the Pegasus site. Residents will be made aware of this register, and the consequences of planting potential weed species. Only indigenous species of aquatic plants will be planted around the lake shore or in the lake, waterways or wetlands.

In the short term (during construction, planting and establishment of vegetation cover and until aquatic habitats have stabilised) there may be increased numbers of insect pests (e.g. mosquitoes, midges) in the area of the lakes, waterways and wetlands. These will not become "pests" until there are people living in the area. It is envisaged that as the indigenous vegetation establishes, and fish and birds recolonise the aquatic habitats, then predators of insect pests will also increase in numbers and a balanced system will develop. It will be possible to address the pest issue through monitoring and management responses.

Effects of enhancement of waterways and wetlands

- f. Long-term increase in indigenous plants, animals in the area
- g. Long-term enhancement of ecological processes in coastal environment
- h. Encouragement and support for neighbours and wider community to carry out enhancement projects
- i. Improvement in amenity values of waterways and wetlands for residents and visitors

The enhancement of the waterways and wetlands in the Eastern Conservation Management Area zone of the Pegasus site will take place in accordance with the provisions of the Waimakariri District Council District Plan and the Eastern Conservation Management Area Management Plan (**Appendix I**). It will be beneficial in a number of aspects.

Populations of indigenous plants and animals will increase in a part of the Region that has been seriously depleted of indigenous flora and fauna through a variety of land and water uses. It is anticipated that a range of

invertebrates and birds will be attracted to the site, adding to the biodiversity of the coastal area.

Through restoration of the network of ponds and waterways in this coastal wetland area, the ecological processes will be enhanced. That means that a variety of conditions will be created in which breeding, shelter, feeding and roosting habitats will be created for a variety of animals. There should be a more “natural” water circulation, and some of the adverse effects found at the moment (through grazing and drainage) will be removed.

Pegasus Town Ltd has consulted with Te Tuhaitara Trust about management of waterways and wetlands along their common boundary, including Tutaepatu Lagoon. The Trust has a long-term vision for enhancement of the lands and water for which it has responsibility and it is likely that the Pegasus development will provide an example of what can be achieved. Pegasus Town Ltd has actively supported the Trust, and is likely to provide similar support and encouragement to other neighbours undertaking similar enhancement work.

The wetlands and waterways enhancement is based on providing for not only natural and cultural values, but also associated recreation values (see **Appendix I**). The planting and habitat proposals are integrated with recreation proposals to provide for high human activity areas in robust habitats, and less or no human activity in more sensitive habitats. It is likely that through having an opportunity to live and recreate close to an attractive and thriving wetland, people’s understanding and empathy with nature conservation will increase.

5.2.8 Terrestrial ecology

The large part of the site on which residential development will take place has little indigenous vegetation. Up to 5 known plants of matagouri (*Discaria toumatou*) lie within the development area (that is, outside the Eastern Conservation Management Area). Like all the matagouri on the site, these are old, isolated plants. If present, seed from these plants will be collected prior to earthworks commencing and propagation attempted. Those near to the dune ridge will be transplanted into the ECMA dunes, and managed as part of the enhancement, but it is highly likely that loss of these plants cannot be avoided.

However, some of the dunes within the proposed ECMA do have some valued plant species - as well as matagouri, four square rush (*Lepidosperma australe*) and *Nertera setulosa* occur or have been recorded on the dune separating the township from the ECMA. Adverse effects on these plants have been avoided by the inclusion of the dune ridge in which they occur in the CMA. Their management is described in **Appendix I**. This includes gradual removal of marram grass and its replacement with appropriate dune grasses and shrubs. The individual plants in this area do not make up a natural plant community and do not appear to be reproducing or spreading. It is likely that in time they would all succumb to grazing and competition from weeds. The creation of an area in which the plants will be managed as part of a dune plant community recognises the historical vegetation values in the area and provides an opportunity for invertebrates associated with them to survive.

There are no significant species on the more easterly dunes in the ECMA so that any earthworks associated with enhancement activities will have only beneficial effects.

The birds using the dry areas are all highly mobile introduced species, tolerant of disturbance by humans (e.g. finches, quail). The effects on these species of earthworks will be minor, and most will be able to return to the area once the development of the township (with its gardens and reserves) is completed.

5.2.9 Cultural values

Consultation will continue throughout developing the design and construction stages, and then through operation of the town itself. This should ensure that cultural values are considered at all phases and adverse effects are avoided. For more detail see **Appendix H**.

5.2.10 Archaeological values

As discussed in Section 2 of this AEE (description of the existing environment), the Pegasus site has been classified into two main archaeological areas (each with three sub areas).

Processes to mitigate any effects on archaeological values have been built into the project and are described in more detail in the Archaeological Report attached to this application as **Appendix J**. Based on this report, the Historic Places Trust has considered archaeological issues and granted an Archaeological Authority for work to proceed on the site.

5.2.11 Community issues

The Consultation report (see **Appendix E**) sets out the key issues raised in consultation with the community, which include:

- Water quality
- Flood capacity of the system
- Treatment, monitoring and maintenance regime of the stormwater solution
- Protection and Enhancement of the mahinga kai resource
- Preservation of the cultural and ecological significance of the site.

The following aspects of the design have in part been formulated in response to issues that have been raised during the consultation process:

- The storm water solution has been specifically tailored to the site
- The storm water solution achieves the key principles and objectives of the Waimakariri District Plan
- The effects of a 1:100 year flood will be successfully managed within the site
- A high standard of storm water treatment (to accepted industry standards) is achieved

- The proposed storm water design allows the opportunity to improve water flows to the Tuhaitara Trust land.
- It was also identified that the proposed solution is an environmentally responsible solution, which on a wider scale seeks to preserve and enhance the ecological characteristics of the site.

Overall it is considered that the key issues raised by the community are addressed through the Masterplan and the design as it relates to the stormwater management system and the ongoing monitoring and mitigation measures.

5.2.12 Cumulative effects

Cumulative effects of earthworks and stormwater management lie in the areas of surface water quantity, surface water quality, and biodiversity enhancement. These effects could be cumulative upon:

- existing conditions,
- conditions that could occur when the proposed Mapleham development is under construction or in operation,
- environmental enhancement activities underway in the Waikuku Beach area

No other large scale subdivision or development works in the area are known of or have been taken into account.

Surface water quantity

Mapleham will have no adverse effects on the quantity of water in the Taranaki Stream or on flood conditions downstream (see Mitchell Partnerships and Boffa Miskell 2005³). All developed land lies outside the modelled flood path of the Ashley River, and all stormwater run-off will be stored and re-used on site other than in extreme events.

Similarly, Pegasus Township development will have no adverse effects on land or water downstream of the site. (Refer **Appendix F**). Flood modelling shows that excavation of the lake will compensate for filling to raise houses on the flood-prone parts of the site above 1 in 500 year flood levels. Stormwater run-off will be stored in the gravel soakage areas, lake and wetlands so that there will be no adverse effects on floodable areas downstream.

There are therefore no cumulative adverse effects on surface water quantity.

Surface water quality

Both Mapleham and Pegasus will include state-of-the-art stormwater management infrastructure and operational systems using swales, gravel soakage, sand and rock filters, and wetland polishing to improve on the base set by normal treatment systems. At Mapleham there will be no discharge to

³ Mitchell Partnerships and Boffa Miskell 2005. AEE accompanying applications for resource consents to Environment Canterbury, relating to Mapleham development.

surface water (i.e. the Taranaki Stream) except in extreme rainfall events; and that water will have passed through extensive treatment.

At Pegasus, water will finally be discharged from the site into artificial drains draining north to the Taranaki following intensive treatment.

There are therefore no cumulative adverse effects on surface water quality.

Biodiversity

There will be positive cumulative effects of the proposed riparian enhancement works at Mapleham, and wetland/waterways enhancement in Pegasus. In both places it is proposed to remove or control willows and replace them with indigenous vegetation.

Enhancement in the Pegasus ECMA will introduce to the coastal area one of the largest single wetlands dominated by indigenous vegetation north of Christchurch. This will bring birds into the area that already are increasing their use the less disturbed areas, such as the Waimakairi River mouth and Otukaikino wetland, which will be beneficial to Waikuku Beach wetlands and other restoration projects further north.

5.2.13 Summary

As described above, there are a range of potential effects from the proposed earthworks, stormwater system development and construction of the conservation management areas. Generally these effects are either positive or can be mitigated through design and operation. Monitoring is proposed to be undertaken and the proposed conditions of consent (see section 8) is intended to ensure all potential adverse effects are avoided, mitigated or remedied.

Chapter 6 Alternatives

6.1 Alternative Locations

Pegasus town has been through many years of planning and has been located by way of zoning provisions within the Waimakariri District Plan. These characteristics combine to form a compelling case for the development as proposed, and provide context to the decision not to pursue a similar development in an alternative location.

In terms of area and topography, the site lends itself to the development as proposed. There will be limited earthworks required to achieve the desired development. The development itself will have no significant adverse effects on the environment and will provide benefits in terms of the ecological enhancements associated with it.

6.2 Alternative Methods

In the areas of concern in these applications to Environment Canterbury the project will have no significant adverse effects, because of the high standards of design and operation that are proposed.

Early in the design phase, potential adverse effects of stormwater run-off were identified on:

- water quality and quantity in drains and streams surrounding the site
- consequential effects on cultural and ecological values

Potential positive effects of planting and restoration of indigenous plant communities were identified.

These factors became design criteria for managing the stormwater on site, leaving the site, and in the planting planning. Accordingly, only methods which provide the highest standards of stormwater control and treatment will be used, and adverse effects on the environment will be avoided. Riparian management and wetland restoration are integral parts of that system as well as having biodiversity aims in themselves.

Chapter 7 Consultation

7.1 Introduction

Full details of the consultation process, and the consultation that has taken place to date, are described in the Consultation Report and included as **Appendix E**.

Consultation was initially carried out to discuss the whole Pegasus Town proposal, once Infinity Investment Group had taken over the project. As the project progressed, consultation focused on the proposed Mapleham development in particular. A comprehensive database of all communications with stakeholders and potentially affected parties has been maintained, so that there is an accurate record of issues raised, and of the project team's response to them.

7.2 Summary from Consultation Report

The consultation process included:

- Public information through the local papers and letters
- A public open day
- Meetings with the appropriate consent authorities
- Meetings with iwi
- A mail out to interested parties
- Community and conservation group meetings

The following points encapsulate the central issues and outcomes raised during the course of the consultation process on the proposed stormwater solution and associated earthworks:

- General acceptance of the proposed stormwater solution. The generally positive feedback from the consultation gives the project team the indication that the proposal is a solution that as well as being technically and environmentally sound, is generally regarded as acceptable by the wider stakeholder community.
- Issues raised during the process were primarily concerns about the quality and location of the proposed discharges, the quantities involved and the impact that the development of the site would have on the existing capacity of the area to assimilate flood waters.
- Cultural concerns in terms of enhancing the mahinga kai resource, preserving base flows to the restored wetlands and not adversely impacting upon the quality of the receiving environment are apparent.
- Relationships throughout the community have been established and strengthened throughout this process. These lines of communication remain open, and the developer is committed to ongoing dialogue and discussion with interested parties.

Chapter 8 Mitigation and Monitoring

8.1 Introduction

This section Assessment of Effects on the Environment provides a summary of the mitigation measures that have been proposed in the appended Technical reports and Section 5 of the Assessment of Effects on the Environment, along with proposed conditions and monitoring methods. These measures have been incorporated into design of the Pegasus town development and its construction process and programme.

8.2 Mitigation Measures

8.2.1 Mitigation Measures - Construction

The Contractors will be required to manage the site to reduce the potential for sediment runoff by undertaking a number of standard industry practices. Initially the Contractors will prepare and implement an Environmental Management Plan which address:

- Location of stockpiles

- Use of sediment control devices:

 - Daily inspection and maintenance of the operating integrity and efficiency of the devices

 - Keeping a record of all inspections and items actioned.

 - Checking (and maintaining where necessary) sediment control devices during storm events.

 - Storage of all potentially hazardous substances will not occur within 50 m of a watercourse, external site boundary or the Conservation Management Areas

8.2.2 Stormwater Management, Water Quantity and Quality

To mitigate against potential on-site flooding, design criteria include:

 - A conservative infiltration rate of 10mm/hr to discharge flows to the ground for events up to the 10-year event has been used.

 - Groundwater levels are expected to be at least 1.35m below the building platforms for residential developments.

 - The development of the Pegasus Lake provides increased overall flood storage capacity in the interdune area when compared with the existing scenario.

Mitigation of potential water quality effects from stormwater has been built into the basic design of the stormwater management system and includes:

 - Grassed swales and pipes which collect stormwater and direct its flow;

 - A series of grit traps and gravel soakage areas which treat stormwater;

 - Vegetated strips and wetlands around the lake to treat stormwater;

 - Further stormwater treatment through the ECMA wetlands.

8.2.3 Waterway Ecology

The proposed stormwater and construction management measures, along with the ECMA Management Plan, are expected to ensure that there are no significant adverse effects on the physical environment of the surrounding waterways/waterbodies during construction, and through that mitigate potential adverse effects on the ecosystem long-term.

To mitigate the potential effects of construction earthworks run-off on the aquatic ecology of the adjacent waterbodies the following will be adopted:

Construction of sediment ponds and placement of silt control measures for waterways prior to earthworks commencing

Staging of vegetation clearance work and selective removal in some places

Ensure that all run-off from the construction area outside a 20 metre riparian margin is contained prior to discharge to the waterways

Ensure that the waterways are protected from direct run-off from the 20 metre riparian zone by undertaking construction and vegetation clearance work only in dry weather, and by placing sediment trapping devices (e.g. haybales, silt fences) along the waterway edges to provide a barrier.

Identifying and clearly marking any plants or areas that should not be subject to clearance or earthworks prior to earthworks starting. Some areas may need to be fenced to ensure that vehicles/ machinery do not enter the area. OR Identify and remove sensitive plants for storage and replanting.

Locating all stockpiles of topsoil or other similar materials at least 20 metres from the waterways

While having long term benefits to the ecological values of the area, the restoration work itself could have temporary adverse effects by removing riparian vegetation and exposing soil within the 20 metre riparian margin.

These potential effects will be mitigated by:

Protection of valuable plants or areas of habitat by identification before construction starts, and removal or fencing as appropriate

Selective and staged removal of willows where appropriate to avoid disturbing plants or habitats.

Use of in-stream sediment trapping and control devices to prevent movement of sediment downstream.

8.2.4 Archaeological values

These will be addressed appropriately in the different parts of the site through the different mitigation methods which are fully described in **Appendix J**.

8.2.5 Cultural values

Concerns about effects on water quality, and stream and wetland health will be addressed through adoption of a high standard of stormwater treatment.

Potential effects on cultural values will continue to be mitigated through the consultation process between Pegasus Town Limited, Te Runanga o Ngāi Tahu and Te Runanga o Ngāi Tūahuriri.

8.3 Proposed Conditions

In order to assist in mitigating those effects which have been discussed elsewhere in this document, the following conditions of consent are proposed:

General

The work shall be carried out in general accordance with the activity details set out in the application and associated assessment of effects, dated December 2005, and lodged with the consent authority.

Pursuant to Section 128 of the Resource Management Act 1991, the Canterbury Regional Council may review the conditions of the consent by serving notice on any of the last five working days of January each year, for any of the following purposes:

To deal with any adverse effect on the environment which may arise from the exercise of the consent and which it is appropriate to deal with at a later stage, or

To require the consent holder to adopt the best practicable option to remove or reduce any adverse effect on the environment.

The lapsing provisions of Section 125 of the Resource Management Act 1991 will apply on expiry of ten years from the date of commencement of this consent.

Site Development work (including works in the bed/margins waterways)

The consent holder shall take all practicable measures to avoid spillages of contaminants during construction. In the event of any accidental spillage, the consent holder shall inform the Canterbury Regional Council within 24 hours of the event, and shall provide the following information:

The date, time, location, and estimated volume of the spillage.

The cause of the spillage, details of the steps taken to control and remediate the effects of the spill on the receiving environment, and measures taken to prevent a reoccurrence.

Prior to any earthworks commencing on any part of the site, the consent holder shall construct, implement and maintain appropriate sediment control measures for the interception and treatment of stormwater run off from the works on the site, particularly in relation to any potential runoff from the main site to the ECMA and from the ECMA to downstream areas.

All practicable measures shall be undertaken to minimise adverse effects on property, amenity values, wildlife, vegetation and ecological values from construction activities on the site.

Vehicles and machinery shall, as far as practicable, not enter channels containing flowing water.

The consent holder shall follow at all times the procedures set out in the Construction Management Report (attached to the application as **Appendix G**).

Prior to any stage of work commencing on the site, a Contractor's Environmental Management Plan shall be prepared detailing the measures and procedures to be put in place to undertake the construction activity in compliance with conditions 4-8 of this consent. This Plan shall be submitted to the Canterbury Regional Council prior to construction work commencing. A copy shall also be held by the consent holder along with a copy of the consent. Where necessary, this Plan may be reviewed and updated and resubmitted to the Canterbury Regional Council.

The consent holder shall ensure that all work on site shall follow at all times the measures and procedures set out in the Contractor's Environmental Management Plan.

Stormwater Discharge

Stormwater discharge from the ECMA shall occur as shown in the stormwater system plans lodged with the application at or about NZ Map M35 Grid 5766929 North, 2486318 East.

Design, construction and management of the stormwater system, including swales and waterbodies, shall be in general accordance with the design details and procedures provided in the Report (attached to the application as **Appendix F**).

A certificate signed by the person responsible for designing the stormwater system, or a competent person, shall be submitted to the Canterbury Regional Council within one month of construction, to certify that the system has been constructed and installed in accordance with the plans, design details and procedures submitted with the application as required by condition 12 of this consent.

The consent holder shall take all practicable measures to avoid spillages of contaminants to the stormwater system. In the event of any accidental spillage, the consent holder shall inform the Canterbury Regional Council within 24 hours of the event, and shall provide the following information:

The date, time, location, and estimated volume of the spillage.

The cause of the spillage, details of the steps taken to control and remediate the effects of the spill on the receiving environment, and measures taken to prevent a reoccurrence.

All catchpits, swales, sediment traps, sand and rock filters shall be inspected at least once every six months. Any visible sediment and litter on the swales shall be removed immediately. All other necessary measures shall be undertaken to ensure that the catchpits, swales, sediment traps, sand and rock filters are operating in accordance with the design details and procedures specified in condition 12.

All swales and wetland entry areas shall be regularly maintained to ensure that vegetation is in a healthy and uniform state.

A Stormwater Management Plan detailing the operation and maintenance of the stormwater system, including ensuring compliance with conditions 12-16, shall be developed for the site and submitted to the Canterbury Regional Council prior to the operation of the system. A copy shall also be held by the consent holder along with a copy of the consent. Where necessary, this Plan may be reviewed and updated and resubmitted to the Canterbury Regional Council.

Operation and maintenance of the stormwater system shall at all times be in general accordance with the Stormwater Management Plan required by condition 17 of this consent.

Records of the operation and maintenance of the stormwater system shall be kept. The records shall include, but not be limited to information that demonstrates compliance with the management plan referred to in condition 17 of this consent. Copies of these records shall be provided to the Canterbury Regional Council on request.

Stormwater secondary flowpaths shall be designed such that when flows exceed the capacity of the proposed primary system due to an extreme rainfall event, the overland flows from Pegasus town will not have an adverse effect off-site.

Waterways / ECMA

The finalised Eastern Conservation Management Area Management Plan shall be submitted to the Canterbury Regional Council at the time of lodgement of subdivision consent application/s with Waimakariri District Council. This Plan shall address all works to be undertaken within the ECMA, including construction, maintenance, management and operation. A copy of this Plan shall also be held by the consent holder along with a copy of the consent. Where necessary, this Plan may be reviewed and updated and resubmitted to the Canterbury Regional Council. Any work undertaken within the ECMA shall be carried out in accordance with the ECMA Management Plan.

Any unused drains within the site will be closed off prior to earthworks commencing on the site.

Weirs or culverts shall be installed where needed to control levels and flows in the wetlands, incorporating provision for fish passage.

During willow control works, any significant plants or animals needing protection shall, where practicable, be moved into the Sanctuary area (as shown in the ECMA Management Plan) or other suitable site, subject to necessary permits.

Prior to earthworks commencing in the Northern or Central wetlands area (as shown in the ECMA Management Plan) fences will be erected around any significant vegetation or habitats, to protect them from damage by vehicles.

Ongoing maintenance of silt traps, sediment traps, and weirs will be carried out throughout the lifetime of the ECMA Management Plan.

Ecological issues

When translocation has been necessary and practicable during construction, native species will be relocated within the Pegasus site where possible.

Those plants or animals that have to be kept off the site during construction, will be returned to the site only when the environmental conditions are suitable and appropriate management can be assured.

The majority of in-stream works will be undertaken outside periods of native fish spawning and migration.

Monitoring

The Contractor's Environmental Management Plan will set out a programme for regular monitoring, during construction, of sediment control devices, including attention during storm events during construction works. Copies of these records shall be provided to the Canterbury Regional Council on request.

The consent holder will ensure that monitoring in accordance with the Hydrology report is carried out. Copies of these records shall be provided to the Canterbury Regional Council on request.

The consent holder will ensure that an annual programme of water quality monitoring in the receiving environment immediately downstream of the ECMA wetlands is carried out. Copies of these records shall be provided to the Canterbury Regional Council on request.

The consent holder will ensure that an annual programme of water quality monitoring in the receiving environment within the ECMA wetlands adjacent to the outlet/s from the lake, is carried out. Copies of these records shall be provided to the Canterbury Regional Council on request.

The consent holder will ensure that after extreme rainfall events the same monitoring as required in conditions 32 and 33 shall be carried out. Copies of these records shall be provided to the Canterbury Regional Council on request.

Archaeological Sites Protocol

A consulting archaeologist shall monitor all earthmoving undertaken in accordance with these applications and shall advise on methods to be undertaken to ensure that adverse effects on archaeological values are avoided, remedied or mitigated. The consent holder shall consult with Te Runanga o Ngai Tahu and Te Ngai Tuahuriri Runanga regarding the appointment of the archaeologist.

The consent holder shall provide the consulting archaeologist, Te Runanga o Ngai Tahu and Te Ngai Tuahuriri Runanga, the following information no less than 25 working days prior to any earth-moving works:

A schedule of the dates of all significant earthmoving events within the areas identified in condition 35, their sequence and duration.

A summary of all measures being undertaken to ensure that adverse effects on archaeological values are avoided, remedied, reduced or mitigated.

The consent holder shall invite Te Runanga o Ngai Tahu and Te Ngai Tuahuriri Runanga to attend any episode of monitoring or earthmoving activity within the areas identified in condition 35.

The consent holder shall provide Te Runanga o Ngai Tahu and Te Ngai Tuahuriri Runanga and the New Zealand Historic Places Trust with a copy of all archaeological monitoring and investigation results which are required by the conditions of this consent with an invitation to respond, comment or meet to discuss any results.

The consent holder shall notify the Council of all information provided to Te Runanga o Ngai Tahu and Te Ngai Tuahuriri Runanga and any responses received. If appropriate, the Council, with the agreement of the consent holder and Te Runanga o Ngai Tahu and Te Ngai Tuahuriri Runanga, shall convene meetings/hui should any of the information or issues require further discussion.

Waahi Taonga, Waahi Tapu and Urupa Protocol

A representative of Te Ngai Tuahuriri Runanga shall be engaged to be present during construction and excavation of all works undertaken in accordance with these applications, to act as advisor to the developer on identification or protection of waahi tapu, waahi taonga, urupa or historic cultural sites.

The consent holder shall consult with Te Runanga o Ngai Tahu and Te Ngai Tuahuriri Runanga to determine, in accordance with tikanga Maori, if there are any matters of protocol which tangata whenua wish to undertake in relation to the commencement of any development works, significant events or the commissioning of the completed works within the areas identified in condition 40.

The consent holder shall ensure that staff involved with earthmoving activities within the areas identified in condition 40 have received training and are aware of the requirement to monitor earthmoving activities in a way that enables the identification of waahi tapu, waahi taonga, urupa or historic cultural sites. Te Runanga o Ngai Tahu and Te Ngai Tuahuriri Runanga shall be contracted to provide appropriate training to such staff.

Immediately that it becomes apparent that an urupa, waahi tapu, waahi taonga or suspected historical site has been uncovered, earthmoving operations shall stop. The contractor will shut down all machinery or activity immediately, leave the area and advise the consent holder of the occurrence.

In cases other than suspected koiwi tangata (human remains), the representative of Te Ngai Tuahuriri Runanga will be consulted by the consent holder of the site to determine what further actions are appropriate to safeguard the site or its contents, and to avoid, reduce, remedy or mitigate any damage to the site.

Where koiwi tangata (human remains) are suspected:

The consent holder will take steps immediately to secure the area in a way that ensures the koiwi tangata are untouched.

The consent holder shall be responsible for notifying the Te Ngai Tuahuriri Runanga, the Police and the Historic Places Trust and that it is suspected koiwi tangata have been uncovered.

The consent holder of the site will see that staff are available to meet and guide kaumatua, Police and Historic Places Trust staff to the site, assisting with any requests that they may make.

Earthmoving operations in the affected area will remain halted until the kaumatua, the Police and Historic Places Trust staff have marked off the area around the site and have given approval for earthmoving operations to recommence.

If the kaumatua are satisfied that the koiwi tangata are of Maori origin the kaumatua will decide what happens to the koiwi tangata and will give their decision to the Police, the archaeologist and the consent holder.

8.4 Monitoring

Monitoring is an important management component for the development of Pegasus town to ensure that predicted levels of environmental protection are being achieved in a cost-effective way.

Typically, monitoring involves in the first place having a plan or programme which will set out:

What needs to be measured/ counted/ surveyed etc and why

When that should be done, how often

How it should be done and by whom

What are the expected results

What will be done in terms of management and operations if unexpected or undesirable results occur

8.4.1 Construction Monitoring

The Contractor's Environmental Management Plan will set out a programme for regular monitoring of sediment control devices, including attention during storm events. This will address the repair or redesign of devices if they are not functioning as expected.

8.4.2 Stormwater System Monitoring

The first stage of monitoring would be specific to the set-up period, expected to be 1-year from completion of development. At the end of this period a report would be completed evaluating the performance of the stormwater management system and the development as a whole. If the performance is satisfactory, then a long-term monitoring regimen would be used, otherwise monitoring on the same (set-up period) basis would continue for another year and the assessment repeated. For the set up period, the following monitoring is proposed:

Monitor selected soakage pits (especially those used for roads) after large storm events to check rate of infiltration.

A visual inspection at least once every three months, and immediately after large storms, of devices such as swales, coarse sediment traps, sand filters and wetland entry areas.

Weekly monitoring of water level at the outlet wetland weir from the ECMA into the interdune area.

Initially monthly sampling of Lake water quality and the water quality at the discharge point from the ECMA. Water quality will be monitored for faecal coliforms, copper, zinc and total suspended solids.

Visual inspection of Lake aesthetics on a weekly basis including plant growth, and clarity.

Once the system is operating satisfactorily, then the Town can be handed over to WDC. Long-term monitoring would still be necessary, for the following items:

Monitor selected soakage pits (especially those used for roads) after large storm events to check rate of infiltration.

A visual inspection at least once every year, and immediately after large storms, of devices such as swales, coarse sediment traps, sand filters and wetland entry areas.

Annual sampling of Lake water quality and the water quality at the discharge point from the ECMA. Water quality will be monitored for copper, zinc and total suspended solids.

Visual inspection of Lake aesthetics on a two-monthly basis including plant growth, and clarity.

8.4.3 Operational Monitoring of Water Quantity and Quality

Discharges from the wetlands into the downstream receiving environment will occur in a managed and controlled manner. Discharges will also occur during

periods of high rainfall - sampling at these times may be difficult to complete. The proposed monitoring, therefore, is based around an assessment of the immediate downstream environment to determine if there are any effects from the discharge, on a cumulative basis.

The following will take place to maintain the quality and quantity of discharges as expected:

Components of the stormwater management system will be monitored/inspected regularly, and modified if necessary;

The receiving environment within the wetlands and immediately downstream of the wetlands will be inspected to identify if there is evidence of contaminants.

8.4.4 Monitoring for Biodiversity Values

It is very difficult to monitor directly for biodiversity values at a specific site because of the large number of factors that might affect the presence, diversity or abundance of plants and animals at that site. However, monitoring to determine the success of revegetation projects can be valuable in management discussions and will be developed for the ECMA.

CHAPTER 9 – STATUTORY CONSIDERATIONS

9.1 Overview

All land is subject to the provisions of the Resource Management Act 1991. Under this Act, each Region must be managed in accordance with a Regional Policy Statement, with Regions having the option to prepare Regional Plans covering specific issues, water management for example. Specific land use plans (District Plans) must be prepared for each District.

The land covered by this project is within the Waimakariri District and the Canterbury Region.

The statutory provisions and documents that apply to the land are:

- Waimakariri District Plan (Waimakariri District Council)
- Canterbury Regional Policy Statement (Environment Canterbury)
- Canterbury Transitional Regional Plan (Environment Canterbury)
- Canterbury Proposed Natural Resources Regional Plan (Environment Canterbury)
- Canterbury Regional Coastal Environment Plan (Environment Canterbury)

The purpose of this chapter is to clearly set out individual resource consents that are required, and identify any areas where Council has restricted its discretion. In addition, assessment matters set out in the regional plans relevant to the resource consents are indicated. These matters have informed the identification and assessment of potential environmental effects, which are reported on in Chapter 5 of this document.

9.2 Transitional Regional Plan

9.2.1 Rules Summary

The information located in Table 9-1 to this report summarises the applicable provisions from the Transitional Regional Plan as they apply to the development of Pegasus Town, in order to clearly determine which specific resource consents are required. This table outlines the compliance proposed in the application and the status of the activities proposed.

9.2.2 Consent Requirements

In summary, the consents sought from Environment Canterbury under the Transitional Regional Plan as part of this application are:

Consent type	Proposed activity	Rule / Provision	Activity status in terms of TRP
Discharge Permit	Discharge of water into water at the lake outlets into the ECMA; discharge of water into water for the ECMA wetlands into drains to the east	General Authorisation for the Discharge of Land Drainage and Aquifer or Bore Test Water	Discretionary

	of the site; discharge of water into water in flood conditions for the ECMA wetlands into drains leading towards the south. Discharge of water to land (seepage to groundwater) for the ECMA wetlands land to the south (leading towards the Tutaepatu lagoon).		
	Discharge of stormwater to land	General Authorisation for the Discharge of Stormwater	Discretionary
Water Permit	Taking of water from existing drains and wetlands to create the ECMA and MCA waterways and wetlands	General Authorisation for the Abstraction of Natural Water	Discretionary
	Taking of groundwater to create the ECMA and MCA waterways and wetlands	General Authorisation for the Abstraction of Natural Water	Discretionary
	Diverting water from the existing drains and wetlands for waterways and wetlands in the ECMA and MCA	General authorisation for the Diversion and Discharge of Natural Water	Discretionary
	Damming of water within the lake (weirs); damming of water within the existing drains and wetlands to create the ECMA and MCA waterways and wetlands	General Authorisation for the Damming of Rivers or Streams	Discretionary
Bore Permit	Construction of the lake, ECMA and MCA	Bylaw No. 2: Underground Water	Discretionary

9.3 Proposed Canterbury Natural Resources Regional Plan

Five chapters within the Proposed Canterbury Natural Resources Regional Plan (NRRP) apply to the development of Pegasus Town. These chapters include Chapter 3: Air Quality, Chapter 4: Water Quality, Chapter 5: Water Quantity, Chapter 6: Beds and Margins of Lakes and Rivers, and Chapter 7: Wetlands.

It is noted that the proposed NRRP is in a relatively early stage of plan development. Chapters 1-3 were notified in June 2002. Submissions have closed, and hearings started in June 2004. Presentations by submitters to the Hearings Panel on Chapter 3 commenced in October 2004. Variation 1 to the proposed NRRP introduced Chapters 4-8, and was notified on 3 July 2004. Submissions closed on these chapters on the 17th of December 2004, with further submissions closing on 19 December 2005.

9.3.1 Objectives and Policies of the Proposed Canterbury Natural Resources Regional Plan

The five chapters within the NRRP described above contain objectives and policies considered relevant to the proposed Pegasus Town development. These objectives and policies have been summarised below.

Air Quality

Objective AQL1 and Policies AQL4, AQL6, and AQL8 aim to ensure that localised contaminant discharges to air do not result in significant adverse effects on the environment, and contain specific policies to:

- Permit discharges of contaminants into air from industrial or trade premises or processes that have no more than minor adverse effects on the environment – this includes construction activities.

Water Quality

Objective WQL1 and Policies WQL1, WQL3, WQL4, and WQL5 contain water quality outcomes for rivers and lakes, and specify a range of provisions relating to point and non-point source discharges to water, and to the management of riparian margins. Objective WQL2 and Policies WQL6, WQL7, and WQL10 contain water quality outcomes for groundwater and contaminated land. A range of policies relate to managing point and non-point source discharges onto or into land or from land uses that may affect soil or groundwater quality.

Water Quantity

Objective WQN1 aims to enable present and future generations to access the region's surface and groundwater resources to gain cultural, social, recreational, economic and other benefits, through adhering to flow and level

Objective WQN3 and Policies WQN8, WQN9, WQN11, and WQN13 relate to groundwater management, and contain specific policies to:

- Manage the impact of groundwater takes on surface water bodies;
- Prevent the long term decline in groundwater levels;
- Prevent localized land subsidence associated with groundwater takes.

Objectives WQN4, WQN5 and WQN7 aim to allocate the available water resource in ways that enables communities to maximise their social, economic and cultural wellbeing, and their health and safety, achieve a high level of efficiency in terms of resource availability and the reasonable use of water, and manage the interference effect between bores, so that new bores do not significantly affect the yield from neighbouring bores.

Beds of Lakes and Rivers

Objective BLR1 and Policy BLR1 aim to provide for activities and land uses to be undertaken in the beds and margins of lakes and rivers whilst protecting, preserving, and promoting a range of features. Objective BLR2 and Policy BLR2 aim to control a range of land use activities within the beds and margins of lakes and rivers.

Wetlands

Objective WTL1 and Policies WTL1 and WTL2 aim to manage Canterbury's wetlands in ways that enable people and communities to provide for their social, economic, and cultural wellbeing, and outline methods and constraints to achieve wetland regulation.

9.3.2 Rules Summary

The information located in Table 9-2 to this document summarises all applicable rules from the Proposed Natural Resources Regional Plan (NRRP) as they apply to the Pegasus Town development, in order to clearly determine which specific resource consents are required. This table outlines the compliance proposed in the application, the status of the activities proposed, and matters over which Council has restricted its discretion.

9.3.3 Consent Requirements

In summary, the consents sought from Environment Canterbury under the NRRP as part of this application are:

Consent Type	Proposed activity	Rule Provision /	Activity status in terms of NRRP
Discharge Permits	Discharge to land and water, and to land in circumstances where it could enter water - To discharge water and contaminants during construction, including the excavation of the lake,	WQL56 WQL57	Discretionary

	Eastern Conservation Management Area, Mudfish Conservation Area and Western Ridge Conservation Area.		
	Discharge of water into water at the lake outlets into the Eastern Conservation Management Area; discharge of water into water for the Eastern Conservation Management Area wetlands into drains to the east of the site; discharge of water into water in flood conditions for the Eastern Conservation Management Area wetlands into waterways leading towards the south.	WQL56	Discretionary
	Discharge of water to land (seepage to groundwater) for the Eastern Conservation Management Area wetlands to land to the south (leading towards the Tutaepatu Lagoon).	WQL56 WQL57	Discretionary
	Stormwater discharge - To discharge contaminants (stormwater) to land and water, and to land in circumstances where it may enter water.	WQL7 ⁴ WQL57	Discretionary
Land Use Consents	Vegetation clearance and soil disturbance within a riparian zone for construction works throughout the site.	WQL34 BLR8	Restricted discretionary
	Excavation within the bed or margin of a waterway (various drains) for the construction of the roads, Eastern Conservation Management Area and Mudfish Conservation Area waterways and wetlands.	WQL34	Discretionary
	The placement of structures within the bed of the proposed lake, and structures within the bed of the proposed waterways within the Eastern Conservation Management	BLR8	Discretionary

⁴ The total population of Pegasus Town that forms the subject of this Assessment of Effects on the Environment will exceed 200 people, and accordingly, the site can be considered to be a stormwater management area under the definition of settlement provided within the rule.

	Area and Mudfish Conservation Area.		
	To carry out work in areas that are deemed to be wetlands or streams, including new planting.	WTL7 BLR8	Discretionary
	Restoration of an existing wetland area.	WTL7	Discretionary
	Excavation of land for the lake, Eastern Conservation Management Area and Mudfish Conservation Area waterways and wetlands	WQL62 BLR8	Non-complying
Bore Permits	Construction of the lake, waterways/wetlands in the Eastern Conservation Management Area and Conservation Management Area.	WQL38 WQL59	Discretionary
Water Permits	To take and use groundwater during the creation of the Lake, Eastern Conservation Management Area and Mudfish Conservation Area wetlands.	WQN16 WQN23	Discretionary
	Taking and/or diverting surface water from existing drains and wetlands to create the Eastern Conservation Management Area waterways and wetlands.	WQN40 WQN41	Non-complying
	Damming of water within the waterways and wetlands in the Eastern Conservation Management Area. Damming of water within the lake.	WQN41 WQL38 WQL59	Discretionary

9.3.4 Assessment Matters and Control of Discretion

Council has specified a range of information to be provided with each of the resource consent applications and this information was used to ensure adequate provision of information in this document.

In relation to controlled activities and restricted discretionary activities, Council has limited the matters over which it has discretion when considering the applications and what conditions may be imposed. These matters have been identified below and are further assessed in the Assessment of Environment Effects chapter of this document.

Discharge of Water

The discretion of Environment Canterbury will include, but is not limited to the following matters:

1. Measures to:
 - (a) avoid or minimise the production of waste to be discharged.
 - (b) reduce the volume and concentration of contaminants in the discharge.
2. The availability and use of any existing waste treatment and discharge systems.
3. The location of the discharge and the impact on instream values, including recreation and amenity values, and existing uses, including water takes and discharges.
4. Measures to ensure that the rate, volume, timing, and concentration of contaminants in the discharge are managed so that the water quality standards in Schedule WQL1 for the receiving water will be achieved:
 - (a) outside of the Zone of Non- Compliance; and
 - (b) when river flows or lake levels are reduced below the value used to calculate the Zone of Non-Compliance.
5. Restrictions on the discharge when the river ceases to flow or lake levels fall below the outfall.
6. Monitoring of water quality.
7. The requirement for financial contributions, or bonds.
8. The duration of a resource consent.
9. Review of resource consent conditions.

Vegetation Clearance within a Riparian Zone

Environment Canterbury has restricted its discretion to the following matters:

1. The area, timing and location of the activity.
2. Measures to avoid, remedy or mitigate any adverse effects of the activity, including ongoing adverse effects on the water body following the completion of the activity, on:
 - (a) the water quality of the receiving water body, including sedimentation of the bed; and
 - (b) aquatic ecosystems, salmonid spawning areas, archaeological or historic sites, or Ngāi Tahu values; and
 - (c) sources of drinking water
3. Remediation and maintenance of the site after the activity has ceased.
4. The requirement for financial contributions, or bonds.
5. Review of resource consent conditions.
6. The duration of the land use consent.
7. The frequency and reasons to review consent conditions.

Construction of a groundwater bore or water infiltration gallery

Environment Canterbury have restricted its discretion to the following matters:

1. The location and depth of the bore, and the location of screens.
2. The location, length, width and depth, and orientation of the water infiltration gallery.
3. Measures needed to rehabilitate the site following the completion of the construction activity.
4. Measures to avoid, remedy or mitigate any adverse effects of construction.
5. Measures to avoid, remedy or mitigate any adverse effects of the activity, on:
 - (a) water quality;
 - (b) any significant habitat of indigenous flora or fauna;
 - (c) a site of significance to Ngai Tahu; or
 - (d) an archaeological site or a site registered with the New Zealand Historic Places Trust.
6. Decommissioning of the bore or water infiltration gallery upon cessation of use.
7. The requirement for financial contributions, or bonds.
8. The duration of the land use consent.
9. Review consent conditions.

Taking of water from groundwater

Discretion will include, but is not limited to the following matters:

Those matters that are not complied with in the conditions in Rule WQN15.

The interference effect on neighbouring bores.

3. The stream depletion effect including any effects on wetlands, and on values of significance to Ngai Tahu.

Diversion of surface water

The discretion of Environment Canterbury will include, but is not limited to the following matters:

1. The effect on the values set out in Objective WQN1.
2. The effects on water quality, including clarity, nutrients, temperature, dissolved oxygen.
3. Potential changes to water quality in the lake during establishment and operation and the options for avoiding, remedying or mitigating these.
4. Impact of storage on the flow regimes and the instream values of the rivers, including Ngai Tahu values, natural character, indigenous species passage and habitat, and trout and salmon passage and habitat.

5. The release of flows from storage, in order to maintain instream values, including the need for variable flows, and flows that simulate freshes that are sufficient to remove vegetation colonising gravel bars and nuisance periphyton.
6. The effects on existing water permit holders and other users.
7. The effects on the flood carrying capacity of rivers.
8. The effects on gravel transport.
9. The effects on bed loading and coastal erosion.
10. Sedimentation rates in storage lakes.
11. Management of lake levels, including maximum and minimum operating levels.
12. Management of risks during construction and throughout the life of the dam.
13. Impact on any heritage or other important sites that may be inundated or disturbed.
14. Financial contributions as specified in Part 5.10 of this Chapter.

9.4 Proposed Canterbury Regional Coastal Environment Plan

The Proposed Canterbury Regional Coastal Environment Plan is largely operative. Volume 3 of the Planning Maps, which identifies hazard zones, is still subject to Environment Court appeals, and can therefore not be considered operative.

None of the proposed works for the Pegasus Town development are restricted in any way by the Hazard zones in the Coastal Environment Plan. No work is presently proposed to the coastal area or the coastal marine area.

9.5 Canterbury Regional Policy Statement

As the provisions of the Regional Policy Statement are embodied in the NRRP, the above assessment covers all the relevant matters addressed in the RPS.

9.6 Other Consents Existing or Required

9.6.1 Environment Canterbury

Further resource consents may be necessary for other works in relation to the new waterbodies and these will be sought at a later date.

9.6.2 Waimakariri District Council

Separate consent applications have been lodged with the Waimakariri District Council in relation to earthworks associated with this proposal. Applications for subdivision consent will follow in due course, as will any other associated landuse consent applications.

9.6.3 Archaeological matters

Archaeological authorities have been obtained from the New Zealand Historic Places Trust. These are needed for both investigation and for works to occur.

9.6.4 Department of Conservation

Anyone who wishes to transfer or release any live aquatic life into freshwater needs to get approval under Section 26ZM of the Conservation Act 1987. This process is being undertaken in relation to the transfer of mudfish within the site.

Table 9-1: Summary of Transitional Regional Plan Provisions

Activity	Provision	Compliance Check	Status of Activity
Discharge of water from the lake, waterways, etc.	<p>General Authorisation for the Discharge of Land Drainage and Aquifer or Bore Test Water</p> <p>Under Section 22 of the Water and Soil Conservation Act 1967, the Canterbury Regional Council authorises the discharge of land drainage water, including dewatering water, into any surface water body, and the discharge of aquifer or bore test water onto the ground or into any surface water body, within its region, subject to the following condition:</p> <ol style="list-style-type: none"> 1. This authorisation shall not apply to the drainage of wetlands, ponds or lakes. <p>This authorisation is effective from 28 September 1991.</p> <p>Definition: A wetland is defined as any permanently or intermittently wet area, shallow water and land water margins that support a natural ecosystem of plants and animals that are adapted to wet conditions.</p> <p>Under the Resource Management Act 1991, the discharges specified in this general authorisation are Permitted Activities. Proposed discharges that do not meet the conditions of this general authorisation are Discretionary Activities, and specific discharge permits are required.</p>	The discharges applied for relates to discharges from the lake, waterways, ponds, etc. Accordingly, they do not comply with this general authorisation.	Discretionary
Discharge of stormwater to land	<p>General Authorisation for the Discharge of Stormwater</p> <p>Under Section 22 of the Water and Soil Conservation Act 1967 the Canterbury Regional Council authorises the following specified discharges of stormwater into natural water, within its region, subject to the specified conditions:</p> <ol style="list-style-type: none"> 1. The discharge of roof stormwater from buildings and structures either into the ground or directly into groundwater provided it is via a sealed system that excludes all other stormwater; except in the following areas: <ol style="list-style-type: none"> (a) that part of the Christchurch urban area where the Christchurch City Council stormwater system is available; (b) that part of the Christchurch City Council area south of the Avon-Heathcote Estuary and the Heathcote River; (c) that part of the Kaiapoi urban area where the Waimakariri District Council stormwater system is available; (d) the Banks Peninsula District Council area; (e) that part of the Selwyn District Council area east of the Halswell River; and (f) that part of the Timaru urban area where the Timaru District Council stormwater system is available. 2. The discharge of stormwater to surface waters, except stock water races and irrigation races, from all existing buildings, structures, hard-standing surfaces and roading. 3. The discharge of stormwater to surface waters, except stock water races, irrigation races and lakes, from residential or rural-residential subdivisions made after 28 September 1991, involving fewer than 30 allotments. 4. The discharge of stormwater from roading into the ground, outside of the Christchurch City Council urban area. <p>Under the Resource Management Act 1991, the discharges specified in this general authorization are Permitted Activities. Proposed discharges that do not meet the conditions of this general authorization are Discretionary Activities, and specific discharge permits are required.</p>	The proposed stormwater discharge is to land, and is not addressed in this general authorisation. Accordingly, it does not meet the conditions of the general authorisation.	Discretionary
Taking of water from existing	<p>General Authorisation for the Abstraction of Natural Water</p> <p>Under Section 22 of the Water and Soil Conservation Act 1967 the Canterbury regional Council authorises the</p>	The taking of water will not meet these provisions. Accordingly, it	Discretionary

drains and wetlands to create the ECMA and MCMA waterways and wetlands and Taking of groundwater to create the ECMA and MCMA waterways and wetlands	<p>following abstractions of natural water, except geothermal water, for beneficial uses, within its region, subject to the specified conditions:</p> <p>The abstraction of natural water from any surface water resource, provided that the volume abstracted shall not exceed 10 cubic metres per day, per property, at a rate not exceeding 5 litres per second ...</p> <p>...</p> <p>The abstraction of natural water from any groundwater resource, provided that the volume abstracted shall not exceed 20 cubic metres per day, per property, from any bore and the abstraction bore shall be future than 50m from any bore on a neighbouring property or from any surface water resource (ie from the riverbank of a river or stream, or the high water mark of any lake, pond or wetland)...</p> <p>The abstraction of natural water from any groundwater resource, provided that the volume abstracted shall not exceed 100 cubic metres per day from any bore, per property, at a rate not exceeding 10 litres per second and: the abstraction shall occur on a property greater than 20 hectares in area; and there shall be a minimum separation distance of 100 metres between any abstracting bore and bores on adjoining properties that are used to abstract groundwater, and between any abstracting bore and any surface water resource...</p>	does not meet the conditions of the general authorisation.	
Diverting water from the existing drains and wetlands for waterways and wetlands in the ECMA and MCA	<p>General authorisation for the Diversion and Discharge of Natural Water</p> <p><i>Under Section 22 of the Water and Soil Conservation Act 1967 the Canterbury regional Council authorises the diversion and discharge of natural water, except geothermal water, associated with minor realignments of, and minor improvements to, watercourses within its region, subject to the following condition:</i></p> <p>Within any urban area, the catchment area above the point of diversion shall not exceed 40 hectares.</p>	The diversion and discharge could be considered more than minor. Accordingly, it does not meet the general authorisation.	Discretionary
Damming of water within the lake (weirs); damming of water within the existing drains and wetlands to create the ECMA and MMCA waterways and wetlands	<p>General Authorisation for the Damming of Rivers or Streams</p> <p><i>Under Section 22 of the Water and Soil Conservation Act 1967 the Canterbury regional Council authorises the following damming of rivers and streams, within its region, subject to the specified conditions:</i></p> <p>(1) The damming of intermittently flowing rivers and streams that flow only after rainfall, or during periods of wet weather, subject to the following conditions:</p> <p>The dam shall not exceed three metres in height from its lowest point to the spillway overflow level.</p> <p>The spillway overflow shall not be constructed in fill (ie repositioned soils)</p> <p>The potential maximum volume of impounded water shall not exceed 1,000 cubic metres</p> <p>The dam shall not be constructed within 100 metres upstream or downstream of property boundaries nor within 500 metres immediately upstream of a dwelling or boundary</p> <p>The damming shall have no detrimental effect on any domestic or stock water supply or on any public water supply</p> <p>This authorisation shall not apply to the part of any stream which is used during the irrigation season as a distributary of an irrigation scheme.</p> <p>...</p>	The damming proposed, especially that for the lake, may not meet these provisions. Accordingly, it does not meet the conditions of the general authorisation.	Discretionary
Construction of the lake, ECMA and MCMA	<p>Bylaw No. 2: Underground Water</p> <p>...</p> <p>3.1 No person shall make or alter or cause or allow to be made or altered any bore without first obtaining a permit to do so from the Council.</p> <p>...</p>	The bylaw states that a permit is required from the Council for a bore and thus a consent is necessary under this provision.	Discretionary

Table 9-2: Summary of Proposed Canterbury Natural Resources Regional Plan Provisions

Activity	Rule / Standard	Compliance Check	Status of
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	Clause		Activity	
Discharge of water in relation to construction, waterways and irrigation.	WQL1	<p>The point source discharge of water or a contaminant into a surface water body or onto land which may result in a contaminant or water entering a surface water body is a permitted activity if the discharge complies with all of the conditions of this Rule, except where it is:</p> <p>(a) a permitted activity under Rules WQL 3, WQL6, WQL16, WQL 17, WQL 20, WQL49, WTL 2(a) or WTL2 in which case the provisions of those rules apply; or</p> <p>(b) a controlled activity under Rules WQL4 or WQL7; or</p> <p>(c) a restricted discretionary activity under Rule WQL21</p> <p>(d) a discretionary activity under Rule WQL 56; or</p> <p>(e) a non complying activity under Rules WQL14, or WQL 60; or</p> <p>(f) a prohibited activity under Rules WQL15, WQL22, WQL28, or WQL 46.</p> <p>A discharge which does not comply with:</p> <p>1. Any one or more of Conditions 1 to 6 and 8 to 11 is a discretionary activity, requiring a resource consent under Rule WQL 56; or</p> <p>2. Condition 7 is a non-complying activity, requiring a resource consent under Rule WQL 60.</p> <p>Conditions:</p> <p>1. The specific conductance (conductivity measured at 25 degrees Celsius) of the discharge shall not exceed 40 millisiemens per metre.</p> <p>2. The rate of flow in the receiving water at the point and time of discharge shall be at least five times the rate of the discharge.</p> <p>3. The concentration of chlorine in the discharge shall not exceed 0.5 gram per cubic metre.</p> <p>4. The concentration of hydrogen sulphide in the discharge shall not exceed 0.1 gram per cubic metre.</p> <p>5. The discharge shall not result in:</p> <p>(a) an increase in the embeddedness of the riverbed substrate by more than 20 percent; or</p> <p>(b) an increase in the flow in the receiving water body at the point of discharge by more than one percent of a flood event with an Annual Exceedance Probability of 20 percent (one in five year event); or</p> <p>(c) a significant increase in flooding of a dwelling or land; or</p> <p>(d) a significant increase in the erosion rate of the bed or banks of the receiving water body.</p> <p>6. For areas other than those identified in Condition 8, the discharge shall not, outside of the Zone of Non-Compliance:</p> <p>(a) change the colour by more than five Munsell units;</p> <p>(b) decrease the clarity by more than 20 percent;</p> <p>(c) change the pH by more than 1.0 pH unit;</p> <p>(d) change the temperature of a river or artificial water course by more than three degrees Celsius ;</p> <p>(e) change the temperature of a lake by more than one degree Celsius;</p> <p>(f) produce conspicuous oil or grease films, scums or foams;</p> <p>(g) produce any objectionable odour;</p> <p>(h) cause any significant adverse effects on aquatic life; or</p> <p>(i) render fresh water unsuitable for consumption by farm animals.</p> <p>7. For the purposes of this rule, the Zone of Non-Compliance means the receiving water in:</p>	<p>The discharges from the construction, waterways fall under none of the listed sections attached to the rule.</p> <p>The discharges should comply with conditions 1, 3, 4, 6, and 7, as the water being discharged will be of a similar composition to the receiving waterway.</p> <p>The discharge will comply with conditions 8, 9, 11 and 12.</p> <p>The discharges may significantly increase the flows in surrounding waterways, and therefore may not comply with conditions 2 and 5.</p> <p>The discharges may not comply with condition 10.</p>	Discretionary - Assessment under WQL56

		<p>(a) a reach of a river or an artificial water course measured from the point of discharge for a distance L (length in metres) calculated using the following formula: $L = (\sqrt{W}) \times 25$ Where W is the width of the flow measured in metres at the point of discharge; or</p> <p>(b) 20 metres from the point of discharge into a lake.</p> <p>8. Where the discharge is within any of the following areas:</p> <p>(a) within one kilometre upstream on a river, or within one kilometre on a lake, from an intake for a community drinking water supply listed in Schedule WQL2; or</p> <p>(b) a river identified in Table WQN17 of Schedule WQN 5; or</p> <p>(c) a significant spawning reach for salmon listed in Schedule WQN14; the discharge shall meet the water quality standards for the receiving water as set out in Schedule WQL1 at the point of discharge and there shall be no Zone of Non-Compliance.</p> <p>9. A discharge of land drainage water shall:</p> <p>(a) only be from a drainage system which existed at the time of notification of this rule; and</p> <p>(b) not be from a wetland unless the drainage of the wetland is authorised as a permitted activity by the rules of Chapter 7 of this plan; and</p> <p>(c) flow by gravity only.</p> <p>10. The duration of the discharge shall not exceed three days in any consecutive six month period, except for a land drainage discharge or a site de-watering discharge, which may be continuous.</p> <p>11. The discharge shall not occur into a wetland:</p> <p>(a) classified as moderate significance or higher in <i>Schedule WTL1: Moderate and higher significance wetlands</i>; or</p> <p>(b) that has not been classified in accordance with the protocol defined in Appendix WTL B.</p> <p>12. A discharge of water that commences for the first time after the date of notification of this rule shall only be of water sourced from the same river catchment in which the discharge occurs.</p>		
<p>Discharge of water in relation to construction, the lake, waterways.</p> <p>Discharge to water, or discharge to land where it can enter groundwater, of contaminants from construction activities</p>	WQL56	<p>The discharge of:</p> <p>(i) water into a river, lake or artificial watercourse; or</p> <p>(ii) a contaminant into water onto or into land in circumstances which may result in a contaminant entering a river, lake, or artificial watercourse; is a discretionary activity if the discharge is into:</p> <p>(a) a river or lake and the discharge complies with all of the conditions of this Rule; or</p> <p>(b) an artificial watercourse whether or not the discharge complies with any of the conditions of this Rule.</p> <p>Conditions:</p> <p>1. The Zone of Non- Compliance for a contaminant shall be calculated in accordance with Part 2 of Schedule WQL1.</p> <p>2. The Zone of Non-Compliance for a contaminant discharged shall not exceed the size of the zone calculated in accordance with Part 2 of Schedule WQL1.</p> <p>3. The discharge shall be directly into the water of a river or lake.</p> <p>4. The discharge shall not, outside of the Zone of Non-Compliance, result in the water quality of the receiving water body being lower than the water quality standards specified in:</p> <p>(a) Schedule WQL1 for that river or lake type as identified on the Map Volume Part 1- Planning</p>	<p>The discharges from the construction, waterways fall under this rule.</p> <p>The contaminant discharged from construction activities will primarily be dust and particulate matter.</p>	Discretionary

		<p>Maps; or</p> <p>(b) the Water Conservation Order for either the Ahuriri River or the Rakaia River if the discharge is to a surface water body within either of the areas of these Orders.</p> <p>5. A discharge within any of the following areas shall meet the water quality standards set out in Schedule WQL1 at the point of discharge and there shall be no Zone of Non-Compliance:</p> <p>(a) within one kilometre upstream on a river, or within one kilometre on a lake, from an intake for a community drinking water supply listed in Schedule WQL2; or</p> <p>(b) a river identified in Table WQN17 of Schedule WQN 5; or</p> <p>(c) a significant spawning reach for salmon listed in Schedule WQN14.</p>		
Discharge of stormwater containing contaminants onto or into land	WQL5	<p>The discharge of stormwater containing contaminants onto or into land where contaminants may enter groundwater; is -</p> <p>(a) a permitted activity if a discharge complies with all of the conditions of this Rule;</p> <p>(b) a discretionary activity if a discharge does not comply with any one or more of the conditions of this Rule, in which case a resource consent under Rule WQL 57 is required.</p> <p>For the purposes of this rule:</p> <p>1. "stormwater management area" means:</p> <p>(a) a settlement; or</p> <p>(b) a watershed catchment of a river named on New Zealand Map Series 260 1:50,000 scale, or a tributary of that river upstream of the confluence of the tributary and any other river where 30 percent or more of the catchment is identified in a district plan for residential, commercial or industrial activities, or any combination of these activities;</p> <p>2. "settlement" means an existing or proposed collection of residences or workplaces, or any combination of these activities, with a population of 200 or more people. This includes any proposed settlement or extension to an existing settlement.</p> <p>Conditions:</p> <p>1. There is no pipeline network available for the collection of stormwater. For the purpose of this condition, "available" means:</p> <p>(a) a stormwater network system passes within 30 metres of the property boundary; and</p> <p>(b) the stormwater can flow into the network under gravity; and</p> <p>(c) the network operator will accept the discharge.</p> <p>2. The stormwater from a roof may be discharged onto or into land via a subsurface drainage system located in the soil layer provided:</p> <p>(a) the system is designed to prevent the entry of surface runoff into the stormwater system;</p> <p>(b) there is no runoff or percolation of water onto any neighbouring property except where the written approval of the current landowner of that property has been obtained;</p> <p>(c) the total roof area of the building does not exceed 400 square metres and the building is not located in a stormwater management area; or</p> <p>(d) the total roof area of the building does not exceed 50 square metres and the building is located in a stormwater management area.</p> <p>3. The discharge shall not be from a site where an activity listed in Schedule WQL3 is occurring.</p> <p>4. There shall be no discharge from a network servicing a stormwater management area after Regional Rule WQL 7 becomes operative.</p>	The proposed stormwater discharge will service an area greater than 2ha. The discharge therefore does not comply with condition 5 of this rule.	Discretionary - Assessment under Rule WQL57

		<p>5. The discharge shall not be from a stormwater collection system established after the date of notification of this rule which collects stormwater from:</p> <p>(a) an area greater than 500 square metres within Zone BP in Map Volume Part 1 Planning Maps.</p> <p>(b) an area greater than two hectares elsewhere in the region.</p> <p>6. Except where the discharge meets Condition (2), the discharge shall not occur over an unconfined or semi-confined aquifer where the highest groundwater level, which can reasonably be expected at the point of discharge based upon relevant and available groundwater data, is less than two metres below the land surface.</p> <p>7. The discharge of stormwater from a road, vehicle parking areas, any impermeable surfaces, or a stormwater collection system, onto or into land over an unconfined or semi-confined aquifer, where the highest groundwater level, which can reasonably be expected at the point of discharge based upon relevant and available groundwater data, is deeper than two metres but less than 30 metres from the ground surface, shall be via an infiltration system:</p> <p>(a) with a minimum thickness of infiltration media calculated using the following formula;</p> $D = \frac{240}{A \times R}$ <p>Where: A = infiltration surface area (square metres), D = depth of infiltration media (metres), and R = oil retention capacity of the media (litres per cubic metre); and</p> <p>(b) with a minimum separation distance of one metre between the base of the infiltration media (D) and the highest groundwater level expected at that site.</p> <p>8. A stormwater collection system which collects runoff from a road in a drain or swale before the stormwater is discharged down a soak hole that is:</p> <p>(a) installed or replaced after this rule becomes operative; and</p> <p>(b) the soak hole is located over in an unconfined or semi-confined aquifer, where the highest groundwater level, which can reasonably be expected at the point of discharge based upon relevant and available groundwater data, is less than 30 metres from the ground surface; shall have a grassed section at least 20 metres in length with a minimum topsoil depth of 150 millimetres immediately before each soak hole.</p> <p>9. Except where the discharge meets Condition (2), the discharge shall not occur in a Community Drinking Water Supply Protection Zone for a well listed in Schedule WQL2.</p>		
Discharge of stormwater containing contaminants onto or into land	WQL57	<p>Except where it is:</p> <p>(a) a permitted activity under Rule WQL 2, Rule WQL 3, Rule WQL5, Rule WQL 8, Rule WQL 10, Rule WQL 11, Rule WQL 13, Rule WQL16, Rule WQL 23, Rule WQL24, Rule WQL31, Rule WQL 47, or Rule WQL 49; or</p> <p>(b) a controlled activity under Rule WQL 7, Rule WQL 12, Rule WQL 26, Rule WQL 41, or Rule WQL 50; or</p> <p>(c) a restricted discretionary activity under Rule WQL 9 or Rule WQL 27; or</p> <p>(d) a discretionary activity under Rule WQL 51, WQL 54, WQL57; or WQL58</p> <p>(e) a prohibited activity under Rule WQL28, Rule WQL46, or Rule WQL 52;</p> <p>the discharge of a contaminant onto or into land; is -</p> <p>1. a discretionary activity if the discharge complies with the Condition of this Rule;</p> <p>2. a non-complying activity if the discharge does not comply with the Condition of this Rule, in which case a resource consent under Rule WQL 62 is required.</p>	The proposal will meet the condition.	Discretionary

		<p>Conditions:</p> <p>1. The discharge shall not occur within a Community Drinking Water Supply Protection Zone for a well listed in Schedule WQL2.</p>		
Discharge of stormwater containing contaminants onto or into land from a stormwater management area	WQL7	<p>The discharge of stormwater:</p> <p>(a) onto or into land; or</p> <p>(b) into a river, lake or artificial watercourse;</p> <p>from a stormwater management area is a controlled activity if the discharge complies with all of the conditions of this rule.</p> <p>For the purposes of this rule:</p> <p>(i) "stormwater management area" means:</p> <p>(1) a settlement; or</p> <p>(2) a watershed catchment of a river named on New Zealand Map Series 260 1:50,000 scale, or a tributary of that river upstream of the confluence of the tributary and any other river where 30 percent or more of the catchment is identified in a district plan for residential, commercial or industrial activities, or any combination of these activities;</p> <p>(ii) "settlement" means an existing or proposed collection of residences or workplaces, or any combination of these activities, with a population of 200 or more people. This includes any proposed settlement or extension to an existing settlement.</p> <p>Conditions:</p> <p>1. The area which is being serviced by the stormwater network shall be included in an integrated catchment management plan, which has been prepared in accordance with Section 4.7.3.2 of this Chapter, and any discharge shall comply the requirements of that plan.</p> <p>2. Where the discharge is to a river or a lake in areas other than those identified in Condition (5), the discharge shall, outside of the Zone of Non-Compliance, meet the water quality standards for the receiving water as set out in Schedule WQL1.</p> <p>3. A discharge to a river, lake or an artificial watercourse water shall not:</p> <p>(a) have a maximum total suspended sediment concentration of more than 125 percent of the maximum total suspended sediment concentration that occurred from the catchment before the land became a stormwater management area; or</p> <p>(b) increase the flow in the receiving water body by more than five percent of a flood event for that water body with an Annual Exceedance Probability of 20 percent (one in five year event).</p> <p>4. There shall be no discharge in the areas identified as Zone 1A, Zone 1B, or Zone 1C of the Christchurch Groundwater Recharge Zone on Map Volume - Part 1 Planning Maps.</p> <p>5. Where the discharge is to a river or a lake within any of the following areas:</p> <p>(a) within one kilometre upstream on a river, or within one kilometre on a lake, from an intake for a community drinking water supply listed in Schedule WQL2; or</p> <p>(b) a significant spawning reach for salmon listed in Schedule WQN14; the discharge shall meet the water quality standards for the receiving water as set out in Schedule WQL1 at the point of discharge.</p>	<p>The total population of Pegasus Town that forms the subject of this Assessment of Effects on the Environment will exceed 200 people, and accordingly, the site can be considered to be a stormwater management area under the definition of settlement provided within the rule.</p> <p>An integrated catchment management plan has been prepared. The discharge will comply with the requirements of that plan. The discharge is to land, and therefore does not need to comply with conditions 2, 3, and 5. The discharge is not located within an identified Christchurch Groundwater Recharge Zone.</p> <p>Accordingly, the proposed stormwater discharge complies with the conditions of this rule.</p>	Controlled
Discharge to air of	AQL38	Discharge of contaminants into air from unsealed or unconsolidated surfaces on industrial or	The discharge of dust from	Complies

particulates from construction activities		trade premises and construction sites, not otherwise addressed by rules in the Proposed NRRP, is a permitted activity. 1. The dispersal or deposition of particles shall not cause an objectionable or offensive effect beyond the boundary of the property where the discharge originates.	construction activities on the site will not cause an objectionable effect on a temporary basis. Accordingly, this rule is complied with.	
Vegetation clearance within a riparian zone	WQL32	<p>The use of land in a margin of a river or lake, where the land has a dominant slope and is within the setback distances specified in Rule Table WQL 32, for vegetation clearance; is -</p> <ol style="list-style-type: none"> 1. a permitted activity if such use complies with all of the conditions of this Rule; 2. a restricted discretionary activity if such use does not comply with any one or more of conditions of this Rule, in which case a resource consent under Rule WQL 34 is required. <p>For the purposes of this rule, a river means a permanently or intermittently flowing river, but not an ephemeral watercourse.</p> <p>Conditions:</p> <ol style="list-style-type: none"> 1. The vegetation clearance is only undertaken: <ol style="list-style-type: none"> (a) for the repair or maintenance of: <ol style="list-style-type: none"> (i) public network utilities; (ii) public roads, tracks, or railway tracks; (iii) legally established stream or river crossings; (iv) legally established private tracks, (v) firebreaks required under the Forest & Rural Fires Act 1977; (vi) public reserves established under the Reserves Act 1977 or National Parks Act 1980 Wildlife Act 1953; (vii) flood control structures or flood control plantations or access to these; (b) for the management of farm assets; (c) to establish survey lines or install an instrument to monitor water flow and levels; (d) for the restoration or enhancement of riparian vegetation to maintain or improve water quality, indigenous biodiversity, salmonid habitat, cultural or amenity values.; or (e) to comply with the requirements of the Regional Pest Management Strategy, a national pest management strategy, or the Biosecurity Act 1993. 2. Except for those activities identified in Conditions 1(d) and 1(e), the total area of vegetation clearance shall be less than 100 square metres in any kilometre length of the margin of a river or a lake in any consecutive six month period. 3. No vegetation, slash or plant debris with a diameter greater than 75 millimetres, or longer than two metres shall be: <ol style="list-style-type: none"> (a) deposited into the bed of a river, or lake; or (b) placed on land in a position where it is likely to enter a river, or lake. 4. All practicable measures shall be taken to avoid vegetation, slash or plant debris, with a diameter less than 75 millimetres or length less than two metres, soil or any other debris being deposited in the bed of a river or lake. 5. Except for those activities identified in Condition 1, the vegetation clearance shall not take place on land above an elevation of 900 metres above sea level. 6. The vegetation clearance is undertaken for the maintenance or harvesting of trees planted in a production forest that was established at the date of notification of this rule provided: <ol style="list-style-type: none"> (a) trees are felled away from: 	Vegetation clearance may be required along drains and watercourses. Although most of these works will be required for the restoration and enhancement of riparian vegetation, some vegetation clearance may be necessary. Accordingly, the clearance will not comply with this rule.	Restricted Discretionary - Assessment under WQL34

		<p>(i) any permanently flowing river; or (ii) any river with an average bed width greater than two metres in the area where the clearance is occurring, or (iii) a lake; and (b) no logs or trees shall be dragged through or across the bed of a lake or a permanently flowing river; and (c) Environment Canterbury shall be notified in writing of the location and timing of the harvesting, at least five working days prior to the commencement of the harvesting, 7. There shall be no vegetation clearance for the maintenance or harvesting of trees planted in a production forest after the date of notification of this rule.</p>		
Disturbance of soil within the margins of watercourses.	WQL33	<p>The use of land in a margin of a river or lake, where the land has a dominant slope and is within the setback distances specified in Rule Table WQL 33 and such use results in the disturbance or deposition of soil; is - 1. a permitted activity if such use complies with all of the conditions of this Rule; 2. a restricted discretionary activity if such use does not comply with any one or more of conditions of this Rule, in which case a resource consent under Rule WQL 34 is required; For the purposes of this rule, a river means a permanently or intermittently flowing river, but not an ephemeral watercourse.</p> <p>Conditions: 1. All practicable measures shall be taken to avoid soil being deposited into the bed of a river, or a lake, or placed in a position where it is likely to enter a river or lake. 2. Any discharge of soil to the water in a river or a lake from the use of the land shall not result in: (a) a conspicuous change to the colour or clarity of the receiving water for more than 60 consecutive minutes in any 24 hour period compared with the colour or clarity of the river immediately upstream of the activity, or the natural colour or clarity of the lake in the area of the activity; or (b) the embeddedness of the river or lake bed substrate increasing by more than ten percent. 3. All excavations, batters, side-castings or other areas of soil disturbance or deposition resulting from the activity shall be stabilised to prevent slumping, or protected from soil erosion by revegetation or other methods as soon as practicable. These protection or stabilisation works shall commence no later than within two months of the activity ceasing, and be completed with one month after commencing. 4. Stormwater run-off controls, water table cut-offs, sediment traps and culverts are to be installed and maintained on tracks and roads to minimise erosion of the land surface and surface run-off. 5. Any trenches excavated shall be back-filled and compacted within three days of being excavated. 6. Cultivation shall be undertaken across the contour of the land and a permanent vegetation cover shall be maintained between the cultivation activity and the edge of the river or lake. 7. The extent of soil disturbance or the volume of soil excavated or deposited when the activity is located:</p>	<p>The extent of soil disturbance or the volume of soil excavated or deposited may exceed 500 square metres or 40 cubic metres in a kilometre length of the margin of the river. Accordingly, the proposed excavation may not comply with Condition 8 of this Rule.</p> <p>All other conditions will be complied with.</p>	Restricted Discretionary - Assessment under WQL34

		<p>(a) within three kilometres upstream on a river, or within one kilometre on a lake, from an intake for a community drinking water supply listed in Schedule WQL2; or</p> <p>(b) Zone BP shown on the Map Volume Part 1- Planning Maps; and shall not exceed an area of 200 square metres, or a volume of 20 cubic metres in any continuous kilometre length of the margin of a river or lake in a consecutive six month period.</p> <p>8. The extent of soil disturbance or the volume of soil excavated or deposited, where the activity is located outside of Zone BP shown on the Map Volume Part 1- Planning Maps, shall not exceed:</p> <p>(a) an area of 500 square metres; or</p> <p>(b) a volume of 40 cubic metres; in any kilometre length of the margin of the river or lake in a consecutive six month period.</p> <p>9. The activity shall not occur within the following areas:</p> <p>(a) a significant spawning reach for salmon listed in Schedule WQN14; or</p> <p>(b) a site registered on the Environment Canterbury Listed Use Land Register.</p>		
Vegetation clearance within a riparian zone Disturbance of soil within the margins of watercourses.	WQL34	<p>The following uses of land are restricted discretionary activities, and require a resource consent:</p> <p>1. The use of land on the margin of a river or lake where such land has a dominant slope and is within the setback distances specified in:</p> <p>(a) Rule Table WQL32 for vegetation clearance in a way that does not comply with any one of the conditions of Rule WQL32; or</p> <p>(b) Rule Table WQL33 for the disturbance or deposition of soil on the land in a way that does not comply with any one of the conditions of Rule WQL 33.</p>	Both the vegetation clearance and soil disturbance are covered by this rule.	Restricted Discretionary
The placement of within the bed of the watercourses.	BLR2	<p>1. The erection or placement of a structure, or part of any structure in, on, over or under the bed of a lake or river; or</p> <p>2. any excavating, drilling, tunnelling or other disturbance, planting or removal of any plant or part of any plant, depositing of a substance or reclamation required to undertake the activities in (1) above; is:</p> <p>(a) a permitted activity provided the activity complies with all the conditions of this rule;</p> <p>(b) a permitted activity where condition (1) is not complied with, but the activity complies with all the conditions of Rule BLR6;</p> <p>(c) a discretionary activity where condition (1) is not complied with, and the activity does not comply with the conditions in Rule BLR6, in which case the activity requires resource consent under rule BLR8;</p> <p>(d) a prohibited activity where condition (7) is not complied, in which case no consent can be applied for under Rule BLR9; or</p> <p>(e) a discretionary activity where any other condition is not complied with; in which case the activity requires resource consent under Rule BLR8.</p> <p>Conditions:</p> <p>1. The activity shall not be undertaken within the beds of any natural state or high naturalness water bodies listed in schedule WQN5.</p> <p>2. For culvert crossings or bridges with abutments in the bed, the width of the bed at the point of crossing shall be less than 5 metres wide.</p> <p>3. Any bridge, spanning a bed greater than five metres wide at the point of crossing, shall not</p>	The structures proposed may not meet the conditions of this rule.	Discretionary - Assessment under BLR8

		<p>have piers or abutments within the bed and the soffit shall be 600 millimetres above the level of fullest flow (without overtopping its banks).</p> <ol style="list-style-type: none"> 4. The catchment area above any dam or weir shall not exceed 50 hectares or the mean annual flow of the river being dammed shall not exceed 300 litres per second, whichever is the lesser. 5. Any dam or weir shall not be capable of impounding more than 1000 cubic metres of water, and shall be less than three meters in total height above the bed. 6. The activity shall not be the erection or placement of a jetty or whitebait stand. 7. No plant species identified in Schedule BLR1 of this chapter shall be planted or introduced. 8. The activity and any associated equipment, materials or debris shall not obstruct or alter the passage of water in a manner that causes: <ol style="list-style-type: none"> (a) any increase in the risk or potential for flooding of surrounding lands; (b) any destabilising of lawfully established flood control structures or flood control vegetation or any other lawfully established structures within the bed of a lake or river; (c) any increase in erosion of the river or lake bed; or (d) drainage of the bed. 9. A discharge of sediment into water shall not: <ol style="list-style-type: none"> (a) for more than a total of 60 minutes in any consecutive 24 hour period: <ol style="list-style-type: none"> (i) change the colour by more than five Munsell Units; or (ii) decrease the clarity by more than 20 percent; or (b) increase the embeddedness of the bed substrate by more than ten percent. 10. The activity shall not adversely affect flood control vegetation. 11. The activity shall not restrict access to flood control structures or flood control vegetation for the purposes of their repair or maintenance. 12. The activity shall not obstruct the passage of fish both upstream and downstream, or be undertaken within any significant salmon spawning sites listed in Schedule WQN14. 13. The activity and any associated equipment, materials or debris shall not obstruct or alter the navigation of the bed or water body in a manner that may cause injury to any person. 14. Upon completion of the activity: <ol style="list-style-type: none"> (a) any reject, surplus or unused bed material stored in the bed shall be spread out; (b) any excavated areas shall be left with battered slopes not exceeding a 3:1 slope angle (3 horizontal to 1 vertical); and (c) all equipment and temporary structures associated with the activity shall be removed from the bed. 		
Excavation within the bed of drains and watercourses.	BLR3	<ol style="list-style-type: none"> 1. The excavating, drilling, tunnelling or disturbance (but not including excavation of materials for the erection, reconstruction, placement, use, alteration, extension, demolition or removal of a structure classified as a permitted activity by rule BLR1 or BLR2) in, on, over or under the bed of a lake or river, or 2. any depositing of excavated material on the bed associated with the undertaking of activities in (1) above (but not including excavation of materials for the erection, reconstruction, placement, use, alteration, extension, demolition or removal of a structure classified as a permitted activity by rule BLR1 or BLR2) in, on, over or under the bed of a lake or river, is: <ol style="list-style-type: none"> (a) a permitted activity provided the activity complies with all the conditions of this rule; (b) a permitted activity where condition (1) is not complied with, but the activity complies 	The volume of bed material excavated may exceed 10 cubic metres per week, and 50 cubic metres in a 12 month period. All other conditions will be complied with.	Discretionary - Assessment under BLR8

	<p>with all the conditions of Rule BLR6;</p> <p>(c) a discretionary activity where condition (1) is not complied with, and the activity does not comply with the conditions in Rule BLR6, in which case the activity requires resource consent under rule BLR8; or</p> <p>(d) a discretionary activity where any other condition is not complied with, in which case the activity requires resource consent under Rule BLR8.</p> <p>Conditions:</p> <ol style="list-style-type: none"> The activity shall not be undertaken within the beds of any natural state lakes listed in table 3 of schedule WQN5; The activity shall not involve the disturbance or removal of any rocks with a diameter greater than 500millimetres in any direction. The volume excavated by any person or on behalf of any person, organisation or corporation: <ol style="list-style-type: none"> in the bed of any river or lake shall not exceed 10 cubic metres per week and not more than 50 cubic metres in any 12 consecutive months or, between 1 February and 31 August, in the beds listed in Schedule BLR2, shall not exceed 50 cubic metres per month and not more than 150 cubic metres in any 12 consecutive months or, between 1 February and 31 August, in the beds listed in Schedule BLR3, shall not exceed 100 cubic metres per month and not more than 300 cubic metres in any 12 consecutive months. Any excavation undertaken in accordance with conditions 3(b) or (c) of this rule will require the Customer Service Centre of Environment Canterbury to be notified, before the activity takes place, as to the location of the excavation site, the quantity of material to be excavated, the dates when the activity is to be undertaken and a contact address and phone number of the person undertaking the activity. To avoid destabilising any lawfully established structure in, on, under or over the bed of a lake or river the activity shall: <ol style="list-style-type: none"> be undertaken at a distance greater than 50 metres from any lawfully established dam, weir, crossing, surface water intake plant or pylon and 150 metres from any lawfully established water level recorder; and; be undertaken at a distance from any existing flood control structures or vegetation and to a depth, not exceeding the depth as determined in the following table: <p>Table BLR3: Setback distances</p> <table border="1"> <tr> <td>Distance, in metres, from flood protection works or flood protection vegetation</td> <td>0 - 3m</td> <td>3 - 5m</td> <td>5 - 10m</td> <td>10m or greater</td> </tr> <tr> <td>Depth, in metres, below ground level immediately surrounding the excavation. (not to be exceeded).</td> <td>0m</td> <td>0.3m</td> <td>0.6m</td> <td>1.2m</td> </tr> </table> The activity, or any associated equipment, materials or debris shall not obstruct or alter the passage of water in a manner that causes: <ol style="list-style-type: none"> any increase in the risk or potential for flooding of surrounding lands; 	Distance, in metres, from flood protection works or flood protection vegetation	0 - 3m	3 - 5m	5 - 10m	10m or greater	Depth, in metres, below ground level immediately surrounding the excavation. (not to be exceeded).	0m	0.3m	0.6m	1.2m		
Distance, in metres, from flood protection works or flood protection vegetation	0 - 3m	3 - 5m	5 - 10m	10m or greater									
Depth, in metres, below ground level immediately surrounding the excavation. (not to be exceeded).	0m	0.3m	0.6m	1.2m									

		<p>(b) any destabilising of lawfully established flood control structures or flood control vegetation or any other lawfully established structures within the bed of a lake or river;</p> <p>(c) any increase in erosion of the river or lake bed; or</p> <p>(d) drainage of the bed.</p> <p>7. The activity shall not destabilise flood control vegetation.</p> <p>8. No part of the activity shall occur within surface water or at or below the water table.</p> <p>9. The activity and any associated equipment, materials or debris shall not obstruct or alter the navigation of the bed or water body in a manner that has the potential to cause injury to any person.</p> <p>10. Upon completion of the activity:</p> <p>(a) all reject surplus or unused bed material stored in the bed shall be spread out;</p> <p>(b) stripped areas shall be left with battered slopes not exceeding a 3:1 slope angle (3 horizontal to 1 vertical) and any flow channels disturbed during the activity shall be reinstated; and</p> <p>(c) all equipment and temporary structures associated with the activity shall be removed from the bed.</p>		
<p>The placement of structures (including bridges) within the bed of the watercourses</p> <p>Excavation within the bed of watercourses</p>	BLR8	<p>Any:</p> <p>(a) use, erection, reconstruction, placement, alteration, extension, removal, or demolition of any structure or part of any structure;</p> <p>(b) excavating, drilling, tunnelling;</p> <p>(c) introduction or planting of any plant or any part of any plant (whether exotic or indigenous);</p> <p>(d) depositing of any substance; (including industrial, commercial or residential rubbish);</p> <p>(e) reclamation or drainage; or</p> <p>(f) disturbance, removal or damage to any plant or part of any plant (whether exotic or indigenous),</p> <p>in, on, over or under the bed of any lake or river that is not classified as a permitted activity, a restricted discretionary activity or a prohibited activity in this chapter is a discretionary activity.</p>		Discretionary
<p>Introduction of vegetation to the beds and margins of watercourses</p>	BLR4	<p>The introduction or planting of any plant or part of any plant in, on or under the bed of a lake or river, including any associated disturbance of the bed, is:</p> <p>a permitted activity provided the activity complies with all the conditions of this rule;</p> <p><i>(abridged)</i></p> <p>Conditions:</p> <ol style="list-style-type: none"> 1. The activity shall not be undertaken within the beds of any natural state or high naturalness water bodies listed in schedule WQN5. 2. No plant species identified in Schedule BLR1 of this chapter shall be planted or introduced. 3. The activity shall not obstruct the passage of fish both upstream and downstream, or be undertaken within any significant salmon spawning sites listed in Schedule WQN14. 4. The planting or introduction and any associated equipment or materials shall not obstruct or alter the passage of water in a manner that causes: <ul style="list-style-type: none"> (a) any increase in the risk or potential for flooding of surrounding lands; (b) any destabilising of lawfully established flood control structures or flood control vegetation or any other lawfully established structures within the bed of a lake or river; 	<p>The proposed planting will comply with all of the conditions of this rule</p>	Permitted

		<p>(c) any increase in erosion of the river or lake bed; or (d) drainage of the bed.</p> <p>5. The activity shall not restrict access to flood control structures or flood control vegetation for the purposes of their repair or maintenance.</p> <p>6. A discharge of sediment into water shall not:</p> <p>(a) for more than a total of 60 minutes in any consecutive 24 hour period:</p> <p>(i) change the colour by more than five Munsell Units; or (ii) decrease the clarity by more than 20 percent; or</p> <p>(b) increase the embeddedness of the bed substrate by more than ten percent.</p> <p>7. The planting or introduction shall not contravene rules WQN45 or WQN46 under Chapter 5 of this Proposed NRRP.</p>		
Land use activities within 7.5m of the bed of a river	BLR7	<p>The use of land within 7.5 metres of the bed of a lake or river, or any flood protection structure is:</p> <p>(a) a permitted activity provided the activity complies with all the conditions of this rule; (b) a prohibited activity where condition (5) is not complied with for which no consent can be applied for under Rule BLR9; or (c) a discretionary activity where any other condition is not complied with, in which case the activity requires resource consent under Rule BLR8.</p> <p>Conditions:</p> <p>1. The activity and any associated equipment, materials or debris shall not cause:</p> <p>(a) any increase in the risk or potential for flooding of surrounding lands; (b) any destabilising of lawfully established flood control structures or flood control vegetation or any other lawfully established structure within the bed or margins of a lake or river; or (c) any increase in erosion of a flood protection structure or the bed or margin of a lake or river.</p> <p>2. No vegetation used for flood control shall be disturbed, removed, damaged or destroyed except by or on behalf of the person or agency responsible for maintaining that vegetation for flood control purposes.</p> <p>3. A discharge of sediment into water shall not:</p> <p>(a) for more than a total of 60 minutes in any consecutive 24 hour period:</p> <p>(i) change the colour by more than five Munsell Units; or (ii) decrease the clarity by more than 20 percent; or</p> <p>(b) increase the embeddedness of the bed substrate by more than ten percent.</p> <p>4. The activity shall not restrict access to flood control structures or flood control vegetation for the purposes of their repair or maintenance.</p> <p>5. No plant species identified in Schedule BLR1 of this chapter shall be planted or introduced.</p>	All activities within 7.5m of the bed of a river will comply with the conditions of this rule.	Permitted
To carry out work in areas that are deemed to be wetlands or streams for the lake, waterways, etc.	WTL1	<p>1. Where the sole purpose is to enhance or restore levels and flows of water in an existing, former or new wetland so as to assist in managing its conservation values, to:</p> <p>(a) take, use, dam or divert water from a river; or (b) disturb the river bed; or (c) reclaim any river bed; or (d) discharge excess/overflow water from the wetland onto land or into surface water; is a</p>	The proposed works may not meet conditions of this rule.	Discretionary - Assessment under WTL7

		<p>permitted activity, provided the activity complies with the conditions in this rule.</p> <ol style="list-style-type: none"> 2. Where Condition 1 is not complied with, the whole activity is a discretionary activity and requires resource consent under Rule WQN9, Chapter 5 Water Quantity. 3. Where any other condition is not complied with, the whole activity is a discretionary activity and requires resource consent under Rule WTL7. 4. This rule does not authorise the taking, use or diversion of water from within the subject wetland. <p>Conditions:</p> <ol style="list-style-type: none"> 1. The permitted activity is limited to rivers less than two metres in average width. Average width is to be calculated based upon the width of the river over a 100-metre reach upstream, beginning from the point of taking, damming or diversion, when it is at its fullest flow without overtopping the banks. 2. The activity shall not reduce levels or flows of water in any other wetland. 3. There shall be no restriction of fish passage. 4. No works shall be carried out during the spawning periods set out in Table WTL3. 5. In the course of diverting or realigning a river, all practical steps shall be taken to minimise disturbance of the original bed, and any riverbed construction or other riverbed works shall: <ol style="list-style-type: none"> (a) be carried out in accordance with the Environment Canterbury fact sheet "Drain and Waterway Guidelines"; (2004 edition) and (b) any riverbed construction shall be similar in standard and character to the original bed. For example, gravel where the former bed was gravel, and replicate as closely as possible the variety of pool, riffle and run habitat, and any meanders of the original riverbed; and (c) the construction methods shall include means of trapping sediment as far as practicable during commissioning for later disposal to land. 6. On completion of any works, any water discharged into water shall not, outside the Zone of Non-Compliance: <ol style="list-style-type: none"> (a) change the colour by more than five Munsell Units; or (b) decrease the clarity by more than 20 percent; or (c) increase the temperature by more than three degrees Celsius. <ol style="list-style-type: none"> (i) For the purpose of this condition, "Zone of Non-Compliance" means the receiving water in a reach of a river or watercourse measured from the point of discharge for a distance L (length in metres) calculated using the following formula: $L = (\sqrt{W}) \times 25$ (ii) Where W is the width of the flow measured in metres and tenths of a metre at the point of discharge. (Advice on assessing these changes is available from Environment Canterbury.) 7. To minimise the risk of erosion, any former riverbed not part of the wetland shall either be contoured and planted, or be backfilled using uncontaminated soil, sand, gravels or rock, and planted. In either case, planting shall be undertaken within six months of the works being completed. Planting shall then be maintained and any failures made good for a period of two years. 8. Irrespective of the path it follows in the course of damming or diversion, the flow remaining in the source river where it leaves the nominated area (see Condition 10) shall not be less than 		
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		<p>75 percent of the available flow where it enters the nominated area. In this context:</p> <p>(a) where a minimum flow has been set, and/or one or more permits to take water have been granted and have not lapsed, "available flow" means the actual flow minus the sum of any set minimum flow and every take authorised by a water permit; and</p> <p>(b) where (a) does not apply, "available flow " means the actual flow in the river.</p> <p>9. No dam shall exceed one metre in height relative to the average level of the original bed at the base of the dam, and any such dam shall be constructed and maintained so as to avoid any risk of failure.</p> <p>10. All aspects of the activity shall be confined within a nominated area, which may be any convenient area within a single property or may extend over several properties (see Figure WTL2).</p> <p>11. A plan showing the nominated area and a description of the proposal shall be lodged with Environment Canterbury at least 10 working days before any work commences. This plan shall be signed by or on behalf of each owner or occupier of land in the nominated area.</p>		
To carry out work in areas that are deemed to be wetlands or streams.	WTL7	<p>Where any condition relating to an activity described in:</p> <p>(a) Rule WTL1, except Condition 1; or</p> <p>(b) Rule WTL2, except Condition 1 or 2; or</p> <p>(c) Rule WTL3, except Condition 1; or</p> <p>(d) Rule WTL5, except Condition 1 or 2; or</p> <p>(e) Rule WTL8; or</p> <p>(f) Rule WTL9;</p> <p>is not complied with, the activity is a discretionary activity and requires resource consent.</p>		Discretionary