

IN THE MATTER OF

the Resource Management Act
1991

AND

IN THE MATTER OF

An application to take and use
water and disturb the bed by
**WAIHAO DOWNS IRRIGATION
LIMITED (CRC040427,
CRC040428 and CRC040429)**

STATEMENT OF EVIDENCE OF LYNN TORGERSON

BACKGROUND AND QUALIFICATIONS

- 1 My name is Lynn Torgerson and I am an Environmental Engineer with Pattle Delamore Partners Ltd. I have a Bachelor of Science in Civil and Environmental Engineering from the University of Wisconsin (Madison), USA (1988). From 1988 to 1998, I worked for the Wisconsin Department of Natural Resources as a Water Regulation Engineer. My duties involved the review, analysis and design of surface water resources projects. In 1999, I was an Investigating Officer for the Canterbury Regional Council. From 1999 to 2005, I was a Hydrology Lecturer for the Natural Resource Engineering Group at Lincoln University. My lecture topics included surface and groundwater behaviour and modelling. I have been employed with Pattle Delamore Partners (PDP) since 2006 working on surface and groundwater-related projects.
- 2 I have been involved in the preparation of numerous resource consent applications and assessment of environmental effects for groundwater and surface water projects in Canterbury.
- 3 The evidence I will present today is within my area of expertise, except where I state that I am relying on information provided by another party. I have not knowingly omitted facts of information that might alter or detract from the opinions I

express. I am familiar with the Code of Conduct for Expert Witnesses and I agree to comply with this code.

SCOPE OF EVIDENCE

- 4 My evidence is presented on behalf of Waihao Downs Irrigation Limited. I am familiar with the site and wider vicinity, the proposal and the applicable planning provisions. PDP was contracted by Waihao Downs Irrigation Limited (WDIL) in 2006 to assist in the consent application process. I have been involved with this aspect of the WDIL project since October 2006.
- 5 The original application was prepared by Richard de Joux on behalf of WDIL and lodged with Environment Canterbury (ECan) on 19 August 2003. On 11 September 2003, the Minister for the Environment Marion Hobbs called in the resource consent applications for the abstraction of water in the Waitaki Catchment. Following this ministerial action, ECan requested that the WDIL application be placed *“on hold under Section 37(5A) until the associated call-in application(s) have reached a stage that could enable your set of applications to follow synchronised timeframes.”*
- 6 In July 2006, the Waitaki Catchment Water Allocation Regional Plan (WCWARP) became operative, and ECan requested further information on the applications. Response to the request for further information were provided in 2006, with further clarification of matters as requested by Warwick Pascoe provided in early 2007. The project was notified in August 2007. No further information requests have been made by ECan.
- 7 I have read the planning reports prepared by the Investigating Officer of Environment Canterbury (ECan) under section 42A of the Resource Management Act 1991 (RMA). The Investigating Officer (Tim Ensor) has concluded that there is not enough information included in the application to assess several effects

and therefore has made no recommendations on the WDIL applications other than CRC040429.

- 8 The evidence I will present will supplement the consent application documents. In summary, I will:
- briefly describe the proposal, the site and the vicinity;
 - describe the classification of the activities in terms of the relevant regional rules;
 - summarise the submissions following public notification of the resource consent applications;
 - assess the effects specifically related to those identified in Mr Ensor's Section 42A reports (including comments on any related submissions);
 - assess the proposal in the context of the relevant objectives and policies and in terms of the Part II of the RMA;
 - comment on the Investigating Officer's reports and proposed conditions of consent.
- 9 I do not intend to repeat details which would overlap with other evidence that has been presented on behalf of the applicant.
- 10 My evidence is based on contributions and evidence provided by Mr Paul Harrison, Mr Jon Kirk and Mr Dave Attewell. Where noted in my evidence, I have also relied on the information provided by Meridian Energy Limited in their Hunter Downs Irrigation Scheme (HDIS) application.

BRIEF SUMMARY OF THE PROPOSAL

- 11 I will describe the project as it relates to my evidence. All figures referenced in my evidence can be found in Appendix A attached. Figure 1 shows the general location of the proposed WDIL scheme command area.

- 12 Resource consent is being sought from Environment Canterbury to take and use water from the Waitaki River at a maximum rate of 3.06 m³/s, with an annual volume not exceeding 38 million cubic metres for the spray irrigation of up to 6,800 ha in the upper Waihao River catchment (CRC040428). The proposed take will occur at one of three areas:
- (a) New intake to be constructed near Pub Road near Ikawai, about 5 km downstream, of Stonewall on the north bank of the Waitaki River; or
 - (b) New intake beside the Morven Glenavy Irrigation Scheme intake, at Stonewall; or
 - (c) Proposed Hunter Downs Irrigation Scheme intake, also at Stonewall.
- 13 Figure 2 shows the locations of the three intake location options.
- 14 A land use consent is also being sought to disturb the bed of the Waitaki River to construct and maintain a new intake structure and diversion channel (CRC040427). This application relates specifically to the construction of the new intake structures and diversion channels near the Pub Road location or the Morven Glenavy location. Figure 2 shows the location of the areas to be disturbed for the intake and the diversion channels.
- 15 This same application is also to disturb the bed of Waihuna and Elephant Hill Streams to construct and reconstruct inverted siphons for the conveyance of irrigation water. The locations of the works on the Waihuna and Elephant Hill Streams can be seen on Figure 3.
- 16 Finally, land use consent (CRC040429) is being sought for the disturbance of the beds of minor watercourses, the placement

of pipes within these minor watercourses, and to use land with slopes greater than 21° for the excavation and placement of the water supply pipeline for the WDIL scheme. The location of the water supply pipeline route can be seen on Figure 4.

- 17 A consent duration for 35 years has been requested for all three resource consent applications. The original application requested that the consents for all three applications be set to expire on 30 April 2028, which was consistent with the expiry date of the existing Morven-Glenavy Irrigation Scheme. During the preparation of the public notice wording, consent duration for all three applications was specified as 35 years. The public notice has been published with that consent duration.
- 18 Mr Attewell has described in his evidence the background leading to the layout of the irrigation scheme, including the infrastructure layout and intake locations on the Waitaki River. He has also described how the scheme will be constructed. In his evidence, he described the mitigation measures proposed to mitigate any water quality impacts as a result of the construction methods.

DESCRIPTION OF THE SITE

- 19 I have visited the WDIL scheme command area and the proposed intake sites on the Waitaki River.
- 20 The WDIL scheme command area is located in the Waihao Downs area located north of the Waitaki River. The proposed irrigated areas are located in the Waihao River catchment.
- 21 The North Branch and the South Branch of the Waihao River meet at the Waihao Forks, and form the Waihao River, a meandering stream which flows to the sea.
- 22 The North Branch of the Waihao River has a site of special wildlife importance, while downstream of the Waihao Forks to the mouth is designated wetlands of regional importance.

- 23 With the Waihao River catchment are lands of national significant, primarily forest habitat located to the adjacent to the North Branch of the Waihao River and . The western parts of Waihao River catchment are classed as regionally significant lands.
- 24 The lands to be irrigated are in the Waihao Downs area and are primarily rolling hills. The soils of the proposed irrigation area are primarily deep silt loams (ECan database). Irrigation will be limited on steep slopes (greater than 21°) and will only utilise low impact sprinklers.
- 25 Currently the area is used for sheep, beef cattle and some dairying. The intent of the irrigation is two-fold: to drought-proof some farms, and to allow for future uses.
- 26 The location of the intake option at the Morven-Glenavy Irrigation Scheme is a developed intake area with an open channel delivery system. The current intake is a diversion from the river, with a ponded area.
- 27 The location of the Pub Road intake option is currently farmed area to the edge river. The area is supported by border dyke irrigation. There is stock currently grazing adjacent these areas. Vegetation along the intake areas consists of gorse and other exotic vegetation.
- 28 The proposal involves the crossing of the Waihuna Stream bed and Elephant Hill Stream. Both streams are dry stony beds with no flow or standing water on the date of the site visit. There was grassy vegetation on the banks, with farming occurring up to the edges.

PROPOSED FLOW SHARING REGIME

- 29 The Waitaki Catchment Water Allocation Regional Plan (WCWARP) has provided for 90 m³/s of flow to be allocated in the Lower Waitaki River downstream of Black Point. WDIL

recognises that a flow sharing regime needs to be proposed in which the existing consent holders have been considered. WDIL is currently considering the various flow sharing regimes in consultation with other water users, however, at the date of writing this evidence, I have not been given direction as to the flow sharing regime proposed.

PLANNING MATTERS

30 As part of the preparation of this evidence, I reviewed the proposed activities with respect to the Resource Management Act 1991 (RMA), and the operative and proposed regional plans. The relevant plans include the Canterbury Transitional Regional Plan (TRP), Waitaki Catchment Water Allocation Regional Plan (WCWARP), both of which are operative, and the proposed Natural Resources Regional Plan (PNRRP).

Resource Management Act 1991 (RMA)

31 Section 14 of the Resource Management Act (RMA) states that no person may take or use any water unless allowed by a rule in a regional plan or in any relevant proposed regional plan or a resource consent. WDIL propose to take and use water for irrigation.

32 Section 13 of the RMA states that no person may use, erect, place any structure or part of any structure in, on or over the bed of a river, nor may one excavate or otherwise disturb the bed of the river, unless expressly allowed by a rule in a regional plan or proposed regional plan or a resource consent. WDIL propose to disturb the bed of the Waitaki River for the placement of the intake structure and disturb the beds of Waihuna Stream and Elephant Hill Stream for the placement of the pipeline structures for the delivery of the irrigation waters.

33 Section 9 of the RMA states that no person can use any land in a manner that contravenes a rule in a regional plan or a proposed regional plan unless that activity is expressly allowed by a resource consent. WDIL propose to disturb land with

slopes greater than 21° for the placement of the pipeline system.

Canterbury Transitional Regional Plan (TRP)

- 34 The Canterbury Transitional Regional Plan (TRP) contains a number of general authorisations allowing for water takes and discharges that are deemed to have an impact that is no more than minor.
- 35 The TRP contains the General Authorisation for the Abstraction of Natural Water (GA). WDIL propose to abstract an annual volume not exceeding 38 million cubic metres at a maximum rate of 3.06 L/s of water from the Waitaki River. Given that the volume abstracted exceeds the volume and rate permitted under this GA, the proposed abstraction is classified as a **discretionary** activity under the TRP, and resource consent is required.
- 36 The TRP also contains the General Authorisation for the Diversion and Discharge of Natural Water. This GA provides for the diversion of natural water associated with minor realignments or and minor improvements to water courses subject to conditions. This requires that the diversion of the natural water from a surface flows river and the return of the flow shall be within one property. As the water will be diverted, but will be delivered to upland areas for irrigation (and therefore not be discharged directly back to the river), the proposed project does not meet the conditions of this GA. Therefore, the diversion activity associated with the intake is classified as a **discretionary** activity under the TRP, and resource consent is required.
- 37 The TRP contains the South Canterbury Catchment Board (SCCB) Bylaws which regulate certain activities on the beds of watercourses and the lands.

- 38 Part V of the SCCB Bylaws 1948 deals with watercourses. This bylaw states that no person may alter in any way the course of a watercourse or erect any structures or place any materials on the bed without the written permission of the Board. The proposed project involves the placement of an intake structure on the bed of the Waitaki River, the diversion of the channel braid for the intake, and the pipeline crossings of the Waihuna and Elephant Hill streams. As such these activities are classified as discretionary under the TRP, and resource consent is required.
- 39 The SCCB Conservation of Ground Cover Bylaw 1981 states that no person shall engage in any practices which will cause erosion. The proposed works involves the removal of soil and vegetation for the placement of the delivery pipeline within the command scheme area. The works will occur in areas where soil could enter watercourses and in areas where the slopes are greater than 21°. As such these activities are classified as **discretionary** under the TRP, and resource consent is required.

Waitaki Catchment Water Allocation Regional Plan (WCWARP)

- 40 The Waitaki Catchment Water Allocation Regional Plan (WCWARP) became operative on 3 July 2006. The plan provides for the allocation of water in the Waitaki catchment on the basis that it is consistent with the purpose and principles of the Resource Management Act. The WCWARP applies to the take of water and does not apply to the land use portion of this project. Furthermore, the use of water for this proposal is for the irrigation in the Waihao Downs area which is not identified on the WCWARP maps, and therefore considered out of catchment. As such, the use of the water is not covered under this plan.
- 41 Rules 9 through 24 provide the classification of an activity with the catchment. These rules should be read in conjunction with the other Rules 1 through 7 in the WCWARP to determine the status of the activity.

- 42 Rule 1 limits the take to 10 cubic metres per day per property at a rate not exceeding 5 L/s. The application exceeds these limits and therefore this rule does not apply.
- 43 Rule 2 (1) states that no person shall take surface water unless:
- (a) the flows in the relevant river is above the minimum flow or level in Table 3; and
 - (b) the amount taken from the river does not exceed the allocation limits in Table 3; and
 - (c) the take complies with a flow-sharing regime listed in Table 3; and
 - (d) where applicable, provides flushing flow as listed in Table 3.
- 44 The proposed project is to take water from the Lower Waitaki River downstream of Black Point. According to Table 3, the minimum flow is set to 150 m³/s from the Waitaki dam to the sea, and there is an allocation limit of 90 m³/s. There is no flow-sharing regime and flushing flows apply to the area above Black Point. The application is to take 3.06 m³/s and fits within the allocation limit, however, the application has requested a minimum flow of 100 m³/s, which is in line with the Hunter Downs proposal. Because of this lower minimum flow, the WDIL proposal does not comply with Rule 2.
- 45 Rule 6 (1) states that no person shall take water when by itself or in combination with other takes, the sum of the annual volumes authorized by resource consent exceeds the annual allocation to that activity as listed in Table 5.
- 46 Table 5 provides annual allocation volumes for activities in various parts of the Waitaki Catchment. For agricultural and horticultural activities, downstream of Black Point, the annual allocation is 1,100 million cubic metres per year. The proposed project is for an annual volume not exceeded 38 million cubic

metres. The proposal complies with Rule 6. It should be noted that the calculations prepared by Page and Potts also found that the WDIL proposal are within the annual allocation volume.

- 47 Rule 16 states that any activity which contravenes any of Rules 2, 6 or 7 is a non-complying activity. Given that Rule 2 is contravened, the proposed take activity is classified as a ***non-complying*** activity.
- 48 Rule 16 states that in considering an application to which this rule applies, the consent authority will have regard to all the Policies of the WCWARP. It should be noted that Policy 13 is cross-referenced to the water quality objectives in the Natural Resources Regional Plan.

Proposed Natural Resources Regional Plan (PNRRP)

- 49 The PNRRP is a proposed regional plan that will supersede the Canterbury TRP once it becomes operational. Environment Canterbury publicly notified PNRRP Chapters 1-3 in June 2002 and Chapters 4-7 in July 2004 of the PNRRP. At the present time the NRRP is still going through the submission process. Despite this, any activities must still have regard to the rules of the PNRRP. The PNRRP chapter containing relevant rules to the proposed activity is Chapter 5 – Water Quantity, Chapter 4 – Water Quality and Chapter 6 Beds and Margins of Lakes and Rivers.
- 50 The take and use of water from surface waters is covered under Chapter 5- Water Quantity. However as the WCWARP is the operative plan regulating the take and use of water within the Waitaki River catchment, the rules regarding the take of water contained within Chapter 5 of PNRRP are not applicable. However, as the use of water is for irrigation within the Waihao River catchment and is not in the mapped area in the WCWARP, it is subject to the use rules within this chapter of the NRRP. As it does not meet the conditions of the specified rules, the use

falls under WQN26 and as such is classified as a **discretionary** activity.

- 51 Chapter 4 manages the water quality of the waters within Canterbury, and again, as the take and use activity falls under the purview of the WCWARP, it is important to recognize that consideration must be given to the water quality objectives establish in Chapter 4.
- 52 For the land use activities, the PNRRP is applicable. Chapter 6 provides rules for the disturbance of streambed and their margins. The construction of the intake, the siphons and the pipeline across the waterways fall under the auspices of this chapter.
- 53 Rule BLR2 is for the erection or placement of structures and provides conditions which must be met for the activity to be considered permitted. It is my opinion that the placement of these structures can be done so as to meet the conditions of this rule, and therefore can be classified as a permitted activity under this rule.
- 54 Rule BLR3 is for the disturbance within the bed and is relevant to the construction of these structures. As with the previous rule conditions must be met for the activity to be classified as permitted. It is my opinion the disturbance of the streambed and margins can meet the conditions of this rule, and be classified as a permitted activity under this rule.
- 55 With respect to the disturbance of land on slopes steeper than 21°, the PNRRP does not seem to have specific rules. However, Chapter 8 - Soil conservation provides policies which must be considered.

Overview of Planning Classification

- 56 Where the TRP, WCWARP and PNRRP classify the activities differently the more conservative classification should apply.

Below is a table which shows the planning classification under each plan and the final classification.

Table 1: Overview of Planning Classification					
		TRP	WCWARP	PNRRP	Final
CRC04027	To disturb the bed of the Waitaki River for the placement of an intake structure	Discretionary	N/A	Permitted	Discretionary
CRC040428	Take and use of water	Discretionary	Take:Non-complying Use: N/A	Take: N/A Use:discretionary	Non-complying
CRC04029	To disturb the beds of streams, and place pipelines on land greater than 21°	Discretionary	N/A	Permitted	Discretionary

SUBMISSIONS

57 On 4 August 2007, public notification of 165 applications for resource consent in the Waitaki catchment occurred. The notification of the three Waihao Downs resource consent applications was in the Otago Daily Times and the Timaru Herald. The closing date for submissions was 28 September 2007.

- 58 On the closing date, submissions by 21 parties were received by Environment Canterbury, of which five supported the proposal. Fourteen submissions opposed the proposal, and two were neither in support or opposition to the proposal. Of these twenty one submissions, four wished to be heard.
- 59 The majority of submissions were concerned about using a minimum flow less than the established minimum flow in the Waitaki Catchment Water Allocation Regional Plan. Many of the submissions were opposed to all the applications in the catchment voicing their concern about the sustainability of the river's quality.

CONSIDERATION OF THE EFFECTS ON THE ENVIRONMENT

- 60 As part of the application for resource consent, the potential effects on the environment as a consequence of the proposed activities have been addressed. An assessment of environmental effects (AEE) was prepared and included with the consent applications. Further assessment of effects were included as part of the request for further information from ECan.
- 61 The following environmental effects are considered to be relevant to the applications. These effects are based on ECan's approach to processing these types of consents.

Take and use water:

- Effect of take on eco-systems with respect to flows;
- Effect of take and use on other surface water users;
- Effect of inefficiency of take and use of water;
- Effect of take and use on groundwater quality;
- Effect of take and use on surface water quality;

Land use consents:

- Effect of structures on floodwater carrying capacity of Waitaki River, Waihuna and Elephant Hill streams;
- Effect of bed disturbance on stream water quality;
- Adverse effects on existing structures, including stability;
- Adverse effects on in-stream plants and animals;
- Adverse effect on amenity values.

62 I note that the Investigation Officer, Mr Ensor, has followed a similar approach in his assessment of the activities. For most of the potential effects related to the two land use consents, Mr Ensor agrees with the conclusion provided in the AEE and supplementary information or he concludes that mitigation measures can be proposed that ensure that the effects are no more than minor. Mr Attewell has provided information on the additional mitigation measures in his evidence that supports the conclusion that the effects to environment from the land use activities will be no more than minor.

63 With respect to the take and use of water, Mr Ensor has raised several issues of concern with the proposed project. Primarily, he finds that there is not enough information provided to determine whether the effects to the environment will be no more than minor. Specifically he has identified the effects associated with the proposed minimum flow of 100 m³/s and the lack of a proposed flow sharing regime, creating associated effects on the ecosystems, existing users, and amenity values. He has stated that the reasonable use of water has not been sufficiently demonstrated to be able to conclude that the use of water is efficient. He also commented that insufficient information was provided to make a conclusion about the water quality effects as a result of the use. Finally, while he has not directly commented on the Tangata Whenua values, he has identified this as a potential effect that needs to be addressed.

- 64 In my evidence I will comment on these effects, and will not discuss any effects where we reached a similar conclusion that the effect would be no more than minor.
- 65 Meridian Energy Limited (MEL), in its application for the Hunter Downs Irrigation Scheme (HDIS), has proposed that the minimum flow for the Waitaki River from the Waitaki Dam to the outlet of the sea be reduced to 100 m³/s. The HDIS includes the WDIL scheme in its applications. While WDIL has also continued to pursue its independent application with this proposed minimum flow, WDIL has been granted permission to rely on the evidence provided by MEL with respect to potential effects resulting from this proposed minimum flow. WDIL relies on the MEL evidence to justify that and its potential effects on the Waitaki River system. If it is deemed to be acceptable then, WDIL seeks the same condition.

Effect of the take of ecosystems

- 66 Minimum flows are set with the intent of protecting the ecosystem, and the WCWARP sets a minimum flow of 150 m³/s. WDIL has proposed a minimum flow of 100 m³/s in support of their application. This is in line with the minimum flow presented by MEL in their proposed Hunter Downs Irrigation Scheme. As WDIL has been included in the Hunter Downs Irrigation Scheme, WDIL is relying on the evidence presented by MEL with respect to the effect on ecosystems.
- 67 MEL concluded that there although a flow regime with a higher minimum flow would probably support higher total numbers of fish, a lower minimum flow would still support the same aquatic communities at similar densities. They concluded that any incremental difference between the numbers would be difficult to measure and that this effect would be minor. Therefore, based on their work, I find that the effect of the take on eco-system when using a minimum flow of 100 m³/s will be no more than minor.

Effect of take on other water users

- 68 The minimum flow of 150 m³/s set in the WCWARP considered the existing users in the systems. Mr Ensor has stated that the proposed take may have an effect on existing users if the take occurs between proposed minimum flow of 100 m³/s and 150 m³/s.
- 69 In the HDIS hearing, MEL presented evidence which addressed this issue. They found that the proposed take would not have an effect on the existing users provided that they were considered in a flow sharing regime. They found that block allocation would reduce current irrigator's reliability somewhat but not to an extent that could be regarded as unreasonable.
- 70 Mr Ensor has also noted that during the preparation of his audit, no flow sharing regime had been proposed and thus he was unable to determine how the proposed take would accommodate existing users, and thus he could not conclude that the effects to existing water users was no more than minor.
- 71 As noted in paragraph 29, a flow sharing regime is being considered by WDIL, however at the date of this evidence, this information has not been presented to me, and thus I can not comment as to whether the existing consent holders have been considered.
- 72 Mr Ensor has identified Morven-Glenavy Irrigation Scheme has a potentially affected user. WDIL is currently negotiating with MGIS, but at the date of this evidence, there is no formal agreement.

Effect of take on people and amenity values

- 73 The WCWARP takes into account people and amenity values when setting a minimum flow of 150 m³/s. It is Mr Ensor's position that effect to people and amenity values based on a minimum flow of 100 m³/s has not been addressed.

- 74 In the HDIS hearing, MEL presented evidence which addressed this issue and concludes that the effect on people and amenity values from a combined take of 20.5 m³/s which includes the 3.06 m³/s for WDIL. MEL looked at the effect of this take on amenities, landscape and recreational values when the minimum flow was 100 m³/s. MEL found that while the Lower Waitaki River is a modified river, it still retains many special landscape qualities and a high degree of natural character.
- 75 They concluded that the take at this lower minimum flow was be difficult for most people to discern and with respect to the natural vegetation and riparian areas, there would be little effect from the take. MEL concluded that this combined take at the lower minimum flow would be no more than minor.
- 76 Given that WDIL is requesting a small portion of that combined flow, I find that the effect from the proposed WDIL take on people and amenity values will be no more than minor.

Effect of inefficient take and use

- 77 The WCWARP and PNRRP aim to ensure that the taking and usage of water is reasonable and efficient.
- 78 Mr Ensor has expressed concerns about the other irrigation consents currently operating within the WDIL scheme command area. He has indicated that the use of these consents should not be included in the annual volume determination.
- 79 I am currently undertaking a review of the existing water take consents in the WDIL scheme command area. The source of my review is the ECan GIS database. According to the database, there are 12 consents to take water for dairying, farming or mixed farming. Four of these consents were groundwater takes, while the remainder are for surface water takes. At the time of this evidence, I am awaiting information from ECan on the irrigation area authorised by these consents.
- 80 Using an estimate of the consented irrigated area, I have reviewed the annual volume proposed by WDIL in light of these consents and find that with the inclusion of these additional

areas, the annual volume requested by WDIL is still appropriate. Once I received the final irrigated areas authorised from ECan, I will verify this conclusion.

- 81 It is recognised that these existing consents fall within the WDIL scheme command area and in an effort not to get a double allocation of water, WDIL recognises and accepts that a condition will be required to ensure that this is avoided.
- 82 In his report, Mr Ensor noted that the original application stated that the water may be distributed via a piped network or an open channel. WDIL can now confirm that the conveyance of water will be through a piped network and therefore is the more efficient way to convey water to the shareholders. This is consistent with Policy 19 of the WCWARP.
- 83 To summarise, it is my opinion that the take and use of water proposed by WDIL, if done in accordance to proposed mitigation measures and consent conditions, is reasonable and efficient.

Effect of take and use on water quality

- 84 The development of irrigation creates increased drainage of water and nutrients through the soil profile into the underlying groundwater. Depending on the types of land use, increased drainage can degrade water quality with respect to nitrate-nitrogen. This degradation of water quality may have adverse effects on other groundwater users and as a consequence of groundwater contamination, on surface water resources.
- 85 WDIL is relying on the HDIS evidence for the assessment of potential water quality effects. This evidence suggested that there is likely to be an increase in the nitrate-nitrogen concentrations as a result of the proposed irrigation. This analysis was a generalised analysis across the entire HDIS command area, and did not take into account the specifics of the Waihao Downs catchment. WDIL recognises that this increase is directly related to land use practices, and is proposing to use on-farm management methods which will reduce the loss of nutrients to groundwater or surface waterways.

- 86 In hilly areas, there is potential for increased runoff to occur as a result of irrigation, which then goes into surface waterways and can impact the water quality of the waterway. In the WDIL scheme command area, areas to be irrigated include some hills. WDIL proposes to limit the application rate so that the irrigated water will soak into the soil, rather than runoff. Soils in the area are primarily deep and therefore are capable of accepting irrigation applied at the proposed rate without converting to runoff.
- 87 In addition, vegetative buffer strips adjacent to waterways will assist in the trapping of any sediment and taking up of nutrients that may be carried in the runoff to the waterways during rain events. This will reduce the likelihood of any sediment or nutrients entering a waterway via overland flow. This buffer strip should extend around streams and any adjacent wetlands.
- 88 In addition to the buffer strip, it is critical to ensure that stock are kept out of the waterways and wetlands. Stock trampling on the banks or walking in the stream can also influence the nutrient loading within the waterway. Keeping stock out of the waterways can be accomplished through the use of fencing.
- 89 The use of irrigation provides the potential for more intensive land use than if the land was not irrigated. This includes carrying more stock on the land for longer periods than previously. A consequence of this would be an increase in the nitrogen returned to the land in dung, urine and fertiliser. The additional water from irrigation provides a means of more easily mobilising the nitrates so that more reach groundwater. Balancing this to some extent is the dilution afforded to the nitrogen by the additional drainage water. However, one means of ensuring that the amount of nitrate-nitrogen leached to the groundwater is minimised is properly managed nitrate-nitrogen on the farm.
- 90 Farm management practices can be used to reduce potential nitrate-nitrogen leaching and minimise the impacts of irrigation on the groundwater quality. A farm management programme (FMP)

can be developed to manage the nitrate-nitrogen on farm in an effort to reduce nitrogen losses to groundwater. Each farm should have its own FMP which considers the specific farm site and receiving environment.

- 91 A FMP identifies key sources of nitrate-nitrogen, and then develops practices in which to reduce or mitigate the loss of nitrate-nitrogen. A monitoring or auditing regime should be put in place to ensure that the recommended practices are occurring are effective. Strategies should also be incorporated in a FMP to address any deficiencies found during the monitoring/auditing process. Finally, provisions should be made to periodically update the FMP with respect to changes in farm status or improving technology.
- 92 WDIL will develop a FMP which is tailored for the catchment and the specific farm use. When properly implemented, the effects to groundwater quality from the proposed irrigation project should be reduced such that the impacts are no more than minor.
- 93 To summarise, the management of irrigation to prevent surface runoff, the use of vegetative buffer strips and the implementation of a FMP to manage on-farm nutrient sources will reduce the likelihood of nutrients entering the waterways, via overland flow or groundwater.
- 94 The ECan GIS database has identified areas of significance, in particular the Waihao River downstream of the Waihao Forks and the wetland downstream of the Waihao Forks. Buchanans Creek is a tributary located further downstream of the proposed command scheme area. These waterways support eco-systems that are sensitive to changes in water quality.
- 95 The implementation of these mitigation measures will ensure that any impact to these sensitive waterbodies from the take and use of water for WDIL will be no more than minor.

Effect of take and use on Tangata Whenua values

- 96 Te Runanga O Ngai Tahu-Mamoe Fisher People lodged a submission in opposition to the all notified applications in the Waitaki River catchment. In their submission, they challenge Environment Canterbury as the appropriate consenting authority to issue consents with respect to the water rights, use or priorities. In this submission, they do not address the WDIL project specifically, nor do they provide any comments about environmental or cultural concerns about the project.
- 97 According to the ECan GIS database the Waitaki River is designated as a statutory acknowledgement area.
- 98 The WCWARP identifies the cultural issues of mixing of waters from other catchment. In this project, the take of water will be from the Waitaki River catchment, and the use will be in the Waihao River River catchment. The WCWARP implies that where the water is soaking into ground, the concern is mitigated. While Tangata Whenua has not identified this as a concern in their submission, I would like to note that the irrigation will be applied to land at a rate such that runoff to the surface waterway will not occur, thus the water is going through the ground.
- 99 WDIL is currently in the process of consulting with Te Runanga O Ngai Tahu to determine whether there are specific issues with respect to the WDIL project, and I hope to be able to provide further comment about this at the hearing.
- 100 **Summary of assessment of environmental effects**
- 101 Based on my assessment of environmental effects, I consider that any potential adverse effects resulting from the proposed activities are no more than minor, when constructed in accordance with the proposed mitigation measures.
- 102 I therefore consider that the first threshold test in section 104D is satisfied.

OBJECTIVES AND POLICIES

103 I have reviewed the project with the objectives and policies in the Canterbury Regional Policy Statement (RPS), the Transitional Regional Plan (TRP), and Waitaki Catchment Water Allocation Regional Plan (WCWARP), the proposed Natural Resources Regional Plan (NRRP). I will comment on the most relevant policies.

Regional Policy Statement

104 Chapter 9 of the RPS relates to water and identifies the issues, objectives and policies related to the management of water in Canterbury. It is particularly relevant with respect to the take and use of water. Policy 2 is to promote the efficiency in use of water. I have considered the efficiency of the irrigation in terms of the proposal and find that this policy is met.

105 Policy 6 states that in considering a permit to take water, the consent authority should consider the maximum permitted usage over specific periods as well as maximum abstraction rates and be based on actual and reasonable water needs. This information has been provided the ECan so that this policy can be met.

106 Policy 11 is to promote land use practices which maintain and where appropriate enhance water quality. Mitigation measures have been proposed which include farm management plans. These plans encourage on-farm practices which reduce the impact to waterways as a result of the irrigation. Therefore I find that these applications are consistent with this policy.

107 Chapter 10 of the RPS relates to the beds of rivers and lakes and their margins. Policy 3 states that riparian vegetation should be retained or promoted along the margins of rivers to reduce the adverse effects of land use on water quality. The fencing of waterways to prevent stock access and the establishment of buffer strips ensures that this policy is met.

- 108 Policy 4 states that land use within bed and margins of river should be undertaken in such a way that any adverse effects on the free passage of floodwaters within the beds are avoided or mitigated. As described earlier in my evidence, the proposed intake, siphons and pipeline structures will not impede flood flows and therefore the proposal is consistent with this policy.
- 109 Policy 6 of Chapter 10 states that land use activities within the beds and margins of rivers should be undertaken in such a way that any adverse effects on the stability or performance of essential structures are avoided. The installation of the intake, siphons and pipeline structure will not undermine the stability or performance of essential structures, and therefore I find that the proposed activities are consistent with these policies in Chapter 10.
- 110 Chapter 16 of the RPS deals with natural hazards including flooding. Objective 1 of this chapter aims to avoid or mitigate the actual or potential costs of loss or damage to life, property or other parts of the environments from natural hazards. Policy 2 states that local authorities shall have responsibility to control the use of land to avoid or mitigate natural hazards.
- 111 Chapter 7 deals with soils and land use, and is particularly relevant where land use may cause induced soil erosion, as in the case of working on steep slopes. Policy 2 states that wherever an activity is carried out that increase the likely hood of erosion, the best practicable method shall be used to reduce the amount of erosion resulting from that activity. Mitigation measures have been proposed to ensure that erosion is reduced such that the effect is no more than minor. I find that if the project is constructed in accordance with these measures, the proposed project will be consistent with this policy.

Waitaki Catchment Water Allocation Regional Plan

- 112 The objectives and policies of the WCWARP are directly applicable to the proposed water take and use. This plan has

catchment-wide policies and waterway-specific policies. The catchment-wide policies are dealt with first.

- 113 Policy 9 discourages the take and use of water so that it mixes with the water of another catchment, however it provides measures in which to mitigate adverse effects from the mixing. WDIL proposes to take water from the Waitaki River and deliver it to the Waihao River catchment. The water will be used for spray irrigation, which if applied at an appropriate rate to avoid runoff, will mitigate the adverse effects. Therefore, while the mixing is discouraged, I find that the proposed project is still consistent with this policy.
- 114 Policy 13 states that when considering whether to grant consent to take and use water allocated to agricultural activity, the consent authority will have regard to the extent in which the consent could result in the water quality objectives of the Natural Resources Regional Plan not be achieved.
- 115 It is recognised that the take and use of water for spray irrigation may have an impact on the groundwater quality of the Waihao Downs catchment, however, mitigation measures have been proposed which will mitigate the effect. Thus I find that the proposed activities are consistent with this policy.
- 116 Policy 14 states that when considering whether to grant consent to take and use water outside of the Waitaki catchment, the consent authority will have regard to the extent in which granting the consent will reduce the availability of water to current and reasonable foreseeable in-catchment needs.
- 117 Mr Attewell, along with my evidence, has demonstrated that the use of this water is reasonable. Existing users in the Waitaki River catchment have been considered and WDIL's use of the water will not adversely affect these users. Therefore I find that this policy is met.

- 118 Policy 15 requires that the rate of abstraction and annual volume for the take and use of water is reasonable for the intended use and avoids significant wastage of water. This ties in with Policy 16 as the basis for the reasonable use tests. As described earlier in my evidence, the basis of the rate of abstraction and annual volumes has been demonstrated and I have concluded that it is reasonable for the intended use. Therefore I find the proposed take and use application consistent with these policies.
- 119 Policy 19 encourages the piping of the water supply to ensure that water losses are minimised and water quality is maintained. The proposed irrigation scheme relies on the piping of the supply and therefore is consistent with this policy.
- 120 Policy 21 relates to water metering. The proposed project includes the installation of water metering and recording systems which meet this policy.
- 121 Policies 45 and 46 relates to the Lower Waitaki River. Policy 45 describes the basis for setting the flow regime to a cumulative peak abstraction of 90 m³/s and instructs the consent authority to consider these reasons if considering an application which results in this peak abstraction rate being exceeded. The WDIL proposed abstraction rate, when considered along existing users, does not exceed this rate and therefore this policy is not applicable.
- 122 Policy 46 gives the basis from which the minimum flow for the Lower Waitaki River downstream of the dam has been set. Any change in minimum flow must address these issues. During the HDIS hearing, MEL put forth information as to the rationale of the lower minimum flow and submitted evidence to support that proposed minimum flow. Based on their evidence, I conclude that the proposed minimum flow considers these issues in setting the minimum flow for the Lower Waitaki River.

Proposed Natural Resources Regional Plan

- 123 For the water take and use, the water quality objectives of the PNRRP are applicable. Chapter 4: Water Quality of the PNRRP is the relevant chapter for these objectives.
- 124 Objective WQL1 provides for the water quality outcomes of surface waters. Objective WQL2 provides for the water quality outcomes for groundwater and contaminated land.
- 125 The project has the potential to impact the surface water quality of the Waihao River and its tributaries, Waitaki River, Waihuna Stream and Elephant Hill Stream, however, mitigation measures have been proposed which mitigate any impacts to the water quality of the surface waterways. Therefore I find that the proposed project is consistent with Objective WQL1.
- 126 The use of water for irrigation has the potential to impact the groundwater quality with respect to the groundwater nitrate-nitrogen concentrations. Mitigation measures have been proposed which reduce the nitrate-nitrogen concentrations to groundwater and therefore, if implemented, the proposed project will be consistent with Objective WQL2.
- 127 For the land use consents, the relevant objectives are in Chapter 6 and Chapter 8 of the PNRRP.
- 128 The objectives and policies of the PNRRP are applicable to the installation and maintenance of the structures in the bed and margins of the Waitaki River, Waihuna Stream and Elephant Hill Streams.
- 129 Policy BLR1 from Chapter 6 Beds and Margins of Lakes and Rivers states that land use activities within the margins and beds of waterways shall be controlled such that flood carrying capacity of the waterway is not reduced. Further, the land use activity must not cause an increase in scour of the bed or banks, nor should it undermine the stability of existing structures.

130 WDIL, through Attewell Irrigation Consultants Limited, has consulted with the ECan Rivers Engineers with respect to the works within any of the waterways they manage. The WDIL scheme has incorporated the recommendations of the ECan Rivers Engineer and thus ensures that the placement of the structures will not alter the flood carrying capacity, increase scour or undermine stability of existing structures. Therefore I find that the proposed activities are consistent with this policy.

131 Chapter 8 of the PNRRP is particularly relevant to work on steep slopes. Policy SCN5 states that where any earthworks or vegetation clearance activity is carried out that increase the risk of soil erosion, the best practicable method for reducing the amount of erosion shall be adopted. Mr Attewell, in his evidence, has described how the works will be managed to reduce the likelihood of erosion. Based on the methods he has described, I find that the proposed activities are consistent with this policy.

132 To summarise, I have considered the objectives and policies in the RPS, WCWARP and the PNRRP and I find the proposal to be consistent with these provisions. I therefore consider that the second threshold test in section 104D is satisfied.

PART II OF THE RESOURCE MANAGEMENT ACT 1991

133 Section 5 (1) states that the purpose of the RMA is to promote sustainable management of natural and physical resources. Assessment of effects have been prepared and based on the conclusions drawn from the assessments, the proposed project is consistent with the purpose of the RMA.

134 Section 6 of the RMA outlines the matters of national importance that must be recognised and provided for in relation to the managing the use, development and protection of the natural and physical resources.

- 135 It is my opinion that there are no matters of national importance compromised by the proposed activities.
- 136 Section 7 of the RMA directs decision makers to have particular regard for matters outlined in this section. Of particular relevance to the application for consents relating to this project are:
- Efficient use and development of natural and physical resources;
 - Maintenance and enhancement of quality of the environment;
 - Any finite characteristics of natural and physical resources.
- 137 Based on the assessment of effects and the mitigation measures proposed, it is my opinion that no matters outlined in Section 7 will be compromised by the proposed activities.
- 138 Section 8 of the RMA states that the consenting authority shall take into account the principles of the Treaty of Waitangi when managing the use, development and protection of natural and physical resources. Te Runanga O Ngai Tahu and Te Runaka O Arowhenua were advised of this application by ECan. No submissions were lodged by Te Runaka O Arowhenua, however submission were lodged by Te Runanga O Ngai Tahu-Mamoe Fisher People in response to the public notice. WDIL is currently undertaking the consultation process with Te Runanga O Ngai Tahu. It is my opinion that Section 8 has been met.
- 139 In my opinion the proposal is consistent with the Part II matters and provides an efficient and appropriate use of the natural and physical resources.

DRAFT RECOMMENDED CONDITIONS

- 140 I have reviewed the Investigating Officer's reports, and note that for the land use consents, a list of conditions is attached to

Appendix 6 of the Introductory Report. Mr Ensor states that those in the land use are typical conditions that would be attached to this type of consent. I have reviewed the conditions and find that the proposed conditions offered in Appendix 6 are appropriate for the land use consents, if tailored to address the locations identified in the application.

141 In addition, as discussed in Mr Attewell's evidence, WDIL will work with the ECan Rivers Engineers to ensure that there concerns are met. Therefore in addition to the consent conditions recommended by Mr Ensor, I also offer the following condition for CRC040427:

142 "One month prior to commencing works to disturb the bed of the Waitaki River, Elephant Hill and Waihuna Streams, detailed design plans shall be submitted to Canterbury Regional Council Regional Engineer."

143 With respect to the water permit, I have reviewed the typical conditions proposed as shown in Appendix 6 and I find that most are not quite appropriate for the proposed project. Therefore, attached to this document, I offer draft conditions for the take and use of water.

CONCLUSION

144 This proposal requires three resource consents from Environment Canterbury:

- A water permit to take and use water from Waitaki River for spray irrigation (CRC040428);
- A land use consent to disturb the bed of the Waitaki River to construct and maintain a new intake structure and diversion channel (CRC040427). This covers the intake locations at Pub Road or Morven-Glenavy Irrigation Scheme at Stonewall. This also includes disturbance to the bed of Waihuna and Elephant Hill Streams to construct and

reconstruct inverted siphons for the conveyance of irrigation water.

- A land use consent (CRC040429) to disturb the beds of minor watercourses, the placement of pipes within these minor watercourses, and to use land with slopes greater than 21° for the excavation and placement of the water supply pipeline for the WDIL scheme.

145 It is my opinion that any potential adverse effects on the environment resulting from the proposed project, when constructed and maintained in accordance to the suggested mitigation measures, will be no more than minor. Furthermore, I find that a consent duration of 35 years, as requested, is an appropriate duration for all consents.

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- Auckland Regional Council, 1999. *Erosion and Sediment Control Guidelines for Land Disturbing Activities in the Auckland Region*, Technical Publication No. 90
- Canterbury Regional Council (CRC) 1991. *Transitional Regional Plan*.
- Environment Canterbury (ECan). 2004. *Proposed Natural Resources Regional Plan: Chapter 4, Water Quality*. Report No. R04/15/4 (Notified in 2004).
- Environment Canterbury (2004). *Proposed Natural Resources Regional Plan: Chapter 6, Beds and Margins of Lakes and Rivers*. Report No. R04/15/6 (Notified in 2004).
- Environment Canterbury (2004). *Proposed Natural Resources Regional Plan: Chapter 8, Beds and Margins of Lakes and Rivers*. Report No. R04/15/6 (Notified in 2004).
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- Environment Canterbury (ECan). 2007b. *Erosion and Sediment Control Guidelines for the Canterbury Region*. Report No. R06/23.
- Harding, J, P Mosley, C Pearson and B Sorrell (2004) "Freshwaters of New Zealand". New Zealand Hydrological Society. Wellington.
- Meridian Energy Limited, Application and Assessment of Environmental Effects for the Hunter Downs Irrigation Scheme.
- Mosley, MP (1992). "Waters of New Zealand". New Zealand Hydrological Society. Wellington.

Li, FY, PD Jamieson and GS Francis (2005), "Estimates of nitrogen and phosphorus leaching under various land uses in Canterbury." Crop & Food Research Confidential Report No. 1533. Prepared for Aqualinc for Central Plains Water.

Waitaki Catchment Water Allocation Regional Plan (2006), (WCWARP)

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Water Permit to Take Water from the Waitaki River

To take and use water from the Waitaki River.

Duration of this Water Permit – 35 years.

Conditions of this Consent:

- 1 The water shall be taken from the Waitaki River at the one of the following intake locations options:
 - a. New intake constructed near Pub Road, Ikawai, at or about map reference NZMS 260 J41:408-897; or
 - b. New intake constructed beside Morven Glenavy Irrigation Scheme's existing intake at Stonewall, at or about map reference NZMS 260 J40:361-907; or
 - c. Proposed Hunter Downs Irrigation Scheme Intake at Stonewall, at or about map reference NZMS 260 J40:361-907.
- 2 The rate at which water is taken from the Waitaki River shall not exceed a maximum rate of 3.06 cubic metres per second, with a volume not exceeding 38 million cubic metres between 1st July and the following 30th June.
- 3 The rate at which water is taken from the Waitaki River shall not exceed a maximum rate of 3.06 cubic metres per second, with a volume not exceeding 38 million cubic metres per year, when the consent XXXXX or any subsequent replacement consent is operative. *(Needs to be modified to include additional consents in command area)*
- 4 For the purposes of determining compliance with Conditions 3 and 4:
 - (a) The instantaneous rate of water take (in cubic metres per second) shall be recorded at least every 15 minutes;
 - (b) The average rate of water take (in cubic metres per second) over the previous one hour shall be recorded at least every 60 minutes, based on the above 15 minute instantaneous record;
 - (c) In the event that any instantaneous rate of water take (under (a) above) exceeds the maximum rates of water taken in Conditions 3 and 4, then the consent holder shall ensure that the subsequent one hour average starting with that 15 minute period does comply with the maximum rates of water take in Conditions 3 and 4. This shall be deemed to constitute compliance with Conditions 3 and 4.
 - (d) Notwithstanding (c) above, any instantaneous recorded rate of water take (under (a) above) shall not be more than 10% greater than the maximum rates of water take specified in Conditions 3 and 4.
- 5 Whenever the calculated flow in the Waitaki River at the Kurow Gauge (map reference NZMS 260 I40:079-088) as estimated by the Canterbury Regional Council (expressed in cubic metres per second) falls below 100 cubic metres per second, the abstracted flow shall cease. For the purposes of this Condition, the flow in the Waitaki River at the Kurow Gauge shall include any flow taken from the Waitaki catchment upstream of the Kurow Gauge and returned downstream of the Kurow Gauge but upstream of the Waihao Downs Irrigation Scheme point of take.
- 6 Whenever the calculated flow in the Waitaki River at the Kurow Gauge (map reference NZMS 260 I40:079-088) as estimated by the Canterbury Regional Council (expressed in cubic metres per second) falls below 190 cubic metres per second, then the rate of abstraction shall not exceed that calculated using the flow sharing formula *(once a flow sharing regime has been established)*. For the purposes of this Condition, the flow in the Waitaki River at the Kurow Gauge shall include any flow taken from the Waitaki catchment upstream of the Kurow Gauge and returned downstream of the Kurow Gauge but upstream of the Waihao Downs Irrigation Scheme point of take.

- 7 The take of water permitted by this consent shall not be exercised until resource consents have been obtained for the construction and land use of the intake, diversion channel and irrigation delivery system, and for the divert and discharge of the water necessary for the operation of the Waihao Downs Irrigation Scheme.

Water Metering

- 8 (a) Prior to water being taken under this consent, the consent holder shall install a water flow measuring device that has an international accreditation, New Zealand or equivalent calibration endorsement, to continuously measure the taking of water in terms of this consent to within an accuracy of plus or minus 10 per cent.
- (b) The measuring device shall, as far as is practicable, be installed at a site likely to retain a stable rating, i.e. a man-made channel, concrete, steel or fibreglass flume or pipe. Installation shall be in accordance with ISO 1100/1-1981 or equivalent by a suitably qualified or experienced person.
- (c) The rates and times of abstraction shall be recorded by electronic means, at not greater than 15 minute intervals, with a tamper-proof recording device such as a datalogger kept for that purpose. The recorded data shall not be changed or deleted by any person, until after 12 months have passed since the date of recording.
- (d) The measuring and recording device shall be available for inspection at all times by the Canterbury Regional Council.
- (e) All data from the recording device described in 10(a) shall be provided to the Canterbury Regional Council on request, and shall be accessible and available for downloading at all times by the Canterbury Regional Council.
- (f) Within six months of the commencement of this consent, and at five yearly intervals thereafter, and at any other time when requested by Canterbury Regional Council, the consent holder shall provide a certificate to the Canterbury Regional Council signed by a suitably qualified person certifying the accuracy of the measuring and recording devices installed in accordance with clauses 10(a) and (b), and also certifying that data can be readily accessed.

Water Permit to Use Water from the Waitaki River for Irrigation

To use water taken from the Waitaki River for the purposes of irrigation.

Duration of this Water Permit – 35 years.

Conditions of this Consent:

- 1 The water shall be used for the spray irrigation of land within the Scheme Area generally in accordance with the attached plan entitled “Waihao Downs Irrigation – Scheme Area”, and ancillary purposes associated with the operation of the Waihao Downs Irrigation Scheme.

Scheme Management Plan

- 2 Prior to exercise of these consents and the commissioning of the Waihao Downs Irrigation Scheme (the Scheme), the consent holder shall prepare and submit to the Canterbury Regional Council a Scheme Management Plan.
- 3 The Scheme Management Plan shall, as a minimum, include the following matters:
 - (a) Operational requirements for the take of water for the Scheme from the Waitaki River, including any water sharing arrangements with other abstractors during times of low flows in the Waitaki River;
 - (b) Operational rules for the Scheme including responsibilities and arrangements for water management and distribution, including allocation during water shortages;
 - (c) A Template to be used as the basis for individual Farm Management Plans. The Farm Management Plan Template shall have the following objectives:
 - (i) To achieve technically efficient use of water, minimising runoff and drainage;
 - (ii) To minimise contamination of groundwater and surface water, particularly in terms of faecal contamination, Nitrogen and Phosphorus;
 - (iii) To minimise nutrient losses to water while managing soil fertility to optimise pasture and crop productivity;
 - (iv) To minimise adverse effects on groundwater and surface water levels;
 - (v) Soil in good physical condition;
 - (vi) To minimise adverse effects on water bodies and riparian areas through healthy riparian margins;
 - (vii) To safeguard significant indigenous biodiversity and ecosystem values within the Scheme area;
 - (viii) To respect Ngai Tahu values in relation to freshwater;
 - (ix) To provide information to the consent holder including land use, area irrigated, stock numbers and fertiliser use.
- 4 Within one year of the granting of the consents for the intake and delivery facilities for the Waihao Downs Irrigation Scheme, the consent holder shall submit to Environment Canterbury a Scheme Pre-Commissioning Monitoring Plan for the Scheme Area. The Scheme Pre-Commissioning Monitoring Plan shall specify the monitoring which shall be undertaken prior to the commissioning of the Scheme. This monitoring shall maintain and update the data used in the assessments of effects for these consents so that sufficient data is available at consistent locations and sampling frequency in order to provide current and comprehensive existing environmental baseline information at the time of Scheme commissioning, against which to compare post-commissioning monitoring. The Scheme Pre-Commissioning Monitoring Plan shall include the following, amongst other matters:

- (a) Physical and chemical ground and surface water quality;
 - (b) Macrophytes and periphyton in rivers and streams;
 - (c) Macroinvertebrates in surface waters;
 - (d) Native fish, in particular Canterbury mudfish, whitebait and long-finned eels;
 - (e) Trout;
 - (f) Riparian vegetation and habitat;
 - (g) Wetlands, including sedgeland and turfland communities in Wainono Lagoon;
 - (h) Groundwater and surface water levels and the operation of drainage infrastructure in the catchment;
- 5 Prior to the exercise of consents, the consent holder will undertake monitoring in accordance with the Scheme Pre-Commissioning Monitoring Plan. A summary of the results of the analyses of all monitoring undertaken in terms of the Scheme Pre-Commissioning Monitoring Plan is to be provided annually to the Canterbury Regional Council by no later than 31st July for each year that is required from the date specified until the Scheme is commissioned.

Scheme Monitoring Plan

- 6 At least six months prior to the commissioning of the Waihao Downs Irrigation Scheme and the exercise of these consents, the consent holder shall submit to Environment Canterbury a Scheme Monitoring Plan for the Scheme area. The Scheme Monitoring Plan shall identify the location, sampling and frequency of monitoring throughout the exercise of these consents, and any analyses that will be undertaken on the basis of the proposed monitoring information. The monitoring programme shall include:
- (a) Ground and surface water quality for the purposes of monitoring any potential changes in relation to ecological, contact recreation and potable water supply parameters as a result of the exercise of these consents. The water quality monitoring programme for the Scheme area shall be undertaken at representative sites in each of the following catchments and shall including monitoring for the parameters listed below:

Environmental Reporting

- 7 The consent holder shall complete an Annual Environmental Report and provide it to the Canterbury Regional Council by 31st July each year following the commissioning of the Waihao Downs Irrigation Scheme, covering the following matters:
- (a) A summary of the operation of the water take and use, and the associated river flows, in the preceding 12 months, based on the monitoring, undertaken as part of the exercise of these consents, in particular Condition 8 of the water permit to take water from the Waitaki River for the Irrigation Scheme;
 - (b) An overall audit report covering compliance generally of all water users with the provisions of their Farm Management Plans in accordance with Condition 3(c).
 - (c) The results of the monitoring undertaken as part of the exercise of these consents in accordance with Condition 8 of the water permit to take water from the Waitaki River for the Irrigation Scheme.
 - (d) A description of the off-farm environmental mitigation, monitoring and reporting intended to be carried out in the next 12 months with an approximate timetable of activities.
 - (e) A description and analysis of any unexpected adverse effect on the environment that has arisen as a result of the exercise of these consents in the last 12 months, the steps taken in response to that effect, and the results of those steps.

Record Keeping and Provision of Information to Canterbury Regional Council

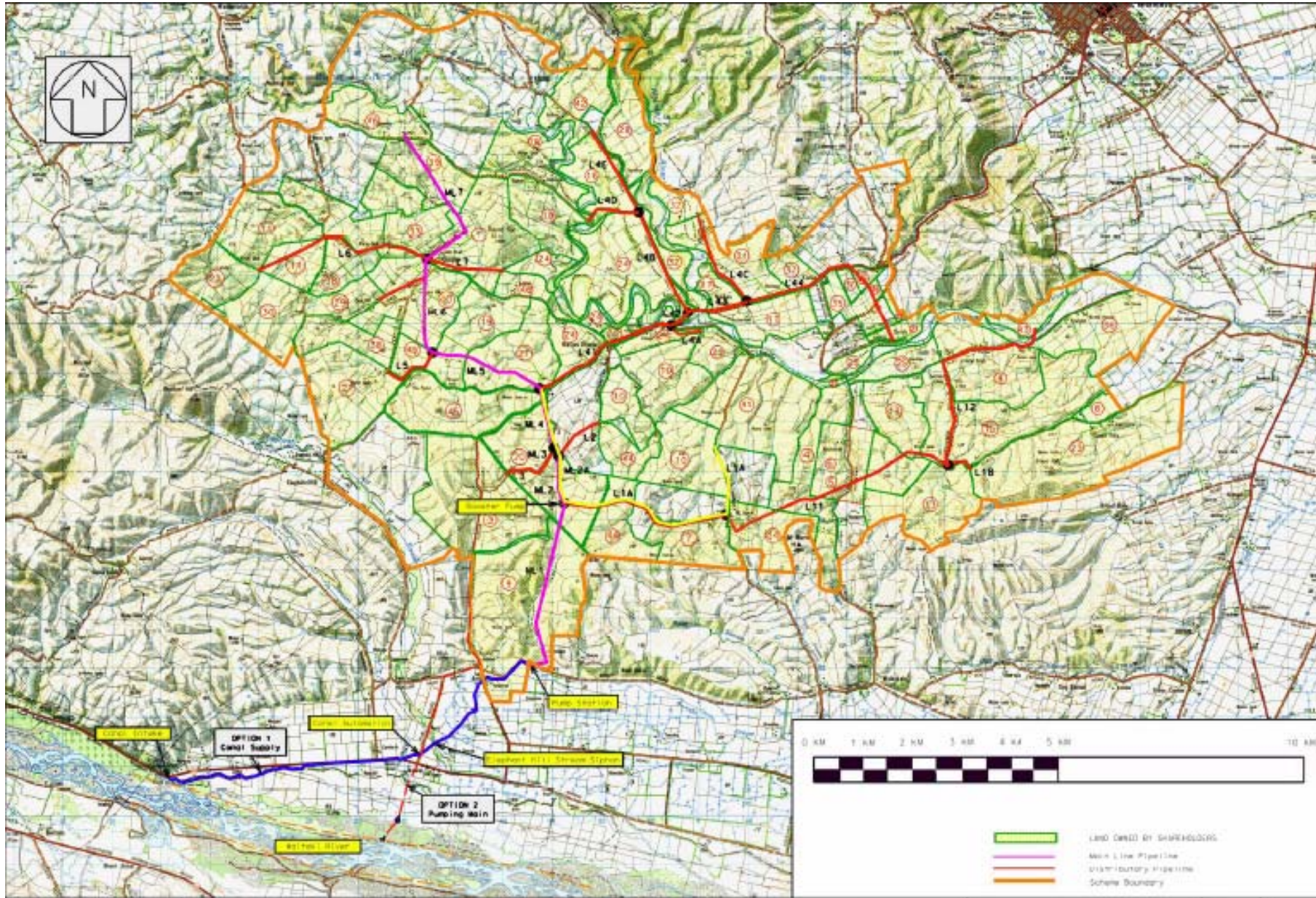
- 8 All data measured and calculated in accordance with Conditions 8 of the water permit take water from the Waitaki River for the Irrigation Scheme, shall be provided to the Canterbury Regional Council on request, and shall be accessible and available for downloading by the Council.
- 9 The consent holder shall keep records of timing and rate of water supply to each property and shall make these available to Canterbury Regional Council on request.

Review of Conditions

- 10 Canterbury Regional Council may, on the last working day of June each year, serve notice of its intention to review conditions of these consents for the purposes of dealing with any adverse effects on the environment which may arise from the exercise of the consents and which it is appropriate to deal with a later stage. However, this condition shall not be exercised for the first three years from the time at which these consents are first exercised, and shall not be exercised to review the same condition more than once in any three year period.

Lapsing Date

- 11 The lapsing provisions of Section 125 of the Resource Management Act 1991 shall not apply until after the expiry of 10 years from the date of grant of all the consents necessary for the construction and use of the intake, diversion channel and irrigation delivery system, and for the use and discharge of the water necessary for the operation of the Waihao Downs Irrigation Scheme.



**Figure 1 Waihao Downs Irrigation Command Scheme Area
(provided by Attewell Irrigation Consultants Limited)**

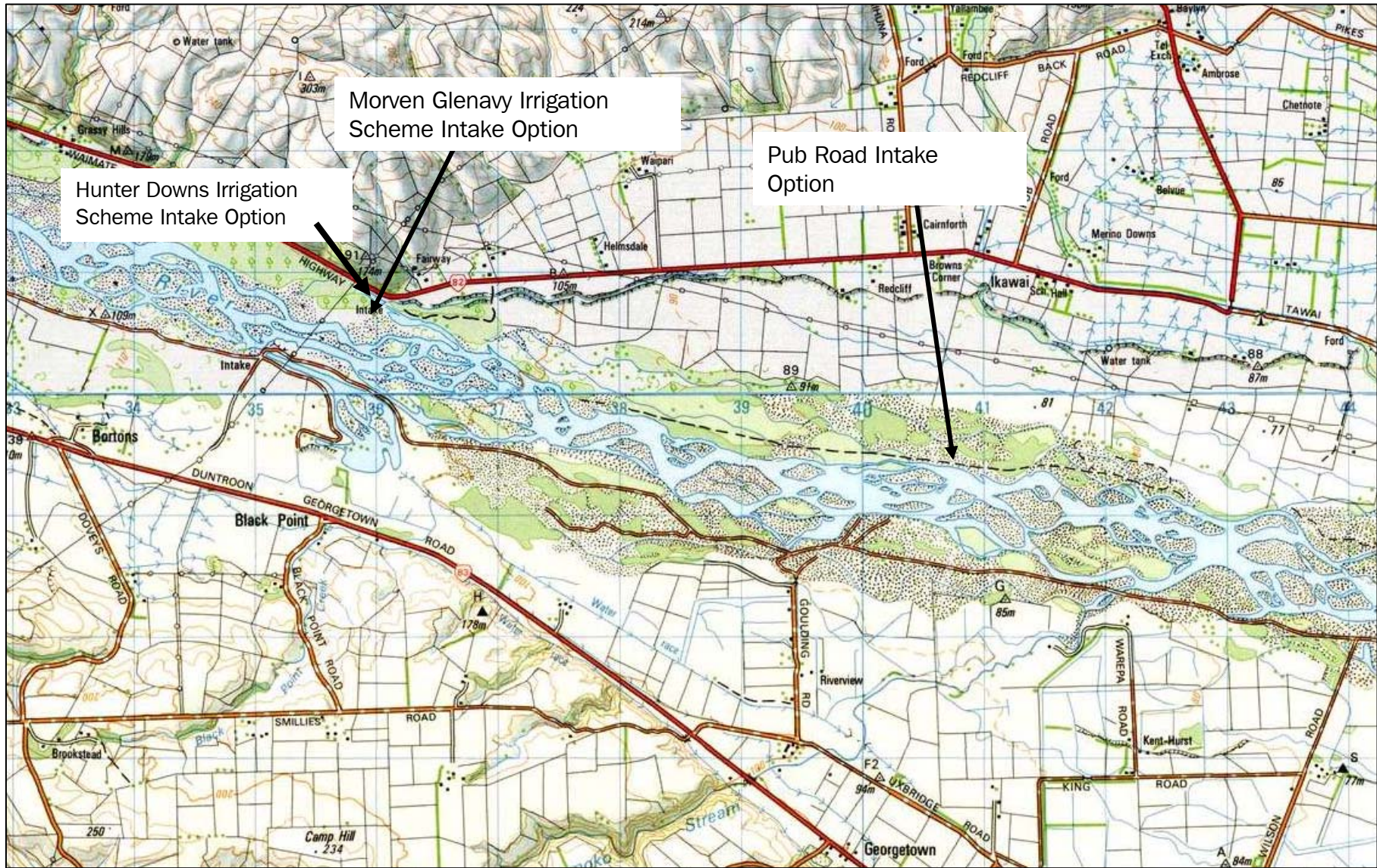


Figure 2: Location of Intake Options

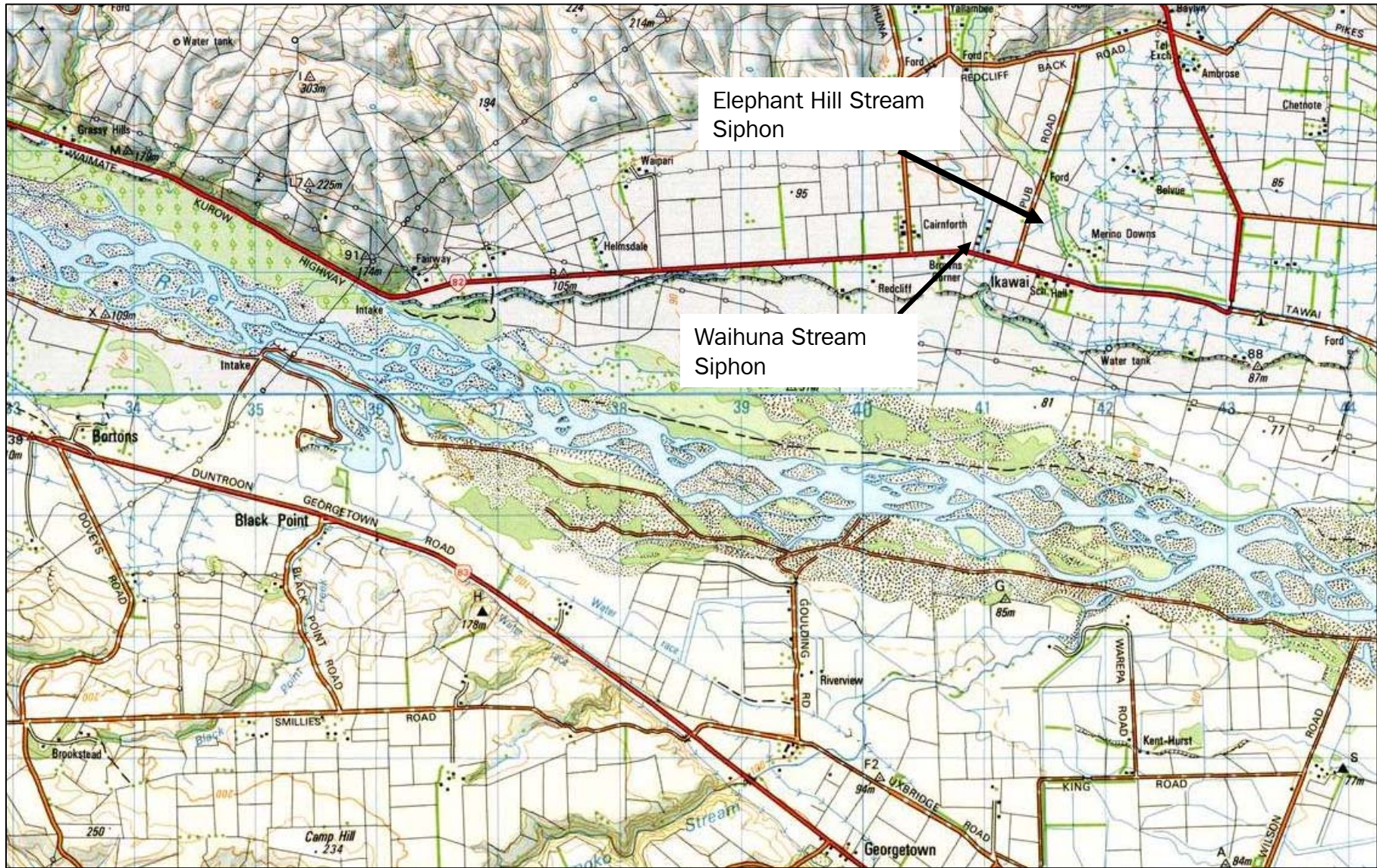


Figure 3: Location of Waihuna Stream and Elephant Hill Stream Siphons

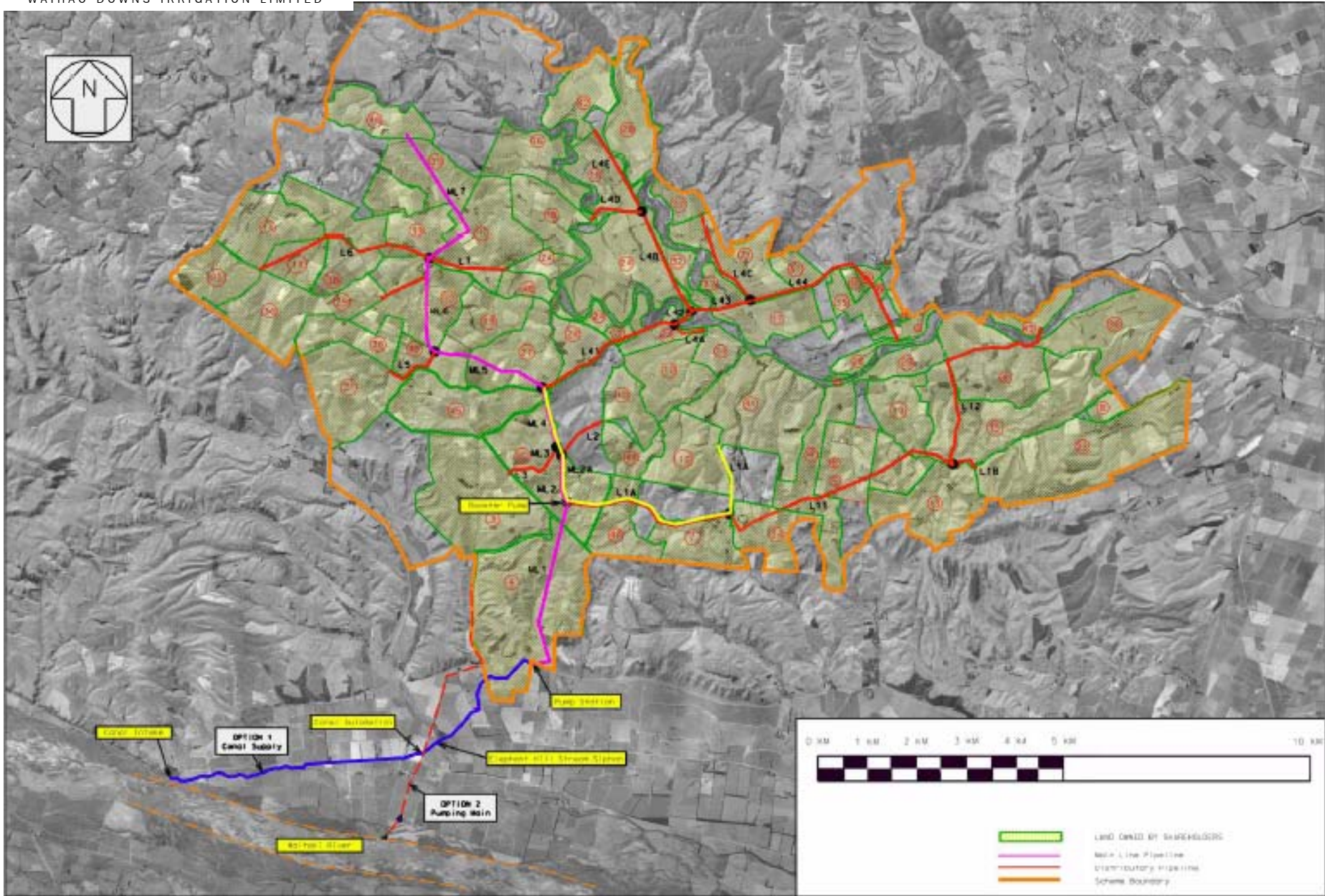


Figure 4: Location of Waihao Downs Pipeline Route