

Mr F I Graham

Conditions for Water Permit CRC072363

Condition No.	Applicant Proposed Condition	ECan Comments	Meridian Comments	Applicant Comments	DOC Comments								
Take													
1	Water may only be taken and / or diverted from Black Jack Stream located at or about map reference NZMS 260 I39:956-25 at the property referred to as Te Akatarawa Station.	<p>Water is diverted to small holding pond from where it is taken.</p> <p>REVISED WORDING BELOW:</p> <p>“Water shall only be diverted into a holding pond at or about map reference NZMS I39:956-215 and taken from this pond in accordance with condition 3 at the property referred to as Te Akatarawa Station ...”</p>		agreed									
2	<p>Water for irrigation shall only be taken between 1 September and the following 30 April and only in accordance with the maximum rate, daily volume (being from 12.00am to 12.00am the following day) and annual volume (measured between 1 July and the following 30 June) set out in Table A.</p> <p>Table A – Maximum Rates & Volumes</p> <table border="1" data-bbox="315 1214 887 1390"> <thead> <tr> <th>Year</th> <th>Maximum rate of abstraction (litres / second)</th> <th>Maximum Daily Volume (cubic metres / day)</th> <th>Maximum Annual Volume (cubic metres / year)</th> </tr> </thead> <tbody> <tr> <td>1 September</td> <td>12 l/s</td> <td>1,037</td> <td>150,000</td> </tr> </tbody> </table>	Year	Maximum rate of abstraction (litres / second)	Maximum Daily Volume (cubic metres / day)	Maximum Annual Volume (cubic metres / year)	1 September	12 l/s	1,037	150,000	Don't see need for table as no increase in volume.		We were only suggesting a table to comply with derogation issues associated with tranching but this is a renewal consent so not subject to MIC issues	
Year	Maximum rate of abstraction (litres / second)	Maximum Daily Volume (cubic metres / day)	Maximum Annual Volume (cubic metres / year)										
1 September	12 l/s	1,037	150,000										

	2009 to 30 April 2010		m ³ /day	m ³ /annum				
	1 September 2010 to 30 April 2011	12 l/s	1,037 m ³ /day	150,000 m ³ /annum				
	1 September 2011 to 30 April 2012	12 l/s	1,037 m ³ /day	150,000 m ³ /annum				
	1 September 2012 to 30 April 2013	12 l/s	1,037 m ³ /day	150,000 m ³ /annum				
	1 September 2013 to 30 April 2014 and every year thereafter	12 l/s	1,037 m ³ /day	150,000 m ³ /annum				
Use								
3	Water allocated in Table A of Condition (2) shall be used only for the spray irrigation of pasture for the grazing of stock and viticulture of 25 hectares on the area of land shown on attached Plan CRC072363 .		Water to be used for viticulture has not been sought by the applicant. Revised wording suggested: "Water taken in accordance with Table A of condition (2) shall be used only for the spray irrigation of 25 hectares of pasture and crops for grazing sheep and beef." No conditions proposed that specify minimum setback distances of irrigation areas from surface water bodies. These should be specified in a condition e.g., minimum of 20 metres.		Agreed not sure where viticulture has come from – it can be deleted- but note that grapes are a crop so I don't see this is precluded in any case/ Agreed given that this is a k line operation set back suggested at 5 metres			

		<p>FISH SCREEN:</p> <p>(a) A fish exclusion device shall be installed, operated and maintained on the intake to ensure that fish are prevented from passing into the intake.</p> <p>(b) The fish exclusion device shall be positioned to avoid the entrapment of fish at the point of abstraction, and to minimise the risk of fish being damaged by contact with the fish screening device.</p> <p>(c) The fish exclusion device shall be designed or supplied by a person with experience in freshwater ecology and fish screening techniques, who</p>		<p>Applicant wants right to take as currently occurs</p>	<p>1(d) mentions operation and maintenance plan but needs to include specific requirement and monitoring to ensure the screen device is complying with conditions 1(a)(b).</p> <p>Monitoring of fish communities is required to (amongst other things) measure effectiveness of conditions 1(a) & (b) (see general comment below in regard to baseline and on-going monitoring)</p>
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		<p>shall ensure that the performance criteria specified in clauses (a) and (b) of this condition are achieved, and that the device is designed in accordance with best practice, as outlined in the document Fish Screening: Good Practice Guidelines for Canterbury, NIWA Client Report 2007-092, October 2007.</p> <p>(d) Before the taking of any water in terms of this permit, a certificate shall be provided to Canterbury Regional Council, by a person with experience in freshwater ecology and fish screening techniques, to certify that the design plans and</p>			
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		<p>operation and maintenance plan for the fish screen will meet performance criteria as outlined in this condition, and that the fish screen has been installed in accordance with the details provided to Canterbury Regional Council in accordance with clause (d) of this condition.</p> <p>(e) The fish screen shall be maintained in good working order. Records shall be kept of all inspections and maintenance, and those records shall be provided to Canterbury Regional Council upon request.</p>			
4	The consent holder shall take all practicable steps to:				

	<p>(a) Ensure that the volume of water used for irrigation does not exceed that required for the soil to reach field capacity; and</p> <p>(b) Avoid leakage from pipes and structures; and</p> <p>(c) Avoid the use of water onto non-productive land such as impermeable surfaces and river or stream riparian strips</p>				
Minimum flows					
	<p>The taking of water shall cease when the natural flow in the Sutton Stream as estimated by the Canterbury Regional Council at or about map reference NZMS 260 I39:967-215 is less than or equal to 80 litres per second.</p>	<p>Remove reference to CRC, and replace with reference to condition below.</p> <p>No flow graph. This is required as minimum flow site is upstream of abstraction. Refer to recommended condition in s42A Report 2A (Attachment Four) and s42A addendum report of Claire Penman, paragraphs 15-21</p>			
		<p>Monitoring of the minimum flow:</p> <p>The consent holder shall, prior to exercising this consent, install a water meter measuring device at (map reference NZMS 260 NZMS 260 I39:961-210) in the Sutton Stream</p>		<p>As this consent is for the renewal of 25 hectares – and is below the dams, the flow recorder requirement will be prohibitively expensive relating to this take – I know that feasibility of being able to exercise a consent is a matter for consent holder but is there any other method to be adopted</p>	

		<p>that will enable the determination of the continuous rate of flow in the reach of the waterbody to within an accuracy of 10 percent.</p> <p>(a) The measuring device shall, as far as is practicable, be installed at a site likely to retain a stable relationship between flow and water level. The measuring device shall be installed in accordance with the manufacturer's instructions.</p> <p>(b) install a tamper-proof electronic recording device such as a data logger(s) that shall time stamp a pulse from the flow meter at least once every 15 minutes, and have the capacity to hold at least one season's data of</p>		<p>here.</p>	
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		<p>water taken as specified in clauses (d)(i) and (d)(ii), and which is telemetered, as specified in clause (d)(iii).</p> <p>(c) The recording device(s) shall:</p> <p>(i) be set to wrap the data from the measuring device such that the oldest data will be automatically overwritten by the newest data (i.e. cyclic recording); and</p> <p>(ii) store the entire season's data in each 12 month period from 1 July to 30 June in the following year, which the consent holder shall then download and store and provide to the Canterbury Regional Council in a format and standard</p>			
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		<p>specified in the Canterbury Regional Councils form for Water Metering Data Collection; and be readily accessible to be downloaded by the Canterbury Regional Council or by a person authorized by the Canterbury Regional Council: RMA Compliance and Enforcement Manager; and</p> <p>(iii) shall be connected to a telemetry system which collects and stores all of the data continuously with an independent network provider who will make that data available in a commonly used format at all times to the</p>			
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		<p>Canterbury Regional Council and the consent holder.</p> <p>(d) The measuring and recording devices described in clauses (a) and (c) shall be available for inspection at all times by the Canterbury Regional Council.</p> <p>All data from the recording device described in clause (c), and the corresponding relationship between the water level and flow (b), shall be provided to the Canterbury Regional Council annually in the month of June, and shall be accessible and available for downloading at all times by the Canterbury Regional Council.</p>			
Measuring & Metering					

<p>5</p>	<p>(a) The consent holder shall, within six months after the grant of this consent, install a water meter measuring device in a location that will enable the determination of the continuous rate of flow and volume of water being diverted to within an accuracy of 10 percent.</p> <p>(b) The measuring device shall, as far as is practicable, be installed at a site likely to retain a stable relationship between flow and water level. The measuring device shall be installed in accordance with the manufacturer's instructions.</p> <p>(c) install a tamper-proof electronic recording device such as a data logger(s) that shall time stamp a pulse from the flow meter at least once every 15 minutes, and have the capacity to hold at least one season's data of water taken as specified in clauses (d)(i) and (d)(ii), and which is telemetered, as specified in clause (d)(iii).</p> <p>(d) The recording device(s) shall:</p> <ul style="list-style-type: none"> (i) be set to wrap the data from the measuring device such that the oldest data will be automatically overwritten by the newest data (i.e. cyclic recording); and (ii) store the entire season's data in each 12 month period from 1 July to 30 June in the following year, which the consent holder shall then download and store and provide to the Canterbury Regional Council in a format and standard specified in the Canterbury Regional Councils form for Water Metering Data Collection; and be readily accessible to be downloaded by the Canterbury 	<p>Ensure that metering is installed before first exercise of the consent to ensure consistency with Resource Management (Measurement and Reporting of Water Takes) Regulations 2010</p>			
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	<p>Regional Council or by a person authorized by the Canterbury Regional Council: RMA Compliance and Enforcement Manager; and</p> <p>(iii) shall be connected to a telemetry system which collects and stores all of the data continuously with an independent network provider who will make that data available in a commonly used format at all times to the Canterbury Regional Council and the consent holder.</p> <p>(e) The measuring and recording devices described in clauses (a) and (c) shall be available for inspection at all times by the Canterbury Regional Council, including access to the data recorded in accordance with clause (d).</p> <p>(f) All data from the recording device described in clause (c), and the corresponding relationship between the water level and flow (b), shall be provided to the Canterbury Regional Council annually in the month of June, and shall be accessible and available for downloading at all times by the Canterbury Regional Council.</p>				
6	<p>(a) The water meter installed in accordance with Condition 5 shall be an electromagnetic or ultrasonic meter; or</p> <p>(b) The consent holder shall, within 6 months of the first exercise of this consent install or make available an easily accessible straight pipe(s) at a location where the total water take is passing through, with no fittings or obstructions that may create turbulent flow conditions, of a length at least 15 times the diameter of the pipe, as part of the pump outlet plumbing or</p>				

	within the mainline distribution system, to allow the Canterbury Regional Council to conduct independent measurements.				
7	<p>Within one month of the installation of the measuring or recording device(s), specified in conditions 5 and 6 or any subsequent replacement measuring or recording device(s), or at any time when requested by the Canterbury Regional Council, the consent holder shall provide a certificate to the Canterbury Regional Council, attention: RMA Compliance and Enforcement Manager, signed by a suitably qualified person certifying, and demonstrating by means of a clear diagram, that:</p> <ul style="list-style-type: none"> (a) the measuring and recording device(s) is installed in accordance with the manufacturers specifications; and (b) data from the recording device(s) can be readily accessed and/or retrieved in accordance with clauses (b) and (c) of condition 6. 				
8	<p>Within 6 months of the commencement date and at five yearly intervals or at any time when requested by the Canterbury Regional Council, the consent holder shall provide a certificate to the Canterbury Regional Council, attention: RMA Compliance and Enforcement Manager, signed by a suitably qualified person certifying that:</p> <ul style="list-style-type: none"> (c) the water meter(s) is measuring the rate of water taken as specified in condition 5; and (d) the tamper-proof electronic recording device is operating as specified in condition 5. 				

9	The taking of water in terms of this permit shall cease for a period of up to 48 hours on notice from the Canterbury Regional Council, to allow measurement of the flow in Black Jet Stream.	Correction to name – Black Jack Stream.			
Nutrient Loading (NDA limits)					
13	The annual (1 July to 30 June) nutrient loading (the nutrient discharge allowances (NDAs)) to water from Te Akatarawa Station shall not exceed 26302 kg of nitrogen and 748 kg of phosphorus.	Essential to define “Te Akatarawa Station” by reference to an area (X ha), legal description and/or a map, otherwise there is a risk that the authorised nutrient load would be uncertain.		Agreed Te Akatarawa Station defined by legal description of whole property as contained in application	
Overseer Modelling					
15	Where Overseer, or Overseer modelling, is referred for the purposes of determining compliance with the NDA limits associated with activities on the property it shall undertaken by an independent person with an Intermediate or Advanced Sustainable Nutrient Management Certificate issued by Massey University or an equivalent qualification.	Don't consider that the three day intermediate course is adequate. Should require the more intensive Advanced Certificate. Majority of fertiliser representatives have this qualification and an increasing number of agricultural consultants.			

Farm Environmental Management Plan

<p>16</p>	<p>The consent holder shall implement, and update annually the Farm Environmental Management Plan (FEMP) for Te Akatarawa Station. The FEMP shall include:</p> <ul style="list-style-type: none"> (b) Verification of compliance with NDA's by farm nutrient modelling using the model Overseer[®] (Agresearch model version number 5.4.3 or later). (c) When undertaking the modelling outlined in clause (b), the consent holder shall use either weather records collected on-farm or from constructed data from the nearest weather station. (d) Implementation of Mandatory Good Agricultural Practices ("MGAPS") and requirements to manage in accordance with the Te Akatarawa Station Overseer[®] model inputs specified in the attached Appendix A - Te Akatarawa Station Overseer[®] parameter report. Appendix A forms part of this consent. (e) A property specific environmental risk assessment (including a description of the risks to water quality arising from the physical layout of the 	<p>A FEMP including verification of NDA compliance is not the same as an actual requirement to comply with the NDA.</p> <p>As above.</p> <p>No Appendix A provided.</p>			
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	<p>property and its operation which are not factored in as an Overseer parameter) prepared by a suitably qualified person which identifies any farm specific environmental risks along with measures to mitigate the farm specific environmental risks.</p> <p>(f) A requirement to review the risk assessment if there are any significant changes in land use practice</p>				
17	<p>Detailed records shall be maintained of nutrient inputs to the nearest kilogram, types of crops (including winter feed/forage crops), cultivation methods, stock movements and yields, prediction of realistic crop yields that are used to determine crop requirements and all other inputs to the Overseer nutrient budgeting model. Such reports are to be used as inputs to the Overseer method as described in condition 16.</p>	<p>Incorrect condition number reference</p>			
18	<p>A report based on Overseer[®] modelling shall be provided within one month of completion and no later than two months prior to the start of the next irrigation season to the Canterbury Regional Council, Attention: RMA Compliance and Enforcement Manager.</p>	<p>The full Overseer output and input reports should be provided not a report “based on Overseer modelling”. These should include the “Current farm” calculated total N and total P leaching/runoff.</p>			

19	Significant Changes may be made to Appendix A Te Akatarawa Station Overseer® model inputs, provided that written certification is provided that the change is modelled using Overseer®, and that the result of that modelling demonstrates that the NDAs are not exceeded.				
20	A copy of that certification plus a copy of the resultant Overseer parameter report shall be provided to the Canterbury Regional Council, Attention: RMA Compliance and Enforcement Manager, prior to the implementation of that change.				
<p><i>Advisory notes</i></p> <p><i># for the purposes of this consent "Significant changes" constitutes a major change in the stock ratios between sheep, cattle, and deer or a major change in the farming systems for the property. . For example going from extensive sheep and beef farming to dairy farming or cropping. It does not include changes in stock numbers as would be expected to deal with inter seasonal variations arising from climatic conditions or changes in stocking rates due to market demand.</i></p>		<p><i>Not clear why this is needed. Conditions should allow for any change provided that the NDA is complied with and annual Overseer modelling is carried out.</i></p>		<p><i>agreed</i></p>	
Fertiliser					
21	Fertiliser shall be managed and applied in accordance with 'The Code of Practice for Nutrient Management (With Emphasis on Fertiliser Use) NZFMRA 07' or any subsequent updates.	This code of practice is generally not written as an enforceable document, which means that this condition could not be enforced, doesn't			

		provide any assurance about effects and is therefore not necessary. Retention may give an impression that many aspects of fertiliser use can be controlled via a consent condition and enforced when they cannot. Therefore recommend deletion unless specific and enforceable components could be separated out and applied.			
22	The consent holder shall keep a record of all fertilizer applications applied to the property, including fertilizer type, concentration, date and location of application, climatic conditions, mode of application and any report of the fertilizer contractor regarding the calibration of the spreader.				
23	For land based spreading of fertiliser an independent fertiliser spreading contractor shall be used to spread any fertiliser on the property except as provided for by clause (b) below. (a) Where an independent fertiliser spreading contractor is used the consent holder shall keep a record of the contractor used which can be supplied to the				

	<p>Canterbury Regional Council upon request.</p> <p>(b) Where the applicant's own fertiliser spreaders are used, the consent holder shall test and calibrate the fertiliser spreaders at least annually, and every 5 years the fertiliser spreader will be certified by a suitably qualified person in accordance with 'The Code of Practice for Nutrient Management (With Emphasis on Fertiliser Use) NZFMRA 07' or any subsequent updates and the results of testing shall be provided to the Canterbury Regional Council upon request.</p>	<p>Not clear what use could be made of "a record of the contractor".</p>			
24	<p>Nitrogen fertiliser shall not be applied to land between 31st May and 1st September in any year except for the use of nitrification inhibitors</p>				
25	<p>All fertiliser brought onto the property which is not immediately applied to the land is stored in a covered area that incorporates all practicable measures to prevent the fertiliser entering waterways.</p>				
26	<p>Applications of nitrogen fertiliser shall not exceed 50 kg nitrogen / hectare per application.</p>				
27	<p>If liquid fertilisers, excluding liquid effluent, are stored on-site for more than three working days, the consent holder shall ensure that the fertiliser is stored in a bunded tank, at least 110% of the volume of the tank to avoid any discharge to</p>				

	surface or groundwater and such that it is also protected from vehicle movements.				
28	Fertiliser filling areas shall not occur within 50 metres from a water course, spring or bore.				
Irrigation Structures					
29	<p>The consent holder shall ensure that all new (not on the property at the time of commencement of this consent) irrigation infrastructure is designed and certified by a suitably qualified independent expert, and installed in accordance with the certified design.</p> <p>(a) Copies of certified design documents shall be provided to the Canterbury Regional Council upon request.</p> <p>(b) All irrigation infrastructure shall be tested within 12 months of the first exercise of this consent and afterwards every five years in accordance with the 'Irrigation Code of Practice and Irrigation Design Standards, Irrigation NZ, March 2007' (code of practice) by a suitably qualified independent expert.</p> <p>(c) The expert shall prepare a report within two months of the testing, outlining their findings and shall identify any changes needed to comply with the code of practice.</p>	<p>Issued by who? NZWETA?</p> <p>What certified design? Certified by who?</p> <p>This code of practice is not written as an enforceable document, which means that this condition could not be enforced, doesn't provide any assurance about effects and is therefore not necessary. Retention may give an impression that aspects of irrigation design can be controlled via conditions and enforced when they cannot. Therefore recommend deletion unless specific and enforceable components could be</p>		<p>Comments already made on other consents on these issues</p>	

	<p>(d) Any changes needed to comply with this code of practice shall be implemented within five years from the date of the report. A copy of the report shall be provided to the Canterbury Regional Council Attention: RMA Compliance and Enforcement Manager, within three months of the report being completed.</p>	separated out and applied.			
30	<p>If existing irrigation infrastructure is being used, the consent holder shall obtain an evaluation report prepared by a suitably qualified person, on the following terms:</p> <p>(a) The evaluation shall determine the system's current performance in accordance with the Code of Practice for Irrigation Evaluation.</p> <p>(b) This report shall be obtained within three months of the first exercise of the consent.</p> <p>(c) Any recommendations identified in the report shall be implemented within five years from the date of receipt of the report.</p> <p>A copy of the report shall be forwarded to the Canterbury Regional Council within 3 months of the report being completed.</p>				

Fertigation					
31	i. Gravity feed system				
32					
33					
34					
35					
36					
Subdivision					
37	The NDAs shall be recalculated if there is a sale or transfer of any part, but not the whole, of the total farm area specified in Appendix [should be Appendix A]*. The recalculated NDAs shall replace the NDAs specified in condition 15. The recalculation of the NDAs shall be undertaken and certified using Overseer, completed and provided to the Canterbury Regional Council, Attention: RMA Compliance and Enforcement Manager together with a copy of the full Parameter report, within one month of the sale or transfer.	No Appendix A provided. Condition 15 does not specify the NDA. Suggest add after "The recalculated NDAs..." "...shall be undertaken to accurately redistribute the NDA between the resultant properties and...". Also need to add: "The new NDAs may be recalculated on any proportionment as long as the total of all the NDAs does not exceed the NDAs of the parent title as set out in condition X.		Agreed substitute	

Soil Management

38	<p>The consent holder shall use, where practicable, direct drilling as the principal method for establishing pastures</p> <p>On the irrigation area the consent holder shall sow and irrigate all ploughed areas as soon as possible following ground disturbance.</p>	Agree			
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Administrative Conditions

39	<p>The Canterbury Regional Council, Attention: RMA Compliance and Enforcement Manager, shall be informed immediately on first exercise of this consent by the consent holder.</p>				
40	<p>The Canterbury Regional Council may, once per year, on any of the last 5 working days of March or July, serve notice of its intention to review the conditions of this resource consent for the purposes of dealing with any adverse effect on the environment which may arise from the exercise of the resource consent wan which it is appropriate to deal with at a later stage, including</p> <p>(a) any cumulative adverse effect on a waterway arising from abstractors;</p> <p>(b) amending the flow in Black Jet Stream at which abstraction is required to be reduced or discontinued as set out in condition [x]</p>	<p>“Black Jack Stream”</p>			<p>Should include review for the purpose of requiring the consent holder to adopt the best practicable option to mitigate any adverse effect upon the environment.</p>

General Comments:

Generate new conditions along the lines of:

Fencing Condition

A fencing condition should be imposed stating that permanent fencing shall be erected at a minimum setback distance of 12 metres from the edge of any natural,

permanently flowing, surface water feature within the irrigation area; where practicable, riparian planting shall be carried out within fenced areas; temporary fencing will be erected when stock are grazing areas of the property where there is access to other waterways; and all fencing will be maintained in a good state of repair. Delete proposed condition 2(b) re 5m setback.

Baseline and On-going monitoring

Prepare conditions that require baseline and ongoing monitoring to provide information that can be used to determine whether the exercise of the consent is a cause of, or contributing cause to, changes in invertebrate fish or birds community structure. (See Hakataramea example) .

*Objective and Purposes of the ***** Monitoring Plan*

- 1 The objective of all survey and monitoring programmes shall be to obtain a definitive and representative assessment of any effects of the use of water authorised by this consent on the state of the environment of the
- 2 Without limiting this objective, the purpose of the monitoring plan is to provide information which may be used to determine whether the exercise of this consent is a cause or contributing cause to changes in:
 - a. Periphyton in the
 - b. Macro-invertebrates species in the surface water bodies;
 - c. Target native fish and salmonids; and the
 - d. Physical and chemical ground and surface water quality.
- 3 This is a catchment wide survey.
- 4 PROVIDED THAT compliance by this consent holder with one or more parts of this condition shall be deemed to be compliance by the following consent holders of the same part(s):
(list here)
- 5 PROVIDED ALSO THAT compliance by a Water Quality Group representing all the consent holders who are the subject of this condition shall be deemed to be compliance by the consent holder.

Baseline surveys to be undertaken prior to taking of water for irrigation purposes

- 1 Subject to sub-clause [.] before the first exercise of this consent the consent holder shall provide to the Regional Council a copy of the a baseline survey plan prepared in accordance with the sampling design specified in Schedule A.
- 2 The baseline surveys shall be undertaken over a period of one year and completed within a period of two years from the date consent was granted.
- 3 The baseline survey plan shall be designed and carried out using standard scientifically accepted methods by suitably qualified personnel with appropriate (recognised) experience in the matters being surveyed.
- 4 Timeframes specified in the Surface Water Baseline Study, Groundwater Baseline Study and the Land Baseline Study shall be co-ordinated by the personnel engaged.
- 5 The surveys may include any matters which the personnel engaged to design and carry out the baseline surveys consider necessary or more desirable and which are in addition to, or instead of, the provisions in Appendix *.
- 6 Resource Consents ***** may take water under the terms of this consent from the date that consent is granted. However, taking must cease if after two years from the grant of consent the baseline survey has not been completed in accordance with this condition. Taking may only resume once the baseline survey has been completed.

On-Going Monitoring

- 1 Within three months of the completion of all of the baseline surveys the results of each of baseline survey's shall be assessed to determine the location, sampling and frequency of on-going monitoring throughout the exercise of these consents and any analysis that will be undertaken on the basis of the proposed monitoring information in Appendix A
- 2 All monitoring programmes shall be designed and carried out using standard scientifically accepted methods by suitably qualified personnel with appropriate (recognised) experience in the matters being monitored.
- 3 On-going monitoring time intervals shall be re-evaluated and modified as appropriate.
- 4 Appendix ** shall be reviewed annually and changed as necessary on the recommendation of the personnel engaged to design and carry out the monitoring programme following monitoring results.
- 5 The consent holder shall provide in advance of implantation to the Regional Council a copy of the annual monitoring plan prepared in accordance with this condition.
- 6 At least once every five for the duration of the consent the consent holder shall undertake an audit of land use changes in accordance with the Land use Inventory in Appendix * identifying gross changes.

Reporting of the Baseline Surveys and Annual Monitoring

- 1 The consent holder shall provide the Canterbury Regional Council with an annual report no later than ***** in each year during the term of this consent. The report shall include a summary of the analyses and records collected in accordance with the conditions of this consent and as a minimum shall also:
 - a) Summarise all the data collected as required under the conditions of this consent (including graphical presentation and statistical summations of monitoring data) and analyse the information in terms of compliance of this consent.
 - b) Highlight and discuss any important environmental trends in the results.
 - c) Compare results obtained over the reporting period with the results obtained from previous reporting periods.
 - d) Audit compliance by consent holders and water users with the provisions of their Farm Management Plans in accordance with condition [].
 - e) Report and discuss any operational difficulties, changes or improvements to the Farm Management Plan which would result in a notable variation of water quality.
 - f) List any maintenance works needed, proposed or undertaken to ensure compliance with the conditions of the consent.
 - g) Report detailing any remedial steps to be incorporated by amendment to the Farm Management Plan in response to the results of the baseline survey and monitoring program.
 - h) Report detailing any changes to Appendix A. Within 3 months of completion of each of the surveys or monitoring reports the consent holder shall provide copies of survey and monitoring reports and results to the Canterbury Regional Council , the Director-General of the Department of Conservation, Te Runanga o Ngai Tahu and Central South Island Fish and Game Council.

Schedule A

The Baseline Study and On-Going Monitoring shall include the following elements:

Land Baseline Study

Daily monitoring of:

- air temperature

- rainfall
- wind speed and direction
- evapo-transpiration (representative of catchment)
- sunshine hours at one control site for at least one year.

Monthly monitoring of:

- soil moisture
- evapo-transpiration
- leachate quality (e.g. N, P)

at four control sites located on land, which may include but which is not limited to, land which is the subject of this consent. One control site shall be a non-irrigated cropping block. One control site shall be on an existing irrigated cropping block. The remaining two controls sites shall be located on non-irrigated and irrigated grazing blocks.

Land use Inventory

A survey of agricultural and horticultural land use within the Hakataramea Valley and estimate the area of land used for Inventory of land use:

- Cropping production,
- Livestock including sheep, beef, deer and dairying
- Mixed arable and livestock

Advisory Note: This inventory should include changes that occur seasonally on these lands. For example, cropping occurs only in certain parts of the year, and dairying practices can also change seasonally, depending on the farmer.

Inventory of land use practices:

- Cropping Methods i.e. harvesting, planting, and fallow times in between.
- Stock grazing/breeding programs
- Audit of fertilizer use (nutrient budgets – Overseer/Spasmo)
- Animal waste management
- Percentage of streams fenced and area of margins between fence and stream bank
- Survey of current stock access to stream beds and banks, including routine stock crossing i.e. dairy cows making way to cow shed.

A desktop investigation on catchment wide land classification, specifically:

- Geology
- Land class (e.g. LUC)
- Topography (e.g. steep/shallow)
- Non-agricultural/horticultural land use and estimated areas of these (e.g. forestry, reserve land etc.)

Advisory Note:

The purpose of this desktop investigation is provide a summary of those catchment features which may affect the water quality of the Hakataramea River or its tributaries. The catchment feature could either be impacted by land use practices (for example intensive grazing on highly erodible soils) or the catchment feature

itself could contribute an effect on the waterway when the land use practice is employed (such as increased runoff when irrigating on steep slopes).

Surface Water Baseline Study

From the control sites at monthly intervals for duration of at least 1 year the surface water quality shall be sampled for:

- Dissolved Inorganic Nitrogen (DIN)
- Dissolved Organic Nitrogen (DON)
- Total Nitrogen (TN)
- Dissolved Reactive Phosphorous (DRP)
- Total Phosphorus (TP)
- Total Suspended Sediment (TSS)
- Conductivity
- pH
- Temperature
- Dissolved Oxygen
- Clarity/Turbidity/Absorbance
- E.coli/F.coli
- Periphyton percentage cover (filaments and mats) and the ratio of dead to living species. Flow depth and velocity shall be obtained at each site when the sample is collected. On four occasions during the year, quantitative sampling should be carried out to provide an accurate description of:
- Macro-invertebrate species present (MCI) (%EPT);
- Target native fish and salmonid species (counts, type, presence/absence, tolerances);
- Plant species;
- Stream bed conditions (e.g. degraded/eroded) adjacent to the control sites;
- Riparian margins adjacent to the control sites; and an
- Observation of terrestrial biodiversity in the margins (presence/absence, tolerances).

Control Sites

Three control sites shall be established in the following tributaries:

- *****
- *****
- *****

***** control sites along the *****. One site will be located in the ***** reaches of the river, with the three remaining sites located at increasing downstream intervals. Control site locations shall be surveyed in, and monthly sampling should be taken at, in a way to ensure spatial variations are minimised.

Groundwater Baseline Study

At quarterly intervals for duration of at least 1 year the groundwater quality at each of the seven control sites shall be sampled for:

- Nitrogen

- Phosphorous
- E.coli

The Consent Holder shall establish seven control sites at the following locations:

- Top of the catchment;
- *****;
- Two non-irrigated properties (one up gradient and one down gradient);
- Two existing irrigated properties (one up gradient and one down gradient);
- A gaining Tributary;

The down gradient wells installed at each control site shall be close to the ***** in a reach that is gaining from groundwater and at a distance approximately ***m from the river bed. This consent authorises the taking of groundwater at each of the control sites for the purpose of the baseline survey and on-going monitoring.

