

**Before the commissioners appointed by the
Canterbury Regional Council**

In the matter of The Resource Management Act
1991

and

In the matter of 60 water permit applications to
take and use water, 29 land use
consent applications and 21
discharge permit applications, for
agricultural and horticultural
activities in the upper Waitaki
catchment

Section 42A Report – Hydrology

Date of hearing: September 2009 – February 2010

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Reports – David Stewart**

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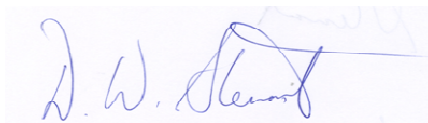
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34 - 37	Hydrology - General	<p>80% of total flow measured at the Waitaki Dam comes from the Lake Tekapo, Pukaki and Ohau catchments which together make up 40% of catchment area.</p> <p>Runoff rates much greater from the mountain rivers compared to the most downstream catchments.</p>
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PART 2		
70 – 74	Introduction	Brief review of which applications covered by this report and derivation of prescribed minimum flows. Note that agreement reached between ECAN, applicants, consultants, Fish and Game Council and Department of Conservation on the MALF and 5Y7DLF flows for each abstraction.
High Natural Character Water Bodies (Rule 2, Table 3(1))		
75 - 89	CRC052502 – Glenmore Station Ltd	Take water from the Cass River. Mountain catchment with quite high flows. MALF agreed at 4550 l/s. Abstraction 250 l/s. Recommend no minimum flow as abstraction fully compliant with the WCWARP.
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105 – 121	CRC031175 – Lonestar Farms Ltd	Take water from Mistake River. Mountain catchment. MALF agreed at 520 l/s. Application non-complying so minimum flow set at MALF. Reasonable flow correlation with Jollie River. At least 5 years flow data collection required.
Grays River and Tributaries (Rule 2, Table 3(v))		
122 – 151	CRC042661 - Grays Hill Station and CRC041542 – A N Hope	Low water yield catchment. Significant groundwater baseflow. Appears WCWARP flow is too high. Based on poor correlation ($R^2 = 0.75$) with Forks Stream. Recent data and different correlation site (Maryburn at Mt McDonald) provides better correlation and better derivation of 5Y7DLF of 1500 l/s. Agreed 5Y7DLF

		minimum flow at Days Bridge of 1500 l/s but non-complying. Recommend 1500 l/s as minimum flow. ECAN already started a continuous flow data collection program.
152 – 170	CRC041543 – A N Hope	Proposed abstraction from Snow River, a tributary of the Grays. Minimum flow set as above for the other Grays River applications.
All Other Rivers and Streams (Rule 2, Table 3(xxii))		
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224 – 240	CRC042020 - Marie Horo	Take from Ahuriri River East Branch. Longstanding abstraction although lapsed recently. Poor correlation with any record. Minimum flow (5Y7DLF) agreed was 400 l/s. At least 5 years flow data collection required.
241 – 269	CRC012047 – Otamatapaio Station and CRC012019 and CRC012017 – Bogroy Station	Two takes from Otamatapaio River that naturally goes dry in its lower reaches at low flows and one from its tributary Corbies Creek. Minimum flow set upstream of takes. Corbies Creek abstraction tied into Otamatapaio minimum flow. 5Y7DLF agreed at 200 l/s. Correlation not very good. Comprehensive flow data collection program needed for at least 5 years.
270 – 289	CRC041033 – Otematata Station	Take from Glen Bouie Creek in the headwaters of Corbies Creek. Very high catchment. Small abstraction but some water harvesting. Poor correlation but agreed 5Y7DLF 10l/s. At least 5 years flow data collection required. Also tied in to Otamatapaio River minimum flow

		and must cease when abstractions from that river cease. No other nearby streams as alternative option.
290 - 304	CRC060253 - Peak Valley Station	Takes from Coal Creek and Shepherds Creek both small low-yielding streams. Very poor correlation for Shepherds Creek with Rocky Gully. Good correlation between Coal Creek and Shepherds Creek so only Shepherds Creek to have minimum flow site and Coal Creek controlled from there. Agreed 5Y7DLF minimum flow is 60 l/s on Shepherds Creek. At least 5 years flow data collection required. No other nearby streams as alternative option.
305 - 319	CRC020584 – Totara Farming Company	Take from Scrubby Creek, a small low-yielding catchment. Minimum flow set upstream of abstraction. Very poor correlation between Scrubby Creek and Rocky Gully. Agreed 5Y7DLF minimum flow is 30 l/s. At least 5 years flow data collection required. No other nearby streams as alternative option.
320 – 346	CRC063564 – Twin Peaks and CRC041798 – Killermont Station	Both takes from Manuka Creek, a tributary of Omarama Stream. Manuka Creek goes dry about 200m downstream of the Killermont existing abstraction and it appears unlikely that the water resurfaces in Manuka Creek again at any point downstream. No information available to confirm if Manuka Creek water resurfaces anywhere. Minimum flow site is upstream of proposed abstractions. No point in minimum flow downstream of Killermont as goes dry naturally. Underground residence time means that it is unlikely to provide any significant flow to Omarama Stream or Clifton Downs swamp if it resurfaces at all. Correlation with flow records not great. Agreed 5Y7DLF minimum flow of 65 l/s. At least 5 years flow data collection required.
347 - 366	CRC030944 – Waitangi Station (2 permits) and CRC072363 – Te Akatarawa Station	3 abstractions from the Sutton Stream catchment including one from Sutton Stream, one from Gibson Stream and one from Black Jack Stream. Gibson Stream goes dry naturally downstream of the proposed abstractions. Proposed minimum flow site upstream of abstractions. Poor correlation with any site. All agreed to use Gabites and Horrell MALF estimate of 80 l/s as minimum flow – conservative. At least 5 years flow data collection required.

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Director, Raineffects Limited

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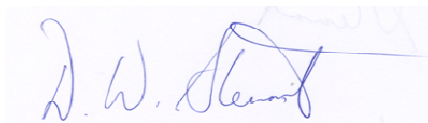
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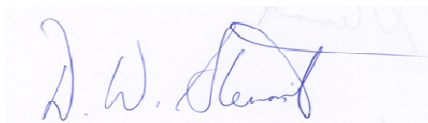
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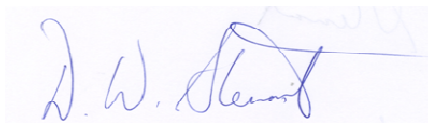
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50 - 51	Timing of low flows	Mountain catchments lowest flows generally winter/early spring – downstream catchments lowest flows generally late summer/autumn
52 – 62	Assessing flows	Methods of analysis to derive the flows including MALF or 5Y7DLF. Often poor or tenuous correlations with other continuous flow records. Need at least 5 years of continuous flow records to derive acceptable statistics.
63 – 69	Reliability of flow data within the Upper Waitaki catchment.	Some of available data is old (30-40 years old) and its accuracy and reliability have not been assessed. Gabites and Horrell report data used in the WCWARP based on poor correlations in many instances and flows corrected for abstraction using an estimate of water usage.
PART 2		
70 – 74	Introduction	Brief review of which applications covered by this report and derivation of prescribed minimum flows. Note that agreement reached between ECAN, applicants, consultants, Fish and Game Council and Department of Conservation on the MALF and 5Y7DLF flows for each abstraction.
High Natural Character Water Bodies (Rule 2, Table 3(1))		
75 - 89	CRC052502 – Glenmore Station Ltd	Take water from the Cass River. Mountain catchment with quite high flows. MALF agreed at 4550 l/s. Abstraction 250 l/s. Recommend no minimum flow as abstraction fully compliant with the WCWARP.
90 – 104	CRC071786 – Lilybank Station Holdings Ltd	Take water from Station Stream. Small mountain catchment. MALF agreed at 320 l/s. Application non-complying so minimum flow set at MALF. Reasonable flow correlation with Jollie River. At least 5 years flow data collection required
105 – 121	CRC031175 – Lonestar Farms Ltd	Take water from Mistake River. Mountain catchment. MALF agreed at 520 l/s. Application non-complying so minimum flow set at MALF. Reasonable flow correlation with Jollie River. At least 5 years flow data collection required.
Grays River and Tributaries (Rule 2, Table 3(v))		
122 – 151	CRC042661 - Grays Hill Station and CRC041542 – A N Hope	Low water yield catchment. Significant groundwater baseflow. Appears WCWARP flow is too high. Based on poor correlation ($R^2 = 0.75$) with Forks Stream. Recent data and different correlation site (Maryburn at Mt McDonald) provides better correlation and better derivation of 5Y7DLF of 1500 l/s. Agreed 5Y7DLF

		minimum flow at Days Bridge of 1500 l/s but non-complying. Recommend 1500 l/s as minimum flow. ECAN already started a continuous flow data collection program.
152 – 170	CRC041543 – A N Hope	Proposed abstraction from Snow River, a tributary of the Grays. Minimum flow set as above for the other Grays River applications.
All Other Rivers and Streams (Rule 2, Table 3(xxii))		
171 – 200	CRC011361 – Dunstan Peaks Ltd	Complicated network of abstractions and discharges from 4 streams. Omarama Stream goes dry naturally and some flow resurfaces between 4 and 6 km downstream just before its confluence with the main Clifton Downs swamp outflow. Outflows from Clifton Downs swamp very influential for low flow reliability in the lower river during dry periods. Lower Omarama Stream included in Ahuriri Conservation Order. Two minimum flows recommended including the Conservation Order flows and a 5Y7DLF on Omarama Stream upstream of all abstractions. Comprehensive data collection program recommended for at least 5 years.
201 - 223	CRC082269 – Haldon Station	Abstraction from Stony River upstream of where it naturally goes dry. Bywash downstream near bridge maintains flow under the bridge – important for trout. Minimum flow set at downstream end of the river after it has resurfaced. Poor correlation between upstream and downstream flows. 5Y7DLF calculated and agreed as 200 l/s at Hinch Bend. Comprehensive flow data collection program required for at least 5 years.
224 – 240	CRC042020 - Marie Horo	Take from Ahuriri River East Branch. Longstanding abstraction although lapsed recently. Poor correlation with any record. Minimum flow (5Y7DLF) agreed was 400 l/s. At least 5 years flow data collection required.
241 – 269	CRC012047 – Otamatapaio Station and CRC012019 and CRC012017 – Bogroy Station	Two takes from Otamatapaio River that naturally goes dry in its lower reaches at low flows and one from its tributary Corbies Creek. Minimum flow set upstream of takes. Corbies Creek abstraction tied into Otamatapaio minimum flow. 5Y7DLF agreed at 200 l/s. Correlation not very good. Comprehensive flow data collection program needed for at least 5 years.
270 – 289	CRC041033 – Otematata Station	Take from Glen Bouie Creek in the headwaters of Corbies Creek. Very high catchment. Small abstraction but some water harvesting. Poor correlation but agreed 5Y7DLF 10l/s. At least 5 years flow data collection required. Also tied in to Otamatapaio River minimum flow

		and must cease when abstractions from that river cease. No other nearby streams as alternative option.
290 - 304	CRC060253 - Peak Valley Station	Takes from Coal Creek and Shepherds Creek both small low-yielding streams. Very poor correlation for Shepherds Creek with Rocky Gully. Good correlation between Coal Creek and Shepherds Creek so only Shepherds Creek to have minimum flow site and Coal Creek controlled from there. Agreed 5Y7DLF minimum flow is 60 l/s on Shepherds Creek. At least 5 years flow data collection required. No other nearby streams as alternative option.
305 - 319	CRC020584 – Totara Farming Company	Take from Scrubby Creek, a small low-yielding catchment. Minimum flow set upstream of abstraction. Very poor correlation between Scrubby Creek and Rocky Gully. Agreed 5Y7DLF minimum flow is 30 l/s. At least 5 years flow data collection required. No other nearby streams as alternative option.
320 – 346	CRC063564 – Twin Peaks and CRC041798 – Killermont Station	Both takes from Manuka Creek, a tributary of Omarama Stream. Manuka Creek goes dry about 200m downstream of the Killermont existing abstraction and it appears unlikely that the water resurfaces in Manuka Creek again at any point downstream. No information available to confirm if Manuka Creek water resurfaces anywhere. Minimum flow site is upstream of proposed abstractions. No point in minimum flow downstream of Killermont as goes dry naturally. Underground residence time means that it is unlikely to provide any significant flow to Omarama Stream or Clifton Downs swamp if it resurfaces at all. Correlation with flow records not great. Agreed 5Y7DLF minimum flow of 65 l/s. At least 5 years flow data collection required.
347 - 366	CRC030944 – Waitangi Station (2 permits) and CRC072363 – Te Akatarawa Station	3 abstractions from the Sutton Stream catchment including one from Sutton Stream, one from Gibson Stream and one from Black Jack Stream. Gibson Stream goes dry naturally downstream of the proposed abstractions. Proposed minimum flow site upstream of abstractions. Poor correlation with any site. All agreed to use Gabites and Horrell MALF estimate of 80 l/s as minimum flow – conservative. At least 5 years flow data collection required.

Signed:



David William Stewart
Director, Raineffects Limited

Date: 2 February 2010