Tabled at Hearing on 5th November 2015

Gary Bruce
Submitter I D Number 64039.
Caithness Farm Ltd,
Willowbridge Road,
No 10 R D
Waimate. 7980.
24 09 15.

Enviroment Canterbury,
Plannings Hearing Officer,
Nancy Bonner.

Please find the following evidence in support of my earlier submissions to LWRP Variation 3 Section 15.4 Policies.

In support of this evidence I wish to call Mr Murray Bruce & Mr Jeffrey Bruce to present evidence.

Also Mr John Hughes will be supportring this evidence.

I request a half hour of time for the 4 of us to present our case.

The basis of my submission is the requirement proposed by E-Can to cease shallow well & surface irrigation abstraction from within the Willowbridge area should the Bradshaws Bridge flow recorder fall below 600 l/s excluding the MGI supplement. If this proposal is implemented it will exclude irrigation for most of the dry summer months when it is needed. With the history of irrigation in the Willowbridge district having no recorded detrimental enviromental effects a measure such as this must not be allowed. Irrigation in Willowbridge stared many decades ago before my time. I will ask my father Mr Murray Bruce to make further submission shortly on this and other related matters including the purpose of the MGI discharge. The origional plan for MGI discharge was an ocean out fall in the vicinity of Morven Beach Road - Maori Road. It was his vision backed by experts & neibouring farmers of the day to put the discharge into the Waihao River for enviromental enhancement & irrigation. When the consent was renewed in Jan 2010 it appears that the irrigation aspect of the consent was dropped without reference to Waihao River or surrounding shallow well & surface cosent holders. Our main well on the home farm in Willowbridge was put down by my Father in 1967. It has been a proven reliable well since that time including the worst drought ever in 1969 which occurred long before MGI water discharge into the Waihao River. This well is refered to in the report I am about to quote. In the 320 page Enviroment Canterbury Section 42 A Report No. R15/107 dated 4 September 2015 the last 10 pages appear to be a response to my earlier submissions. ( Quote page 310 ) This report from Mr Adam Martin clearly states a few facts. That is the well measuring recorded by E-Can & the SCCCB over the last 45 years clearly indicates more stable water levels after MGI discharge began. As he correctly states MGI discharge helps keep water tables higher in surrounding springs & creeks. The report also gives a typical dry summertime sernario of absraction cut off requerments during a dry summer without any MGI flow included. He also states how the Waihao River drys during summer upstream of lateral 3 discharge but has natural flow again near Bradshaws caused by re-emerged water from the shingle riverbed. There have been many changes to the proposed & partialy operational LWRP over the last 3 years. As it stands at the moment I understand the proposal is to limit water abstaction from shallow wells & surface takes to 50 % of allocation when recorder at Bradshaws falls to between 600 – 700 l/s. Under 600 l/s all abstraction must stop. This is proposed without the inclusion of the MGI supplementry water. As quoted in Adam Martins report MGI consent requires a minimum flow of 700l/s ranging up to 34000 l/s during the irrigation season. With total shallow & surface takes adjacent to the Waihao River at 152 l/s I fail to see any adverse enviromental effects by allowing irrigation to continue during the summer while the MGI discharge is operational. It can be stated that irrigation has many enviromental benefits during a dry summer. It helps birdlife & insects feeding on pasture. Livestock health is improved creating less unhealthy animal discharge. Crops are improved requiring less chemical sprays for weeds & disease. Cultivation in

Autum following crop harvest requires far less input on damp ground than hard dry ground after a drought. If the commisioners still recommend that all MGI discharge is for enviromental purposes only then I submit that the little amount taken overall for irrigation has nil effect on the enviromental purpose of the water discharge & if it does surely the minimum flow from MGI can be increased by 150 l/s.

The reasoning for the non allowance of MGI water discharge into the Waihao for any purpose other than enviromental flow is supposably for the benefit mainly of Lake Wainono. Having lived in the Waihao district all my life & owning farmland with family at the mouth of the Waihao for 27 years until 2012 I did notice some water quality improvement in that time from the dead arm chanel from Lake Wainono. In 1994 I along with help undertook bank erosion protection work on our boundary with the dead arm. At that time the mud bottom of the dead arm was a thick black smelling sludge. Flounders caught in the Waihao were fine to eat if taken from the river upstream of the Waihao box. Any taken in the dead arm were non eadable as they smelled as bad as the water they lived in. The water in the dead arm section of the river was always brown dirty. A noticable improvement in this water colour & composition of the bottom & shoreline of the dead arm has occurred over the last 20 years. With more sand rather than mud on the bottom. The last few years we owned the farm bounding the dead arm the flounders taken there were quite eadable. The water now is rather blue in colour than thick brown. The reason for this improvement is undoutably the benefit from the instilation of a modern Waimate sewerage treatment plant some 20 years ago. Prior to that there was a history of 50 or more years of poorly treated sewerage discharged into the Waimate Creek flowing directly to the dead arm. I present a photo I took a few years ago of a minor fresh in the Waihao opening the box showing the dirtier water coming down the Waihao & clear water from the dead arm something we would never have witnessed 20 or more years ago. So between this improvement and the work being done in the Lake Wainono Restoration project particularly to stop they sedimentation caused by the inflows from the Hook River it is my opinion that the water quality in Lake Wainono is already well on the improvement. So I must state again the small amount of water used for irrigation from shallow well & surface takes from the surrounding area will not affect water quality in Lake Wainono. So far as the lake itself goes I have not spent a lot of time there but have spent some. Around 30 years ago once a year I would get the call from my late Uncle Arthur Rollinson of the Wataki Valley Acclimatisation Society to row a kayac around the lake to herd the molting canada geese into onshore pens for a humane cull. We were well warned of the dirty water & if we tipped a kayac, right it straight away & get back to shore to dry out. Fortunantly this never happened to me. I have had several boat trips from the box to the lake mouth over the years & done some duck shooting there. In recent years since 2007 I drive the track between the lake & the shingle beach several times a year shifting farm tractors between our Willowbridge & Makikihi farms. The plantings on the lake margins look to be doing well. There will always be some silt & dirty water in the lake as there is never a trip without seeing an abundance of bird life stiring the shallow waters. The most surprising event occurred 2 years ago mid afternoon during a severe strong westerly wind. The lake had breaking waves along the whole eastern shoreline 30 –

40 cm high. This was causing extensive stiring of silt along the whole eastern frontage but not as severe where plant growth was out into the lake water.

So to finish I have to state there are many ways to improve the Water quality in the Waihao Wainono system but stopping irrigation as it occurs at the moment is not the way.

Tabled at Hearing on 5th November 2015

Murray Bruce

Tabled at Hearing on 5 November 2015

Good Morning Commisioners.

I thank you for this opportunity to present my submissions on the history of the water flows in the lower Waihao River.

My History,

My Grandfather drew section 7 of Block 4 In the Waikakahi ballot in 1898. My father was born there in 1906 & I was born on the north bank at Willowbridge in 1939. I have lived there & on the north bank near the mouth of the Waihao all my life except the last 4 years. My first memories were of the 22nd of February 1945 record flood, State Highway 1 bridge section destroyed & all highway traffic diverted down through Willowbridge & over Bradshaws Bridge & up Maori Road to Morven. The most costly damage to people were the farmers & their crops & livestock. Although the peak flow was exceeded by the March 1986 flood the damage & distress in 1945 coming in the middle of harvest was made much worse because many generations of men were overseas winning World War 2. Maori families had water in houses, mostly older people who coped very well.

Later in 1961 we had a very damaging flood which I took photographic evidence of, the only actual record at peak flood time. I was co-opted onto the Lower Waihao Flood Control Committee in 1967 by Chairman Mr W J Fletcher & Secretary Mr W J Penno. A position I valued & saw the completion of our scheme. I served on the committee until 1983 until it was restructured. These first 30 years of working with qualified catchment engineers were very rewarding by having our fully operational flood control scheme finally completed.

Focus then changed from flood schemes to Maori interests & to later pollution & irrigation issues.

Maori Issues.

I had grown up with Maori families on the Waihao & many had worked at home from 1946 – 1954. Harvesting grain & potatoes, hoeing potatoes, swedes & mangolds. It was rewarding to work with their pleasant ways & disposition. Later in 1987 I was approached by Kelly Davies ( Te Marie ) to ask if I would go to the Waitangi Tribunal hearing at Arowhenua to give evidence on local river issues. I agreed to go & chose the issue of river acess. When my father & his friends in the 1920,s & 1930,s had to make there own Saturday night entertainment the Maori & Pakeha young people chose the river many nights in the spring, Summer & Autumn. The Treaty of Waitangi guaranteeing the Maori people access always to their traditional food gathering areas. In the Waihao - Wainono area 2 reserves did not front the river or the ocean & were useless. Many young people of both races were prosecuted & convicted & fined for having an artificial light on the river & for spearing trout. Once my father & Mr Harry Davies were fined 8 pound each for spearing trout & at that time I believe young Maori did not receive the dole. Because of this my Grandfather paid the 16 pound total fine.

Increasing use of irrigation water & the associated arguments by local farmers & Maori culture & traditional beliefs, Kelly & I formed the Waihao – Wainono Water uses group to facilitate knowledge of different views on the water use. This has been well attended since its inception & a much better understanding is now reached.

Geological Issues.

The geological knowledge of the Lower Waihao outlet to the ocean has been very little studied by geologists because of its location halfway between Dunedin & Christchurch. The so called Dongas on Mr Hargraves & Mr Hughes farms are undoubtably ancient outflows of the Waihao. The present outlet at the box was not always the main outlet. The original box 1897 was located 1.5 KM further north & a river channel by the Opiro homestead indicates another earlier outlet, now owned & farmed by Mr Gary Rooney. Further North at Claridges Ripple the river from the Lake Wainono to the box also broke out to sea during flood times. The paramount feature however is the so called Dead Arm which has been a major river outlet flow & needs qualified study as this region is of very high Maori & cultural significance.

In 1986 when the ocean ranching of salmon was very much promoted on the East Coast of the South Island, Fletcher Construction was engaged jointly by the Skeggs group & myself to engineer the feasibility of an ocean ranching facility south of the box. The foundations of the concrete outlet proposed was required to be located on land which needed to be expertly examined. We engaged a contractor to dig down to 20 feet depth & log the results. This was done but surprisingly the sediment from 14 feet to 17 feet was full of large Bluff oyster shells 100 metres inland from the beach. I took the samples immediately to Canterbury University at Ilam, to a Miss Cameron, a lecturer in geology. I now quote from her report.

"This indicates that paddock site as recently as 1000 – 2000 years ago was an estuarine area "

If this is so it proves the oral history Rakahauto that the other 40 people in the Uruao Waka came ashore for a joyous reunion. It could also mean the east coast here is subject to an uplift on occasions.

The first European to walk & write of his adventures in January 1844 was Bishop George Augustest Selwyn. He stated that after the surprise meeting with Edward Shortland the next day after their farewells Selwyn & his 3 Maori attendants camped the night in the dry riverbed of the Waihao River 2 miles inland from the mouth. This could have been downstream from Lundys Ford at our farms frontage. Or if upstream then between Lundys Ford & the railway bridge. Whatever it clearly demonstrates a natural feature of this river in 1844. The river in January 1844 was dry as recorded by Reverand Selwyn because of a natural low summer rainfall & the underground strata taking the flow which is not observable on the surface, a very similar feature as the State Highway 1 bridge over the summer Selwyn River.

Geological Questions which should be answered.

The present Waihao Catchment of 647 square kilimeters has in ancient ice age times, began glacial cutting of the Waimate Gorge. As times became warmer the river water continued the erosion & near the coast cut the dead arm at Skeltons. This area needs expert examination as the Waimate Gorge, Lundons Gorge, & the present operation of the area down stream of McCullochs Bridge. Likewise the flows in ancient times have exited to the ocean & produced several remaining outlets that were puzzling. I also believe that from State Highway 1 to Bradshaws Bridge is as far South the riverbed has been in Historic times. From the North bank to the terrace on Lucks Road all that highly fertile & potassium rich Willowbridge land has been alluvial deposited especially from the Southern Catchment. I sincerely believe that in very ancient times a gravel & rock strata was deposited under Waimate, Willowbridge, Studholme & Hook districts about 80 – 100 metres below the present surface & accounts for the best & cleanest water at the Studholme factory & Waimate district Council domestic supply.

Irrigation

The first large scale pumping of surface water for crop & pasture irrigation were by 3 local farmers in the very dry summer of 1955-56. The method was a labour intensive hand shift big gun system. In 1964 the Waihao system again had a bad drought & the lack of winter & spring rains leaves a strong image upon ones thoughts & by December & January crops & pasture & lambs unfattend ensured our budget estimates of our revenue would be severly affected. In June & July of 1967 I could forsee that a drought was again on the way. Discussing the problems & seeking advice from Mr Jack Symons from Department of Agriculture, he suggested that a hand shift sprinkler system would be ideal as we had the water in a creek in the centre of the farm & the river at the south end. Upon detailed enquiries I found that it all stacked up financially & we bought a 24 sprinkler 1200 feet sprayline of 4 inch aluminium & 800 feet of 4 inch mainline. A diesel tractor & a new pump & we were in business.

This experience reinforced my belief that supplemental irrigation was very necessary for full production. But there was also much to learn. In March 1968 we had 3 inches of rain which saturated unirrigated ground & swamped irrigated land on heavier soils. In April; the same year we received 4 inches in a cyclonic storm later known as the Wahine Storm after that tragic event in Wellington.

Then to 1969 when the worst drought in my farming lifetime visited us & many grain crops in South Canterbury & North Otago were feed to livestock as not worth harvesting. In my case I employed my wife & sons 7 & 5 respectivley to assist in early night work.

Lake Wainono.

I first visited the lake with my father & a shooting friend in April 1948. On the Eastern side at the South East edge of Wainono the lake was 2 feet deep at the shore which had dense grass like plants like the common cutty grass. The water was very discoloured & nowhere could the bottom be seen. In 1957 - 58 I duckshot at opening weekend at Southern end of Wainono, & night shooting on the Western side with the box closed. The lake level rose & in the darkness walking back to the vehicles the numbers of Short fin eels in grassland of 3 inches of water was very dense , up to 3 per square metre. This in the late 50,s & 60,. But in the 70,s & throughout the 1980,s commercial eelers reeped & raped the waters of Waihao & Wainono & the shortfinned eel population has yet to fully recover. In my experience if there is a large population of eels in a waterway the healthy populations of flounders, mullet, & native species are also to be found.

Vegetation around the fluctuating edges of Lake Wainono should be an urgent priority as wind wave action is a major cause of water turbity.

Finally I also believe that the mixing of alpine waters & downland waters has not been studied & researched enough to determine if the alpine water organisms are compatable with the downstram water & lakes.

Farmers on the Lower Waihao have have spent much money & time to mitigate the ravages of drought from surface takes & also so called shallow wells up to 10 metres deep. To expect generations of farmers in the Waihao area to spend 150000 - $ 450000 is indeed a human rights issue when no documentet proof indicates any harm to the environment or what lives in or on it.

I would swear on the bible that I have never witnessed or heard of an environmental disaster in our area from current irrigation. I would organise a class action against any proposal to ask farmers to stop irrigation when ample water resources are there. I have had experience in these legal matters & was overwhelmed by support from ECAN Timaru staff but abuse from Christchurch.

A declining rural farming population with larger farms & high debt load means most farmers are facing financial ruin if these ECAN proposals are adopted, without irrefutable evidence of any damage we have caused. The proposal to put more Waitaki water into Lake Wainonoa is in direct opposition to Maori advice & proposals which indicates the very similar views that Maori & coastal farmers have on the environment.

I thank you commissioners for this chance to present the history & direction of this highly valued land & its residents & the Waihao Marae, equally valued & esteemed.

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The next name on the map is Te Rua-koaro, and is apparently a hollow with water in it, for the only one of my aged friends who knew the name said it was north of Wainono, and that it was through being a resort of eels it got its name, "rua" being a hole in the land, and "koaro" a hole in the wet mud at the bottom of the water. These "koaro" holes were made by eels, and quite a number of them were in this particular water hole.

Then we come to Makikihi and to Pourewa (elevated or floating post). This last name designates a river, but, strange to say, this river is on our maps as Kohika, although Torlesse in his 1849 map clearly marks it, spelling it Porewa. It would be interesting to know who changed the correct name to the one now used.

My second list gives the next name as O-kahu (place of Kahu=the hawk), but the next name on the map is Okakuu, so written to show the emphasis on the "u," but what Okaku means, the collector does not know. A Maori told me it meant "the adherings," like limpets sticking to rocks. Another said it meant water seeping through shingle.

Then we come to a lagoon, Te Whakai-a-Kohiku (the feeding of Kohiku), but what he was fed on is not related, or the tradition died with the last generation.

There is a mix-up about this name, and we can consider it now. Leaving Waitaki on January 15, 1844, Dr Shortland and his Maoris camped that night in the dry bed of the Waihao River about one mile and a-half from the sea. Next day they proceeded up the "pebble ridge" along the sea shore with "lake Waihao" on the left. "After leaving Waihao, which was nearly three miles long, we passed several small 'hapua' similar to it. They were all crowded with ducks, but so shy that I wasted much time in trying to get a shot at them. This, and the fatigue of constantly walking on loose shingles, caused so much delay that we made only six or seven miles' progress during the day. Evening coming on, we resolved to halt for the night on the beach by the side of one of these lakes, called Te Whakai-a-kohika, the water of which was drinkable. Most of them we had found to be too brackish to quench our thirst." Next morning "we still continued to toil along the beach for about six miles; and then crossing some low grassy hills we again tasted good water at Waimakihikihi [Makikihi] for the first time since we left our encampment at Waihao."

The distance from Waihao (Box) to Makikihi (Mouth) is 10 miles, and from the latter spot to Pareora (Mouth) is almost the same distance. If the party covered six miles the first day, that would leave four to Makikihi. The recorder says six, but it was virgin country, and distances would be hard to estimate, so the statement there is not irreconcilable. From the Waihao Box a tramp of about four miles would bring him near Lake Wainono, and six miles would bring him near its top end, so the supposition is that he camped between it and the sea at its north end. Nowhere does he mention Wainono, and his map only shows four lagoons north of Waihao. It seems likely that when writing up his notes he inadvertently wrote the name of the lagoon you pass before coming to the Otaio River for the big one he passed before reaching Makikihi. Shortland was a methodical and accurate man

but his book shows one or two small errors, such as writing Taki-te-uru for Arai-te-uru on pp. 188 and 190 and so on.

None of my usual Maori informants knew anything of any place of this name Kohika except the oldest lady, who said it was a lagoon near Wainono and near it was another lagoon named Marakura. She did not appear to know the places, but knew the names traditionally. Of course, it is possible there were the two lagoons nine miles apart both bearing the same name, but that would not meet all the difficulties. We can accept the lagoon at Otaio as definite, for not only does the map maker of 1879 record it, but in a list from another Maori source written in 1880 the place is given in exactly the same position as on the map, and, moreover, is spelt as Shortland spells it, with the final letter "a," and not "u." This lagoon at Otaio may be the explanation why the word Kohika was clapped on to the river in place of the genuine name Pourewa.

Shortland says the water at the spot six miles north of Waihao was drinkable, but that would be probably because he would boil it in the billy. The Maoris say that Wainono is brackish and not fit to drink. In the olden days when travelling between Waitaki and Makikihi, there were reckoned to be two places where one could get fresh water, and one was at Waikawa near the Box at Waihao, where was a clear spring, whose name has been forgotten by this generation. The next usable water was at Ohari, south of Wainono, and then there was none until Makikihi, travellers carrying what supplies were needed in the old containers known as "ipu."

To resume our pilgrimage, the next place is Otaia—not Otaio as commonly written. Torlesse wrote it Otaio in his 1849 map and perpetuated that spelling. All the Maoris are unanimous that Otaia is correct, although very few can explain its origin, but I met one who said it meant "to dash down."

Then comes Otaoka, the name of the St. Andrews creek, and called after a fierce old fighter of 300 years ago. His name means "property or possessions," and he was the sort of man (like the barons of old) to see he had plenty of them.

The next name is Pureora, a religious ceremony to free a person from tapu. Probably we are indebted to Torlesse for the erroneous form Pareora.

The map then proceeds with Hene-kura, Patiti, and Timaru. The first of this trio is generally written Hine-kura (red maiden), the second means a kind of grass, while Timaru, on the face of it, translates as "sheltered cabbage tree." Mr James Cowan wrote, "The name Timaru, by the way, means literally 'Shady Cabbage Tree.'" This would infer that a particularly umbrageous specimen originated the name. The word Timaru is probably a local adaptation of the usual word Tumaru (shady).

Leaving the place of this famous cabbage-palm we come to O-tu-tohu-kai, which a Maori told me meant "the standing sign of food." This creek flows into the sheet of water known as Wai-tarakao. A few southern place-names have the word "tarakao" as their principal constituent, and the collector tried to fathom its meaning, with little success. His mentor, a very

Tabled at Hearing on 5th November 2015

Willowbridge,
No. 10 R.D.
WAIMATE

25th June, 1973.

Resident Engineer,
Ministry of Works,
TIMARU

ATTENTION: Mr. W.G. Kenniston.

Dear Sir,

Following my recent telephone approach to a Ministry of Works Draftsman in Timaru, I have further discussed the question of using Waitaki River water to supplement the Waihao River with several other farmers and with Jack Symons our local farm Advisory Officer with the Department of Agriculture and Fisheries, all have expressed enthusiasm for the scheme.

My first thoughts were to ask ff a continual flow of water could be discharged into the Waihao at Lundys Ford where I and other farmers downstream could use it for irrigation, stock and domestic supplies. Upon further thought, however, it would appear that a much wider benefit and area could be covered if the water was discharged into the Waihao river at the State Highway Road Bridge or between the Highway and the Railway Bridge.

I have irrigated my property since 1967 and the water supply is a creek running through the centre of the property and which is diverted to other areas by means of gravity flows through old creek beds. This sytem has worked very well except in periods of low river flows. During the past two seasons the creek has been dry from January until the winter months.

I have viewed the South Canterbury Catchment Boards terraine contour maps which indicate the underground source of the creek being in the wicinity of the Railway Bridge. Also these maps indicate that the larger part of the whole Willowbridge farming area south of State Highway 1 is reliant on its ground water supplies flowing in a N.E. direction from the river.

It is my opinion that if a continual flow from September to March was discharged into the river, not only my farm but a much wider area could be benefitted.

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Tabled at Hearing on 5th November 2015

Department of Geology
**University of Canterbury** Christchurch 1 New Zealand

21 February 1986

1 E Bruce
lo. 10 R.D.
JAIMATE

Dear Mr Bruce

I have examined the material you left with me for possible age determination, and it has proved to be quite interesting.

Firstly - it is an estuarine deposit. So the thick layer of shells epresent a shell bank in an estuary, similar to those in the rr ent Avon-Heathcote estuary. Both the foraminifera and stracods contain dominant estuarine dwelling species. There are ery few specimens which could be from open marine conditions, and hese could have easily been carried in on tidal currents.

The fauna consists of:

ominant Ammonia becarii aoteana
Callistocythere neoplana
Xestoleberis sp.
Copytus novaezealandiae.

All are estuarine dwellers)
ogether with few specimens of

Elphidiononion charlottensis
Elphidiononion simplex aoteanum
Notorotalia finlayi .

hese are shallow water marine dwellers.

econdly - age. Preservation is extremely good and some of the stracods have the chitinous remains of soft-parts inside the oined valves. This implies they are in fact very young, eologically speaking, of the order of a few thousand years at the ost, and probably close to one or two thousand years.

he foraminifers do not give any clearer indication of age. Most f the listed species came into the N.Z. fossil record about 10 illion years ago, but one, Notorotalia finlayi, first appears bout 3 million years ago. So as you see from the foraminifera, he deposit was laid down within the last 3 million years. From he preservation of the shells, I would suggest that the deposit is ertainly less than 1 million years.

his is as far as I can go at present, but it presents an ntriguing problem. If it is as young as the soft part remains uggest, and it is 100 yards in from the present coastline, it uggests a rapid sedimentation rate to account for the thickness of ediment above the shells. There would then need to be some uplift o allow for the present height of the land surface above sea evel.

It might be possible to obtain a more accurate age for the shells by meas of $C_{14}$ dating, but this could take some 2-3 months, depending on priorities. It might also be chargeable - $100/sample is the proposed cost, but we have not been told when this charge will be implemented. At present samples are free. For non-scientific work sample charges are $500/sample. I would be more than happy to put it in for you as a scientific sample, as it could well be justified on grounds of erosion, beach formation etc.

I need to know a little more about location details though. Could you give me a grid refrence, or mark on the enclosed photocopy the site of the drillhole. Any idea of surface height? This would at least help to give a reference to amount of uplift. Also the different layers encountered in the drillhole and thicknesses/ depths from surface. Presumably the drillers gave you a log for the hole.

I am sorry I cannot be more helpful in the first instance regarding a definite age for the deposit.

Yours sincerely

Alice Cameron

A A Cameron (Miss)
LECTURER IN GEOLOGY

AAC/ST

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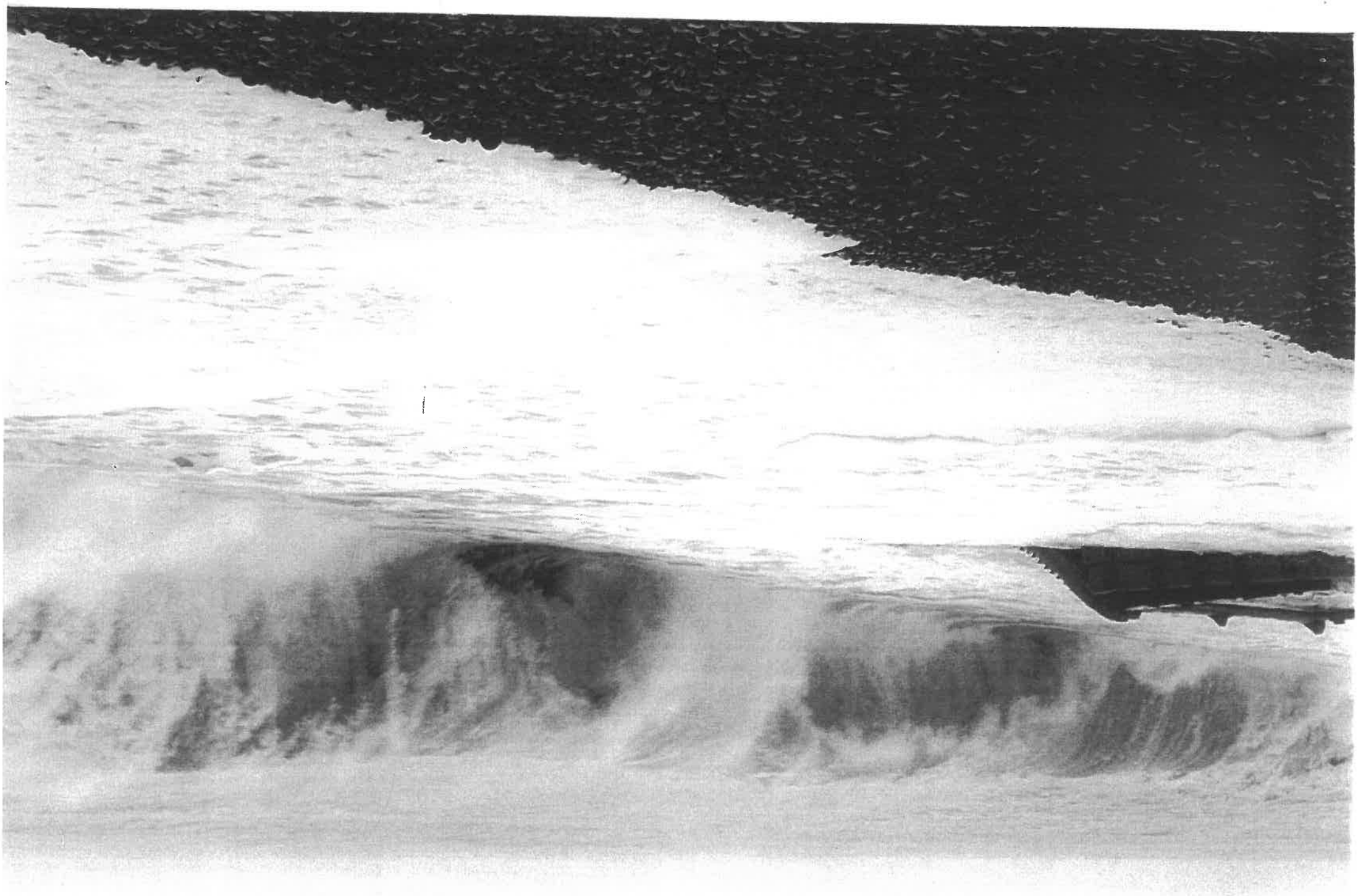
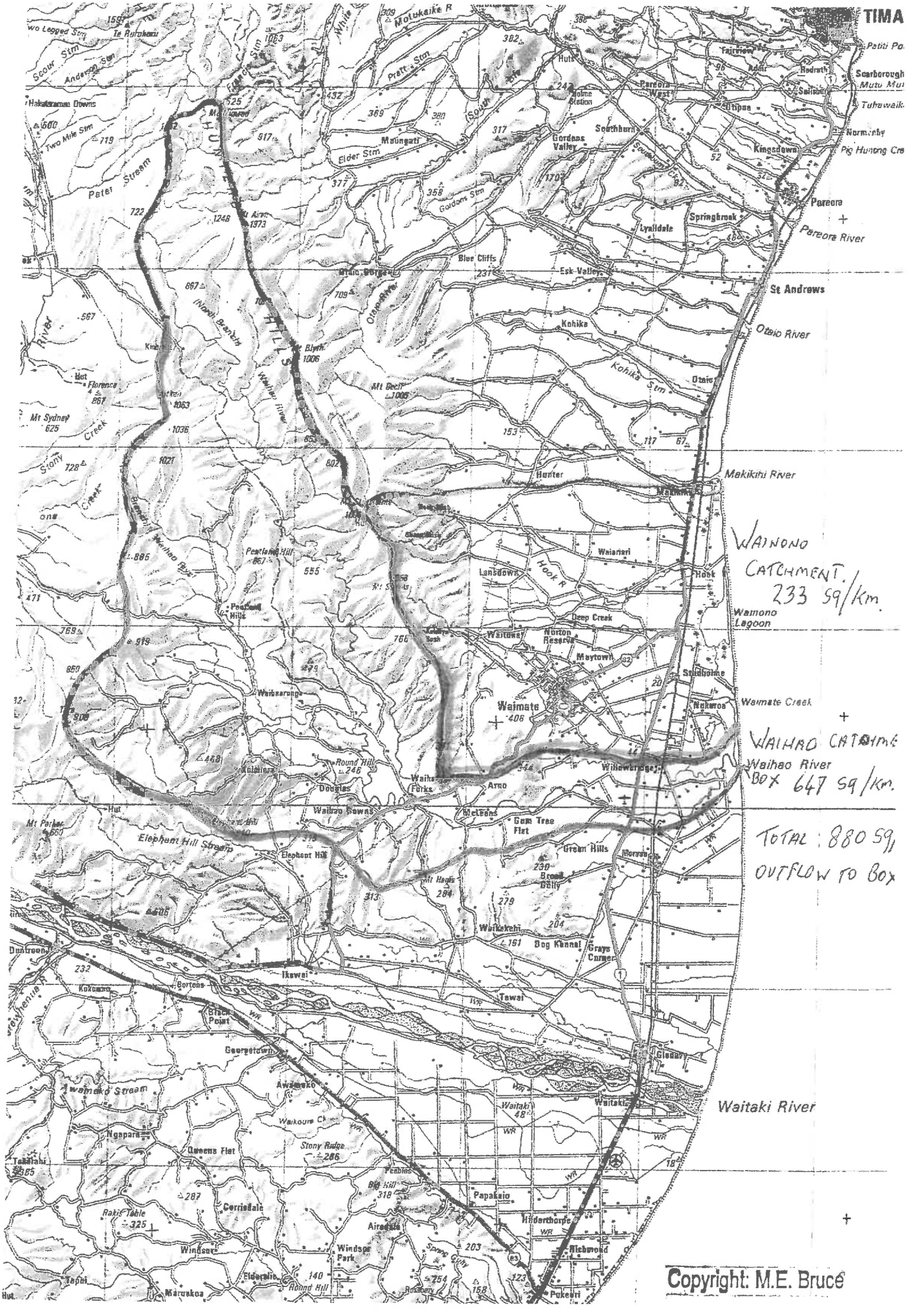
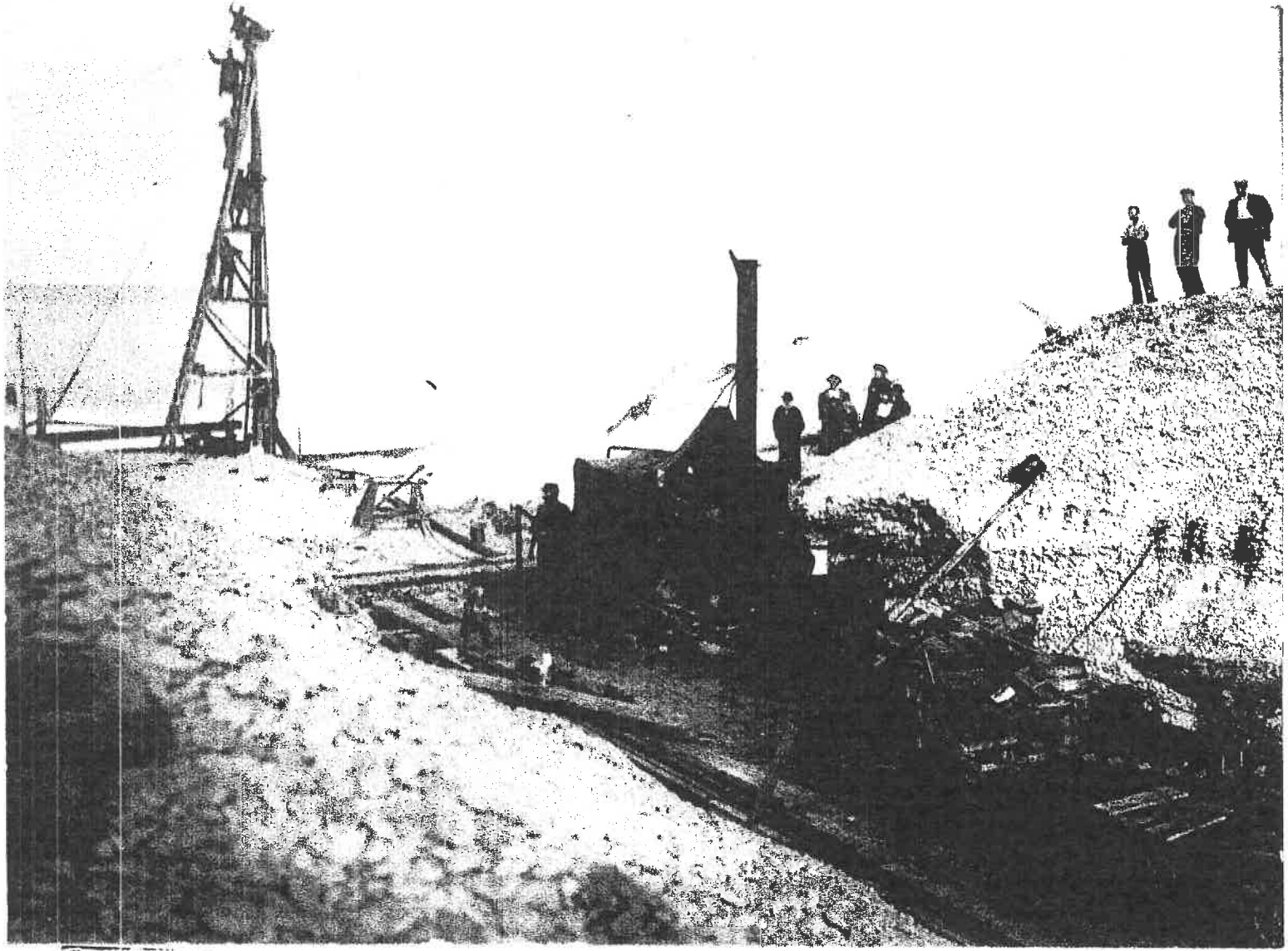
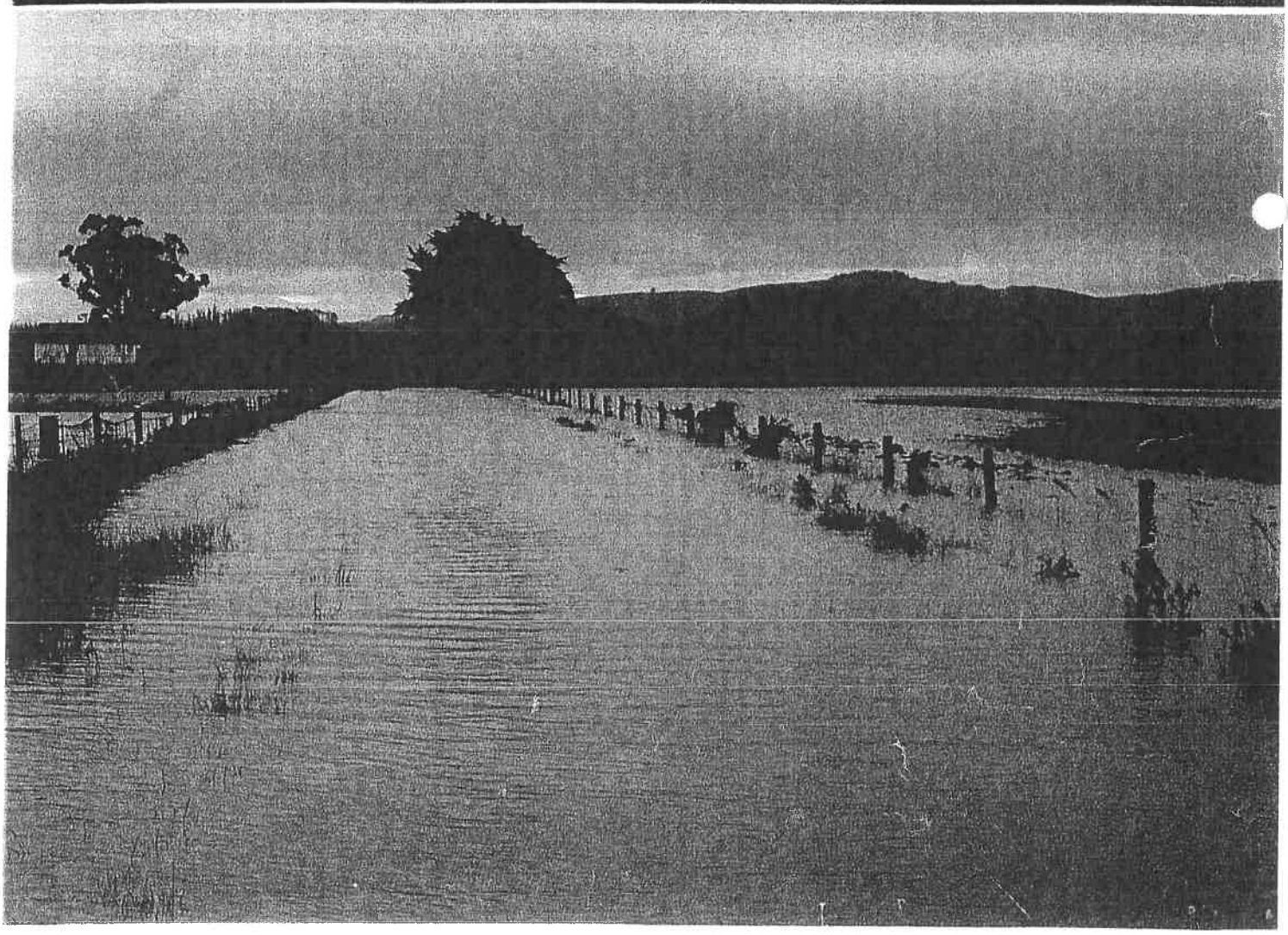




WAIHAO RIVER. 1ST NATIONAL MOKIHI RACE. WAIHAO MAORIS. 3rd TE MUKA MAORIS. 2nd CHATHAM ISLAND MAORIS 1ST





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# Pacific Ocean

Maori Lake
(Hou-were)

The Black Stump (Pow Ta Moai)

Shrouds of a canoe mast

*Maori used nets here to trap moulting game*

Te Wainono Lagoon
Oozing Water

Dead Arm (Takiratawa)

Claridge House

The Ford

Claridge Ripple (or Skeltons)

Bachelor & Best Hut

Poingdestres rabbit farm

G Nash & A Wilson Hut

Te Tau-awa or Waihao River

To The Box

Haymans Lagoon
O-piro

G Meredith Hut

Abandoned Hut

Acclimatisation Hut

O-te-una or Shag Creek

Reserve

Cosy Dell

Claude House

Dohrmanns Road

Traffic Bridge

House once owned by Kippenberger & Meyers

Suspension Foot Bridge

Sir Charles Creek
*(Named after a race horse drowned here, owned by Mr Studholme)*

To Opiro

Haymans Cottage

Weirs House

Butter Factory

Toilet

Maori Hut *(occupied by man known as Kinita)*
*(Kinita Karate Hirapuha)*

Dohrmanns House

Ohari Creek

Waimate Creek

Pratts Creek

Sides House

Swing Bridge

Waihao River

Sullivans House

Rollinsons House

Weirs House

*A request by Arthur Rollinson to supply him with a plan of this part of the Waihao.*
*Eventually turned into a map showing places of interest past and present*

*Signed Frank Sanders 26-8-02*

Rogers House

The Hatchery

Yorkeys Creek
*(Named after the man employed to clean it)*

Meyers Swamp

Hunters House

Foxs' House

Poingdestres Road

Meyers Road

Haymans Road

*Thanks to Mr Studholmes' book Te Waimate for some of the Maori names*

Tabled at Hearing on 5th November 2015



## 15.6 Allocation Limits

### 15.6.1 Environmental Flow and Allocation Limits

The following flow and allocation limits are to be applied when reading policies and rules in Sections 4, 5 and 15

**Table 17: Waihao, Wainono, Sinclairs and Morven Catchment Environmental Flow and Allocation Limits**

| Catchment (see Planning Maps) | Min flow Location | Minimum flow for A permits (L/s) | Allocation limit for A permits (L/s) | Minimum flow for B permits (L/s) | Allocation limit for B permits (L/s) |
|---|---|---|---|---|---|
| **Hook** | Sth Branch Hook (Gunns Bush) | 20<br>1 Oct-30 Apr | 7<br>1 Oct-30 Apr | n/a | 0 |
| | | n/a | 0 | | |
| | Upper Hook (above intake) | 32<br>1 Oct-30 Apr | 47<br>1 Oct-30 Apr | n/a | 0 |
| | | n/a | 0 | 200 | 44<br>1 May - 30 Sept |
| | Hook Beach Rd area | 64<br>1 Oct-30 Apr | 15<br>1 Oct-30 Apr | n/a | 0 |
| | | n/a | 0 | | |
| **Merry Stream** | SH1 | 5<br>1 Oct-30 Apr | 13<br>1 Oct-30 Apr | 45 | 50<br>1 Oct-30 Apr |
| | | 45<br>1 May - 30 Sept | 55<br>1 May - 30 Sept | | 0 |
| **Hook Beach Drain** | | n/a | 0 | n/a | 0 |

| Catchment (see Planning Maps) | Min flow Location | Minimum flow for A permits (L/s) | Allocation limit for A permits (L/s) | Minimum flow for B permits (L/s) | Allocation limit for B permits (L/s) |
|---|---|---|---|---|---|
| **Waituna** | | n/a | 0 | n/a | 0 |
| **Waimate** | At ds intake | 15<br>1 Oct-30 Apr | 42<br>1 Oct-30 Apr | 400 | 100 |
| | | 100<br>1 May - 30 Sept | 100<br>1 May - 30 Sept | | |
| **Sir Charles** | Rooney's Bridge | 100<br>1 Oct-30 Apr | 149<br>1 Oct-30 Apr | 380 | 26 |
| | | 120<br>1 May - 30 Sept | 139<br>1 May - 30 Sept | | |
| **Buchanans** | Fletcher's Bridge recorder | 150<br>1 Oct-30 Apr | 153 | n/a | 0 |
| | | 178<br>1 May - 30 Sept | | | |
| **Upper Waihao** | McCulloughs recorder | 300<br>1 Oct-30 Apr<br>600 all takes reduce their rate of take by 50%* | 378<br>1 Oct-30 Apr | 1,325 | 285<br>1 Oct-30 Apr |
| | | 600<br>1 May - 30 Sept | 269<br>1 May - 30 Sept | | 100<br>1 May - 30 Sept |
| **Lower Waihao** | Bradshaws Bridge | Modified minimum flow 100**<br>1 Oct-30 Apr<br>Pro rata restrictions apply for all takes* | 152 | Modified flow 600**<br>Pro rata restrictions apply for all takes* | 30 |
| | | Modified flow 600**<br>1 May - 30 Sept | | | |

| Catchment (see Planning Maps) | Min flow Location | Minimum flow for A permits (L/s) | Allocation limit for A permits (L/s) | Minimum flow for B permits (L/s) | Allocation limit for B permits (L/s) |
|---|---|---|---|---|---|
| | | Pro rata restrictions apply for all takes* | | | |
| **Waihao Dead Arm** | Poingdestres | Height not to fall below 1.3 metres above mean sea level | 80 | n/a | 0 |
| **Wainono Lagoon** | | n/a | 0 | n/a | 0 |
| **Sinclairs** | | n/a | 0 | n/a | 0 |
| **Morven Drain** | | n/a | 0 | n/a | 0 |

* Unless in a functioning Water Users' Group. See Policy 4.62(b).

** The modified flow is the calculated flow after the environmental discharge (consistent with CRC897381C.2 and CRC091998 and renewed consents) is removed from the recorded flow

See the Waitaki Catchment Water Allocation Regional Plan for the Waitaki catchment flow and allocation limits. For all other areas see Rule 5.123