APPENDIX G | PDP Report - Preliminary Community Water Supply Assessment

Plan Change Request – 535 Mill Road, Ohoka – Preliminary Community Water Supply Assessment

Prepared for

Rolleston Industrial Developments Ltd

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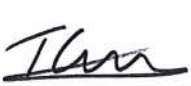
SIGNATURE		
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Executive Summary

Rolleston Industrial Developments Ltd have lodged a plan change to the Waimakariri District Plan to rezone a 156 ha area at 535 Mill Road, Ohoka, for a mixture of residential, rural-residential, and commercial use. The plan change area ('the site') is a collection of land parcels located immediately southwest of the Ohoka settlement that consists predominantly of irrigated pasture that is mostly used for dairy farming. Irrigation is provided via two existing irrigation groundwater take consents on the site, CRC991022 and CRC991827. Ohoka is serviced by a reticulated water supply owned by Waimakariri District Council and is principally sourced from bore BW24/0262 which is screened from 78 – 84 m below ground level. This bore is located adjacent to the northwestern corner of the proposed plan change area.

This report provides a preliminary assessment of the feasibility of establishing a community drinking water supply at the site of the proposed plan change, in terms of water demand requirements, preliminary assessment of environmental effects, and planning considerations. It is assumed that any new community drinking water supply bores would be at least a similar depth to bore BW24/0262, and hence the aquifer parameters estimated for this bore have been used for the purposes of the preliminary assessment of environmental effects.

It is considered viable to establish a supply, with an estimated total of four new bores providing adequate redundancy. A bore spacing of at least 300 to 500 m is recommended to reduce drawdown interference, both between supply bores and with neighbouring bores. The preliminary well interference and stream depletion assessments suggest that the project is feasible based on the change in effects from the existing situation (i.e., that drawdown effects on shallower bores will reduce). However full assessment using site-specific pumping test data will be necessary at resource consent stage to confirm this.

If the stream depletion effect of the new bores is assessed to be low based on the result of aquifer testing in the new bores, it is likely that the preferred consenting strategy would be to apply for a transfer under PC7 rule 8.5.12 of the LWRP. Transfer under rule 5.133 would also be viable, provided past usage records show there would be adequate annual volume to meet water demand requirements.

Overall, it is considered that the preliminary assessments described in this report demonstrate that establishing a new public water supply that meets the anticipated demand for the plan change area is viable. At the resource consenting stage site-specific pumping tests and an assessment of environmental effects will be required to support the resource consent application.

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1.0 Introduction

Rolleston Industrial Developments Ltd have lodged a plan change to the Waimakariri District Plan to rezone a 156 ha area at 535 Mill Road, Ohoka, for a mixture of residential, rural-residential, and commercial use. The plan change area ('the site') is a collection of land parcels located immediately southwest of the Ohoka settlement with multiple titles, that consists predominantly of irrigated pasture that is mostly used for dairy farming (Figure 1).

Ohoka is serviced by a reticulated water supply, which currently has 118 connections (WDC, 2021). The supply is owned by Waimakariri District Council (WDC) and is principally sourced from Ohoka Well No. 2 (ECan bore number BW24/0262). This bore has a screened intake zone from 78.0 – 84.0 m deep, and its location is shown on Figure 2. A backup supply bore (ECan bore number M35/5609) is also owned by WDC, has a screened intake zone from 16.8 – 18.8 m deep, however we understand that this bore is not regularly used as its depth of less than 30 m means it cannot be classified as 'secure' under the Drinking Water Standards for New Zealand. BW24/0262 is consented to take groundwater for community water supply under resource consent CRC166054, while M35/5609 is consented to take groundwater for community water supply under consent CRC990932. WDC growth projections do not account for any plan change at the site, therefore it is likely that new bores will be required to provide adequate supply for the development at the plan change site. It is proposed for a new community water supply source to be established on-site via transfer of one or both of the existing irrigation groundwater take consents on the site, CRC991022 and CRC991827. The bores that are listed on these consents are shown on Figure 2. Details of the WDC supply bores, and irrigation bores authorised under CRC991022 and CRC991827 are provided in the Table 1:

Table 1: Details of WDC supply bores and irrigation bores authorised by CRC991022, CRC991827, CRC166054 and CRC990932

Bore	Diameter (mm)	Depth (m)	Consent Number
M35/9423	250	30	CRC991022
M35/3064	150	12.5	
M35/3065	150	12	
M35/0326	200	13.7	CRC991827
M35/0367	600	9.4	
BW24/0262	300	84.7	CRC166054
M35/5609	200	18.8	CRC990932

Pattle Delamore Partners (PDP) have been engaged to provide the following:

- Summarise the water demand requirements;
- Review and summarise available hydrogeological information in the local area, particularly relating to bore and aquifer performance;
- Review redundancy in existing public water supply bore BW24/0262 that could be utilised for the proposed development;
- Provide comment on the likely number of new bores needed and carry out a preliminary drawdown interference assessment based on existing aquifer test information from bore BW24/0262;
- Provide recommendations on bore spacing, between any proposed bores as well as existing bore BW24/0262 in order to minimise drawdown interference effects between the water supply bores;
- Carry out preliminary stream depletion assessments for proposed new bores based on existing aquifer test information from bore BW24/0262;
- Identify relevant planning policies and rules for the proposed new supply bores.
- Recommendations for new bore installations and associated aquifer testing.

2.0 Hydrogeological Setting

2.1 Soils

A review of soil information available on S-map (Landcare Research) indicates that the soil types underlying the site predominantly consist of Ayreburn moderately deep clay. A very small section on the northern and southern part of the site consists of Ayreburn deep clay and Leeston shallow clay respectively.

The soils determine the rate at which rainfall and associated stormwater infiltrate into the ground and recharge the underlying aquifer. S-map indicates that the Ayreburn moderately deep and deep clay and the Leeston shallow clay are poorly drained.

2.2 Geology

The site is located on the northern Canterbury Plains (i.e., the Waimakiriri – Ashley Plains). The Canterbury Plains comprise a series of large coalescing fluvio-glacial fans built by large braided rivers (e.g. the Rangitata, Rakaia and Waimakariri) that transported detritus (gravel with sand and silt) eastwards from rapidly rising and eroding mountains in the west. Most of the gravel deposition occurred during successive glaciations, when glaciers partly occupied the inland valleys and extended to the eastern foothills (Brown, L.J., 2001). Figure 1 shows the surface geology strata.

The GNS geological map of the area (Forsyth *et al.*, 2008) maps the near-surface geology of the site as late Pleistocene brownish-grey river alluvium (Q2a). Geotechnical investigations at the site encountered silt and clayey silt to a depth of 0.6 to 1.5 m below ground level (bgl), and sandy gravel below this (Tetra Tech Coffey, 2021).

The borelog for existing Ohoka drinking water supply bore BW24/0262 (shown on Figure 2) adjacent to the site is provided in Appendix D. This borelog shows a sequence of predominantly interbedded clayey gravel and sandy gravel down to at least 84 m below ground level (bgl), with a clay layer from 21.7 to 26.6 m bgl.

2.3 Hydrogeology

On the Waimakariri-Ashley Plains, groundwater is dominantly sourced from infiltrating rainwater (i.e., land surface recharge) across the inland plains (to the north-west (upgradient) of the site), together with some seepage losses from the Ashley and Waimakiriri rivers. A map showing the location of the site within the context of the northern Canterbury Plains is provided in Figure 1. Figure 1 also shows the general direction of groundwater movement in the overall area, indicating that groundwater generally flows to the southeast, towards the coast. Groundwater discharges into spring fed streams, including Ohoka Stream and the Cam River/Ruataniwha. Throughout the Canterbury Plains vertical hydraulic conductivity is usually significantly lower than the horizontal hydraulic

conductivity, due to the presence of silt and clay strata, and gravel layers with varying amounts of silt and clay matrix (Lough and Williams, 2009). Vertical groundwater flow (also called 'leakage') is therefore usually significantly slower than horizontal groundwater flow, and pumping from greater depths generally results in drawdown and stream depletion effects at the water table that are more widely distributed and delayed in time, compared to comparable rates of pumping from shallower depths.

2.4 Groundwater Takes and Allocation

As stated in section 1.0 above, the site currently has two active groundwater take consents, CRC991022 and CRC991827:

- Consent CRC991022 authorises abstraction from three bores (M35/9423, M35/3064 and M35/3065), with a maximum instantaneous rate for each bore of 30 L/s, a combined maximum instantaneous rate of 60 L/s and a maximum daily volume of 2,484 m^3/day for each bore and maximum combined daily volume of 4,968 m^3/day. No annual volume is specified in the consent documents. Bore M35/9423 is 30 m deep, M35/3064 is 12.5 m deep, and M35/3065 is 12 m deep. The screened interval is unknown for these bores.
- Consent CRC991827 authorises abstraction from two bores (M35/0326 and M35/0367), with the maximum instantaneous rate from each being 22.8 L/s and a maximum daily volume from each of 1,806 m^3/day. No annual volume is specified in the consent documents. The maximum instantaneous rate and daily volume are also limited according to the flow in Ohoka Stream, taken from measurements at the confluence with the Kaiapoi River. Bore M35/0326 is 13.7 m deep and M35/0367 is 9.4 m deep. The screened interval is unknown for both bores.

The site is in the Eyre Groundwater Allocation Zone, which has an allocation limit of 99,070,000 m^3 per year specified in Section 8.6 of the Canterbury Land and Water Regional Plan (LWRP). As of January 2022, this Allocation Zone is over-allocated, with a current allocation of 104%. The boundary with the Cust Groundwater Allocation Zone is adjacent to the site, along Mill Road. The Cust Allocation Zone is currently 29% allocated. As discussed in section 6.0 below, Plan Change 7 (PC7) to the LWRP will alter these allocation limits, with the allocation limit for the Eyre Groundwater Allocation Zone lowering to 75,330,000 m^3 and the limit for the Cust Groundwater Allocation Zone lowering from 56,300,000 m^3 to 13,250,000 m^3.

3.0 Water Demand Considerations

3.1 Plan Change Area Water Demand Requirements

Inovo Projects Ltd. (Inovo) have estimated the water demand requirements of the proposed plan change area in consultation with WDC and based on a lot distribution of 700 Res3 zoned lots, 150 Res4 (rural-residential) zoned lots,305 Res8 zoned lots (lifestyle or retirement villas) and two areas of business zones.

The full water demand assessment is not provided here, however the key water demand requirements in terms of consenting of a new water supply source are as follows:

- Maximum annual volume = 412,000 m^3/year
- Peak daily rate = 2,412 m^3/day.
- Peak instantaneous flow rate = 33.5 L/s.

The water demand calculations conducted by Inovo indicate that the average daily demand would be 980 m^3. The maximum annual volume of 412,000 m^3/year includes a 15% allowance for deviation from the average and leakage (i.e., 980m^3/day + 15%).

3.2 Redundancy in Existing Water Supply

Section 7.8.1 of the WDC Engineering Code of Practice (WDC, 2019) indicates that all water supplies with 400 or more connected properties shall have two supply wells each capable of meeting the peak daily demand. WDC have indicated that for a proposed water supply of the scale proposed for the proposed plan change, “N + 1” redundancy would be more appropriate. This means that the water supply must be able to meet peak network demand with one bore offline. The Engineering Code of Practice also stipulates that water supply design assume a maximum of 20 hours of pumping per day.

Correspondence with WDC has also indicated that any excess capacity available in existing water supply bore BW24/0262 can be included for assessment of N + 1 redundancy and the required total number of bores, taking into account any projected increase in demand from the existing water supply bore. The existing shallow (18.8 m deep) emergency backup supply bore (M35/5609) cannot be included in the existing redundancy assessment, as it is understood to be subject to water quality issues.

The 2021 Ohoka Water Supply Scheme Activity Management Plan (WDC, 2021) provides usage data for the 11 years from July 2009 to June 2020 and provides a projected increase in average and peak daily flow out to 50 years in the future, not including additional connections that would result from the proposed plan change. The Activity Management Plan indicates that there are currently

(as reported in 2021) 118 connections with an average daily flow of 159 m^3 and a peak daily flow of 532 m^3, which equates to 2.2 L/s and 7.4 L/s average and peak daily flow, respectively, assuming 20 hours per day of pumping. This is projected to increase to 225 connections by 2051/2052 to 2070/2072, with a projected average daily flow of 309 m^3/day (4.3 L/s) and peak daily flow of 807 m^3 (11.2 L/s) (WDC, 2021).

The resource consent abstraction limit for the existing WDC Ohoka supply is 1,555 m^3/day, which equates to 21.6 L/s, however the duty set point for the supply is 12.8 L/s (WDC, 2021), which equates to 921.6 m^3/day at 20 hours per day of pumping. This is consistent with the 13 L/s long term sustainable yield estimated from aquifer testing on the supply bore (PDP, 2016).

Considering the usage data and projected growth, approximately 114.6 m^3/day (1.6 L/s) of excess capacity is available from the existing water supply to contribute to redundancy in the proposed community water supply for the plan change area.

Table 2: Overview of redundancy in the existing water supply

	Usage July 2019 – June 2020	Projected usage 2051/2052	Maximum capacity of existing supply bore [1]	Excess capacity
Peak daily flow (m^3/day)	532	807	921.6	114.6

Notes:

1. *Assuming a duty set point of 12.8 L/s and 20 hours of pumping per day.*

3.3 Number of Supply Bores

The water demand requirements presented in section 3.1 above indicate that 2,412 m^3/day would be required for the proposed plan change area. As shown in section 3.2above, 114.6 m^3/day may be provided from excess capacity in the existing supply bore, therefore 2,298 m^3/day would have to be supplied by new bores, which equates to pumping at 31.92 L/s for 20 hours per day. The N + 1 redundancy requirements also require that the full peak water demand of both the existing supply and the plan change area can be met when one bore is offline.

If the maximum duty point of any new supply bores within the proposed plan change area is assumed to be 12.8 L/s (i.e. the same as the existing deep supply bore), then three new supply bores would be required to meet (and would

exceed) the plan change area water demand requirements. An extra bore would also be required to meet N + 1 redundancy requirements, as the full combined peak daily water demand from the plan change area and the existing water network (including the projected increase in the next 31 to 50 years) can only be met with a minimum of four bores.

Therefore, it would be expected to have to drill four new water supply bores, resulting in a total of five deep water supply bores (including the existing bore BW24/0262) for the Ohoka area. It is expected that the existing shallow backup emergency supply bore (M35/5609) would be able to be retired, which would increase the reliability of the overall water supply network. It is noted that if aquifer testing of any newly drilled bores indicated that one or more of the new bores had a higher long term sustainable yield than 12.8 L/s, then it could be possible for fewer bores to provide the necessary water demand and redundancy requirements. Likewise, if aquifer testing shows that one or more of the new bores had a lower long term sustainable yield, then additional bores would be required.

4.0 Existing Aquifer Information and New Bore Recommendations

4.1 Bore Yield, Specific Capacity and Depth

Any new community water supply bores established to service the proposed plan change area would likely be at a similar or greater depth than existing community water supply bore BW24/0262 to ensure sufficient bore security and water quality. This existing supply bore can therefore give an indication of the possible yield of any new community supply bores. The assessment of environmental effects (AEE) prepared during the consent application for BW24/0262 (PDP, 2016) indicated that it has a potential long term sustainable yield of 13 L/s. If the proposed water supply bores are screened at a similar depth as BW24/0262 (i.e., approximately 78 to 84 m below ground level) it can be inferred that the long term sustainable yield could be similar, provided there are no significant changes in lithology between the bore locations. However, this would need to be confirmed via drilling and aquifer testing prior to beginning any consent application process.

Part of the scope of this report is to assess whether it is likely that drilling to a greater depth than BW24/0262 could result in higher yields. In order to assess this, available data for other neighbouring bores within 5 km of the site has been reviewed to determine whether there are any relationships between yield and/or specific capacity and depth, which could indicate deeper more permeable strata. A histogram of bore depths within 5 km radius of the site (Figure 3) indicates that most neighbouring bores have a depth of 80 m or less. However, there are some deeper neighbouring bores, in the 80 – 100 m and 140 – 150 m depth ranges. A map of neighbouring bore depth is shown in Figure 4.

A plot of maximum yield versus depth is shown on Figure 5 and does not show any clear pattern, although the highest yields have generally been obtained from shallow bores in the depth range of around 10 to 30 m. It is noted that there are significantly more shallow bores than deeper bores, which may skew the results. There are two relatively high yielding bores (M35/12017 and M35/10768) that are 122 m and 109 m deep (screened between 118 – 120 m and 103 – 109 m, respectively) and have reported maximum yields of 50 L/s and 64 L/s, respectively. These bores (M35/12017 and M35/10768) are 4 to 4.5 km south of the site (Shown on Figure 4) and it is not known whether the same yields would be encountered in the proposed plan change area. It should also be noted that the reported bore yield can also be a reflection of the particular water requirements for a bore, i.e., domestic supply bores are generally only tested at low rates, even if higher rates were achievable.

Specific capacity is a measure of bore performance, measured as units of litres per second per metre of drawdown in the bore. This can give an approximate indication of zones where higher bore yield could be achieved. A plot of specific capacity versus bore depth is presented in Figure 6. As shown, higher specific capacity values have generally been obtained from bores at shallow depths. Although, it is also noted that some deeper bores in excess of 100 m deep have reported specific capacities of up to 10 L/s/m which is a good level of bore performance for deep bores, which have more available drawdown than shallower bores to accommodate self-induced drawdown effects. Overall, the yield information from deep bores is quite variable in this area, although the nearby bore B24/0262 provides a useful guide as to what can be expected. Consideration could be given to extending the first bore drilled for the plan change water supply to deeper depths to investigate the performance of deeper strata at the site.

4.2 Aquifer Parameters

4.2.1 Bore BW24/0262

A three-day constant rate pumping test was conducted in bore BW24/0262 (PDP, 2016), and the aquifer parameters estimated from this test provide the best indication of the likely aquifer parameters that would apply for any new water supply bores drilled in the proposed plan change area. The estimated parameters (averaged from analysis of results from two observation bores M35/8381 and M35/07701) were as follows:

- Transmissivity = 115 m^2/day
- Storage = 6.3 x 10^{-4}
- Leakage (K'/B') = 2.64 x 10^{-4}
- Specific yield = 0.1

It was noted that the sets of parameters estimated from the two observation bores implied slightly different conceptual models, with the data from bore M35/8381 suggesting a greater degree of lateral flow and less vertical flow compared to the data from bore M35/7701. The results indicate that the strata in the area around the bore are variable, as is commonplace on the Canterbury Plains.

No value of transmissivity was derived for the shallow strata based on the results of the pumping test, however an estimate of the shallow aquifer transmissivity was derived from an empirical relationship between the specific capacity of a bore and transmissivity derived from pumping tests in Canterbury (Bal, 1996). Based on bores less than 31 m deep within 2 km of the pumped bore, the average transmissivity using that empirical relationship was 975 m^2/day (PDP, 2016).

4.2.2 Neighbouring Bores

Four pumping tests on nearby shallow bores (within 3 km of water supply bore BW24/0262) are recorded in the Environment Canterbury (ECan) well database. The results are provided in Table 3 below. Most of the nearby tests are step-drawdown tests, and it should be noted that estimates of transmissivity made from step-drawdown test data are not as reliable as estimates from constant-rate tests, and cannot be used to estimate leakage, stream depletion effects or storativity. However, the results indicate that the 975 m^2/day shallow transmissivity value estimated based on the Bal (1996) relationship is in a similar ballpark as the range of nearby shallow transmissivity estimates based on pump testing.

Table 3: Nearby shallow pump test data

Bore	Screened interval (m bgl)	Type of test	Distance (km) [1]	Transmissivity	Storativity
M35/6077	17.5 – 20.5	Step	1.6	170	-
M35/0595	6.8 – 9.8	Step	1.8	4,000	-
M35/0313	9.8 [2]	Constant	2.4	1343	0.05
M35/4700	12.2 [2]	Step	2.8	1580	-

Notes:

1. *Distance from water supply bore BW24/0262.*
2. *Depth is recorded where screened interval is unknown.*

4.3 Recommendations for New Bore Installations and Aquifer Testing

The existing aquifer information outlined in section 4.2 above indicates deep strata are variable, and there is no clear evidence of consistently high yielding strata at a greater depth than existing water supply bore BW24/0262, which is 84 m deep. It is not recommended that any new bores are drilled to shallower depths, as well interference effects on shallower bores and stream depletion effects are likely to be greater for bores drilled to shallower depths.

It is recommended that any new bores have a target depth similar to bore BW24/0262 which is screened between 78 and 84 m bgl. However, if desired, consideration could be given to drilling the first bore to a deeper depth in the order of 110 to 150 m deep to investigate the potential for higher yielding strata at greater depths. If unsuccessful, the bore casing could then be pulled back to a shallower depth (but still anticipated to be deeper than 70 m). Step drawdown testing should be conducted on any new bores, in order to assess well performance and sustainable yield. If sustainable yields encountered at the target depth are similar to those of the existing bore (13 L/s) then the yield is likely to be sufficient for use as a drinking water supply.

It is recommended that after the drilling of the first new bore, all subsequently drilled water supply bores are subject to a constant rate pumping test with a pumping duration of 1 - 3 days, and used as monitoring bores with an observable response. The pumping rate should be similar to the sustainable yield estimated from prior step drawdown testing on the pumped bore. The test should be conducted in accordance with the Environment Canterbury (ECan) aquifer test guidelines (ECan, 2008). The constant rate test would involve monitoring of other nearby deep bores and nearby shallow bores, if appropriate. Background groundwater level measurements should be made prior and after testing. Any new bores that are drilled within 500 m of bore BW24/0262 and to the same depth do not strictly need a constant rate test conducted according to ECan guidelines, as the aquifer parameters estimated from bore BW24/0262 can be used for assessment of environmental effects. However, it is still recommended that a constant rate test be conducted on all newly drilled bores in order to allow more robust assessment of environmental effects. The exact details for the constant rate test will need to be confirmed once the bores have been drilled, and more than one constant rate test may be required if the new bores are spaced more than 500 m apart and do not show a drawdown response during the first constant rate test. Additional tests may also be required if the bores are drilled to significantly different depths.

Any new bores must comply with the New Zealand drinking water standards and WDC Engineering Code of Practice (WDC, 2019) in terms of bore installation and bore head security.

5.0 Preliminary Assessment of Effects

5.1 Well Interference

Well interference occurs as a result of pumping in a bore, which lowers the groundwater piezometric surface around a bore. Drawdown decreases in magnitude with increasing distance from the pumping source. Drawdown interference has the potential to adversely affect neighbouring bore users by reducing the available drawdown in their bore and in the worst case, can result in the inability of neighbouring bores to abstract water. In general, pumping from shallow bores will cause greatest drawdown interference in other shallow bores, and pumping from deep bores will cause greatest drawdown interference effects in other deep bores. Most bores surrounding the proposed plan change area are shallow (i.e., less than 31 m deep), and the existing irrigation consents that are proposed to be surrendered (CRC991022 and CRC991827) involve abstraction from shallow bores. Therefore, it is expected that the transfer of abstraction from shallow irrigation bores to deep water supply bores will result in smaller well interference effects for most neighbouring bores (which are shallow).

Schedule 12 of the Canterbury Land and Water Regional Plan (LWRP) outlines the approach ECan requires for well interference assessment. It is necessary to estimate a 150-day maximum volume, which ECan has indicated would be the maximum daily rate multiplied by 150 days, as long as this is within the annual volume on the consent. The 150 day pumping rate is therefore assumed to be 2,412 m^3/day, although this results in a 150 day volume of 361,800 m^3, which is 88% of the total proposed annual volume. This is not realistic, as the remaining 12% of the annual volume would not provide an adequate level of service to the plan change area. It is noted that if a 150 day volume is stipulated in the consent conditions, or a maximum monthly volume, then this rate could be decreased to a more realistic amount. However, for the purposes of this assessment, a conservative approach has been adopted. A 7-day pumping rate is also required under Schedule 12, which in this case would be the maximum daily rate (2,412 m^3/day).

5.1.1 Adequate Penetration Depth

There are many very shallow bores near the plan change area, and Schedule 12 states that "*where an existing bore inadequately penetrates an aquifer, the interference effect of a new bore will be assessed as if the existing bore is also adequately penetrating".* The adequate penetration depth is defined as a "*… level to which 50% of bores within 2 km penetrating the aquifer are already established at 1 January 2002".* The adequate penetration depth for the proposed plan change area has been calculated at 15 m.

5.1.2 Preliminary Well Interference Assessment

The well interference effect of the proposed water supply bores will depend on the placement of the bores across the site and how pumping rates are partitioned between bores. As stated above, in general drawdown effects in neighbouring shallow bores will be expected to reduce due to the transfer of groundwater abstraction from the existing shallow irrigation bores to deeper community drinking water supply bores. Drawdown effects in neighbouring bores of similar depth to the new drinking water supply bores would be expected to increase, however these bores would be expected to have more available drawdown for well interference due to their greater depth.

An indicative demonstration of how changing abstraction from a shallow bore to a deep bore affects drawdown in the shallow aquifer has been conducted by comparing predicted drawdown from two scenarios as follows:

- Abstraction from a deep bore has been estimated using the average aquifer parameters estimated from bore BW24/0262, as described in section 4.2.1 above. The Hunt and Scott (2007) solution was used with an assumed transmissivity of the shallow aquifer of 975 m^2/day and a specific yield of 0.1. This is consistent with the well interference assessment conducted for the existing deep-water supply bore BW24/0262 (PDP, 2016). The pumping rate was assumed to be the same as the duty point of the existing deep water supply bore (12.8 L/s) and a pumping period of 150 days was assessed.
- Abstraction from a shallow bore has been estimated using the Theis (1935) solution, a transmissivity of 975 m^2/day and a storativity of 0.1. In order to allow comparison with the deep abstraction scenario, a pumping rate of 12.8 L/s and a pumping period of 150 days was assessed.

A distance versus drawdown plot of the above comparison is provided in Figure 7, and shows that drawdown in the shallow aquifer will be significantly less if pumping is shifted from a shallow to deep bore, with the difference in drawdown greater at smaller distances from the pumped bore. It should be noted that this is not a full well interference assessment, but does provide a useful demonstration of the predicted change in effect on the shallow aquifer. A full assessment would only be possible after pump testing has confirmed site specific aquifer parameters for each proposed water supply bore.

Overall, it is considered that there is a feasible consenting pathway when considering well interference effects. It is also noted that many of the shallow neighbouring bores are listed as being used for domestic supply. In the unlikely event that a full well interference assessment identifies neighbouring bores that could be adversely affected by well interference, mitigation options are available for potentially affected bore owners, which could for example include expanding the extent of the Ohoka reticulated public water supply network.

5.2 Bore Spacing

As outlined in section 3.3 above, three new supply bores would need to be drilled to provide adequate capacity for the proposed plan change area, assuming the duty point of any new bores is the same as for the existing deep supply bore BW24/0262. An extra bore would be required to provide N + 1 redundancy, in the event one bore is offline. The allowable bore spacing between the new supply bores depends on the performance and sustainable yield of the newly drilled bores, and the amount of drawdown that is deemed acceptable between the bores. Ultimately, the bore characteristics will not be known until the bores are drilled and tested.

As a first high-level assessment, it has been assumed that the flow rate would be evenly distributed between three new bores. This is to allow for any times when the new fourth bore cannot operate. This results in a maximum 7-day flow rate of 804 m^3/day (2,412/3) for each bore and a maximum 150-day flow rate of 565 m^3/day (1,696/3) for each bore. The maximum 150-day flow rate has been assumed to be equivalent to 75 days of abstraction at the peak daily rate (2,412 m^3/day) and 75 days of abstraction at the average daily rate (980 m^3/day). It has been assumed that the same aquifer parameters are applicable as those assumed for the well Interference assessment, using the Hunt and Scott (2007) solution.

Table 4: Predicted drawdown versus distance

Distance (m)	Predicted drawdown (m)	
	7 – day pumping (804 m^3/day)	150 – day pumping (565 m^3/day)
20	4.0	2.9
50	3.0	2.2
100	2.3	1.6
200	1.5	1.1
300	1.1	0.8
500	0.7	0.5
1000	0.2	0.2

Notes:

1. *Calculated drawdown is the effect from each bore. Actual cumulative effect would depend on final bore placement.*
2. *Aquifer parameters are assumed to be the same as those estimated for bore BW24/0262.*

The results shown in Table 4 show that seven days of pumping at the maximum daily rate is predicted to result in the largest drawdown interference between supply bores. It should be noted that this assessment is on a per-bore basis, and effects from all the new bores would be superimposed on each other. The existing supply bore BW24/0262 was estimated to have approximately 5 m of available drawdown after 365 days of pumping at 13 L/s. This does not allow for drawdown interference from other neighbouring bores. Water level data from the existing supply bore shows that the bore has always had at least approximately 13 m of water above the pump during operation. This likely reflects that in reality the bore is not pumped at its maximum flow rate continuously. It is noted that over the last five years the maximum pumping rate from bore BW24/0262 has been 561 m^3/day, and the average 143 m^3/day. These rates could be exceeded in any new water supply bores servicing the plan change area.

Based on the results presented in Table 4 above, a spacing of 300 – 500 m (or greater) may be most appropriate to conservatively ensure reliability of supply during times of low groundwater levels and maximum demand, if one bore is offline. It is considered achievable to place four new bores within the plan change area at a spacing of 300 – 500 m, and such a spacing would be expected to distribute drawdown effects across the site, resulting in lower well interference effects compared to a situation where all the bores were closely spaced. A closer spacing (e.g., 100 m) could still allow reliable operation of the proposed water supply bores, considering the water level monitoring data from bore BW24/0262, however a detailed assessment and consideration of actual pumping test results from the new bores would be necessary before final bore spacing is determined.

5.3 Preliminary Stream Depletion Assessment

Stream depletion is a reduction in stream flow resulting from groundwater pumping. In general, pumping from a deeper bore will result in a lesser and more widely distributed stream depletion effect than pumping from a shallow bore, provided the pumping rate and location are the same.

The most significant waterway that could be affected by stream depletion is the South Branch of Ohoka Stream, which crosses the northern part of the proposed plan change area (Figure 2). Other waterways of note are the North Branch of Ohoka Stream, which is approximately 150 m to the north of the proposed plan change boundary. The Ecan river network GIS layer also shows a spring-fed stream or drain crossing along the southern boundary of the proposed plan change area, and a spring fed stream or drain reaching the eastern boundary of the proposed plan change area, adjacent to Whites Road (Figure 2). Due to the large number of streams across the site, the overall potential stream depletion effects from any proposed water supply bores are not expected to be highly dependent on the exact placement of the supply bores.

Stream depletion is assessed according to Schedule 9 of the LWRP, based on the effect of "*150 days of steady continuous groundwater abstraction*". A moderate degree of stream depletion effect is defined as where the effect is *"… less than 60% but greater than or equal to 40% of that abstraction rate, or the effect of 150 days of continuous steady groundwater abstraction on the surface waterbody is less than 40% of that abstraction rate but pumping the proposed annual volume over 150 days at a continuous steady rate exceeds 5 L/s…".* Schedule 9 also indicates that when there is more than one bore on a property abstracting water, the stream depletion effect for each bore must be determined independently and the stream depletion effect of the bores shall be determined in combination as a borefield.

As a preliminary assessment, the same aquifer parameters have been used as for the well interference assessment (section 5.1 above). The Ward and Lough (2011) solution is considered most applicable to the conceptual setting at Ohoka, where the proposed pumped bore(s) is in a semi-confined aquifer, overlain by an unconfined aquifer which the surface waterway is in connection with. Stream depletion effect is generally highly sensitive to the streambed conductance (λ), which for the Ward and Lough (2011) is defined as the streambed width multiplied by the depth of the streambed "clogging" layer multiplied by the hydraulic conductivity of the streambed. The streambed conductance of Ohoka Stream has been estimated from field measurements in several locations near the proposed plan change area, as presented in Appendix C of the Ecan guidelines for the assessment of groundwater abstraction effects on stream flow (PDP, 2000). A streambed conductance of 0.8 m/day was estimated, and this value has been used for this preliminary assessment. For this assessment a 150-day pumping rate of 1,696 m^3/day has been assumed, which is equivalent to 75 days of abstraction at the maximum daily rate (2,412 m^3/day) and 75 days of abstraction at the average daily rate (980 m^3/day). It is noted that for this 150-day rate to be accepted by Ecan, it is likely that a 150-day maximum volume of 254,400 m^3 would have to be stipulated in the consent conditions.

The preliminary assessment using the parameters described above indicates that the stream depletion effect would be considered 'Low' at all distances from any surface water bodies, based on the aquifer parameters derived from bore BW24/0262. This would mean that rule 8.5.12 of the LWRP (Plan Change 7) would likely be applicable to the proposal and provide a consenting pathway, as discussed in section 6.0below.

Stream depletion assessment is highly dependent on the aquifer parameters estimated from a constant rate pumping test, and a final stream depletion assessment would have to be conducted after a pumping test has been conducted in each new proposed water supply bore. The application of a 150-day volume would need to be reviewed upon the results of the on-site testing.

5.4 Community Drinking Water Protection Zone

Any new drinking water supply bore would have a surrounding Community Drinking Water Protection Zone, the size of which would be determined in accordance with Schedule 1 of the LWRP. As has been discussed earlier in this report, it would be prudent for water quality and safety reasons for the new supply bore to be relatively deep, similar to existing neighbouring supply bore BW24/0262. The protection zone around BW24/0262 is circular, extending 100 m in all directions and is a provisional protection zone due to it being an existing water supply at the time schedule 1 of the LWRP became operative.

Schedule 1 of the LWRP states that any consent for a new community drinking-water supply must provide the dimensions of a specific protection zone, determined using site specific information, including the geology of the site, the depth of the bore, the bore construction, pumping rates, the type of aquifer, types of actual or potential contaminants, the proposed level of treatment and any potential risk to water quality. The Technical Guidelines for Drinking Water Source Protection Zones prepared for the Ministry for the Environment (PDP, 2018) provide guidance for protection zone delineation, and though the Ecan protection zones are not entirely consistent with the technical guidelines, they are generally considered equivalent to Zone 2 (Intermediate Zone) as described in the guidelines. Zone 2 is delineated based on an estimated 1-year time of travel to the well intake.

If the site-specific protection zone extends beyond the site boundaries, it could have implications for neighbouring land owners who are conducting activities that could be considered a water quality risk to the proposed new drinking water supply. This would likely include human effluent discharges to land, i.e., septic tank systems, of which there are several on properties adjacent to the site. Generally speaking deep bores have a relatively small protection zone. The default protection zone for bores deeper than 70 meters at the plan change area is 100 meters (extending in all directions from the bore). The dimensions of any proposed site specific Community Drinking Water Protection Zone will depend on the results of hydrogeological investigations, including aquifer parameters estimated from constant-rate pumping tests conducted on the water supply bores.

Information from WDC (as of 2016) indicated that the bore (BW24/0262) is fully compliant with the Drinking Water Standards for New Zealand (DWSNZ) in terms of bacterial and protozoal compliance. This provides an indication that the deeper water quality in the vicinity of the site and for a potential new deep bore should be able to meet the water requirements under the DWSNZ. The Drinking Water for New Zealand website (https://www.drinkingwater.org.nz/supplies/supplycomplyforcy.asp?ccode=OHO001) also indicates that the Ohoka water supply is fully compliant with the DWSNZ in terms of bacterial and protozoal compliance as reported for

2018/2019. A more detailed review of water quality in bore BW24/0262 and in the vicinity of the site should be undertaken at the subdivision consent stage to confirm that there are no potential water quality issues.

6.0 Relevant Planning Considerations

The proposed plan change area is within the area covered by the Waimakariri area of the LWRP (Section 8). Plan Change 7 (PC7) to the LWRP is relevant to the proposed plan change. It was formally adopted by ECan on 17 November 2021 although aspects of PC7 are currently under appeal. However, it appears that the parts of PC7 relevant to the proposed plan change are not subject to appeal. Further, given rules in PC7 relate to water, they have legal effect pursuant to s86B(3) of the Resource Management Act 1991. Any water take consent application will need to consider PC7 and therefore the changes to the LWRP proposed by PC7 are included in this preliminary assessment of relevant planning considerations.

The proposed plan change area is in the Eyre Groundwater Allocation Zone (GAZ). As of January 2022, ECan indicated that this zone is 104.13% allocated (i.e., over-allocated), with 103,161,590 m^3 allocated out of the current operative allocation limit of 99,070,000 m^3. PC7 lowers the allocation limit of the Eyre GAZ to 75,330,000 m^3, which implies that the zone is 137% allocated under the PC7 provisions, assuming total used allocation remains the same. PC7 also introduces a *Transfer Permit Allocation* which is "only available to holders of existing surface water permits or stream depleting groundwater permits with a direct, high or moderate stream depletion effect who propose, by way of a consent application, to replace their existing take for a take from groundwater that has a low stream depletion effect."

Determining the relevant policies and rules of the LWRP depends on the consenting pathway that is used for the application. There are three primary consenting pathways, which are as follows:

- Apply for a transfer under rule 5.133, which is modified by PC7 rule 8.5.17.
- Apply for a transfer under PC7 rule 8.5.12 for substitution of a stream depleting take with a take with low stream depletion effect.
- Apply for a new take under rule 5.115.

The full wording of the rules and policies referred to in this section are provided in Appendix B. These pathways are described in the sections below.

Recommendations on consenting strategy are provided in section 6.4, although the preferred strategy will be dependent on pumping test results.

6.1 Transfer Under Rule 5.133 and Rule 8.5.17

Rule 5.133 is relevant for transfers within a groundwater allocation zone where the annual volume is less than or equal to the existing take, and the stream depletion effect is no greater than the original take. Such a transfer is a restricted discretionary activity.

It is expected that all of the conditions of rule 5.133 will be able to be met, however, a full well interference assessment will need to be conducted after the bores have been drilled and pump testing conducted. Item 7 in the matters of discretion (groundwater allocation limits) could present a challenge, as the groundwater allocation zone is over-allocated. However, this may be mitigated due to the proposed abstraction being similar or less than the water allocated for the existing irrigation takes, and policies 4.49 and 4.50 support the continued allowance of allocation for community drinking water supplies.

Waimakariri sub-regional rule 8.5.17 is proposed as part of PC7 and provides additional conditions for rule 5.133 and states that the volume of water able to be transferred is restricted to the annual average volume of water used in the preceding five years. If the usage records indicate that sufficient volume would be available to meet the plan change water demand requirements, then the application would still be restricted discretionary. If the annual volume applied for is larger than average use over the previous 5 years (but lower than the allocated annual volume) then it would default to rule 5.134 and the application would be non-complying. In that instance, it is likely that the application would be notified.

6.2 Transfer Under Rule 8.5.12

This rule indicates that substitution of a stream depleting take (i.e., a take with at least a moderate stream depletion effect) with a take with a low stream depletion effect is a restricted discretionary activity. For a transfer under this rule, the allocated annual volume (i.e., from Irricalc) would be relevant, not actual use over the previous 5 years, in contrast with rule 8.5.17. Transfer permit allocation would be available for the entire allocated annual volume (not only the groundwater allocation component) of the existing takes.

This is a potential consenting pathway for the site, as the existing irrigation takes are relatively shallow and are expected to have at least a moderate degree of stream depletion effect. Deeper takes for drinking water supply would be expected to have a lower degree of stream depletion effect, though assessment of whether the effect is low will depend on the results of site-specific pump testing. Correspondence with ECan (Appendix C) has indicated that a full stream depletion assessment of both the existing takes and the new take would be required.

6.3 New Groundwater Take Under Rule 5.115

This is a consenting pathway allowed for in the LWRP for establishing a community drinking water supply, in accordance with policies 4.49, 4.50 and 8.4.16. The groundwater take application for community drinking water supply would be assessed as a restricted discretionary activity. Correspondence with ECan (Appendix C) has indicated that any new groundwater take application may be notified due to the effect on allocation limits.

6.4 Recommended Consenting Strategy

The rules and policies discussed above indicate that there are three viable consenting pathways for the establishment of new community drinking water supply bores on the site.

If pump testing results from new bores indicate that the new bores have a low degree of stream depletion effect, then transfer via rule 8.5.12 (restricted discretionary) may be the preferred consenting pathway. This is because the allocation to be transferred would not be limited to past usage, and transfer permit allocation would be available. This pathway would require additional pump testing on the shallow existing irrigation bores, to confirm that they have a moderate degree of stream depletion effect.

Transfer via rule 5.133 and 8.5.17 is also considered a viable consenting pathway. Water demand requirements relative to past usage records will determine whether the full demand for the plan change area can be transferred under these rules as a restricted discretionary activity. It is possible that unused capacity in the existing deep groundwater bore BW24/0262, in terms of annual allocation, may be able to be used to reduce the total annual allocation needed for the water permit transfer on the site.

If neither of the consenting pathways described above, pertaining to a water permit transfer, are considered viable to meet the full demand for the plan change area then an application under rule 5.115 would be able to be made as a restricted discretionary activity to make up for the shortfall. Correspondence with ECan has indicated that any new groundwater take may be publicly notified, due to the over-allocated nature of the groundwater allocation zone.

7.0 Conclusions

A preliminary assessment of the feasibility of establishing a community drinking water supply at the site of a proposed plan change in Ohoka has been undertaken, in terms of water demand requirements, preliminary assessment of environmental effects, and planning considerations.

It is considered viable to establish a supply, with an estimated total of four new bores providing adequate redundancy, assuming that the performance of any new bores is similar to that of existing community supply bore BW24/0262. A bore spacing of at least 300 to 500 m is recommended to reduce drawdown interference, both between supply bores and with neighbouring bores.

The report suggests that in terms of well interference and stream depletion effects, the project is feasible based on the change in effects from the existing situation (i.e., that drawdown effects on shallower bores will reduce). However full assessment using site-specific pumping test data will be necessary at resource consent stage to confirm this.

If the stream depletion effect of the new bores is assessed to be low based on the result of aquifer testing in the new bores, it is likely that the preferred consenting strategy would be to apply for a transfer under PC7 rule 8.5.12 of the LWRP. Transfer under rule 5.133 would also be viable, provided past usage records show there would be adequate annual volume to meet water demand requirements. Application for a new take under rule 5.115 provides an alternative pathway, which may result in public notification due to effects on groundwater allocation.

Overall, it is considered that the preliminary assessments described in this report demonstrate that establishing a new public water supply that meets the anticipated demand for the plan change area is viable. At the resource consenting stage site specific pumping tests and an assessment of environmental effect will be required to support the resource consent application.

8.0 References

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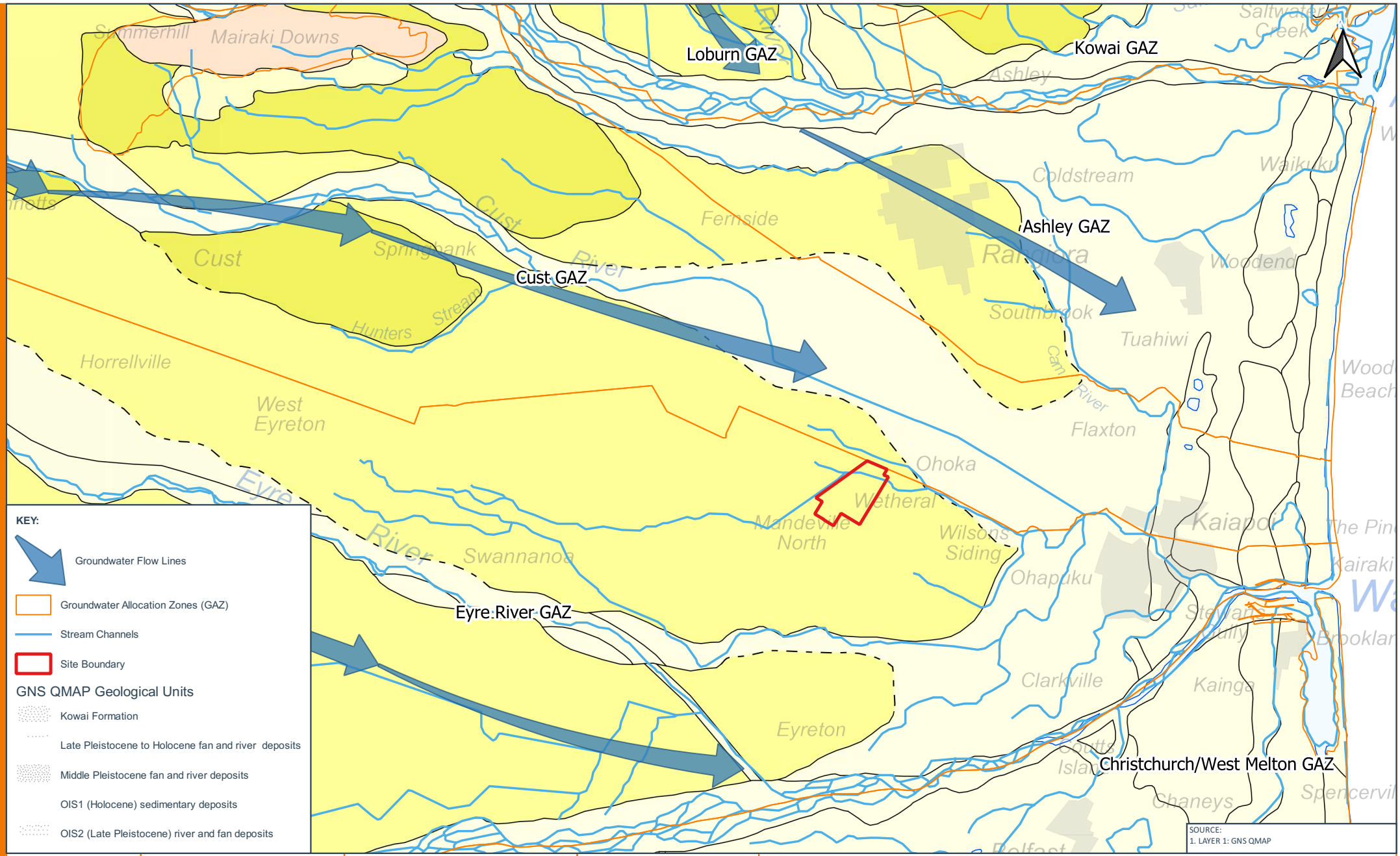
Appendix A: Figures



0 1 2 km

KILOMETRES

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FIGURE

FIGURE 1: GROUNDWATER FLOW PATHS AND HYDROGEOLOGICAL SETTING

PROJECT

PRELIMINARY WATER SUPPLY ASSESSMENT - OHOKA PLAN CHANGE

0 200 400 600 m

METRES

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FIGURE

FIGURE 2: SITE OVERVIEW

PROJECT

PRELIMINARY WATER SUPPLY ASSESSMENT - OHOKA PLAN CHANGE

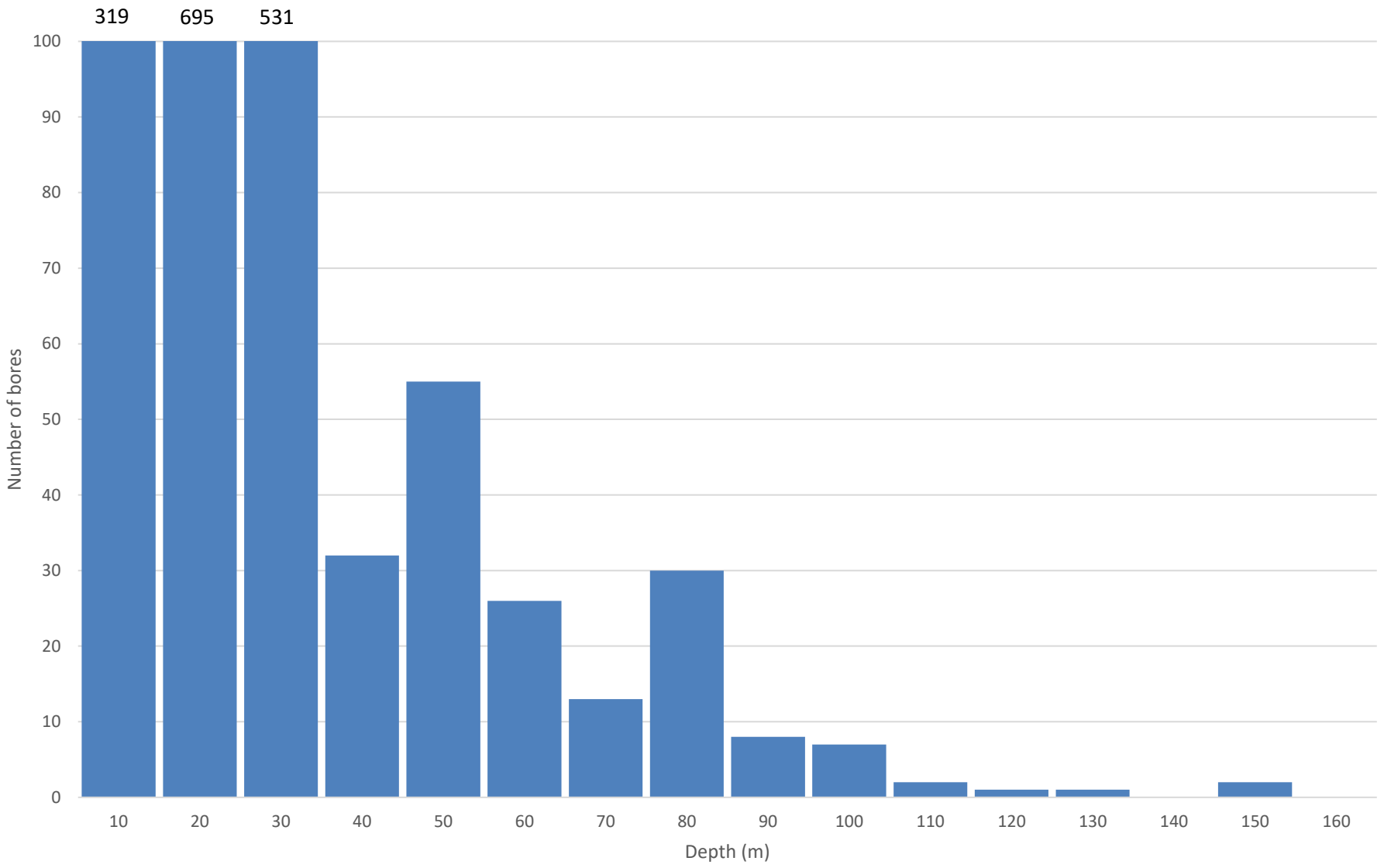
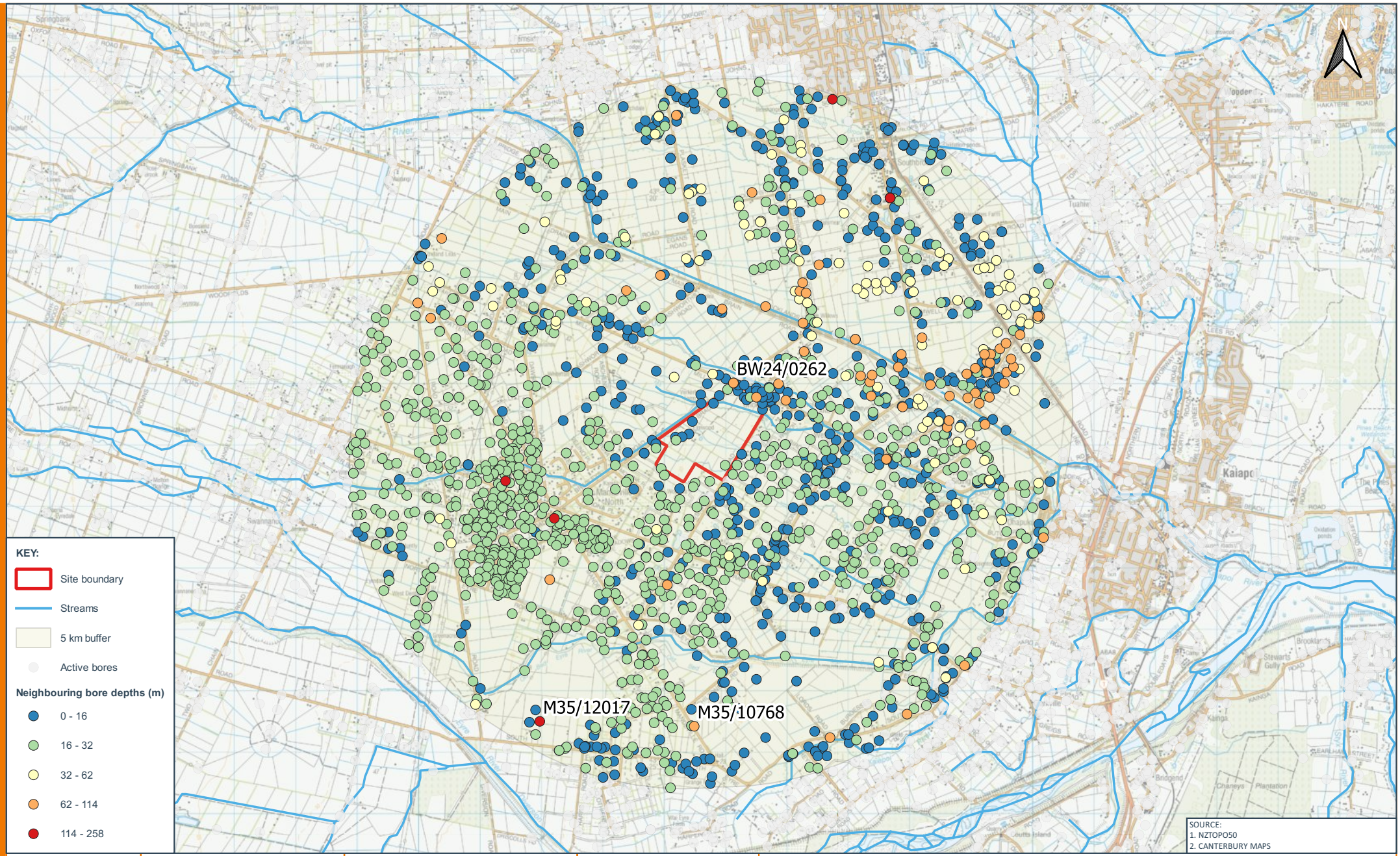


FIGURE 3: HISTOGRAM OF NEIGHBOURING BORE DEPTHS WITHIN 5 KM OF SITE



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A	FINAL	JUN 22	TG

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FIGURE

FIGURE 4: NEIGHBOURING BORE DEPTHS

PROJECT

PRELIMINARY WATER SUPPLY ASSESSMENT - OHOKA PLAN CHANGE

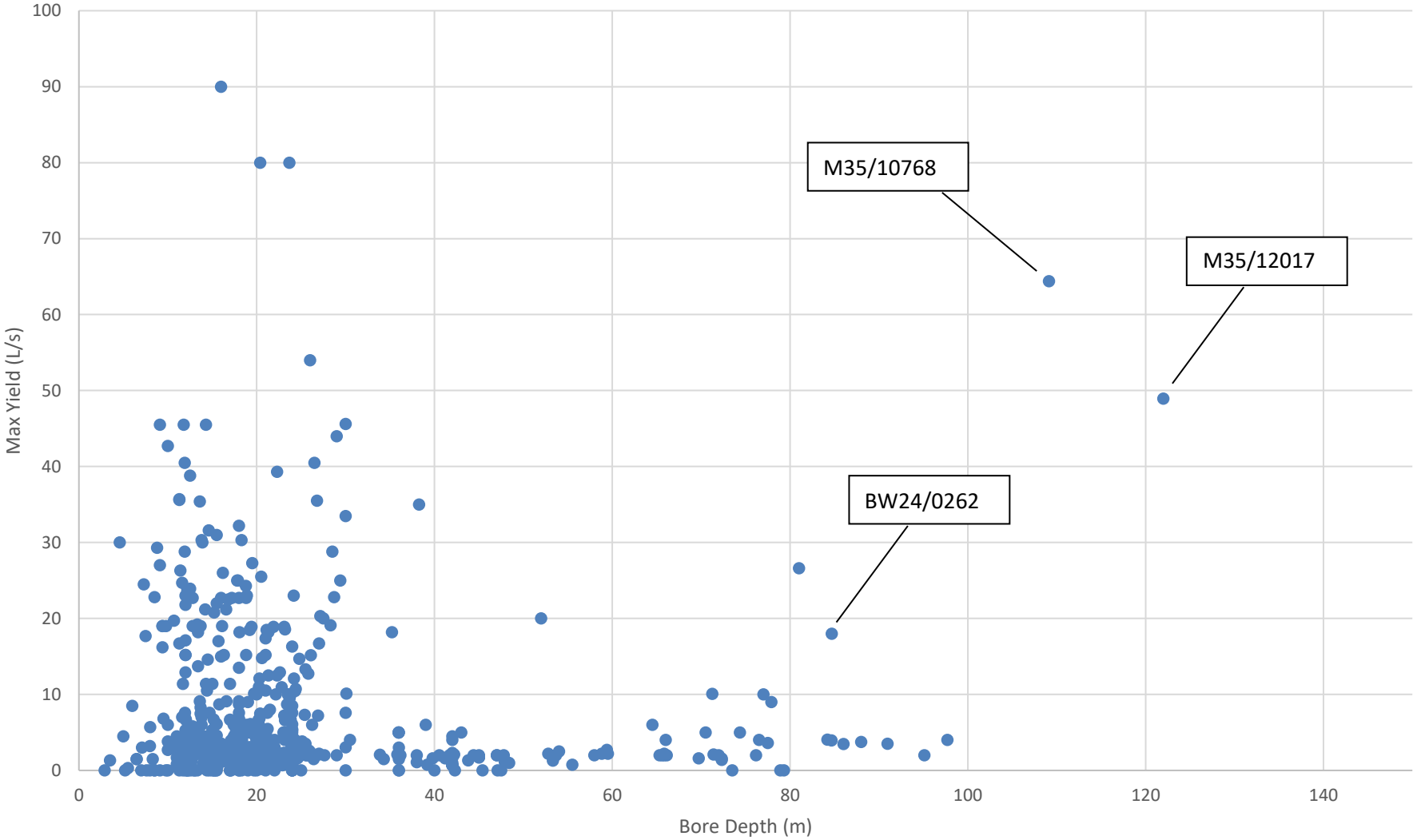

FIGURE 5: MAXIMUM YIELD VERSUS DEPTH FOR BORES WITHIN 5 KM OF SITE

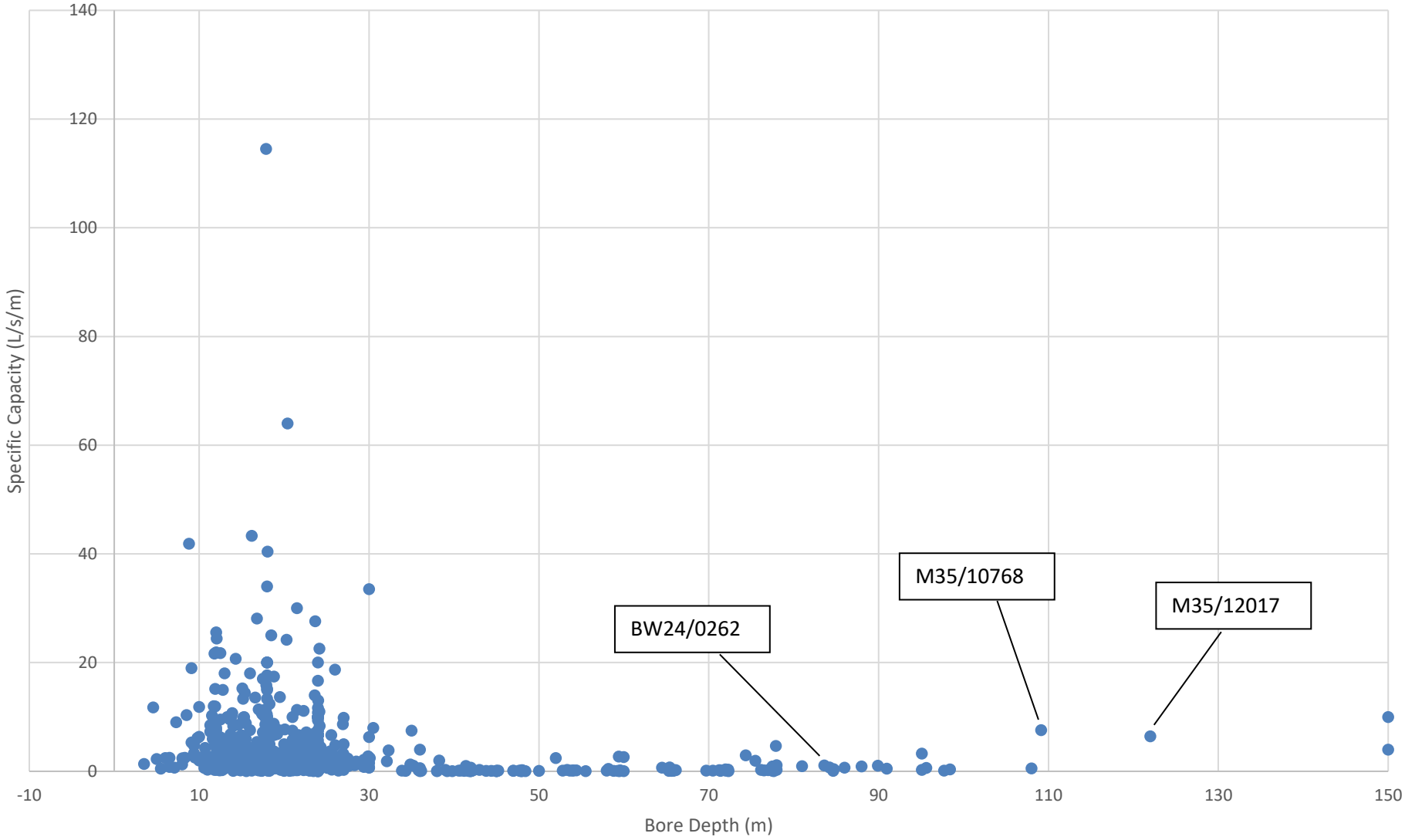

FIGURE 6: SPECIFIC CAPACITY VERSUS DEPTH FOR BORES WITHIN 5 KM OF SITE

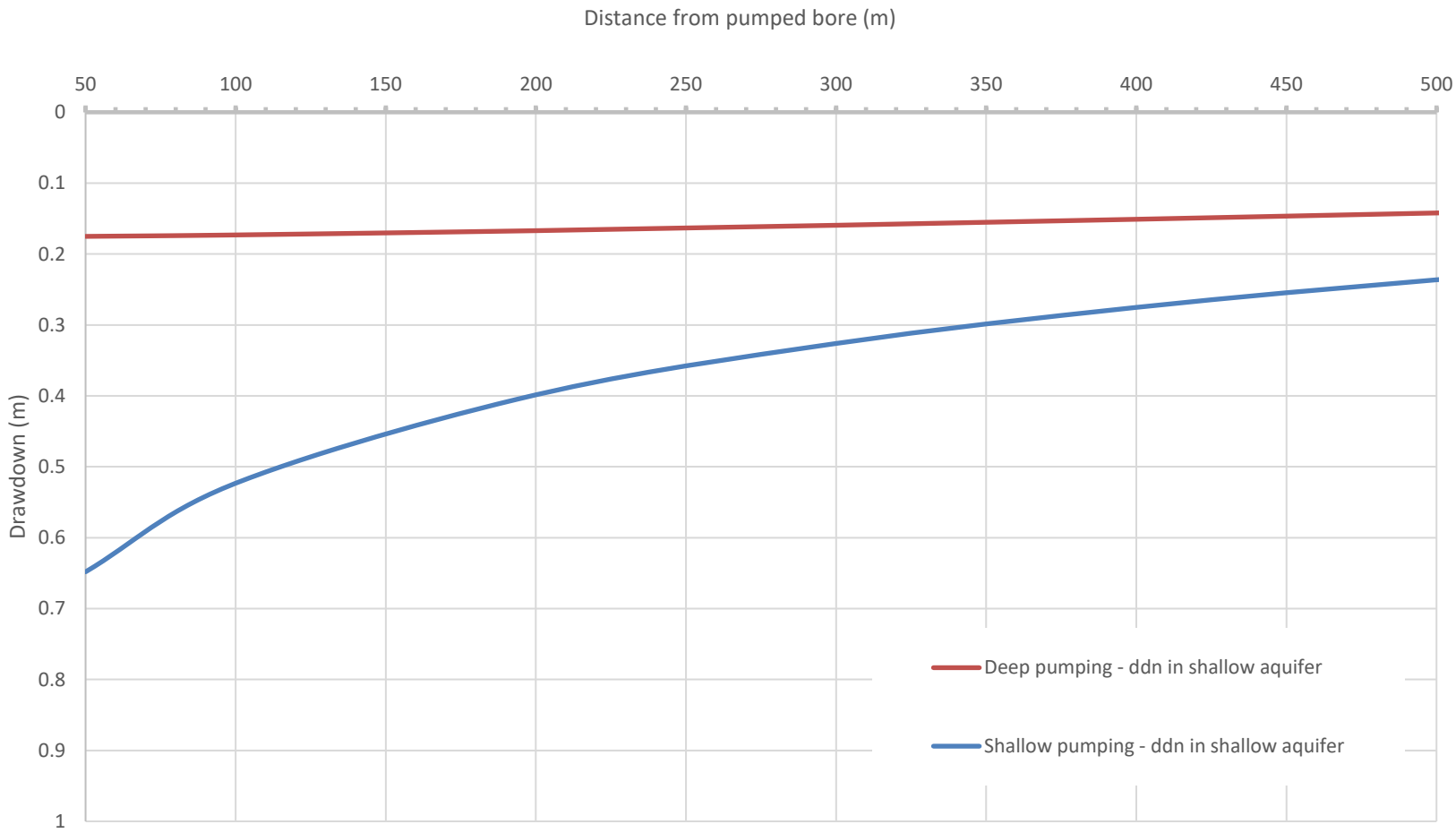

FIGURE 7: INDICATIVE DRAWDOWN IN SHALLOW AQUIFER COMPARED FOR PUMPING FROM A SHALLOW BORE VERSUS DEEP BORE

Appendix B: Relevant Policies and Rules in Canterbury Land and Water Regional Plan (LWRP)

1.0 Introduction

This appendix provides an overview of the full policies and rules in the Plan Change 7 (PC7) version of the LWRP that are considered relevant to the proposed groundwater sourced community drinking water supply.

2.0 Policies

Region-wide policies 4.49 and 4.50 of the LWRP are most relevant for the proposed community drinking water supply. Waimakariri sub-region policies 8.4.15 and 8.4.16 also have relevance to the proposed community supply.

a) Policy 4.49

Policy 4.49 states:

Enable the taking of water for a community water supply by not requiring compliance with any minimum or residual flow or partial restriction conditions and the environmental flow and allocation regime or groundwater allocation limit provided a water supply strategy developed in accordance with Schedule 25 is in place and the water supply is so managed as to restrict the use of water from those supplies during periods of low flow or water levels.

Schedule 25 of the LWRP outlines the information that is required for a water supply strategy, including:

- A description of the community water supply system, including the location of the water source, estimated population supplied, expected peak demand and water treatment methods etc.
- An assessment of existing and future demand for water, including domestic needs, public health needs and any staged increaser in allocation that may be sought during the term of the water permit.
- A description of any proposed water conservation methods and measures to ensure efficient use of water, measures to minimise water loss from the water reticulation network and performance targets to measure the effectiveness of the methods implemented.
- An assessment of any alternative water sources available or alternative means of sourcing water.
- A drought management plan.

The above list is not exhaustive, however it is expected that a water strategy in accordance with Schedule 25 would be able to be achieved for the proposed community supply.

b) Policy 4.50

Policy 4.50 states:

Where the rate of take or volume of water consented for abstraction from a catchment exceeds the environmental flow and water allocation limit for surface water or stream depleting groundwater, or the groundwater allocation limit for that catchment, any further allocation of water is limited to:

a) any abstraction necessary to meet community water supply and stockwater requirements; and

b) the replacement of existing resource consents provided that:

i. a reduction in over-allocation is enabled through the replacement resource consent being for no more than 90% of the previously consented rate of take and annual or seasonal volume unless there is a method and defined timeframe to phase out over-allocation set out in the relevant sub-region Section of this Plan; and

ii. there are significant and enduring improvements in the efficiency of water use and reductions in any adverse effects; or

iii. it is demonstrated that the existing use of water is efficient and that the efficiency is enduring.

As with Policy 4.49, Policy 4.50 indicates that the overallocation of the Eyre GAZ does not preclude further allocation of water for the proposed community water supply.

c) Waimakariri Sub-Region Policies

i) Policy 8.4.15

Policy 8.4.15 states:

Over-allocation of surface water bodies is reduced and river flows improved by enabling takes from the Transfer Permit Allocation in Table 8-4 in substitution for an existing surface water take, or existing groundwater take with a direct, high or moderate stream depletion effect and:

a. The volume of water sought from the Transfer Permit Allocation in Table 8-4 is equal to or less than the volume authorised by the existing permit; and

b. The existing permit is surrendered.

ii) Policy 8.4.16

Policy 8.4.16 states:

Avoid the grant of any water permit for the take and use of surface water or stream depleting groundwater until the freshwater outcomes in Tables 8(a) and 8(b) are met for that surface waterbody, except where:

a. *the take will replace an existing lawfully established take affected by the provisions of section 124 - 124C of the RMA, or the take is consistent with Policy 8.4.15; or*

b. *the take and use is for a community water supply, enhancement of mahinga kai, environmental enhancement (including managed aquifer recharge or targeted stream augmentation), or the take is non-consumptive.*

3.0 Rules

There are several rules that are potentially applicable to the proposed activity, depending on the preferred consenting pathway. Region-wide rule 5.115 would be applicable if the supply is applied for as a new take. If it is chosen to transfer the existing water takes rather than surrender and re-apply for a new take, then rule 5.133 would be most applicable. Several Waimakariri sub-region rules (8.5.12, 8.5.15, and 8.5.17) are also potentially relevant, depending on past usage records and the degree of stream depletion effect.

a) Rule 5.115

Rule 5.115 states (in the proposed Plan Change 7 version):

The taking and using of water for a community water supply from groundwater or surface water is a restricted discretionary activity, provided the following conditions are complied with:

1. *A Water Supply Strategy prepared in accordance with Schedule 25 is submitted with the resource consent application; and*

2. *Where the application seeks water for purposes other than drinking water, the application shall identify which components are not related to drinking water, and which of those are existing or new activities.*

The exercise of discretion is restricted to the following matters:

1. *The reasonable demand for water, taking into account the size of the community, the number of properties and stock that are to be supplied, the uses that are to be supplied and the potential growth in demand for water; and*

2. *The effectiveness and efficiency of the distribution network; and*

3. *The quality and adequacy of, compliance with and auditing of the Water Supply Strategy; and*

4. *The actual and potential adverse effects on other water takes, including reliability of supply; and*
    a. *The effect on the environmental flow and allocation limits within the relevant sub-region Sections 6 to 15; and*
5. *The potential benefits of the activity to the applicant, the community and the environment; and*
6. *Compliance with any relevant Water Conservation Order; and*
7. *The need for and extent of the proposed Community Drinking-water Protection Zone; and*
8. *The matters set out in Schedule 1 and the way in which those matters are responded to in the proposal for which consent is sought and the assessment of effects forming part of the application; and*
9. *The actual and potential effects on any user of land located within the proposed Community Drinking-water Protection Zone; and*
10. *Any adverse effects on Ngāi Tahu values or on sites of significance to Ngāi Tahu, including wāhi tapu and wāhi taonga; and*
11. *The potential adverse effects on significant habitats of indigenous fauna and flora any Critical Habitat.*

It is expected that preparation of a Water Supply Strategy in accordance with Schedule 25 will be achievable for the proposed supply, and hence the proposal would be assessed as a restricted discretionary activity.

In terms of the matters of discretion listed above, from a groundwater perspective the critical matters are expected to be matters 4, 4a and 7. The well interference effects on other water takes are likely to be less than minor due to the transfer of pumping from shallow bores to deep bores, though this will be dependent on a full assessment conducted after a constant-rate pumping test has been conducted on any new bores. The effect on allocation limits would be expected to be mitigated by the surrender of the existing irrigation takes. The preliminary stream depletion assessment (section 5.3 above) indicates that effects on surface water flows are likely to be less than minor and likely to be positive compared to the existing state due to the change from shallow to deep bores. This will need to be confirmed by pumping test results. Matter 7 will need to be assessed at the consenting stage and will be dependent on the results of the pumping test. Any Community Drinking-water Protection Zone(s) that extends beyond the proposed plan change area boundary could limit the range of activities of neighbouring property owners, such as wastewater discharges to land.

b) Rules 5.133, 5.134 and 8.5.17

Rule 5.133, which relates to the transfer of water permits, states that:

The temporary or permanent transfer, in whole or in part, (other than to the new owner of the site to which the take and use of the water relates and where the location of the take and use of water does not change) of a water permit to take or use surface water or groundwater, is a restricted discretionary activity, provided the following conditions are met:

1. *The reliability of supply for any other lawfully established water take is not reduced; and*
2. *The seasonal or annual volume of take after the transfer is less than or equal to the volume of take prior to the transfer, or if no seasonal or annual volume has been applied, a seasonal or annual volume is applied in accordance with Schedule 10; and*
3. *In the case of surface water, the point of take remains within the same catchment and the take complies with the limits set in Sections 6 to 15; and*
4. *In the case of groundwater:*
    a. *the point of take is within the same groundwater allocation zone; and*
    b. *the bore interference effects as set out in Schedule 12 are acceptable; and*
    c. *in addition for stream depleting groundwater takes:*
        i. *the transfer is within the same catchment; and*
        ii. *the take complies with the limits set in Sections 6 to 15 or the limits in any relevant catchment specific plan listed in Section 2.8 of this Plan; and*
        iii. *the stream depletion effect is no greater in the transferred location than in the original location.*

The exercise of discretion is restricted to the following matters:

1. *The nature of the transfer, whether short term, long term, partial or full, and the apportioning of the maximum rate and seasonal or annual volume in the case of a partial transfer; and*
2. *The appropriateness of existing conditions, including conditions on minimum flow, seasonal or annual volume and other restrictions to mitigate effects; and*
3. *The reasonable need for the quantities of water sought, the intended use of the water and the ability of the applicant to abstract and use those quantities; and*

4. *The efficiency of the exercise of the resource consent; and*
5. *The reduction in the rate of take in times of low flow; and*
6. *The method of preventing fish from entering any water intake; and*
7. *In a catchment where the surface water and/or groundwater allocation limits set out in Rule 5.123 and Rule 5.128 or Sections 6 to 15 are exceeded, any reduction in the rate or volume of take that may be required to assist with the phasing out of that exceedance.; and*
8. *Where there is a change to the use of the water or a change in the location the water is proposed to be used, any adverse effects on Ngāi Tahu values or on sites of significance to Ngāi Tahu, including wāhi tapu and wāhi taonga.*

It is expected that all the conditions of rule 5.133 will be able to be met, however a full well interference assessment will need to be conducted after the bores have been drilled and pump testing conducted. Item 7 in the matters of discretion relates to groundwater allocation. The current groundwater zone is over-allocated, however due to the proposed abstraction being similar or less than the water allocated for the existing irrigation takes this is unlikely to be an issue. In addition, policies 4.49 and 4.50 support the continued allowance of allocation for community drinking water supplies.

Rule 5.134 indicates that if one or more of the conditions of rule 5.133 cannot be met, then the water transfer is a non-complying activity. As stated above, it is expected that all of the default conditions of rule 5.133 can be met.

Waimakariri sub-region rule 8.5.17 is proposed as part of PC7 and states that:

Regional Rule 5.133 shall include the following additional conditions:

1A. The volume of water able to be transferred is restricted to the annual average volume of water used in the preceding five years, as demonstrated with actual use records;

1. In over-allocated surface water allocation zones, 50 percent of the rate of take or volume of water to be transferred is surrendered unless the transfer of water is for community water supply or stock drinking water requirements; and

2. There is no transfer of any allocation of water or any water permit that has not been used in the preceding 5 years.

The additional conditions stipulated by rule 8.5.17 indicate that past usage records compared to the water demand requirements will be an important consideration for any application. If not all of the conditions of rule 5.133 can be met, the proposal would default to rule 5.134 and the proposal would be assessed as a non-complying activity.

c) Rule 8.5.12

Rule 8.5.12 is in PC7 of the LWRP, and is relevant for transfers from stream depleting groundwater takes to takes with low stream depletion effect. The rule states:

The taking and use of groundwater that will substitute an existing surface water permit or groundwater permit that has a direct, high or moderate stream depletion effect is a restricted discretionary activity providing the following conditions are met:

1. *The proposed take, in addition to all existing consented takes will not result in an exceedance of the relevant groundwater Transfer Permit Allocation limit in Table 8-4; and*
2. *The resource consent demonstrates that the take will not have a direct, high or moderate stream depletion effect; and*
3. *The point of abstraction will be within the same property as the existing water permit and there is no increase in the proposed rate of take or annual volume; and*
4. *The bore interference effects are demonstrated to be acceptable, determined in accordance with Schedule 12.*

The exercise of discretion is restricted to the following matters:

1. *The rate, volume and timing of the take; and*
2. *Whether the amount of water to be taken and used is reasonable for the proposed use. In assessing reasonable use for irrigation purposes, the CRC will consider the matters set out in Schedule 10; and*
3. *The maximum rate of take, including the capacity of the bore or bore field to achieve that rate, and the rate required to service any irrigation system; and*
4. *Whether salt-water intrusion into the aquifer or landward movement of the salt water/fresh water interface is prevented; and*
5. *The proximity and actual or potential adverse environmental effects of water use to any significant indigenous biodiversity and adjacent dryland habitats; and*
6. *The protection of groundwater sources, including the prevention of backflow of water or contaminants; and*
7. *Where the water is being used for irrigation, the preparation and implementation of a Farm Environment Plan in accordance with Schedule 7 that demonstrates that the water is being used efficiently; and*

8. *Any adverse effects of the use of water on Ngāi Tahu values, or on sites of significance to Ngāi Tahu, including wāhi tapu and wāhi taonga; and*
9. *The timing of the surrender of the existing surface or groundwater permit.*

Rule 8.5.12A states:

The taking and use of groundwater that will substitute an existing surface water permit or groundwater permit that has a direct, high or moderate stream depletion effect that does not comply with condition 4 of Rule 8.5.12 is a non-complying activity.

Rule 8.5.13 states:

The taking and use of groundwater that will substitute an existing surface water permit or groundwater permit that has a direct, high or moderate stream depletion effect that does not comply with one or more of conditions 1, 2 or 3 of Rule 8.5.12 is a prohibited activity.

Rule 8.5.12 is likely to be a viable consenting pathway, the applicability of which would depend on site specific pumping test results used to assess the degree of stream depletion effect in both the existing irrigation takes and any new deep water supply bores.

Appendix C: Record of Correspondence with ECan (Matt Smith)

Tom Garden

From: Matt Smith <matt.smith@ecan.govt.nz>
Sent: Wednesday, 18 May 2022 2:05 pm
To: Tom Garden
Subject: RE: RMA223691 Transfer Water Consents - Pre-Application Consultation w/ ECan

Hi Tom,

Yes that looks good. One other point is that if the existing takes are depleting then only the discounted volume could be transferred under 5.133.

Matt

From: Tom Garden <Tom.Garden@pdp.co.nz>
Sent: Wednesday, 18 May 2022 11:14 AM
To: Matt Smith <matt.smith@ecan.govt.nz>
Cc: Bas Veendrick <Bas.Veendrick@pdp.co.nz>
Subject: RMA223691 Transfer Water Consents - Pre-Application Consultation w/ ECan

Hi Matt,

Thank you for your phone call this morning. Here is the summary of what was discussed as I understand it. It would be appreciated if you can confirm that my interpretation is correct.

As discussed, there are essentially three potential consenting pathways, as follows:

1. Apply for a transfer under rule 5.113/8.5.17 (PC7).
    a. If the annual volume applied for is less than the average use over the previous 5 years then the application would be restricted discretionary.
    b. If the annual volume applied for is larger than average use over the previous 5 years (but lower than the allocated annual volume) then it would default to rule 5.134 and the application would be non-complying and be notified.

2. Apply for a transfer under PC7 rule 8.5.12 (restricted discretionary), for substitution of a stream depleting take with a take with low stream depletion effect.
    a. For a transfer under this rule, the allocated annual volume (i.e. from Irricalc) would be relevant, *not* actual use over the previous 5 years.
    b. Transfer permit allocation would be available for the entire allocated annual volume (not only the surface water allocation component) of the existing takes.
    c. A full stream depletion assessment of both the existing takes and the new take would be necessary. For the rule to apply, the assessment would have to show that the existing takes have at least a moderate stream depletion effect, and that the new take has a low stream depletion effect.

3. Apply for a new take under rule 5.115 (restricted discretionary)
    a. This is a consenting pathway allowed for in the LWRP for establishing a community drinking water supply. You indicated that any new groundwater take application may be notified due to the effect on allocation limits.

It would be appreciated if you can confirm if the above record is correct.

Regards,
Tom

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Appendix D: Assessment of Environmental Effects for Bore BW24/0262 (PDP, 2016)

Application for Resource Consent to Abstract Groundwater from Bore BW24/0262 (Ohoka Public Supply Bore): Assessment of Environmental Effects

Prepared for

Waimakariri District Council

January 2016

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Quality Control Sheet

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Limitations:

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1.0 Introduction

Waimakariri District Council abstract groundwater from an existing bore (M35/5609) located on Bradleys Road, Ohoka that supplies potable water to the surrounding community. The existing bore is 18.8 m deep and is screened from 16.8 m below ground level to 18.8 m below ground level.

Abstraction of water from bore M35/5609 takes place under resource consent CRC990932 (expires 31st March 2041), which allows water to be taken from the bore at rates of up to 18 L/s and 248,030 m^3/year. There are also restrictions placed on the consent which are based on the flow in the Ohoka Stream. In summary, where the flow in the Ohoka Stream is less than 300 L/s, abstraction from the bore is limited to 942 m^3/day and where the flow is between 300 L/s and 800 L/s abstraction is restricted based on a sliding scale.

The flow restriction implies that the existing take has a stream depletion effect on the Ohoka Stream, although the precise level of that effect is not quantified in the consent documents.

The existing bore (M35/5609) is less than 30 m deep and it cannot be classified as 'secure' under the Drinking Water Standards for New Zealand. Therefore, WDC have drilled a new, deeper bore (BW24/0262, 84 m deep). The new bore is located around 140 m north of the existing bore and is just located within the Cust Groundwater Allocation Zone, whereas the existing bore is located within the Eyre River Groundwater Allocation Zone.

As a result of the bores being located in different allocation zones, a new consent is required for the new bore. In order to avoid unnecessary additional allocation WDC propose that the annual volume on the existing consent is reduced to 50,000 m^3/year, and the balance of 198,030 m^3/year is applied to the new consent. The combined annual volume across both consents would remain the same as on the current consent i.e. 248,030 m^3/year. The new bore BW24/0262 will be used as the principal supply bore for community supply in the area, but bore M35/5609 will be used as a back up supply if required.

Whilst both a change in the conditions on the existing consent, and a new consent are required, the assessment of environmental effects has been included in a single document. The two consents are linked and a combined assessment is more appropriate than two separate documents.

A map showing the location of the existing bore and new bore together with surrounding surface water courses is provided in Figure 1.

The purpose of this report is to provide an assessment of the potential environmental effects that could arise as a result of:

- Reducing the annual volume allocation from the existing bore; and

- Taking water from a new bore (BW24/0262).

This report is structured as follows:

- Section 2 summarises the proposed change in condition wording for consent CRC990932 and the proposed consent conditions for the new consent authorising the use of bore BW24/0262;
- Section 3 describes the activity status of the change in conditions for consent CRC990932 and the activity status of the proposed new consent;
- Section 4 describes the geological setting in the area around the bore;
- The results of the pumping tests undertaken on the new bore are presented in Section 5;
- Section 6 summarises the potential effects of using the bore and Section 7 discusses the proposed duration of the consents;
- Section 8 details issues around consultation;
- Sections 9 and 10 provides an assessment of the Section 104 matters, and Part II matters;
- Concluding comments are given in Section 11; and

2.0 Proposed consent conditions

2.1 Proposed change to consent CRC990932

This application seeks to vary consent CRC990932 to allow for the use of a deeper, more secure bore to take and use groundwater for the Ohoka community supply. WDC intend to retain the existing, shallower bore to use as a back-up.

The following changes to consent CRC990932 are proposed. Additional wording is shown as **underlined**.

> 2) Water may be taken at a rate not exceeding 18 litres per second, with an annual volume not exceeding 248,030 cubic metres between 1st July and the following 30th June.
>
> **After Consent CRCXXXXX, authorising the use of bore BW24/0262, is given effect to, the annual volume of water taken under this consent shall not exceed 50,000 cubic metres between 1st July and the following 30th June.**

The purpose of the additional condition for consent CRC990932 is to ensure that the existing annual volume from the existing bore is maintained until the new bore is able to provide water for the Ohoka public supply network. No further changes are proposed to the conditions of CRC990932.

2.2 Proposed conditions for new consent for bore BW24/0262

It is proposed that the new consent includes the following conditions:

1. Water may only be taken from bore BW24/0262, 300 millimetres diameter and 84.7 metres deep, at or about map reference NZTM BW24:65127-99015.

2. The combined maximum rate of take under this consent and consent CRC990932 (or any subsequent consent) shall not exceed 18 L/s.

3. The maximum annual volume taken under this consent shall not exceed 198,030 cubic metres between 1st July and the following 30th June.

4. Water shall only be used for public supply.

5. The consent holder shall within six months of the commencement of this consent, install an easily accessible straight pipe(s), 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 within the main distribution system.

6. The consent holder shall before the first exercise of this consent:

   a.

      i. Install a water meter that has an international accreditation or equivalent New Zealand calibration endorsement, and has pulse output suitable for use with an electronic recording device, which will measure the rate and the volume of water taken to within an accuracy of plus or minus five percent as part of the pump outlet plumbing, or within the mainline distribution system, at a location that will ensure the total take of water is measured; and

      ii. Install a tamper-proof electronic recording device such as a data logger that shall time stamp a pulse from the flow meter at least once every 60 minutes and have the capacity to hold at least one season's data of water taken as specified in clauses b. (i) and b. (ii), or which is telemetered, as specified in clause (b).

   b. The recording device shall

      i. Be set to wrap the data from the measuring device such that the oldest data will be automatically overwritten by the newest data (ie cyclic recording); or

      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 in a commonly used format and provide to the

Canterbury Regional Council upon request in a form and to a standard specified in writing by the Canterbury Regional Council; or

iii. Shall be connected to either the Waimakariri District Council telemetry system or a telemetry system which collects and stores all of the data continuously with an independent network provider who will make the data available in a commonly used format at all times to the Canterbury Regional Council and the consent holder. No data in the recording devices shall be deliberately changed or deleted.

c. The water meter and recording devices shall be accessible to the Canterbury Regional Council at all times for inspection and/or data retrieval.

d. The water meter and recording devices shall be installed and maintained throughout the duration of the consent in accordance with the manufacturer's instructions.

e. All reasonable measures shall be taken to ensure that the water meter and recording device(s) are fully functional at all times.

7. Within one month of the installation of the measuring or recording device(s), or any subsequent replacement measuring device(s), and at five-yearly intervals thereafter, and 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:

    a. The measuring and recording device(s) has been 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. If the system used to distribute water taken in terms of this permit is used to distribute any contaminant,

    a. a backflow preventer manufactured in accordance with AS 2845.1 (1998) or the American society of Sanitary Engineers standards shall be installed within the pump outlet plumbing or within the mainline, to prevent the backflow of water into the bore.

    b. The backflow preventer shall be tested to the standard set out in AS2845.3 (1993) or an equivalent method within one month of its installation and annually thereafter by a qualified person. A test report shall be provided to the Canterbury Regional Council, attention RMA Compliance and Enforcement Manager within two weeks of each inspection.

9. The consent holder shall take all reasonable steps to avoid leakage from pipes and structures.

10. The Canterbury Regional Council, may once per year, on any of the last five working days of may or November, serve notice of its intention to review the conditions of this consent for the purposes of dealing with any adverse effect on the environment which may arise from the exercise of the consent and which it is appropriate to deal with at a later stage.

11. The lapsing date for the purpose of section 125 shall be five years from the data the consent is granted.

3.0 Activity status

The current proposal is to vary conditions of an existing resource consent CRC990932, located within the Eyre River Groundwater Allocation Zone, to reduce the annual volume.

Simultaneously, a new consent is sought to take water from a new bore (BW24/0262), located within the Cust Groundwater Allocation Zone.

A review of the current rules has been undertaken to determine the activity status, and to identify matters of discretion necessary to advance these applications.

The operative Waimakariri River Regional Plan (WRRP) provides rules relating to the taking of water from streams and hydraulically connected groundwater within the Waimakariri River catchment.

WRRP Rule 5.1 applies to the taking of hydraulically connected groundwater and classes the abstraction as a restricted discretionary activity.

This rule is relevant for the proposed variation to the existing consent CRC990932. However, the explanation to the rule goes on to state that the rule does not apply to:

> "(b) abstractions from hydraulically connected groundwater where it can be established using the "Jenkins" method or other scientifically accepted hydrological calculations that the surface water depletion resulting from a 30 day pumping period will not exceed 5 litres per second."

An assessment has been undertaken to determine the extent of any potential stream depleting effects arising from abstraction from the new deeper bore. In this case, the surface water depletion effect on the Ohoka Stream resulting from a 30 day pumping period is less than 5 litres per second, and is therefore not considered to be hydraulically connected under this rule, and it is permitted under this plan. However, this rule also contains a footnote that reminds the reader that although the taking of groundwater in not affected by this rule, the

abstraction may still need to be authorised by another regional plan or by a resource consent.

It is on this basis that the activity is also considered against rules contained in the partly operative Land and Water Regional Plan (LWRP). Rule 5.115 classifies the taking and use of water for a community water supply from groundwater as a restricted discretionary activity provided that the conditions of the rule are met.

Condition 1 requires that a Water Supply Strategy is submitted with the resource consent application and Condition 2 states that where the application seek water for purposes other than drinking water, the application shall identify which components are not related to drinking water and which of those are existing or new activities.

Proposed Plan Change 4 (PC4) to the LWRP provides a slight change to Condition 1 requiring that the Water Supply Strategy be prepared in accordance with Schedule 25.

In this case, Condition 1 can be met, as there is a Water Supply Strategy prepared in accordance with Schedule 25 included with this application to vary the existing consent. Furthermore, the use of water from this supply is limited to drinking water and therefore Condition 2 is not relevant. It is on this basis that a new application for this activity is considered to be a ***restricted discretionary*** activity under the LWRP and proposed PC4 Rule 5.115.

The potential effects arising from the change in consent conditions has been assessed against the relevant matters of discretion listed in the WRRP. The potential effects arising from proposed new consent have also been assessed against the matters of discretion listed for the LWRP. The assessment of environmental effects is found in Section 6.0 of this report.

4.0 Geological setting

A geological map of the strata that make up the Waimakariri – Ashely Plains is shown in Figure 2. In general terms, the Canterbury Plains comprise a series of large coalescing fluvio-glacial fans built by the main stem rivers (including the Waimakariri). During successive glaciations when glaciers partly occupied the inland valleys and extended to the eastern foothills, great quantities of detritus eroded from rapidly rising mountains.

Gravel with sand and silt material was transported eastwards and deposited to form the fans of gravel-dominated sediments that extend beyond the present day coastline, including the Waimakariri and Ashley Plains. During these glacial periods, some re-sorting of the gravel deposits occurred due to alluvial processes (Brown 2001). During the warmer interglacial periods, the glaciers retreated up the valleys and less new gravel material was transported out onto the plains. However, alluvial processes continued to re-work the gravels.

These varied processes that make up the strata underlying the Waimakariri – Ashley Plains have resulted in varied hydraulic properties with respect to groundwater flow. Areas of well sorted gravel strata tend to result in areas of higher permeability with more rapid groundwater movement, whereas areas of poorly sorted gravels, or areas dominated by silts and fine sands tend to represent locations of slower groundwater movement.

The outcropping strata immediately around the pumped bore BW24/0262 is described on the geological map as Late Pleistocene river deposits (Q2), made up of unweathered, brownish grey gravels, sands, silts and clays. The drillers logs for bore BW24/0262 is consistent with that description, with various intervals of gravels and clays recorded up to 10 m thick. The strata across which the bore is screened (from 78 m below ground level to 84 m bgl) is described as 'yellow gravel with some clay', although a water bearing interval is noted immediately above the screened interval. Copies of drillers logs are provided in Appendix E.

5.0 Pumping tests

5.1 Step drawdown test

A step drawdown pumping test was undertaken on bore BW24/0262 by Clemence Drilling on 25th June 2015. A summary of the pumping rates used in the test are provided in Table 1.

Table 1: Step drawdown test (bore BW24/022)[1]

Step	Duration	Flow rate	Drawdown at end of step
1	109	12	27.83
2	104	14	38.11
3	108	16	45.73
4	103	18	53.73
5	102	20	57.36
Recovery	120	0	4.89

Notes:

1. *Data provided by Clemence Drilling. These values have not been independently checked by PDP*

The depth to water and pumping rate measured in BBW24/0262 over the testing period is provided in Figure 3. The effects of the four pumping steps are clearly shown in Figure 3 with abrupt changes in water level at the beginning of each step and a flattening of water levels during the remainder of each pumping step.

The maximum drawdown at the end of the test (i.e. end of Step 5) was 57.36 m.

The water level data from the step-drawdown was analysed using the method developed by Eden and Hazel. Modelled drawdowns were fitted to the measured data using the following equation:

$$s_w = (a + b \log t)Q + CQ^2 + k$$

Where:

- sw is the drawdown in the pumped well (in metres)
- a is the inertia aquifer loss
- b is the time dependant aquifer loss parameter
- t is the duration of the pumping period (in minutes)
- Q is the pumping rate (in m^3/min)
- C is the turbulent head loss coefficient
- k is a correction factor

From the analysis, the following values were calculated for the specific parameters given above which describe the aquifer and well characteristics (Table 2).

Table 2: Eden and Hazel step drawdown test parameters

Parameter	Value	Units
a	12.6094	min/m^2
b	12.386	min/m^2
C	5.024	min/m^5
k	-2	m

These parameters give the following equation:

$$s_w = (12.6094 + 12.386 \log t)Q + 5.024Q^2 + (-2)$$

The modelled drawdown and recovery is shown together with the measured data in Figure 4. This figure shows that the modelled drawdown is generally a good fit with the measured data, although the final step and the recovery are not precisely matched.

The results of the step drawdown test can be used to evaluate the potential yield from the pumped bore, which may vary seasonally depending on groundwater level fluctuations. No continuous long-term groundwater level records exist for

bore BW24/0262 and the closest bore of comparable depth with long-term groundwater records is bore M35/11918, located approximately 2 km northwest of BW24/0262.

Bore M35/11918 is located around 2 km northwest and screened from 66 to 75 m bgl. The available water level data for bore M35/11918 indicates that since 2009, the maximum groundwater level variation is around 3.5 m. A plot showing the complete groundwater level record from M35/11918 is provided in Figure 5.

The static groundwater level measured in BW24/0262 prior to pumping on the morning of the step-drawdown test was 0.5 m above ground level. However, assuming that bore BW24/0262 experiences water level fluctuations of similar magnitude to ECan monitoring bore M35/11918, then a seasonal low water level would be around 3 m bgl, although lower water levels could occur during very dry periods.

A permanent pump has not yet been installed in bore BW24/0262. However, the bore is screened from 78 m bgl and a pump is likely to be installed just above the screened interval, around 76 m bgl.

Based on the assumptions above, the available drawdown in bore BW24/0262 based on the water level conditions at the time of the testing is 74 m (allowing for a 2 m pump length), however during a summer period there is the potential that the available drawdown could reduce to 71 m or potentially less during an extended dry period.

Figure 6 shows the predicted drawdown in the bore based on various rates and periods of pumping. Figure 6 indicates that based on the water level conditions during the testing, bore BW24/0262 may be capable of yielding up to around 13 L/s over the long-term. However, if the available drawdown were to fall then longer-term pumping at 13 L/s may not be possible. Shorter term pumping of 20 L/s (demonstrated by the pumping test) is achievable. Figure 6 would suggest that based on the lowest assumed water level in BW24/0262 the sustainable yield could potentially be approximately 13 L/s.

It should be noted however that the predictions of low water levels in BW24/0262 are uncertain and may not be accurate as they are based on a relatively short water level record in a bore 2 km distant.

5.2 Constant rate pumping test

The following section describes the results and analysis of a constant rate pumping test undertaken on bore BW24/0262. The purposes of the constant rate pumping test below is to derive aquifer parameters that can be used to determine the potential drawdown interference effects that could arise due to operation of the bore.

5.2.1 Description of the test

The constant rate test was carried out by Clemence Drilling and took place in December 2015. Bore BW24/0262 was pumped at an average rate of 20 L/s for three days, from the 16th December 2015 to the 19th December 2015. Water level recovery was monitored for a further four days after pumping ceased, from the 19th December 2015 to the 23rd December 2015.

Groundwater levels were monitored in three nearby bores during the test, including two bores that were a similar depth to the pumped bore and one nearby shallow piezometer. Table 1 lists the details of the bores and a map showing their relative locations is provided in Figure 7.

Table 3: Details of bores used in pumping test

Bore number	Depth (m)	Screened interval (m bgl)	Owner	Use	Static water level (m bgl)[1]	Distance to pumped bore (m)
BW24/0262 (Pumped bore)	84.7	78 to 84	WDC	Public supply	-0.05[2]	-
M35/8381	88	86.5 to 88	Parker	Domestic / Stock	1.05	734
M35/7701	86	84 to 86	HJ Smith	Domestic	1.55	900
- (shallow piezometer)	15.1	Slotted casing	WDC	Water level observation	1.72	13

Notes:

2. *As recorded at the start of the constant rate test on 16 Dec 2015. Adjusted for the level of the casing above ground level.*
3. *The static water level in the pumped bore was recorded as 0.25 m below the top of the casing. The top of casing is recorded as 0.3 m above ground level.*

The bore details in Table 1 indicate that the vertical pressure gradient between the strata monitoring by the pumped bore and the shallow water table is slightly upwards.

Water abstracted during the test was discharged into a nearby drain.

5.2.2 Raw water level data

Raw pressure data from each of the bores observed during the test is presented in Figures 8 (Bore BW24/0262, M35/8381 and M35/7701) and Figure 9 (shallow piezometer).

Effects of pumping are clearly shown in the data from the pumped bore, where the pressure above the transducer reduced by around 60 m. Some slight steps are evident in the pressure data from the pumped bore, which represent slight changes in the pumping rate, where the valve was opened slightly to maintain the flow rate.

Data from bore M35/7701 does not show clear effects from pumping, although a general decline in pressure occurred over the course of the test and a general rise occurred after pumped ceased. However the data record shows a number of fluctuations which may be the effect of groundwater abstraction from other bores in the general vicinity.

In contrast, the effect of pumping is clearly shown in the data from bore M35/8381 and pressures in the bore reduced by around 2 m over the course of the test. There is delay between the start of pumping and effects on the water levels in the bore. Likewise, there is a delay between pumping ceasing and water level recovery.

The water level record for the shallow piezometer, located very close to the pumped bore is shown in Figure 9. It indicates substantial interference effects from nearby pumping. The short term fluctuations are an effect of pumping from the existing WDC supply bore (M35/5609, 140 m south-west), but effects from longer term nearby pumping are also superimposed onto the water level record. As a result of those interference effects, deriving the effects of pumping from bore BW24/0262 on the water level in the shallow piezometer is uncertain, although the effects are unlikely to be particularly large. No further assessment has been completed on the data from the shallow piezometer.

5.2.3 Data corrections

Water level data for each of the bores has been corrected to account for barometric pressure changes that occurred during the test. Barometric pressure data was taken recorded in a dedicated barometric pressure logger installed at the pumped bore. Note that the data for the pumped bore have been corrected for barometric pressure changes, but the drawdown in the pumped bore is sufficiently large (up to 68 m) in comparison to the maximum barometric effect (~0.1 m) that the barometric corrections make little difference to the data.

Figure 10 shows drawdown (relative to the start of the test) in each of the monitoring bores as well as the pumped bore that has been corrected for barometric pressure changes. The barometric efficiency effect is very low in the deeper bores, around 25 %. Plots of the barometric compensation for each bore are provided in Appendix A.

5.2.4 Drawdown analysis

The drawdown curve for the pumped bore BW24/0262 is generally smooth (Figure 10), suggesting that there were no significant changes in the pumping rate over the course of the test. The recovery after pumping ceased is also smooth and complete recovery occurs in the pumped bore within around 4 days of the end of the test.

The maximum drawdown in the observations bores after corrections for barometric effects is around 1.8 m in bore M35/8381 and 0.3 m in bore M35/7701. The greater drawdown in bore M35/8381 is partly due to its smaller distance from the pumped bore (724 m) compared to the greater distance between the pumped bore and M35/7701 (894 m) but different aquifer parameters are also responsible for the differences in observed drawdown.

The drawdown curve from bore M35/7701 (Figure 10) appears to show some small scale fluctuations (up to around 0.05 m) that are not related to barometric pressure changes. Similar fluctuations do not appear in the record for bore M35/8381, despite the two observation bores being located within 300 m of each other. The small scale fluctuations may be an effect from other background influences, including pumping from relatively distant bores.

The data indicate that complete recovery occurs in bore M35/7701 within around three days of the end of the test, whereas bore M35/8381 only recovered to around 84 % of the static level at the start of the test.

The data from the two observation bores have been modelled using the Boulton solution, which allows for leakage from an overlying aquitard.

Figure 11 shows the observed and modelled drawdown in bore M35/8381. The modelled drawdown is a good fit to the observed data. Note that the leakage value is constrained by both the drawdown curve as well as the recovery curve.

Figure 12 shows the observed and modelled drawdown in bore M35/7701. The modelled drawdown is also generally a good fit, although the fit is not as precise as that for bore M35/8381 because of the effect of fluctuations in the drawdown curve. Note that based on the results, the specific yield of the overlying strata cannot be precisely defined. The aquifer parameters used to model the drawdown in the two observation bores are presented in Table 3.

Table 4: Aquifer parameters				
Bore	**Transmissivity (m^2/day)**	**Storage**	**Leakage (K'/B') (day^{-1})**	**Specific yield**
M35/8381	110	3.5×10^{-4}	2.8×10^{-5}	0.1
M35/7701	120	9.0×10^{-4}	5.0×10^{-4}	0.1
Average	*115*	*6.3×10^{-4}*	*2.64×10^{-4}*	*0.1*

The results indicate that the strata are variable, with the value of leakage varying between the two bores, although the estimate of transmissivity is similar.

That variability is characteristic of pumping tests in the Canterbury Plains. The depositional history of the strata mean that even within relatively small areas, aquifer parameters can vary and the distance between the pumped bore and the observation bores will exacerbate that issue.

The two different sets of parameters imply slightly different conceptual models, with the data from bore M35/8381 suggesting a greater degree of lateral flow compared to the data from bore M35/7701, which suggests a lesser degree of lateral flow and a greater vertical flow component. Whilst those results are not mutually exclusive, they do cause a degree of uncertainty in any longer term predictions of drawdown interference based on any one of the results.

5.3 Water Quality

The results from an analysis of a sample of groundwater from bore BW24/0262 are provided in Appendix B. The results indicate that the water quality generally comply with the drinking water guidelines. The only exception is turbidity, where the analysis result indicates a value of 3.71 NTU compared to a guideline value of 2.5 NTU.

6.0 Assessment of Environmental Effects

Rule 5.115 in the LWRP and proposed PC4 identifies that matters for discretion is restricted for this new application. WRRP Rule 5.1 identifies matters for discretion that are relevant to the proposed variation application.

- Reasonable demand for water, taking into account the size of the community, the number of properties and stock that are to be supplied, the uses that are to be supplied and the potential growth in demand for water; and
- The effectiveness and efficiencies of the distribution network, including the availability and practicality of using alternative public or community supplies; and

- The quality and adequacy of, compliance with and auditing of the Water Supply Strategy; and
- The actual and potential adverse effects on other water takes, including reliability of supply; and
- The effect on the environmental flow and allocation limits within the relevant sub-regional Sections 6 to 15, and the WRRP limit on allocation of the Ohoka Stream; and
- The potential benefits to the applicant, the community and the environment; and
- Compliance with any relevant Water Conservation Order.
- The need for and extent of the proposed community drinking-water supply protection zone; and
- The matters set out in Schedule 1 and the way in which those matters are responded to in the proposal for which consent is sought and the assessment of effects forming part of the application; and
- The actual and potential effects on any land user with land located within the proposed community drinking water supply protection zone.

It is noted that Section 3 of this report has discussed the reasonable demand for water, while Section 5 provides an assessment of aquifer properties which is useful in determining the potential effects on other users. It should be noted that there is no relevant Water Conservation Order in this area.

The main issues related to this application that have potential to cause an effect on the environment or effects on other groundwater users are drawdown interference effects on neighbouring bores and stream depletion effects on nearby waterways.

The proposed abstraction is sufficiently inland (more than 11 km) from the coast that salt – water intrusion is not expected to be an issue.

Sections 6.1 and 6.2 address the drawdown interference effects on neighbouring and stream depletion effects respectively.

6.1 Drawdown Interference Effects

Potential concerns from the proposed groundwater abstraction are drawdown interference effects on other groundwater users.

Drawdown interference is the reduction of groundwater levels in surrounding bores from groundwater abstraction. The potential yield in a bore is dependent on the amount of available drawdown and a reduction of water levels may result in a bore not being able to achieve its required yield.

Taking into account the proposed bore, assessments of drawdown interference on neighbouring bores using the ECan WQN10 program (as outlined in Schedule WQN10 of the NRRP and Schedule 12 of the pLWRP) were undertaken and any effects on neighbouring bores within 2 km of bore BW24/0262 were calculated.

WDC are applying for a peak pumping rate of 18 L/s for the new bore (BW24/0262), which is consistent with the consented rate on the existing bore. The proposed consent also includes a condition whereby 18 L/s is the combined peak rate from both the existing bore and the new bore. Therefore, for the purposes of the drawdown interference assessment the 7 day, peak pumping rate (Q7) has been conservatively set to 18 L/s.

Under this proposal, that annual volume on the existing consent (248,030 m^3/year) will be split across two consents, with the annual volume on the existing consent reduced to 50,000 m^3/year and the annual volume on the new consent set to 198,030 m^3/year. The proposed use of the new bore is for public supply, and the existing consent also only permits water use for public supply. As a result, whilst there may be intra-year variations in water use, the annual volume will be spread out across a full year, and will not be exhausted within a 150 day period.

Therefore, the longer term rate for the WQN10 assessment (Q150) is set to 1.6 L/s for the existing consent, while the longer term rate (Q150) is set to 6.3 L/s on the new consent for the purposes of the WQN10 Assessment. Table 4 sets out the pumping rates used in the WQN10 assessment.

Table 5: WQN10 assessment pumping rates

Bore	Existing scenario		Future scenario	
	Q7	Q150	Q7	Q150
M35/5609	18	7.9	0	1.6
BW24/0262	0	0	18	6.3
Total	*18*	*7.9*	*18*	*7.9*

Figure 13 presents a histogram of bore depths for bores within 2 km of the pumped bore. It indicates that the majority of bores are less than 31 m deep, with the remaining bores up to 141 m deep. The results of the pumping test indicate that the deeper strata are variably leaky and/or anisotropic, and therefore, for the purposes of this drawdown interference assessment, bores less than 31 m deep are treated as being in the shallow, overlying strata, whereas bores more than 31 m deep are treated as being in the pumped aquifer.

No value of transmissivity has been derived for the shallow strata based on the results of the pumping test, but an estimate is required to calculate cumulative

drawdown interference effects in the shallow strata. Therefore an estimate of shallow aquifer transmissivity has been derived from an empirical relationship between the specific capacity of a bore and transmissivity derived from pumping tests in Canterbury (Bal, 1996). Based on bores less than 31 m deep within 2 km of the pumped bore, the average transmissivity using that empirical relationship is 975 m^2/day. That value is generally consistent with the results of pumping tests on shallow bores (less than 31 m deep) in the wider area i.e. more than 2 km away.

In order to account for the uncertainty that arises from the results of the pumping test, two WQN10 assessments have been completed using both sets of parameters derived from each observation bore (Table 2). However, both WQN10 assessments use the same value of transmissivity for the shallow strata (975 m^2/day).

The results of the two WQN10 assessments assessments are compared to the existing situation, where abstraction occurs from the shallower bore (M35/5609, 18 m deep) (Table 4) and the results indicate that there are no drawdown interference effects that are more than minor. Copies of the results from the WQN10 assessment are provided in Appendix C.

6.2 Stream depletion effects

The existing bore on the consent is located around 290 m north of the Ohoka Stream, and the take is restricted when flows in the Ohoka Stream drop below specified levels. The new bore is much deeper than the existing bore, and is also located further away from the Ohoka Stream (415 m north). Therefore, stream depletion effects as a result of using the new bore are expected to be less than the existing situation.

Based on the pattern of drawdown observed in bore M35/8381, stream depletion effects may be around 53% after 150 days pumping from bore BW24/0262 (Figure 14). According to Schedule 9 in the LWRP, a stream depletion effect of 53% would fall into the 'moderate' category, where 50% of the annual volume assigned to the take is included in surface water regime. No flow restrictions are applied to groundwater takes with a 'moderate' stream depletion effect and therefore the flow restrictions should not be applied to any abstraction from bore BW24/0262. The annual volume allocation issue is not any larger than the currently consented situation.

A stream depletion analysis has also been completed for drawdown data from bore M35/7701 (Figure 15), which suggests a lower stream depletion effect. Using the stream depletion rate based on data from bore M35/8381 is therefore a more conservative approach.

6.3 Effect on Allocation Limits

The existing consent is part of the groundwater allocation block for the Eyre River Groundwater Allocation Zone. No increase in that allocation is proposed under this variation to the consent and therefore effects on the allocation limit are less than minor.

The new bore (BW24/0262) is located within the Cust Groundwater Allocation Zone and there is sufficient allocation available within that zone to accommodate the proposed annual volume for the new consent. Therefore the effect on the groundwater allocation limit in the Cust GAZ is less than minor.

6.4 Effectiveness and efficiency of the distribution network

Appendix D provides details of the effectiveness and efficiency of the distribution network, together with WDC planned improvements. It is also noted that the successful application for a new consent to take water from bore BW24/0262 will make the WDC network more robust and effective as an alternative source of supply will be added into the network.

6.5 Quality and Adequacy of the Water Supply Strategy

Likewise, Appendix D provides details of the WDC water supply strategy.

6.6 Community Drinking Water Supply Protection Zone

Schedule 1 of the Land and Water Regional Plan specifies that any resource consent application for a community drinking water supply take needs to consider the need for, and extent of a specific protection zone.

Table 1A in Schedule 1 (as amended in Plan Change 4) identifies the protection distance for different aquifer types and different bore depths. According to that table, the required protection zone for a bore that is more than 70 m deep within a confined or semi-confined aquifer is a 100 m radius around the bore.

Figure 16 presents a map showing a 100 m radius around bore BW24/0262. It indicates that the protection zone would encompass areas of existing agricultural land on either side of Bradleys Road. No effect is expected on that land as a result of the proposed protection zone. The bore and headworks will be constructed to comply with the New Zealand Drinking Water Standards 2005 (revised 2008), which will provide adequate protection to the immediate bore surrounds. The thickness of the strata overlying the screened interval of the bore will provide protection from effects at the surface. Therefore, there will be no limits to existing land use practices within 100 m of the bore (within the protection zone), and effects on existing neighbouring land use will be less than minor.

6.7 Benefits of the Proposed Abstraction

The proposed variation to the existing consent, and the new consent will mean that water for public supply can be taken from an additional bore. The additional bore is screened from 78 m below ground level and 84 m below ground level and will therefore fulfil one of the criteria for a 'secure supply' as defined by the New Zealand Drinking Water Standards (2005, revised 2008). That will lead to an improved and safer water supply for the surrounding community.

In addition, use of a deeper bore will help to relieve pressure on the shallow groundwater system, which is relatively heavily exploited in the local area and also reduce groundwater abstraction impacts on the Ohoka Stream.

Furthermore, the proposed reduction in the annual volume limit for the existing consent, located within the Eyre River GAZ, will make more water available to other users in that zone, which is reportedly overallocated.

6.8 Potential Effects to Tangata Whenua Values

While not listed as a matter for discretion under Rule 5.115, a review of the area has found that the Papatipu Runanga in which the proposed activity will occur is Tuahuriri. The location where the activity is to take place is not located on or adjacent to any statutory Acknowledgement Areas nor is it located in an area identified as a Silent File Area.

The Mahaanui Iwi Management Plan 2013 (MIMP) (Chapters 5.3 – Wai Maori and 6.4 – Waimakariri) provides objectives and policies related to this proposal. Further discussion on how the proposal is consistent with the policies contained in the MIMP can be found in Section 9 of this report.

6.9 Summary of Environmental Effects

The Assessment of Environmental Effects provided in Section 6 indicates that no effects that are more than minor are expected to occur as a result of the proposed variation to the consent conditions.

7.0 Proposed duration of consent

The existing consent was granted in March 2006 and will expire in March 2041. No change to that timeframe is sought as part of this consent variation.

A consent duration of 35 years is requested for the proposed consent for the new bore (BW24/0262).

8.0 Consultation

The assessment of environmental effects associated with the proposed groundwater take for public supply indicates that no adverse effects that are more than minor are expected to occur as a result of the application. It is on this

basis that that it is concluded that there are no affected parties arising from the proposed variation. Therefore, no consultation has been undertaken or is considered to be necessary.

9.0 Section 104 matters and Part II matters

9.1 Matters to be Considered

Section 104 of the RMA states:

(1) Subject to Part II, when considering an application for a resource consent and any submissions received, the consent authority shall have regard to:-

(a) Any actual and potential effects on the environment of allowing the activity;

(b) Any relevant provisions of –

i. a national environmental standard;

ii. other regulations;

iii. a national policy statement;

iv. a New Zealand coastal policy statement;

v. a regional policy statement or proposed regional policy statement;

vi. a plan or proposed plan; and

(c) Any other matter the consent authority considers relevant and reasonably necessary to determine the application.

Actual and potential effects have been considered in Section 6 of this report. The following sections consider the relevant national environmental standards, the National Policy Statement for Freshwater Management, the Canterbury Regional Policy Statement and the relevant regional plans.

It is noted that the NZ Coastal Policy is not relevant. Additionally, there are no Water Conservation Orders or Draft Water Conservation Orders or Heritage Orders relevant to this application.

Other matters (c) which may be considered relevant to this application include the Iwi Management Plans (Section 9.8) and the Canterbury Water Management Strategy (see Section 9.9).

9.2 National Environmental Standards

9.2.1 NES for Sources of Human Drinking Water

The purpose of the NES for Human Drinking Water is to reduce the risk of human drinking water source becoming contaminated. These regulations came into effect on 20 June 2008.

These regulations apply to applications for water permits or discharge permits which have the potential to affect a registered drinking water supply. This application is seeking consent to take and use water to provide a community drinking water supply, and this activity will not adversely affect the quality of any registered drinking water supplies located down-gradient.

It is recognised that the community drinking water supply is established this regulation will be applicable to other water takes and discharges applications which may affect the security of this supply. A community drinking water supply protection zone has been proposed in accordance with Schedule 1 of the LWRP to ensure that actual and potential adverse effects from future activities located within the proposed zone are avoided.

9.2.2 NES for Measurements and Reporting of Water Takes

The purpose of the NES for Measurement and Reporting of Water Takes to accurately measure and record water takes so that water resources can be effectively allocated and efficiently used. The regulations came into effect on 10 November 2010.

The current consent CRC990932 contains water metering/reporting conditions, and WDC intends to ensure that the water metering will continue on for any abstractions from the old bore, and will be undertaken on all abstractions from the new bore. Given that the consent holder intends to keep the water metering/reporting conditions, and that similar conditions are proposed for the new consent, the variation to abstract and use water from the new bore will be consistent with this NES.

9.3 National Policy Statement for Freshwater Management

This National Policy Statement for Freshwater Management (NPS-FM) sets objectives and policies to direct local government to manage water in an integrated and sustainable way, simultaneously maintaining economic growth within water quantity and quality limits. The NPS-FM identifies community water supply as an important national value of freshwater.

Part B addresses water quantity. Objective 1 sets out to safeguard the life-supporting capacity and ecosystem processes in sustainably managing the taking and using of freshwater. Objective B2 aims to avoid any further over-allocation of freshwater. Objective B3 seeks to improve and maximise the efficient

allocation and efficient use of water. The Part B policies seek to ensure that effect to this NPS is given by having regard to the connection between water bodies, efficient allocation of freshwater to activities and ensuring that over-allocation does not occur.

The purpose of this variation and new consent is to allow abstraction to provide a community supply from a deeper and more secure bore. The abstraction from the new bore will occur within the allocation framework for the Cust GAZ, as specified in the Land and Water Regional Plan.

It is considered that this application is in general accordance with the NPS-FM.

9.4 Canterbury Regional Policy Statement 2013

The Canterbury Regional Policy Statement (CRPS) provides an overview of the resource management issues specific to the Canterbury region. Within CRPS are the objectives, policies and methods to achieve integrated management of natural and physical resources for Canterbury.

Chapter 5 Land-Use and Infrastructure, and contains objectives and policies which refer to the importance of community water supplies in the siting and development within rural and urban areas.

Policy 5.3.5 seeks to ensure that development is appropriately and efficiently provided with a potable water supply. Policy 5.3.6 seeks to enable potable water supply infrastructure be developed and used provided that adverse effects are avoided. WDC have identified the need for a deeper bore to provide the community need and this application to vary the existing to consent to allow the take and use from that bore seeks to achieve that requirement.

Chapter 7 Fresh Water aims to maintain fresh water standards and methods for improvement. This chapter is directly related to the community take and use activity proposed under this application.

Objective 7.2.1 aims to have the region's freshwater resources managed sustainably to enable people and communities to provide for their social-wellbeing through abstracting and/or using water providing that (1) the life-supporting capacity of fresh water is safe-guarded and (3) any actual or reasonably foreseeable requirements for community are provided for.

Objective 7.2.2 recognises parallel processes for managing water and states that the abstraction of water and development of water infrastructure in the region occurs in parallel with the (1) improvements in the efficiency with which water is allocated for abstraction, the water it is abstracted and conveyed, and its application or use; and (2) the maintenance of water quality where it is of a high standard.

Objective 7.2.3 states that the overall quality of freshwater in the regional is to be maintained or improved and its life supporting capacity be safeguarded.

Objective 7.2.4 promotes the integrated management of freshwater resources and aims to sustainably manage the resource within and across catchments, between activities and between agencies and people with interests in water management in the community.

Policy 7.3.4 addresses water quantity and states that the abstraction of groundwater be managed by establishing water allocation regimes.

Policy 7.3.8 aims to improve the efficiency in the allocation and use of freshwater by ensure that the infrastructure used to reticulate and apply water is highly efficient for any new take.

Policy 7.3.9 seeks to require integrated solutions to the management of fresh water by developing and implementing comprehensive management plans which address the policies of the CRPS.

Policy 7.3.13 encourages the involvement of people and communities in the management of freshwater.

WDC has identified the need to abstract groundwater from this new deeper and more secure bore to provide the community water supply for the Ohoka rural area. The take from Bore BW24/0262 is within the groundwater allocation framework for the Cust GAZ. WDC intends to rely on abstraction from Bore BW24/0262, however they intend to retain the ability to take and use water from Bore M35/5609 as a back-up supply for emergency situations.

This request to vary the existing consent and the proposed new consent to allow this bore for taking and using water for a community water supply is consistent with the relevant objectives and policies contained in the CRPS.

9.5 Land and Water Regional Plan

The purpose of the LWRP is to identify the resource management outcomes for managing land and water resources in Canterbury to achieve the purpose of the Resource Management Act 1991 (RMA). The LWRP contains objectives and policies which provide direction to meeting the purpose of the RMA. This section considers the objectives and policies relevant to this application.

9.5.1 Regional Objectives

- Objective 3.6

  Water is recognised as essential to all life and is respected for its intrinsic values.

- Objective 3.8A

High quality fresh water is available to meet actual and reasonably foreseeable needs for community drinking water supplies.

- Objective 3.9

  Abstracted water is show to be necessary and reasonable for its intended use and any water that is abstracted is used efficiently.

- Objective 3.10

  Water is available for sustainable abstraction or use to support social and economic activities and social and economic benefits are maximised by the efficient storage, distribution and use of water made available within the allocation limits or management regimes which are set in this Plan.

- Objective 3.11

  Water is recognised as an enabler of the economic and social wellbeing of this region.

- Objective 3.12

  When setting and managing within limits, regard is had to community outcomes for water quality and quantity.

- Objective 3.13

  Groundwater resources remain a sustainable source of high quality water which is available for abstraction while supporting base flows or levels in surface water bodies and avoiding salt-water intrusion.

- Objective 3.24

  All activities operate at good environmental practice or better to optimise efficient resource use and protect the region's fresh water outcomes from quality and quantity degradation.

This application is to vary an existing consent and apply for a new consent to allow for the abstraction of water from a deeper and more secure bore to provide for a community supply. This proposed change in conditions for this variation, and the proposed conditions on the new consent are consistent with these regional objectives. More specifically, the take from the new bore will occur within the groundwater allocation framework for the Cust Groundwater Allocation Zone. As demonstrated in Section 6.2, the assessment of the potential stream depletion effects concludes that it is unnecessary to place restrictions on the take from bore BX24/0262 to protect the flows in the Ohoka Stream.

While WDC intend for the primary supply to be sourced from bore BW24/0262, they intend to retain the ability to take water from bore M35/5609 as a back-up supply. Given the hydraulic connectivity of this shallower bore to the Ohoka Stream, the restrictions as provided in the original consent remain for any take from the shallow bore M35/5609.

9.5.2 Relevant Strategic Policies

- Strategic Policy 4.1

  Lakes, rivers, wetlands and aquifers will meet the freshwater outcomes set in Sections 6 to 15 within the specified timeframes. If outcomes have not been established for a catchment, then each type of lake, river or aquifer should be the outcomes set out in Table 1 by 2030.

- Strategic Policy 4.2

  The management of lakes, rivers, wetlands and aquifers will take into account of the freshwater outcomes, water quantity limits and the individual and cumulative effects of land uses, discharges and abstractions will meet the water quality limits set in Sections 6 to 15 or Schedule 8 and the individual and cumulative effects of abstraction will meet the water quantity limits in Sections 6 to 15.

- Strategic Policy 4.4

  Groundwater is managed so that:

  (a) *Groundwater abstraction does not cause a continuing long-term decline in mean annual groundwater levels or artesian pressures;*

  (b) *The individual and cumulative rate, duration and volume of water pumped from the bores is controlled so at to prevent seawater contamination;*

  (c) *The rate and duration of individual abstractions is controlled to ensure that individually or cumulatively, localised pressure reversal does not result in the downward movement of contaminants;*

  (d) *In any location where an overall upwards pressure gradient existing, restrict the taking of groundwater so that at all times, the overall upward pressure difference is maintained between any one aquifer and the next overlying aquifer.*

  (e) *The overall water quality in aquifers does not decline; and the exercise of customary uses and values is supported.*

- Strategic Policy 4.5

  Water is managed through the setting of limits to safeguard the life-supporting capacity of ecosystems, support customary uses and provide

*for group or **community drinking-water supplies <emphasis added>** and stock water, as a first priority, and to meet the needs of people and communities for water for irrigation, hydro-electricity generation and other economic activities and to maintain river flows and lake levels needed for recreational activities, as a second priority.*

- Strategic Policy 4.7

  Resource consents for new or existing activities will not be granted if the granting would cause a water quality or quantity limit set in Sections 6 to 15 to be breached or further over allocation (water quality or quantity) to occur or in the absence of any water quality standards in Sections 6 to 15, the limits set in Schedule 8 to be breached.

- Strategic Policy 4.8B [from NPS-FM 2014]

  1. When considering any application the consent authority must have regard to the following matters:

  (a) The extent to which the change would adversely affect safeguarding the life-supporting capacity of fresh water and of any associated ecosystem and

  (b) The extent to which it is feasible and dependable that any adverse effect on the life-supporting capacity of fresh water and any associated ecosystem resulting from the change would be avoided.

  2. This policy applies to:

  (a) Any new activity and

  (b) Any change in the character, intensity or scale of any established activity –

  That involves any taking, uses, damming or diverting of fresh water or draining of any wetland which is likely to result in any more than minor adverse change in the natural variability of flow or levels of any fresh water, compared to that which immediately preceded the commencement of the new activity of the change in the established activity (or in the case of a change in an intermittent or seasonal activity compared to that on the last occasion on which the activity was carried out.)

The proposed variation seeks to allow the abstraction of groundwater from a deeper, more secure bore to provide a community supply. Community supply is identified as a high priority use of water. Abstraction from this deeper bore is within the framework of the Cust GAZ, and by using this bore for the source of the supply, the potential impacts on streams is minimised. The proposed change in consent conditions is consistent with the Strategic Policies listed above, and

Section 6 of this report demonstrates that the potential effects of taking water will be less than minor.

9.5.3 Regional Policies

- Policy 4.23

  Any water source used for drinking-water supply is protected from any discharge of contaminants that may have actual or potential adverse effect on the drinking-water supply including its taste, clarity and small and groundwater and community drinking water supplies are protected so the align with the CWMS drinking-water targets and meet the drinking-water standards for New Zealand.

Bore BW24/0262 has already been constructed in accordance with the drinking water standards for New Zealand 2005 (revised 2008). The headworks required for the supply will also be constructed in accordance with the drinking water standards and a community water supply protection zone has been defined for the proposed consent.

- Policy 4.49

  Enable the taking of water for a community water supply by not requiring compliance with minimum or residual flow or partial restriction conditions and the environmental flow and allocation regime or groundwater allocation limit provided a water supply strategy is in place and the water supply is so managed as to restrict the use of water from those supplies during periods of low flow and water levels.

- Policy 4.50

  Where the rate or take or volume of water consented for abstraction from a catchment exceeds the groundwater allocation limit for that catchment…any further allocation is limited to:

  (a) *Any abstraction necessary to meet community water supply and stockwater requirements….*

The variation and new consent application is to allow the take for the use of a community water supply from bore BW24/0262 and this take will occur within the allocation limit for the Cust GAZ.

As demonstrated in Section 6.2, the assessment of the potential stream depletion effects concludes that it is unnecessary to place restrictions on the take from bore BX24/0262 to protect the flows in the Ohoka Stream.

While WDC intend for the primary supply to be sourced from bore BW24/0262, they intend to retain the ability to take water from bore M35/5609 as a back-up

supply. Given the hydraulic connectivity of this shallower bore to the Ohoka Stream, the restrictions as provided in the original consent remain for any take from the shallow bore M35/5609.

It should also be noted that a Water Supply Strategy has been developed and can be found in Appendix D.

- Policy 4.52

  The abstraction of groundwater outside any groundwater allocation zone in Sections 6 to 15 may only occur if the applicant demonstrates that:

  (a) The groundwater abstraction has a low stream depleting effect or does not contribute to the over-allocation of any surface water body;

  (b) The groundwater is not hydraulically connected to any groundwater allocation zone in Section 6 or 15 of this Plan which is full or over allocated for abstraction;

  (c) The total amount of groundwater abstracted cannot result in any continuing long-term decline in mean annual groundwater levels or pressures; and

  (d) The abstraction will not result in any seawater contamination in the aquifer.

Section 6 of this report demonstrates that the take from the new bore will result in a moderate stream depletion effect and the Cust GAZ is not over-allocated. No long term decline in water levels is expected to occur as a result of this application. The bore is located sufficiently far inland (more than 50 km) such the seawater intrusion is not a potential risk.

- Policy 4.54

  In addition to the requirements in the Resource Management (Measurement and Reporting of Water Take) Regulations 2010, any new water permit, replacement of an expiring water permit, transfer or review of an existing permit…

  (b) To take water with a minimum flow or trigger level that signifies a restriction on take; …

  shall include a condition requiring water use records to be telemetered to the Canterbury Regional Council or its nominated agent.

The current consent and proposed consent contains a condition which requires the connection to either the WDC telemetry system which collects and stores data in a commonly used format that can be provide to Canterbury Regional Council when requested. There is no change proposed for this condition

proposed and as such, the variation and proposed consents are consistent with this policy.

- Policy 4.57

  Any abstraction of groundwater does not result in cross-contamination between aquifers or water-bearing layers that results in, or may result in adverse effects on water quality.

The bore is not screened in a manner that could cause cross contamination between water bearing strata.

- Policy 4.61

  Any abstraction of stream depleting groundwater with direct, high or moderate depletion is subject to conditions specifying

  (a) The maximum instantaneous rate of take;

  (b) Except for hydro-electricity generation activities, a maximum volume based on the reasonable use determined in accordance with Schedule 10 over the period the water is required;

  (c) A minimum flow at which abstraction ceases in accordance with the relevant flow and allocation limits;

  (d) The area or property within which the water is to be used;

  (e) The location of the take;

  (f) The prevention of fish entering any intake;

  (g) When partial restrictions come into force.

- Policy 4.63

  Any abstraction of groundwater is subject to conditions specifying:

  (h) The maximum instantaneous rate of take;

  (i) A maximum seasonal volume based on the reasonable use determined in accordance with Schedule 10 over the period the water is required;

  (j) The area or property within which the water is to be used;

  (k) The location of the abstraction;

  (l) Any minimum groundwater levels at which abstraction ceases if specified in Sections 6 to 15.

  (m) Any other conditions to regulate the rate or volume that may be abstracted relative to the estimated volume of groundwater store in a groundwater zone, if specified in Sections 6 to 15.

- Policy 4.65

  The rate, volume and seasonal duration for which water may be taken will be reasonable for the intended use.

- Policy 4.69

  Systems to convey freshwater are designed to maximise the efficient use of water.

This variation to the existing consent and proposed new consent provide for a take from Bore BW24/0262 for a community supply. The existing consent conditions include a maximum rate of take and an annual volume. In accordance with Policy 4.49 for community water supplies, flow restrictions to protect the Ohoka Stream flows are not necessary. The groundwater abstraction from BW24/0262 is within the framework of the Cust GAZ.

The new location results in a take that is reasonable for the intended use (see Section 2 of this report) and WDC operate the Ohoka water supply scheme in an efficient manner.

The proposed variation to allow for the take and use of groundwater from Bore BW24/0262 is consistent with these policies.

9.5.4 Sub-Regional Policies

There are no relevant sub-regional objectives and policies contained in Section 8 Waimakariri that relate to this application.

9.5.5 Proposed Plan Change 4 to the LWRP

Proposed PC4 does not include any changes to objectives relevant to this application. There is a minor wording change to Strategic Policy 4.5 however the discussion above remains the same.

Regional Policy 4.23 has been amended to include additional protection measures for drinking-water.

- Policy 4.23A

  The quality of water abstracted from community drinking-water supply sources is protected through:

  (b) requiring applications for new permits to take and use water for community drinking-water supply to include an assessment of the specific protection zone required, taking into account the factors set out in Schedule 1.

- Policy 4.23B

When considering resource consent application to take and use water for a community drinking-water supply, the consent authority shall have regard to:

(a) The factors set out in Schedule 1;

(b) The extent to which the application reflects those factors set out in Schedule 1 when establishing the proposed protection zone and

(c) The level of additional restriction the proposed protection will impose on land users within the proposed protection zone.

As discussed in Section 6.6 of this report, a community drinking water supply protection zone has been proposed with consideration of the revisions to Schedule 1 made under proposed PC4.

Regional Policy 4.49 has been amended to reference a water supply strategy that has been developed in accordance with Schedule 25.

The remainder of the revisions/additions to the policies contained in proposed PC4 are not relevant to this application.

9.6 Natural Resources Regional Plan

Chapter 5 of the Natural Resources Regional Plan contains objectives and policies relating to the take and use of water.

Objective WQN3 is to enable present and future generations to access the region's groundwater resources to gain cultural, social, recreational, economic and other benefits while safeguarding and protecting values of the resource.

(e) Policy WQN10 applies to confined and semi-confined aquifers seeks to manage abstractions to that the groundwater level in the first confined aquifer is always maintained at or above the level set in Schedule WQN3. This policy also seeks to control the rate and duration of individual abstraction to ensure that local pressure reversal does not result in the downward movement of contaminants that could adversely affect water quality in abstraction bores.

The proposed take from Bore BW24/0262 will not cause adverse effects on neighbouring bore owners, or cause the pressure in the screened strata to reduce to cause the downwards movement of contaminants.

Objective WQN4 relates to the allocation of the available water resource and gives priority to potable water from community and ground drinking water supplies and for stock use.

Policy WQN13.2 seeks to implement groundwater allocation regimes, and avoid granting of consent which results in the over-allocation of the groundwater.

The proposed abstraction is within the allocation framework for the Eyre River GAZ.

Policy WQN15 requires the installation of water-measuring and recording devices at the point of take for all water permits. The current consent requires water metering and recording devices, and it is not intended to remove or alter that requirement as part of this variation application.

Policy WQN16 states that when assessing water permit applications to take, and use water, the consent rates/volumes are no more than reasonable for the intended end use, significant wastage of water is avoided and adverse effects on water quality is avoided or limited. This application to vary the consent and the new consent application does not seek any changes to the consented rate or volume in total, but simply allows for the abstraction from a deeper, more secure bore. The rates and volumes are reasonable for the intended purpose as a community supply.

Appendix D provides the WDC water conservation strategy which complies with Policy WQN16.

Chapter 4 of the NRRP relates to Water Quality and is referenced in the objectives and policies relating to the take and use of groundwater.

Objective WQL3 seeks to protect the quality of the source water for community drinking water supply from activities which may affect the water quality.

Policy WQL13 aims to achieve Objective WQL3 through the establishment of a protection zone.

A proposed protection zone has been delineated around the bore, discussed in Section 6.6.

9.7 Waimakariri River Regional Plan

The WRRP contains objectives and policies that are relevant to the proposed variation to consent CRC990932. Policy 5.1 (2) seeks to maintain water allocation regimes. This variation seeks to reduce the annual volume abstraction as as such that policy is met. It also noted that the cessation conditions and the water metering conditions are not proposed to be removed or varied.

9.8 Waimakariri District Plan

The Waimakariri District Plan identifies issues considered important in relation to the sustainable management of the environment in the Waimakariri District. The current Waimakariri District Plan became operative on 28 November 2005.

Chapter 3 deals with water and contains objectives and policies which seek to maintain or enhance the quality of water bodies within the Waimakariri District.

Objective 3.3.3 aims to maintain and enhance the water quality of confined and unconfined groundwater aquifers.

Policy 3.3.1.1 seeks to avoid or mitigate the adverse effects of the use, development and protection of land on the water quality of confined and unconfined groundwater aquifers.

A community supply protection zone will be established around the bore used to supply water under the proposed consent which is expected to mitigate the potential effects of changes in landuse on the water quality of groundwater in the immediate area around the bore.

Chapter 11 of the District Plan deals specifically with utilities. The Plan recognises that utilities are necessary to enable people and communities to provide for the wellbeing, health and safety, and as such Policy 11.1.1.1 states that *a utility should:*

a. contribute to a safe environment;

b. maintain or enhance public health;

c. promote the efficient use of resources and efficient development of the utility so that resources are conserved and used in a sustainable manner; and….

f. maintain and enhance social wellbeing.

As demonstrated in Section 2, the proposal will provide an adequate, reliable, safer and efficient supply of potable water.

In summary, the proposed variation to allow for the take and use of water from Bore BW24/0262 for a community supply is consistent with the relevant objectives and policies contained in the Waimakariri District Plan.

9.9 Iwi Management Plans

The following iwi management plans are relevant to this application:

- Ngai Tahu Freshwater Policy Statement; and
- Mahaanui Iwi Management Plan 2013.

The proposal has been considered against the relevant objectives and policies contained in these iwi management plans.

9.9.1 Ngai Tahu Freshwater Policy Statement

The focus of the Freshwater Policy Statement is the management of freshwater resources within the rohe of Ngai Tahu. It outlines the environmental outcomes sought by Ngai Tahu and the means by which Ngai Tahu is seeking to work with resource management agencies to achieve these outcomes.

The primary focus of the groundwater component of this policy is on the protection of instream values. Given that the take and use will not have an adverse effect on the surface water bodies as demonstrated in Section 6 of this report, it is considered that this application is not contrary to the policies contained this Freshwater Policy Statement.

9.9.2 Mahaanui Iwi Management Plan 2013 (MIMP)

The MIMP was released in March 2013 and this new plan reflects values and policies in regard to natural resource management for many areas within Canterbury. Chapter 5.3 – Wai Maori of the MIMP (2013) deals with the Canterbury water resource.

Policy WM3.1 of this chapter deals with the priority of use of freshwater resources and was put in place to protect and sustain freshwater resources as to provide a reliable supply of drinking water to communities and marae, including stock water supply and other abstractive uses. Policy WM6.7 Maori deals with the relationship between water quality and water quantity and is put in place to ensure that over allocation does not result in a decline in water quality. In addition, Policy WM8.6 requires the protection of groundwater quality and quantity, protection of aquifer recharge and that recharge of the aquifer exceeds abstraction. There is still water available for allocation within the Cust groundwater allocation zone. Hence, the proposed combined abstraction is considered to be consistent with policies WM3.1, 6.7 and 8.6.

Policy 8.16 advocates monitoring and reporting of water take and use. The current consent requires the consent holder to monitor, record and report all water takes and this variation does not seek to remove that requirements.

Chapter 6.4 – Waimakariri addresses issues of significance in the Waimakariri catchment within which the groundwater take and bore installation will take place. Policy WA13.2 relates to the recognition of groundwater and surface connection and the management of both resources so groundwater abstraction will not affect surface flows in water bodies. Taking into account the depth of the proposed groundwater take below ground level as well as the reduced hydraulic connection with the Ohoka Stream (as discussed in Section 6.2), the proposed take is considered to be an improvement and is consistent with this policy.

Overall the prosed activity is generally consistent with the relevant policies within the Mahaanui Iwi Management Plan (2013) and therefore it is considered that the WDC will manage their activity to minimise any effects on Tangata Whenua values.

9.10 Canterbury Water Management Strategy

The CWMS was notified in November 2009 and was developed to help manage Canterbury's water resources, as they are deemed vitally important to the region and to the nation. Lakes, rivers, streams and aquifers are used for hydro electricity generation, agricultural production and drinking water, as well as for a range of customary and recreational uses. The desired outcome of the CWMS is:

> *"To enable present and future generations to gain the greatest social, economic, recreational and cultural benefit from our water resources within an environmentally sustainable framework."*

This vision includes the outcome that water users will have reliable access to water.

In achieving this vision there are fundament principles that have been developed to underpin the strategy. These include setting priorities for the use of water. Community drinking water supplies are included in the first order priority.

The application seeks to vary the existing consent CRC990932 and proposes a new consent to take and use water from Bore BW24/0262 to provide a more secure community supply, and the assessment of effects has demonstrated that this can be achieved without adversely affect other existing users or affecting instream flows. As such, this application to vary the existing consent is consistent with the vision and principles contained in the CWMS

9.11 Section 104C for Restricted Discretionary Activities

As discussed in Section 3, the taking and using of water for a community drinking water supply is a restricted discretionary activity, as per Rule 5.115 of the LWRP. Section 104C of the RMA states that:

When considering an application for a resource consent for a restricted discretionary activity, a consent authority must consider only those matters over which –

a) *Discretion is restricted in national environmental standards or other regulations;*

b) *It has restricted the exercise of its discretion in its plan or proposed plan.*

This application has addressed the relevant matters contained in the NES and the matters of discretion identified in Rule 5.115. When the take and use of groundwater from Bore BW24/0262 for a community water supply is carried out in accordance with the proposed consent conditions, any potential or actual adverse effects are avoided. It is on this basis that the consent authority can consider the granting of this application under Section 104C.

10.0 Part II Purpose and Principles

10.1 Purpose of the Act – Section 5

The purpose of the Act is to promote the sustainable management of natural and physical resources. Sustainable management means *managing the use, development and protection of natural and physical resources in a way, or at a rate, which enables people and communities to provide for the social, economic and cultural well-being and for their health and safety while -*

(a) Sustaining the potential of natural and physical resources to meet the reasonably foreseeable needs of future generations; and

(b) Safeguarding the life-supporting capacity of air, water, soil and ecosystems: and

(c) Avoiding, remedying or mitigating any adverse effects on activities on the environment.

Section 6 of this report provides an assessment of environmental effects of the proposed consent to allow the taking and using of groundwater from Bore BW24/0262 for a community drinking water supply represents sustainable management. Further, the activity, when carried out in accordance with the recommended mitigation measures, the proposed consent condition changes, and the remaining unchanged consent conditions, will avoid adverse effects on the environment.

10.2 Matters of National Importance – Section 6

Section 6 outlines matters of national importance that are to be recognised and provided for in achieving the purpose of the Act. These matters of national importance are:

(a) the preservation of the natural character of the coastal environment, wetlands, and lakes and rivers and their margins, and the protection of them from inappropriate subdivision, use and development;

(b) the protection of outstanding natural features and landscapes from inappropriate subdivision, use and development;

(c) the protection of areas of significant indigenous vegetation and significant habitats of indigenous fauna;

(d) the maintenance and enhancement of public access to and along coastal marine areas, lakes and rivers;

(e) the relationship of Maori, their culture and traditions with their ancestral lands, water, sites, waahi tapu, and other taonga;

(f) the protection of historic heritage from inappropriate subdivision, use and development;

(g) the protection of protected customary rights.

There are no matter of national importance relevant to this application to vary the consent conditions of CRC990932.

10.3 Other Matters – Section 7

Section 7 of the Act sets out those matters that have particular regard attributed to them in achieving the purpose of the Act. Those matters are as follows:

(a) Kaitiakitanga;

(aa) The ethic of stewardship;

(b) The efficient use and development of natural and physical resources;

(ba) The efficiency of the end use of energy;

(c) The maintenance and enhancement of amenity values;

(d) Intrinsic values of ecosystems;

(e) [Repealed];

(f) Maintenance and enhancement of the quality of the environment;

(g) Any finite characteristics of natural and physical resources;

(h) The protection of the habitat of trout and salmon;

(i) The effects of climate change;

(j) The benefits to be derived from the use and development of renewable energy.

Relevant to this proposal are (b) and (g). As demonstrated in Section 6 of this report, when carried out in accordance with the proposed change in consent conditions and the remaining unchanged consent conditions, the potential adverse effects on the environment arising from the take and use of groundwater from Bore BW24/0262 for a community supply is minor. It is considered that these matters have been adequately taken into account.

10.4 The Principles of the Treaty of Waitangi

The Act states in Section 8 that:

"In achieving the purpose of this Act, all persons exercising functions and powers under it, in relation to managing the use, development, and protection of natural and physical resources, shall take into account the principles of the Treaty of Waitangi (Te Tiriti o Waitangi)."

The Court of Appeal has identified four principles, which form the basis of developing a relationship of partnership and communication. These are the Essential Bargain, Tribal Self-Regulation, The Treaty Relationship, and Active

Protection. The third principle, the Treaty Relationship, accords Maori with special status as a Treaty Partner, distinct and separate from status as an 'affected party'. This application will be reviewed by the ECan Iwi Liaison officer prior to any decision on the application being made.

It is considered that the granting of this application will not compromise the principles contained in the Treaty.

Consideration of the principles contained in the relevant iwi management plans has been provided, and where possible, the proposal complies with the principles contained in the iwi management plan.

11.0 Conclusion

This application seeks a new consent, and to vary conditions of consent CRC990932, to allow for the taking of groundwater from Bore BW24/0262 to provide a secure community water supply for Ohoka. The consent holder intends to keep the shallow bore M35/5609 as a back-up supply.

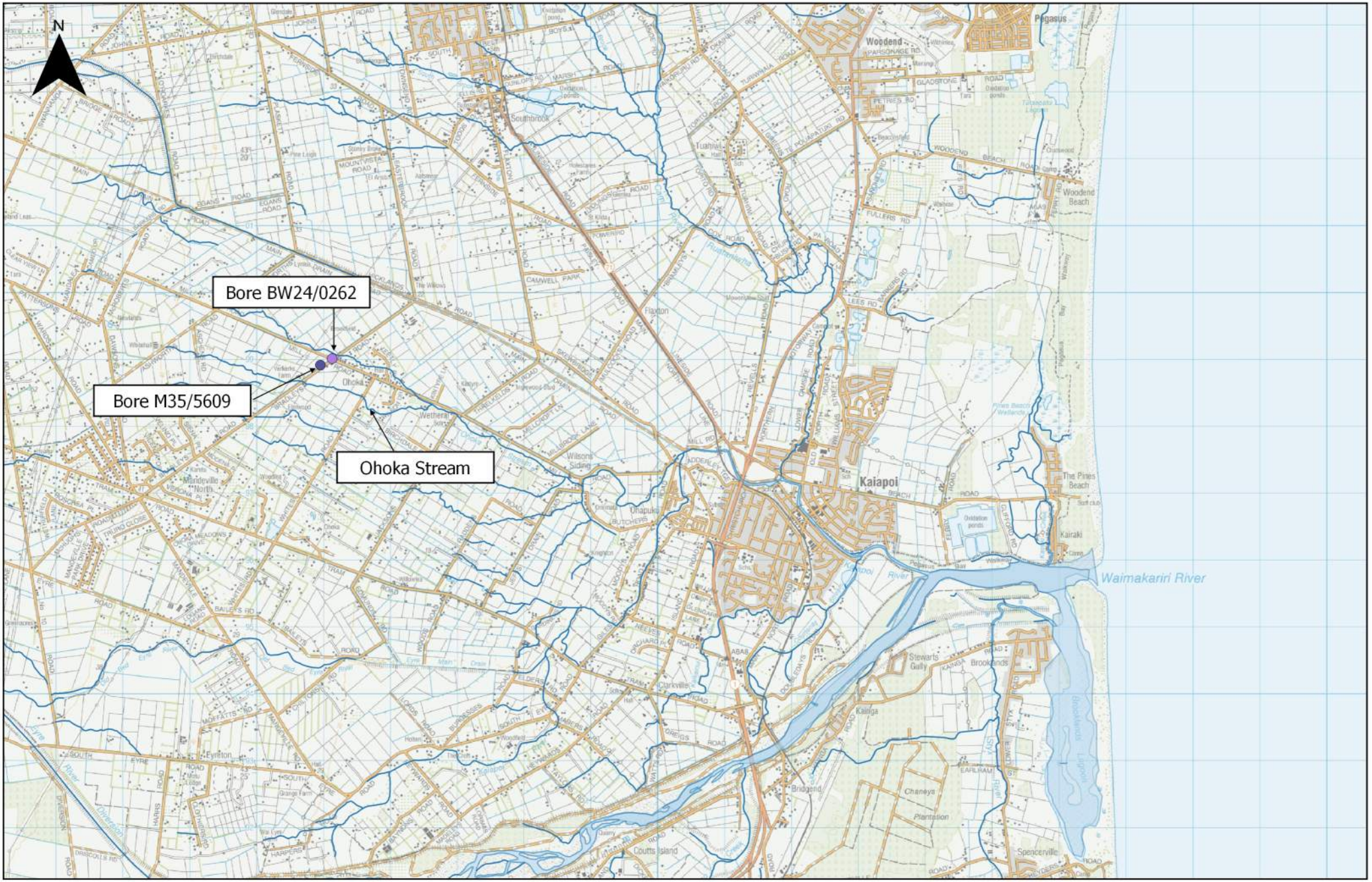
This application does not seek to increase the rate or volume authorised under the existing consent (indeed a reduction in the annual volume is proposed), and a word change to has been proposed to Condition 2 ensure that the **combined** abstraction does not exceed the maximum rate of take or volume specified.

The shift to a deeper well will ensure that the effect on the instream flows of the Ohoka Stream are avoided or minimised, and there is sufficient allocation available in the Cust Groundwater Allocation Zone for the abstraction.

Given that the rates and volumes are unchanged, and the primary source of water will be through a deeper bore, the potential effects to the environment arising from the proposed variation to the existing consent, and from the proposed new consent, are minor.

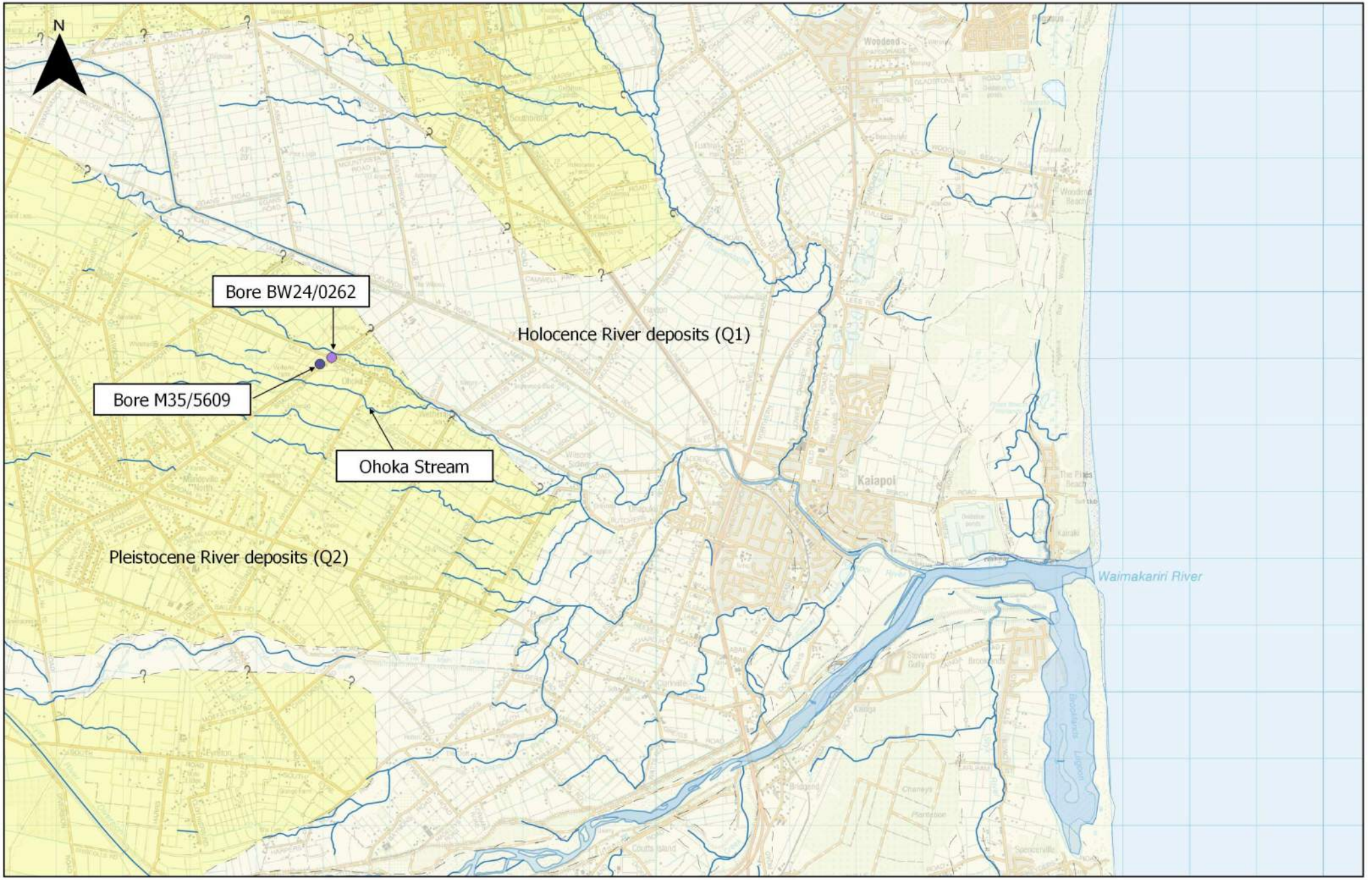
12.0 References

Lough, H., & Ward, N. (2011). Stream Depletion from Pumping a Semiconfined Aquifer in a Two-Layer Leaky Aquifer System. *Journal of Hydrologic Engineering*, 955 - 959.



Note: Locations of features shown above are approximate. Background map from LINZ data service.

FIGURE 1: Location map



Note: Locations of features shown above are approximate. Background map from LINZ data service.

FIGURE 2: Geological map

0 1000 2000 3000 4000 m

PATTLE DELAMORE PARTNERS LTD

S:\C03371\Figure2_GeologicalMap.ops

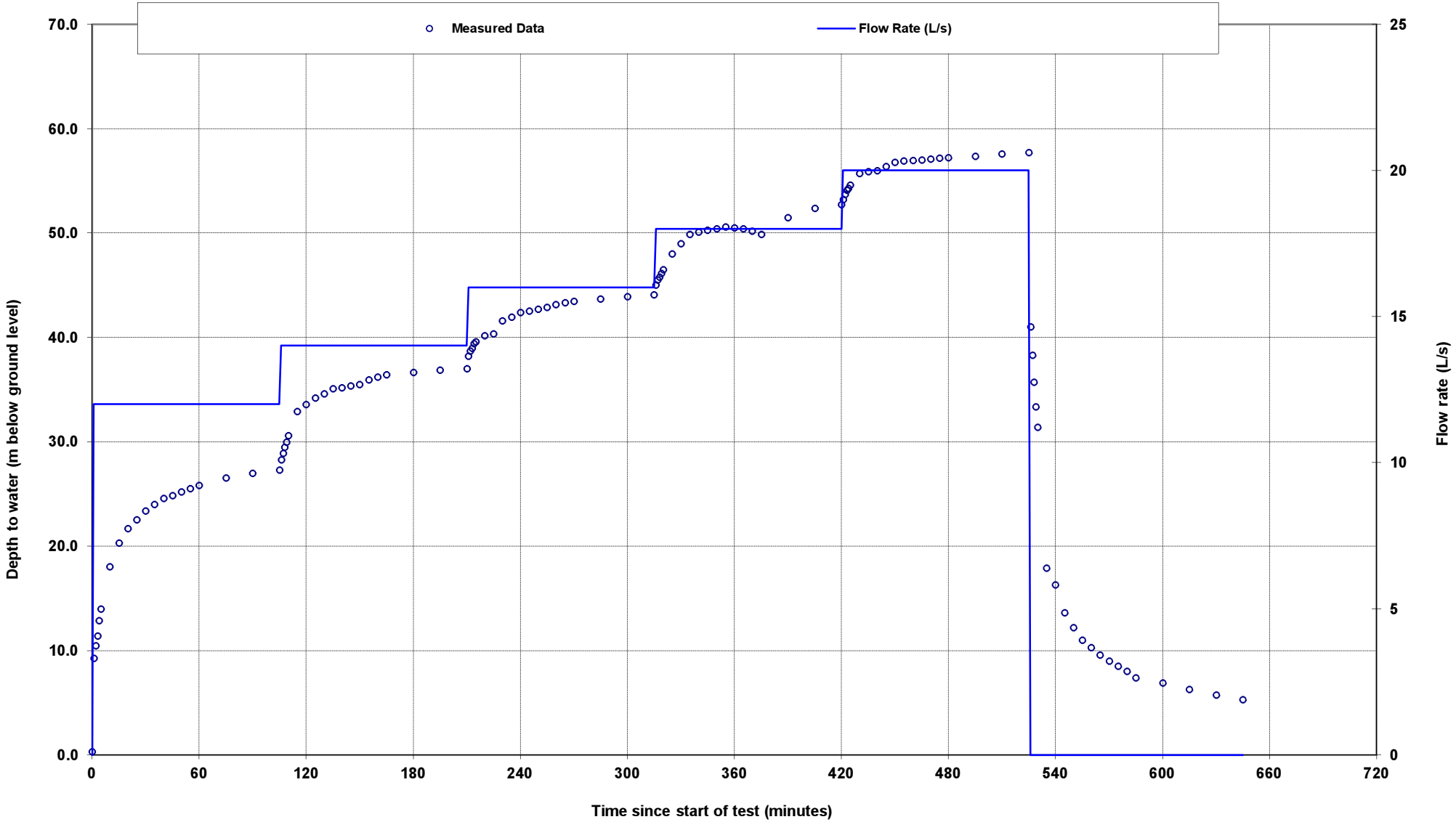


Figure 3: Depth to water observed in the pumped bore during the step test on bore BW24/0262

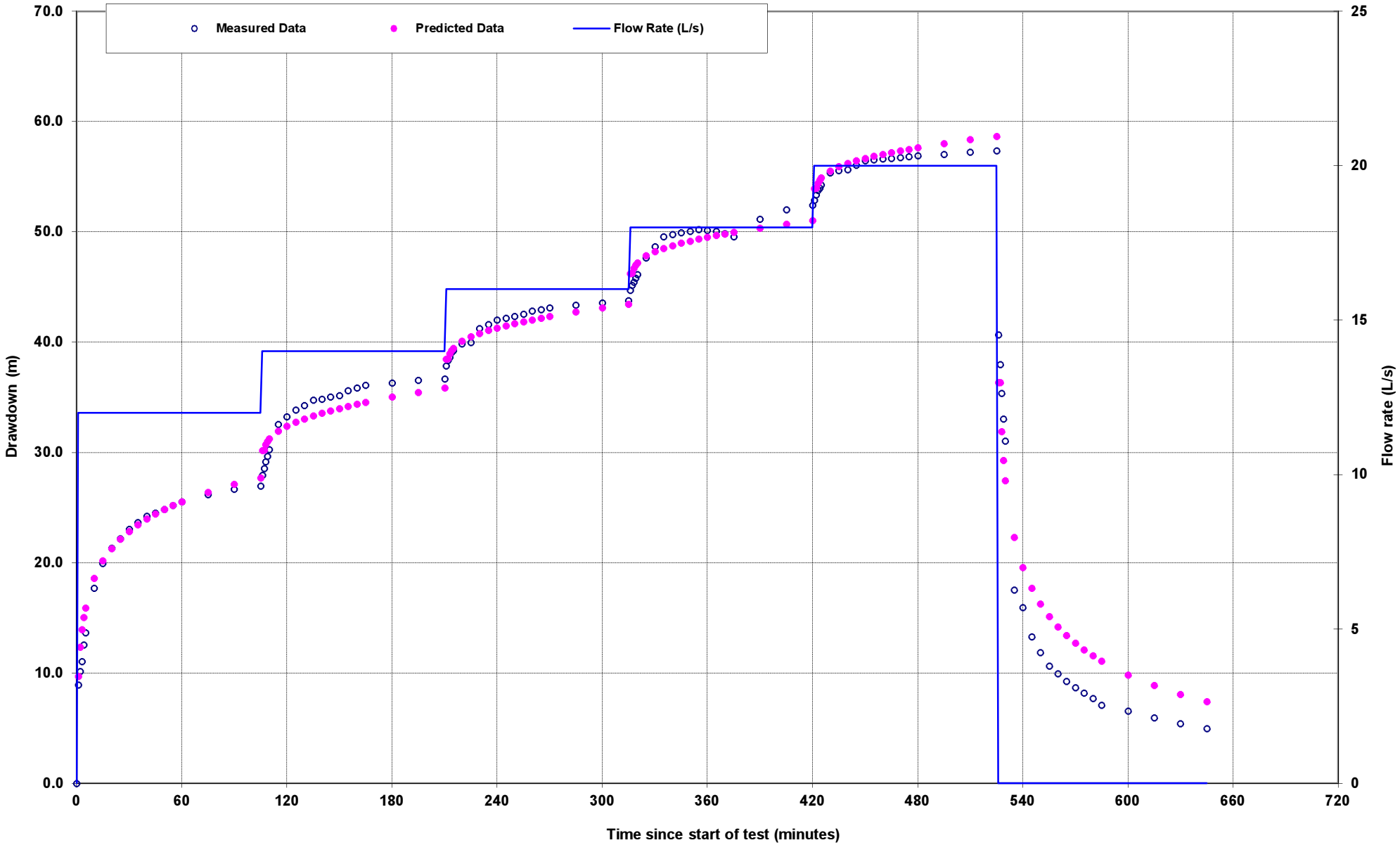


Figure 4: Modelled and observed drawdown in the pumped bore BW24/0262 during the step test

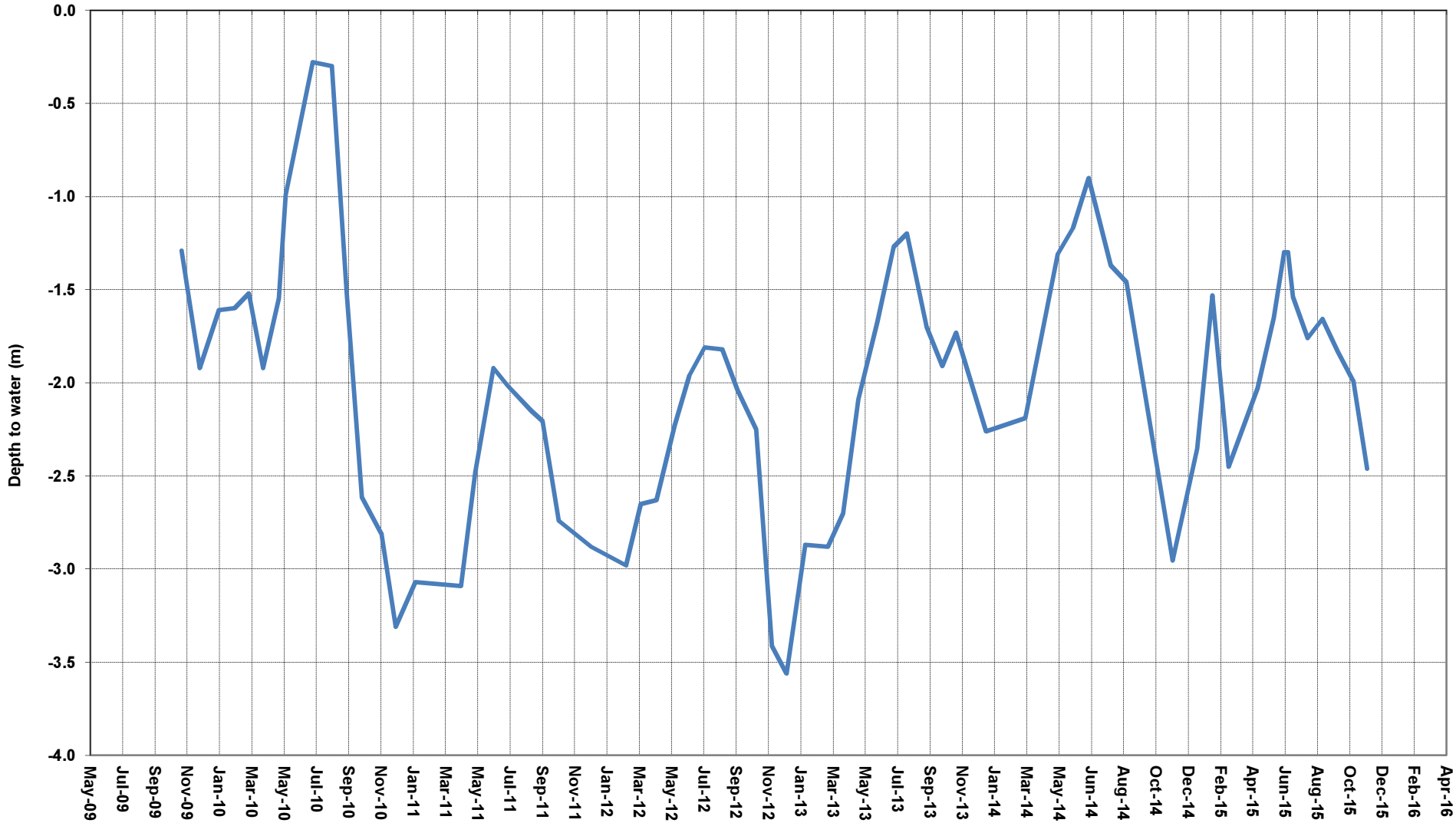


Figure 5: Long term water level records for bore M35/11918

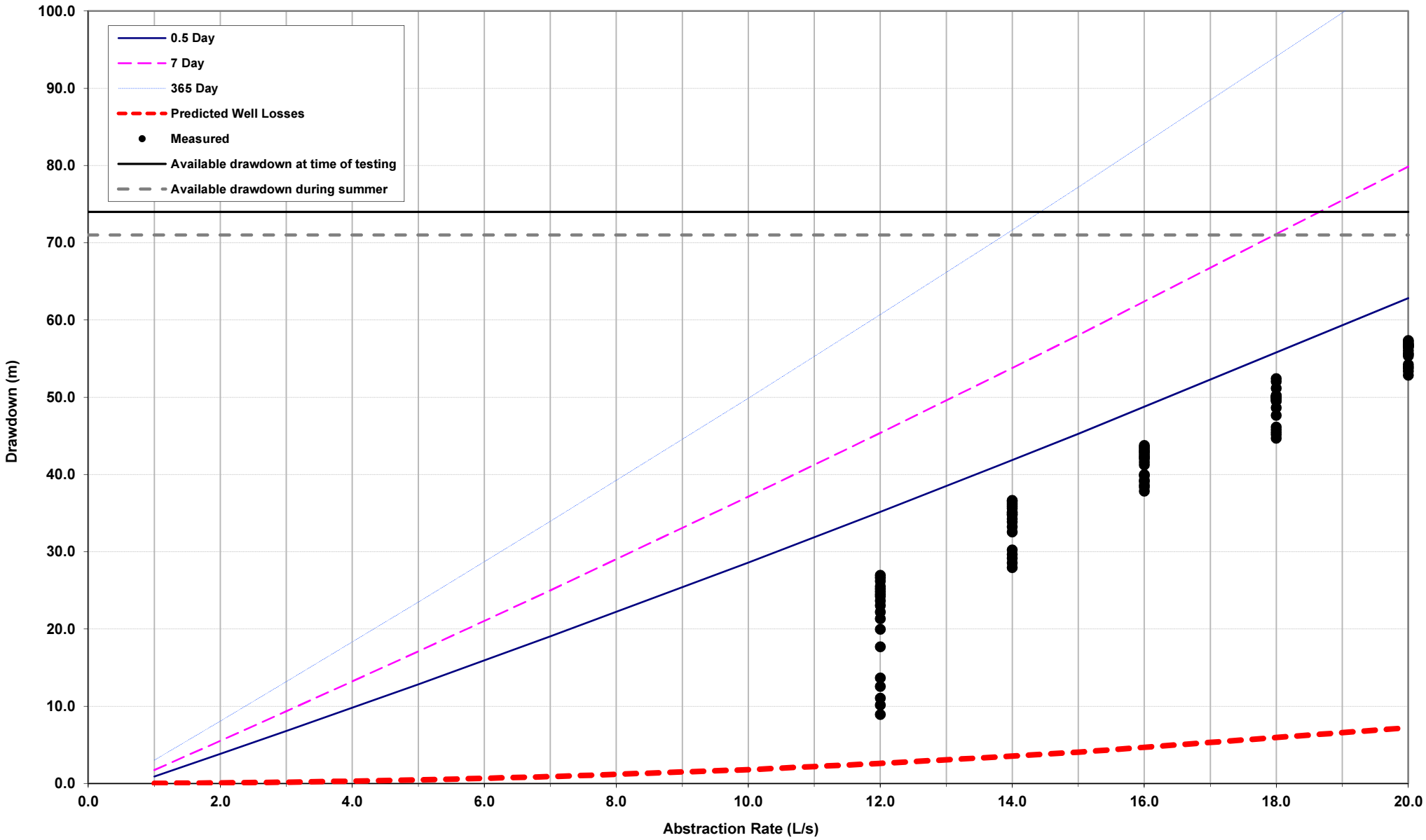
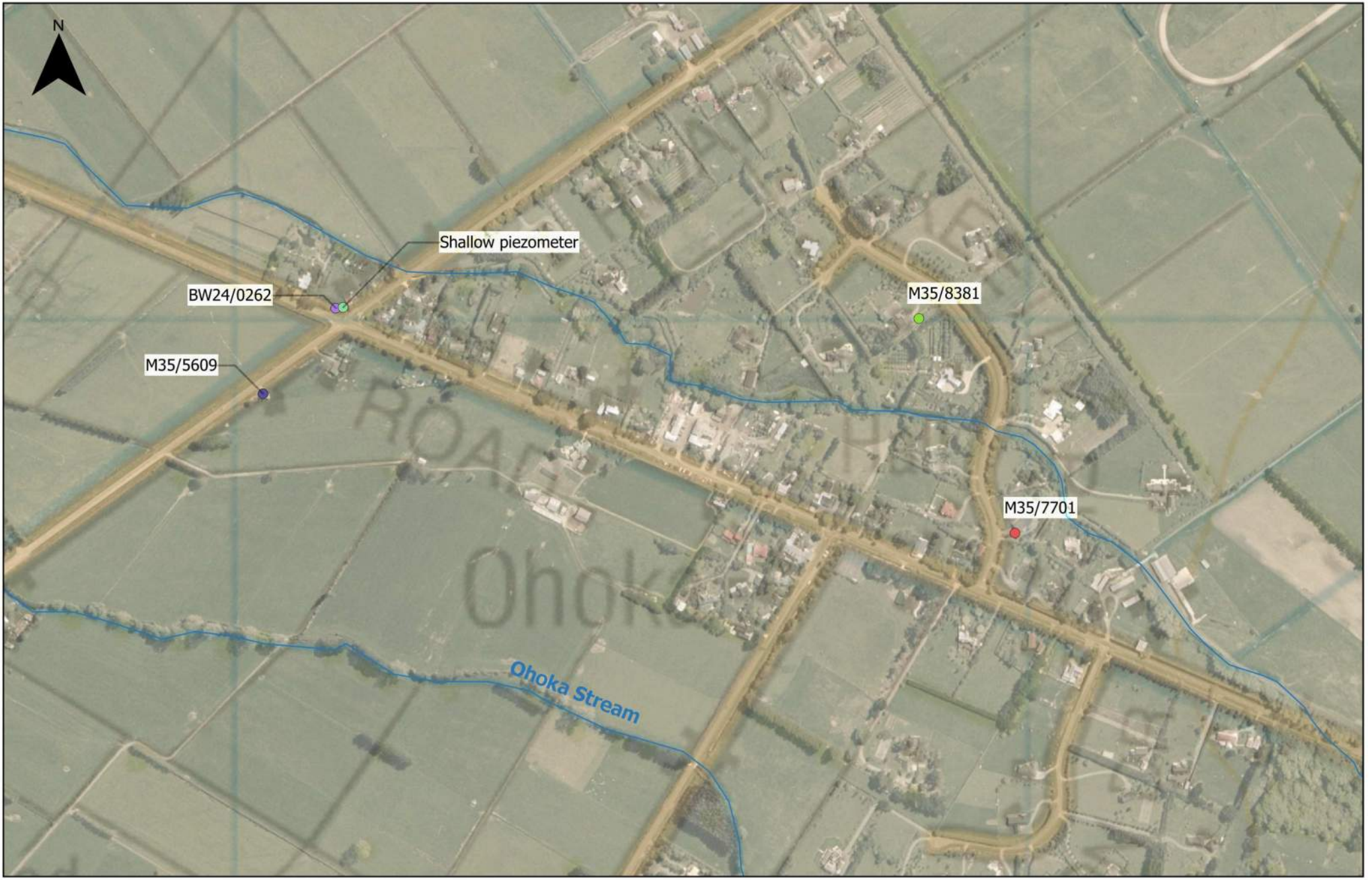


Figure 6: Predicted drawdown in bore BW24/0262 compared to pumping rate



Note: Locations of features shown above are approximate. Background map from LINZ data service.

0 100 200 300 400 m

FIGURE 7 : Monitoring bore locations

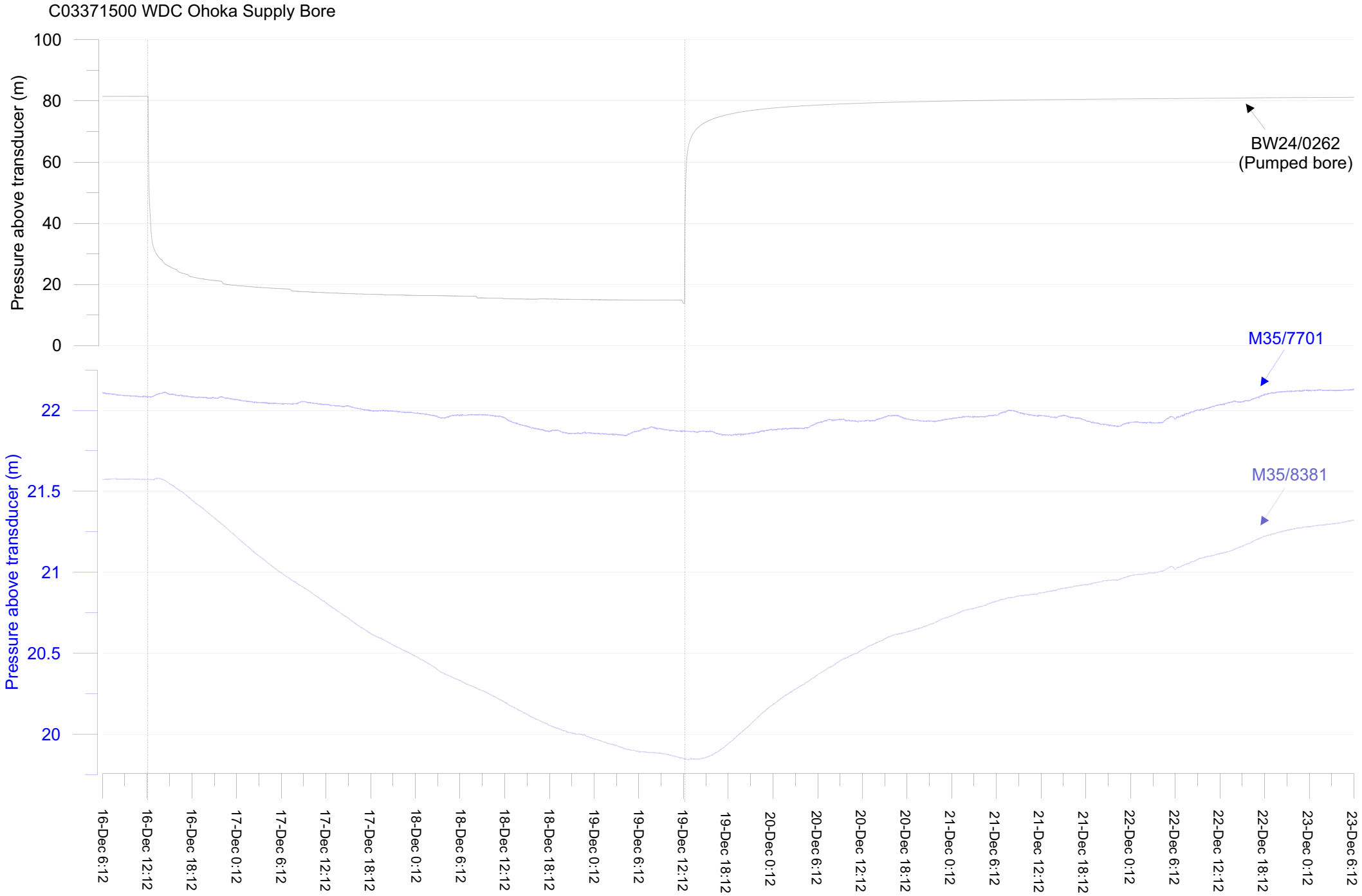


Figure 8: Raw water pressure data for the pumped bore (BW24/0262) and deep monitoring bores (M35/7701 and M35/8381)

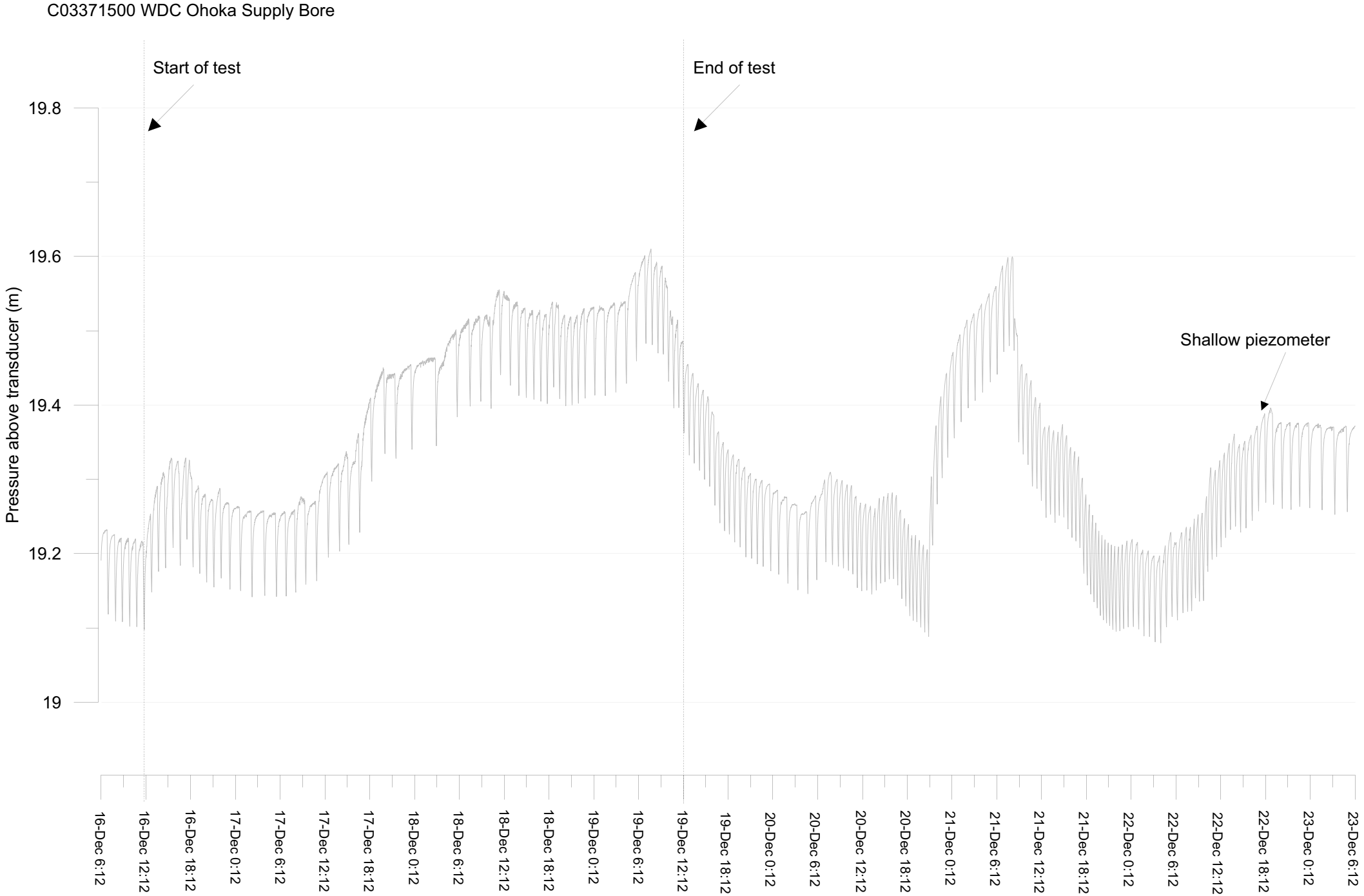


Figure 9 : **Raw water level data from the shallow piezometer**

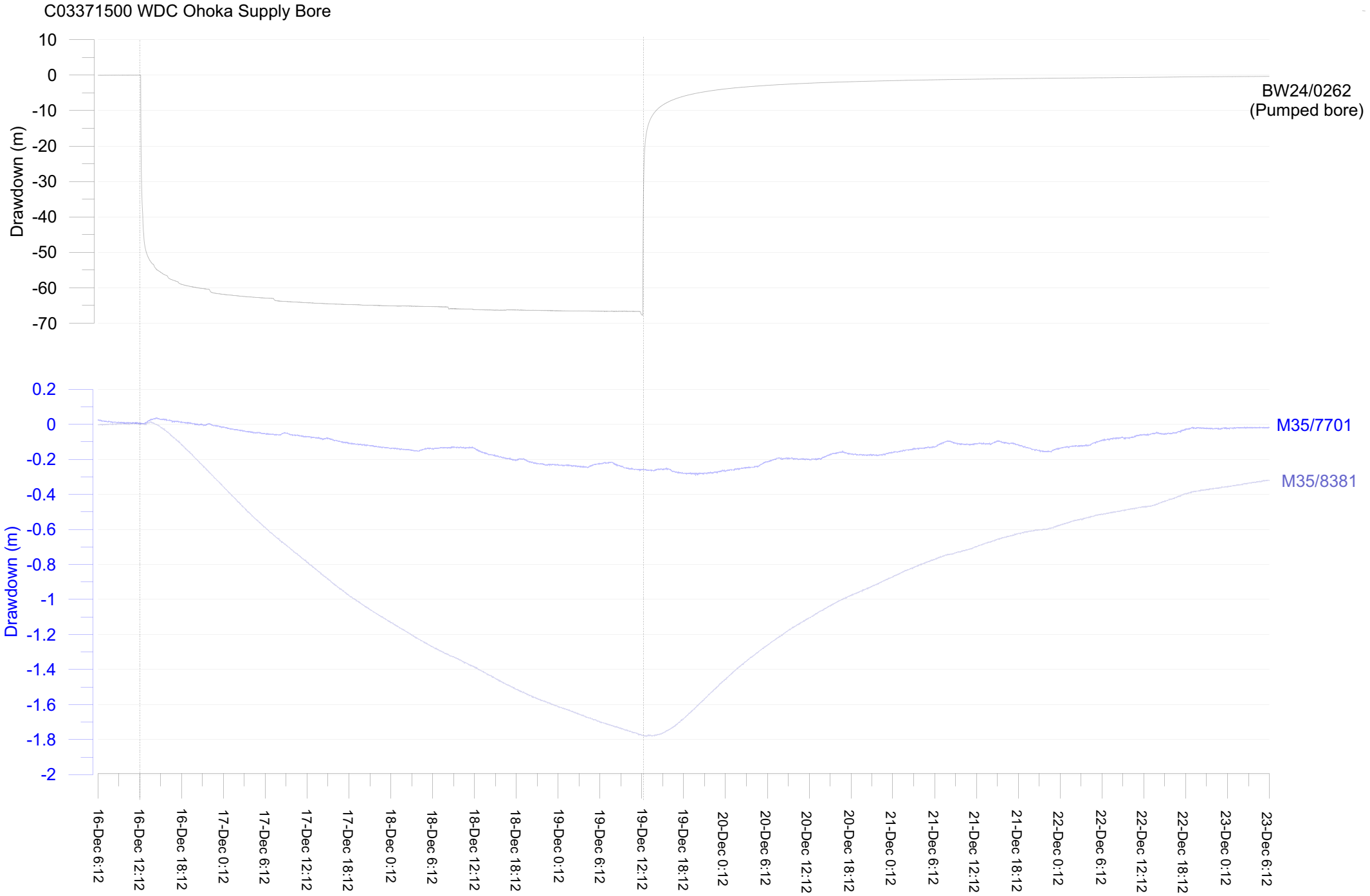


Figure 10: **Drawdown data in the pumped bore and deep monitoring bores**

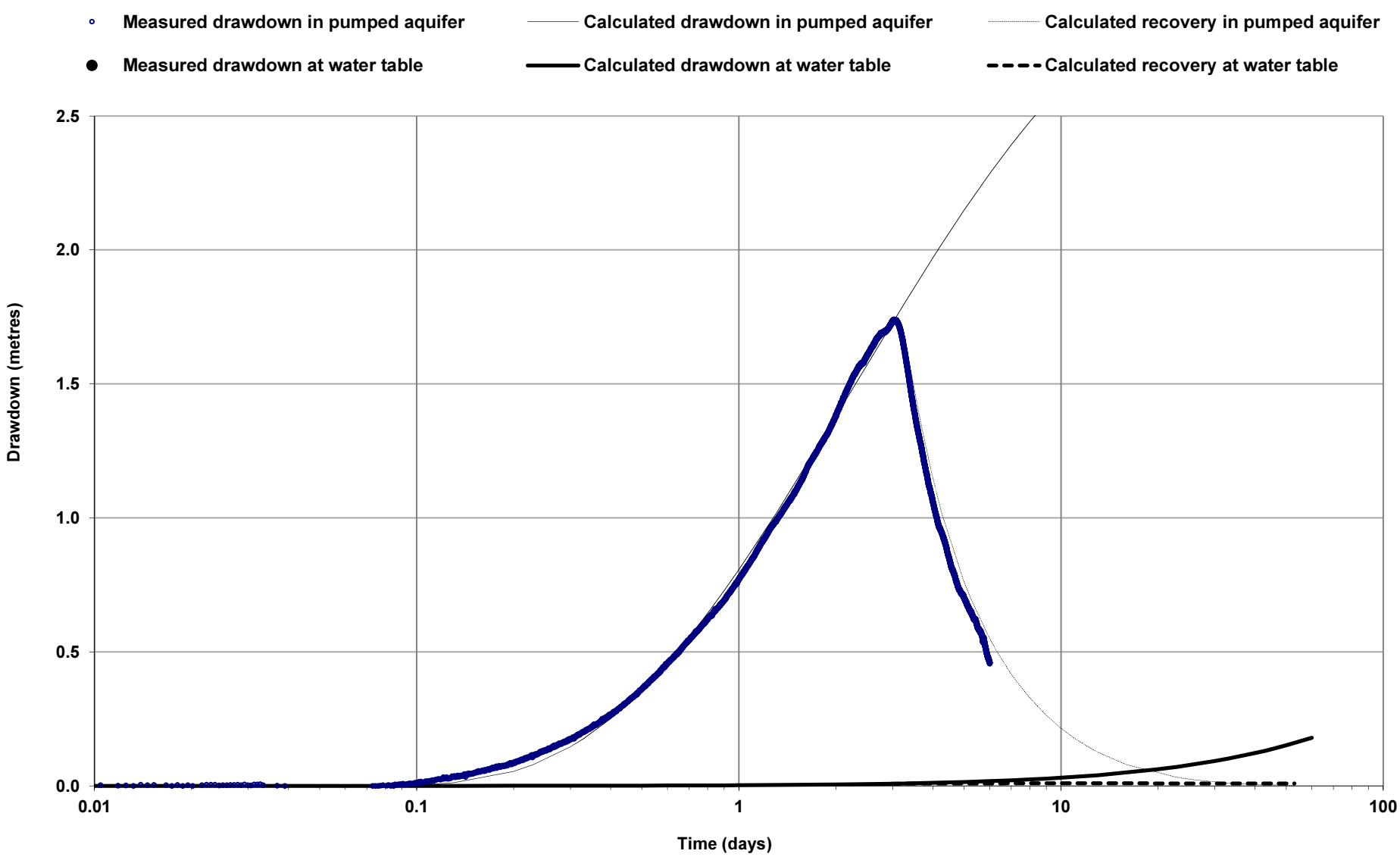


Figure 11 **Modelled and observed drawdown in bore M35/8381**

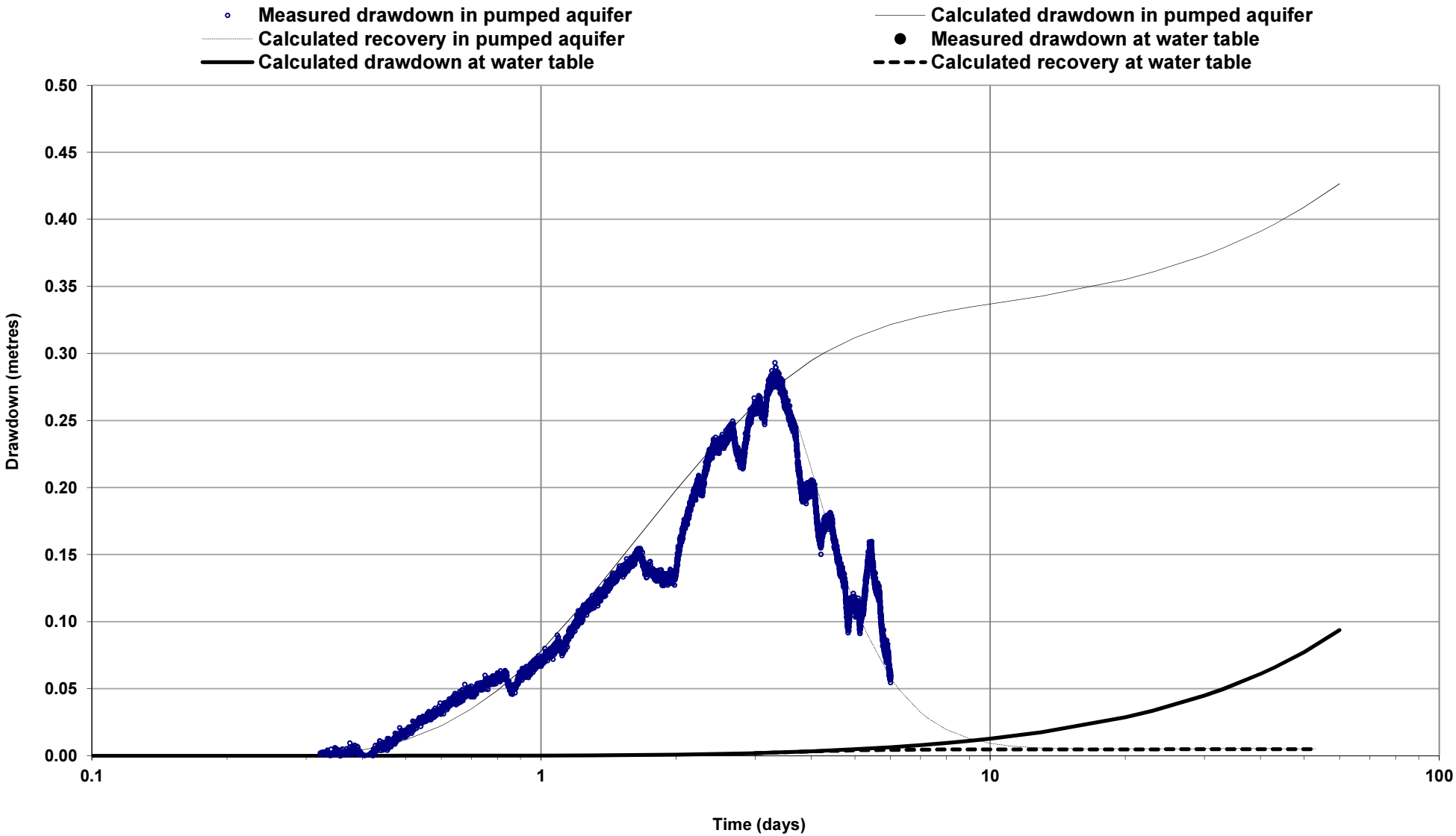


Figure 12 **Modelled and observed drawdown in bore M35/7701**

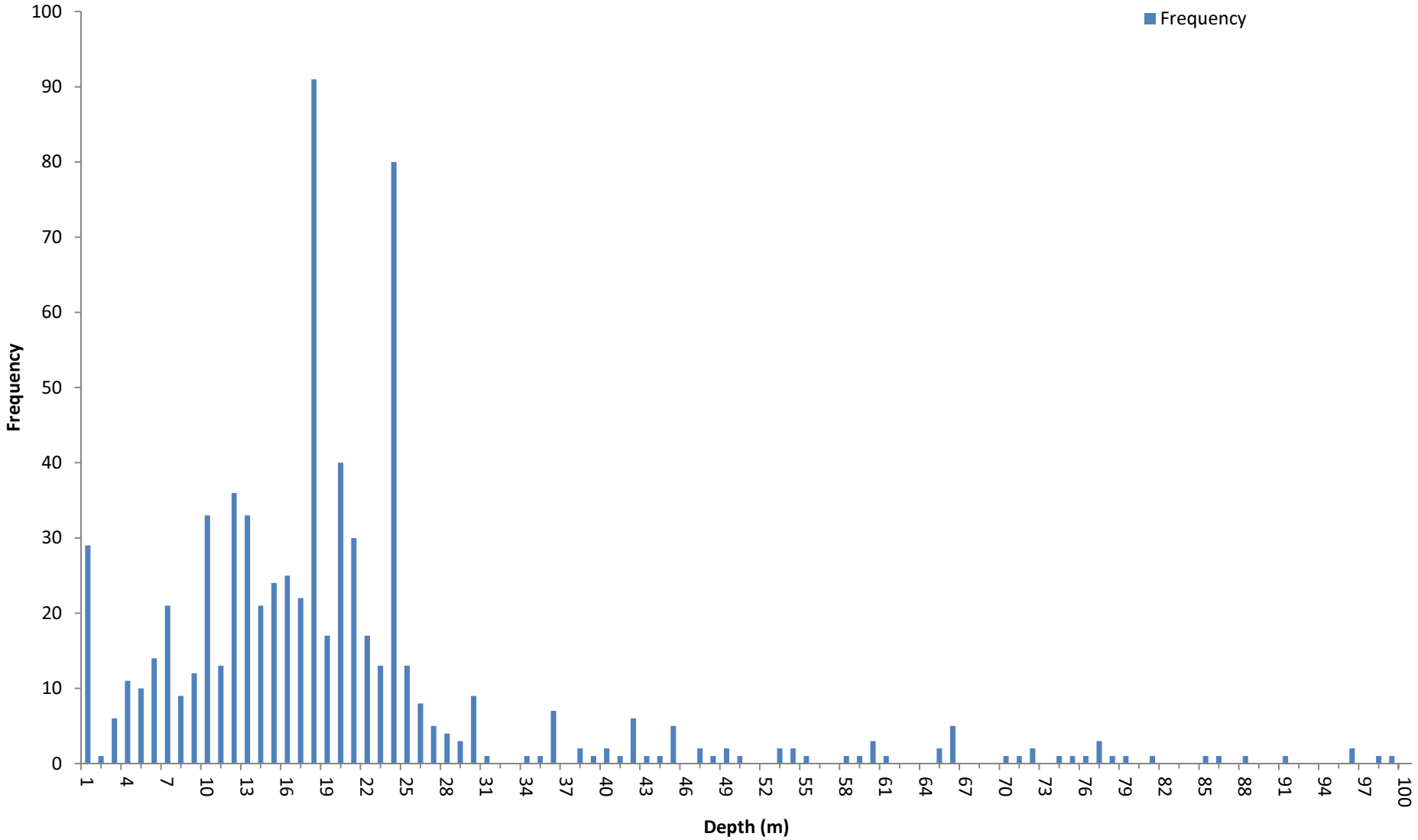
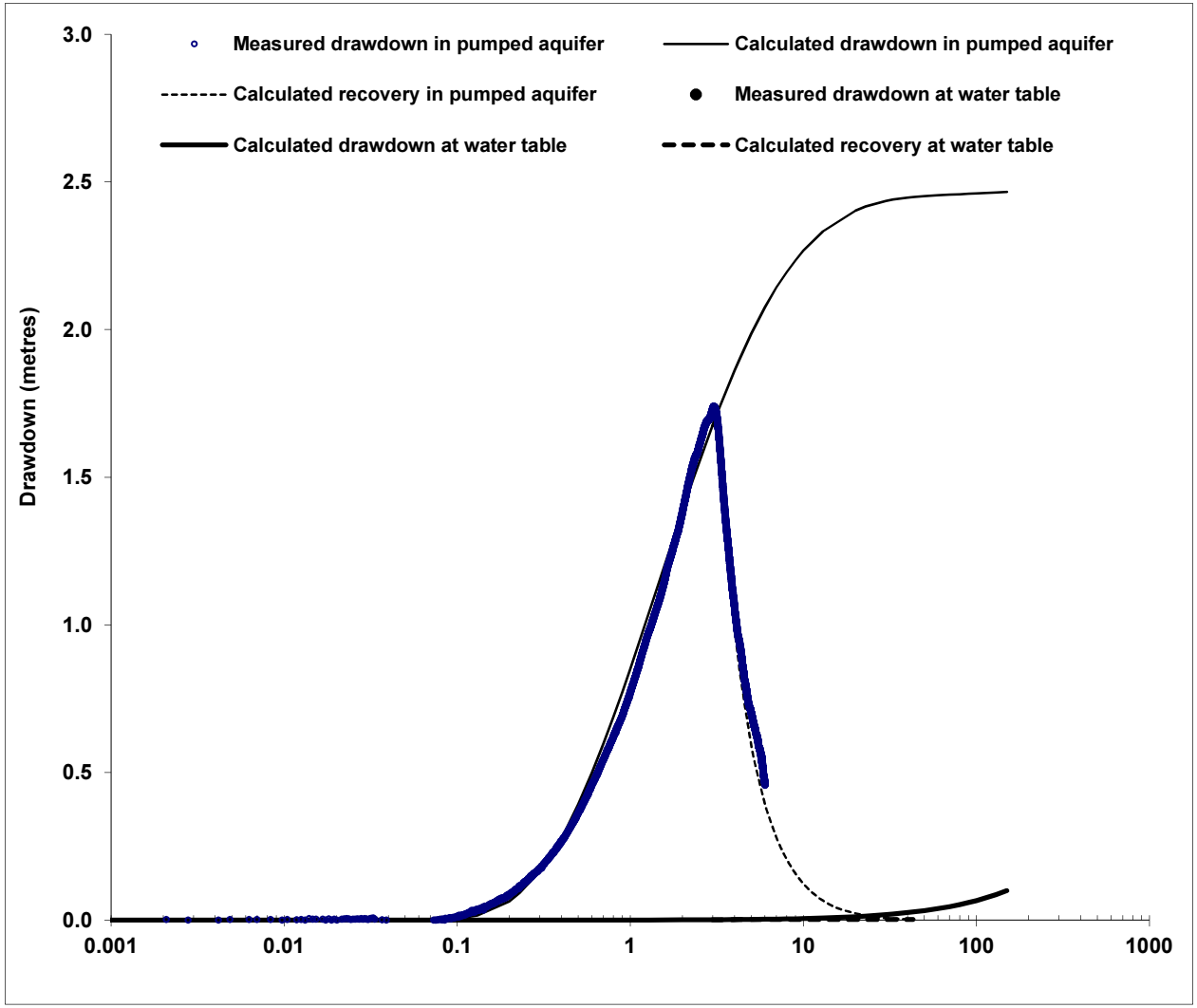


Figure 13 Histogram of bore depths for bores in the vicinity of bore BW24/0262

	A	B	C	D
5	Q (m^3/day)	x (m)	y (m)	L (m)
6	1728	618	523	415

	X	Y	Z	AA	AB
5	T (m^2/day)	S	K'/B' (1/day)	S_y	λ (m/day)
6	110	0.00055	0.000028	0.1	0.2



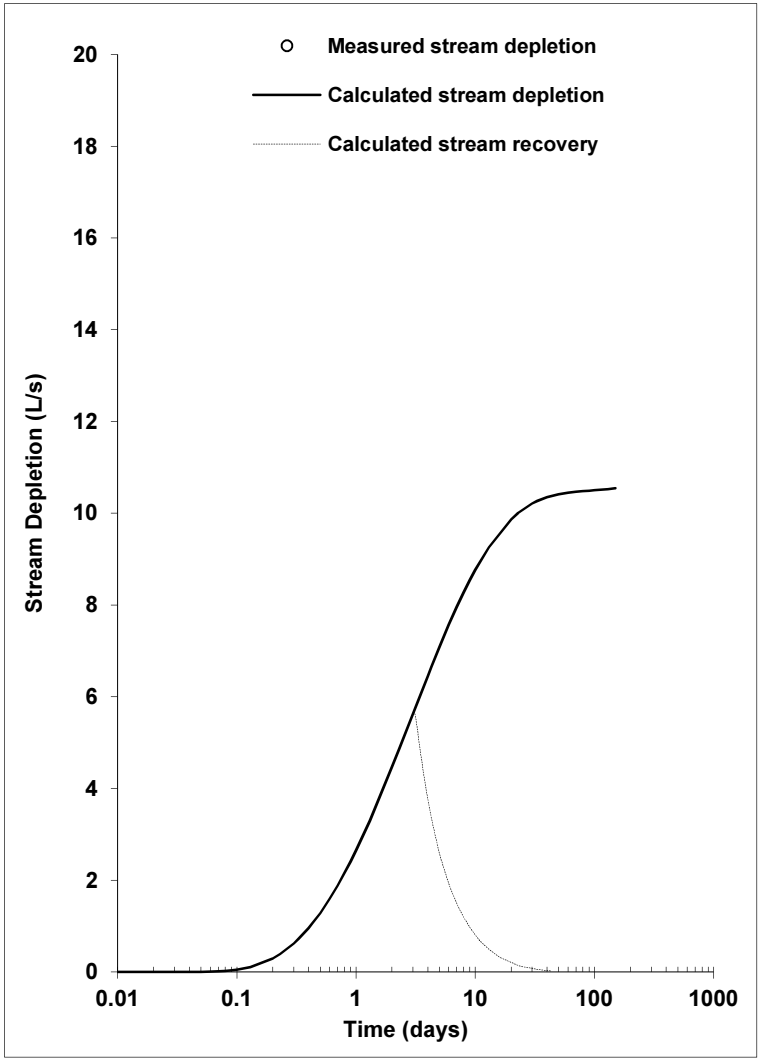
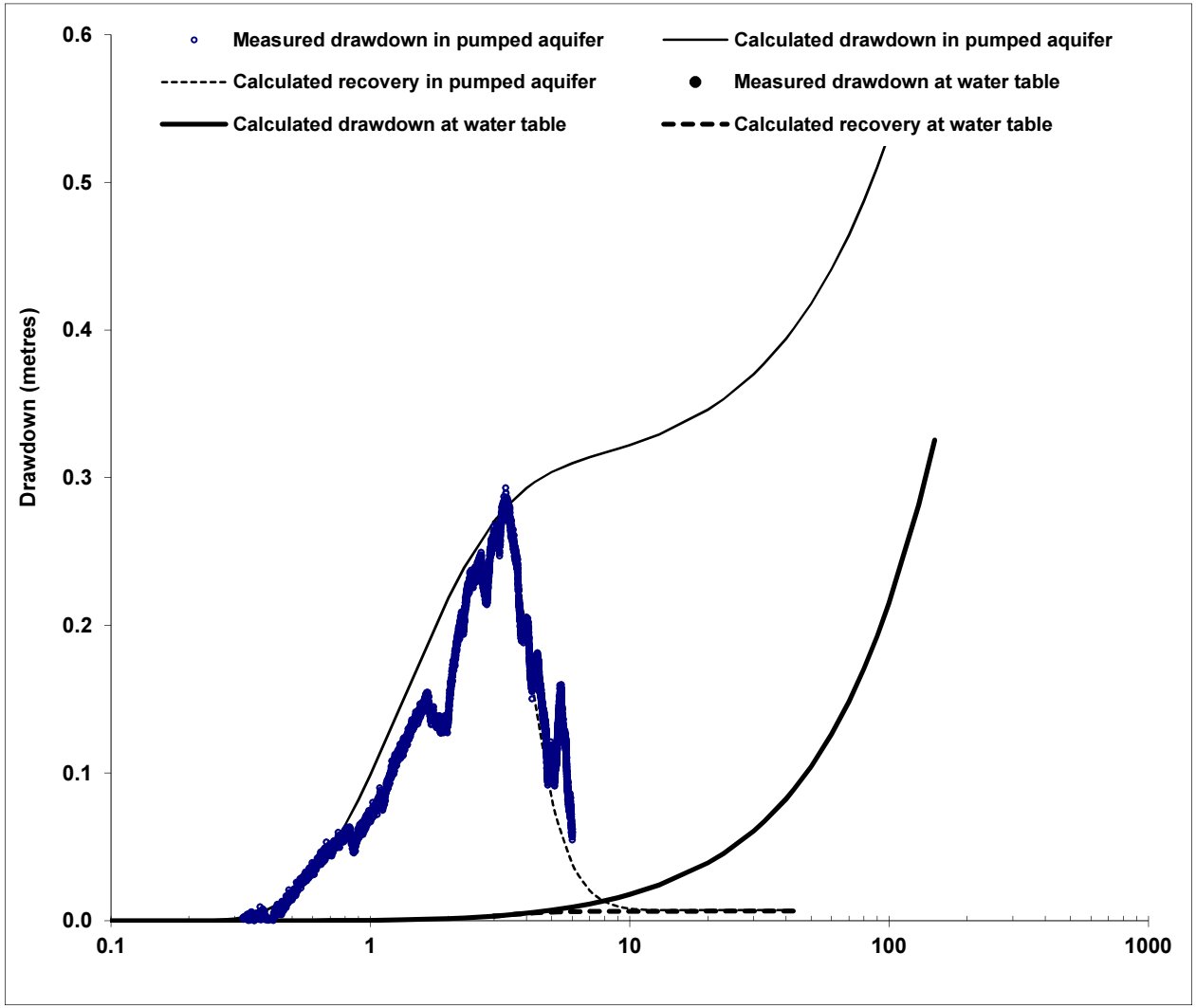


Figure 14 : **Stream depletion analysis for bore bore M35/8381.**
Parameters used to general the modelled solution are provided above

	A	B	C	D
5	Q (m^3/day)	x (m)	y (m)	L (m)
6	1728	428	750	415

	X	Y	Z	AA	AB
5	T (m^2/day)	S	K'/B' (1/day)	S_y	λ (m/day)
6	100	0.00099	0.0007	0.1	0.1



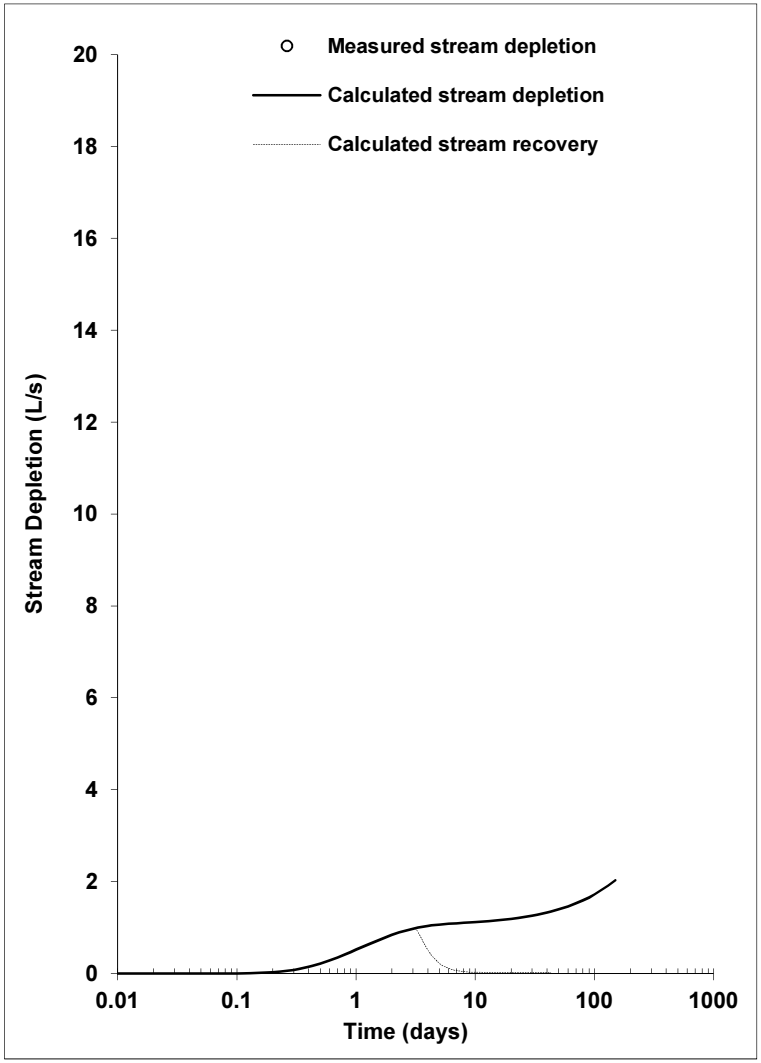
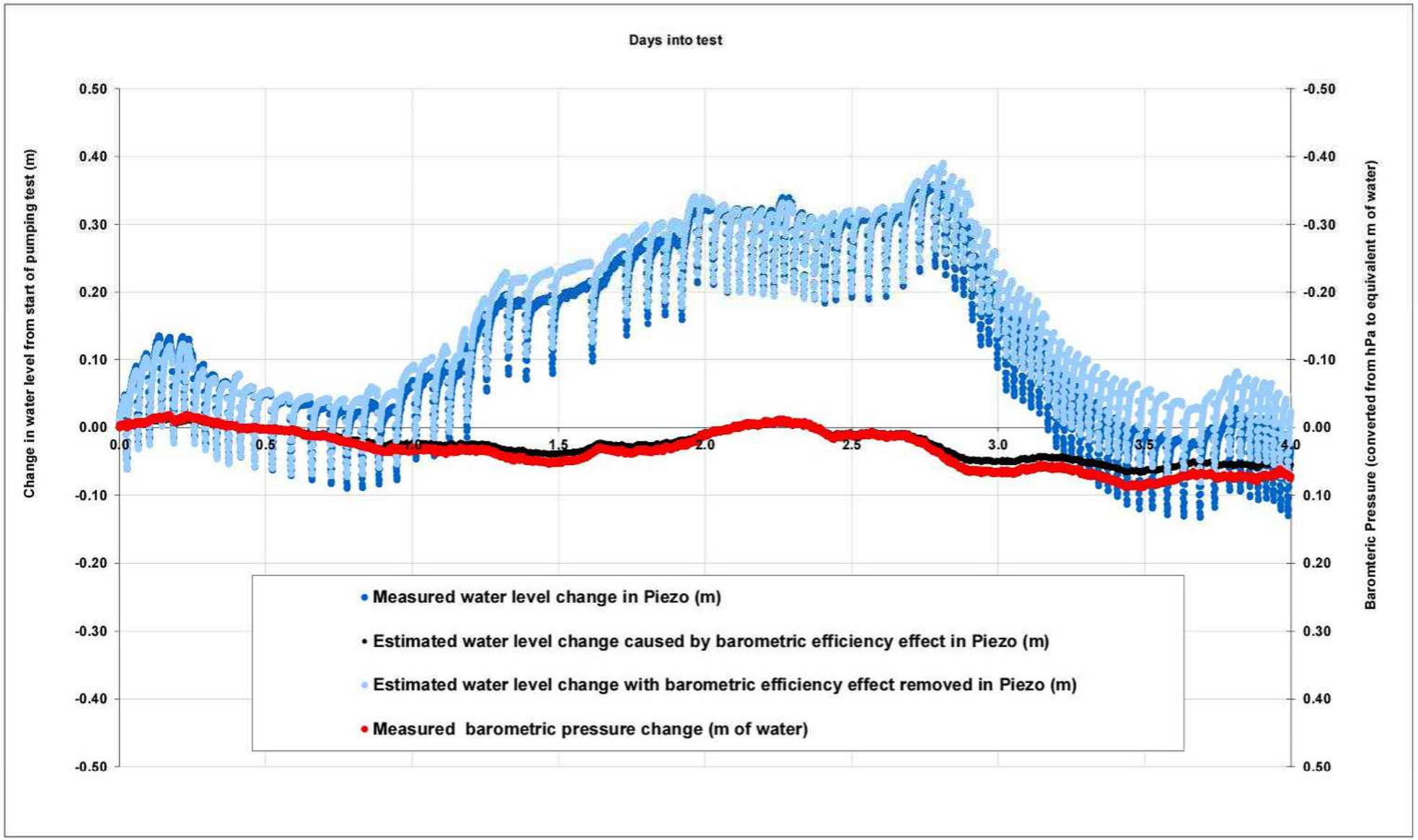
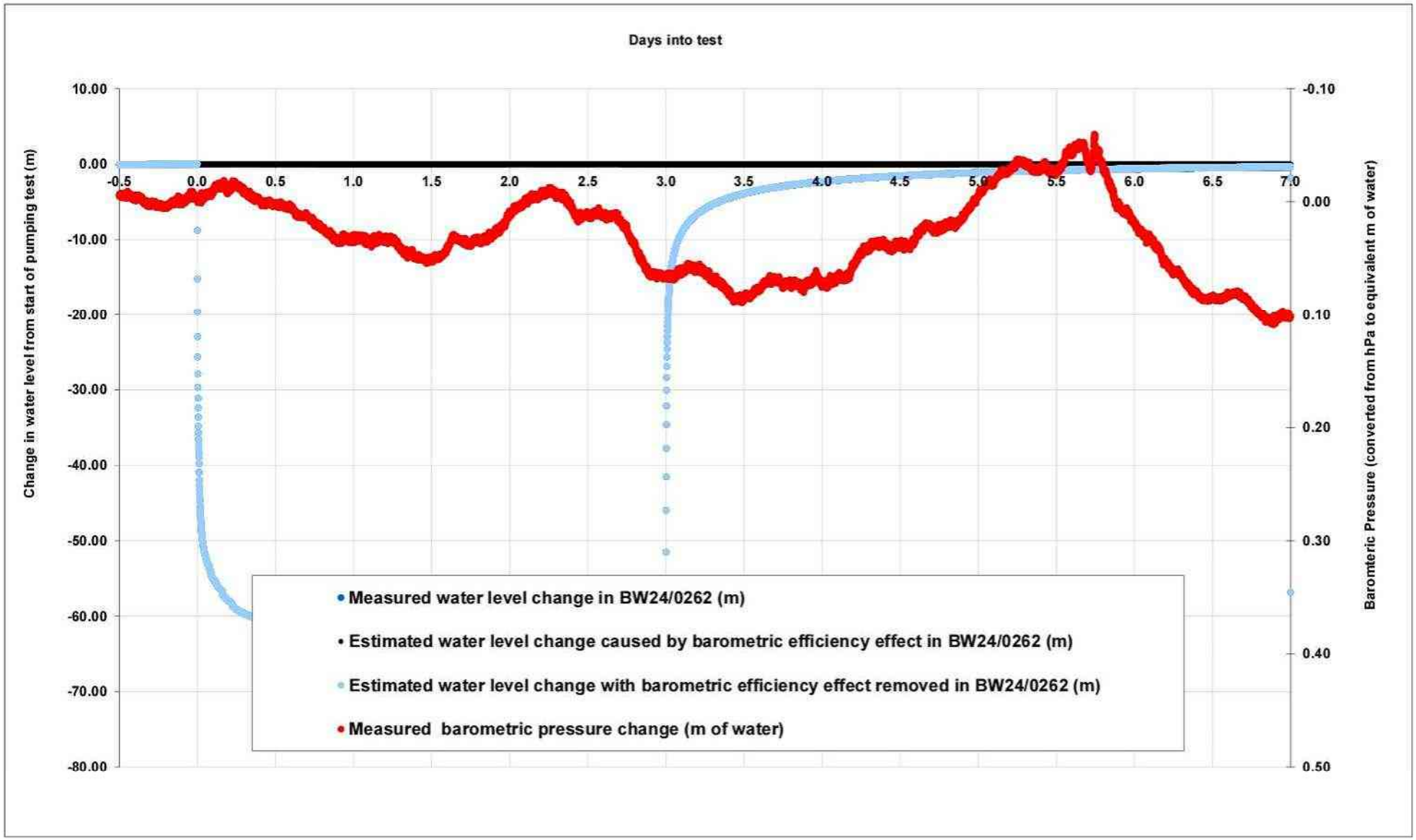


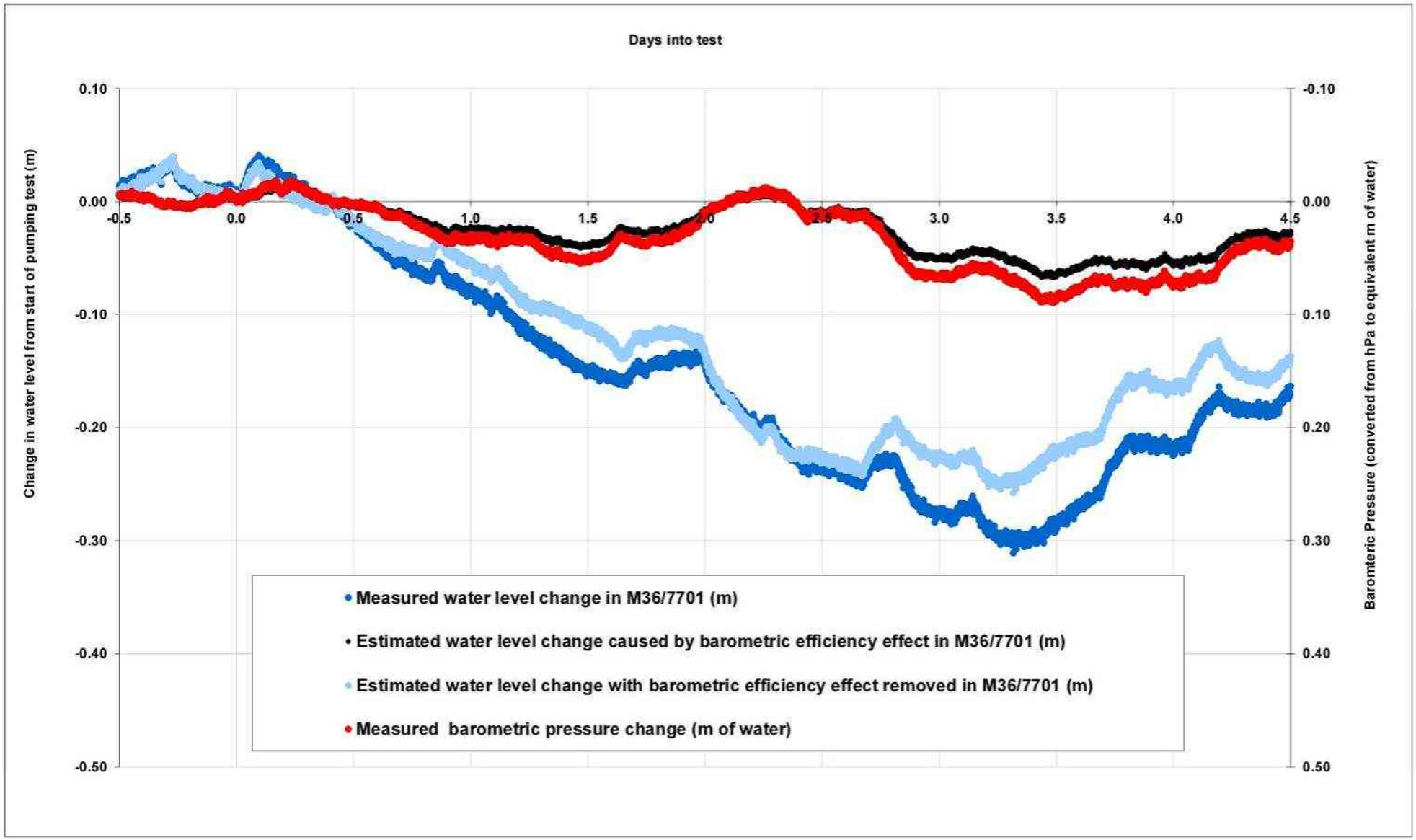
Figure 15 Stream depletion analysis for bore bore M35/7701.
Parameters used to generate the modelled solution are provided above

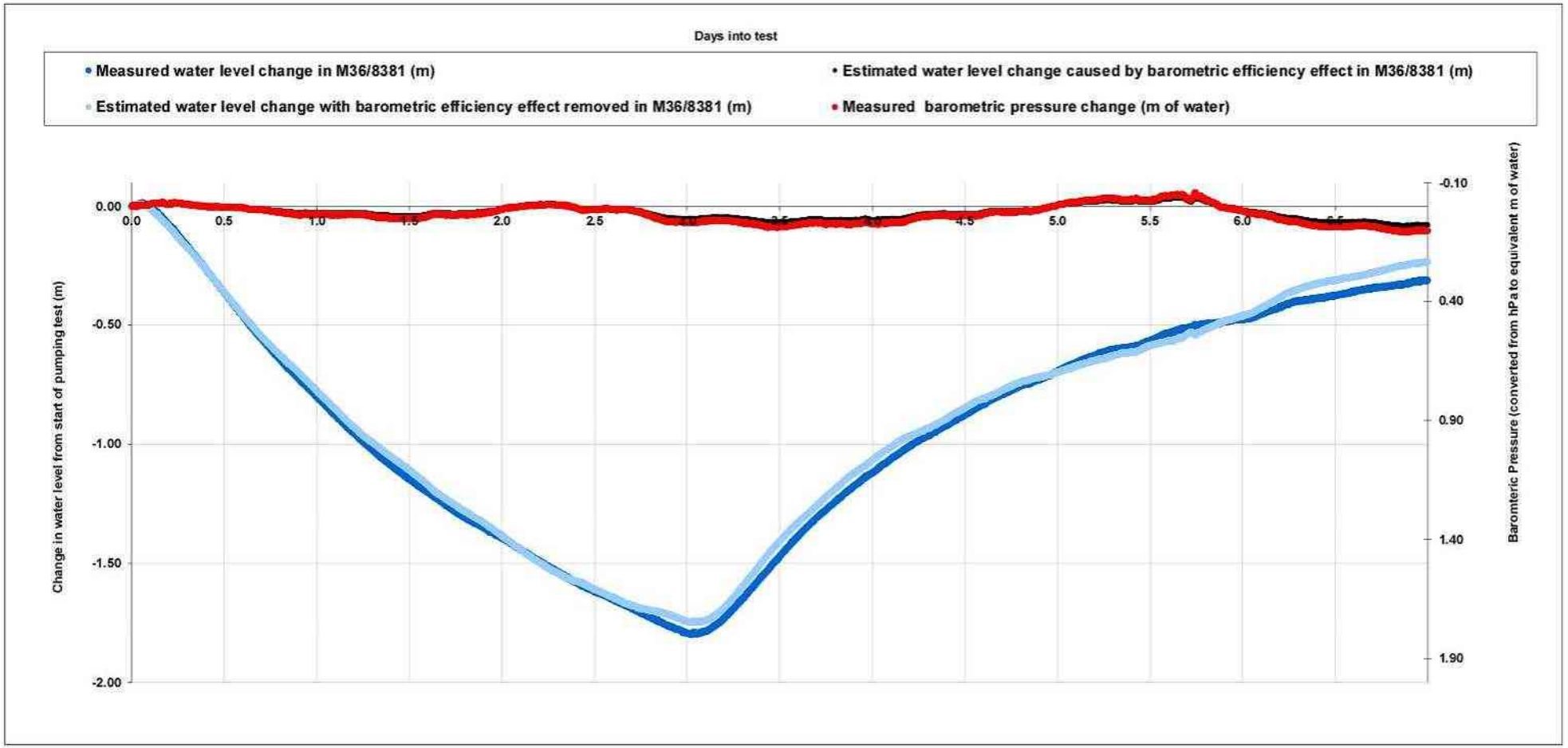
Figure 16: Community Supply Protection Zone around bore BW24/0262 (shown in red). The existing protection zone around bore M35/5609 is shown as a grey shade area. (Image from Canterbury maps)

Appendix A: Plots of barometric compensation


Days into test
Change in water level from start of pumping test (m)
Baromteric Pressure (converted from hPa to equivalent m of water)
0.50
0.40
0.30
0.20
0.10
0.00
-0.10
-0.20
-0.30
-0.40
-0.50
0.0
0.5
1.0
1.5
2.0
2.5
3.0
3.5
4.0
Measured water level change in Piezo (m)
Estimated water level change caused by barometric efficiency effect in Piezo (m)
Estimated water level change with barometric efficiency effect removed in Piezo (m)
Measured barometric pressure change (m of water)


Days into test
Change in water level from start of pumping test (m)
Baromteric Pressure (converted from hPa to equivalent m of water)
10.00
0.00
-10.00
-20.00
-30.00
-40.00
-50.00
-60.00
-70.00
-80.00
-0.10
0.00
0.10
0.20
0.30
0.40
0.50
-0.5
0.0
0.5
1.0
1.5
2.0
2.5
3.0
3.5
4.0
4.5
5.0
5.5
6.0
6.5
7.0
Measured water level change in BW24/0262 (m)
Estimated water level change caused by barometric efficiency effect in BW24/0262 (m)
Estimated water level change with barometric efficiency effect removed in BW24/0262 (m)
Measured barometric pressure change (m of water)


Days into test
Change in water level from start of pumping test (m)
Baromteric Pressure (converted from hPa to equivalent m of water)
0.10
0.00
-0.10
-0.20
-0.30
-0.40
-0.50
-0.10
0.00
0.10
0.20
0.30
0.40
0.50
-0.5
0.0
0.5
1.0
1.5
2.0
2.5
3.0
3.5
4.0
4.5
Measured water level change in M36/7701 (m)
Estimated water level change caused by barometric efficiency effect in M36/7701 (m)
Estimated water level change with barometric efficiency effect removed in M36/7701 (m)
Measured barometric pressure change (m of water)


Days into test
Measured water level change in M36/8381 (m)
Estimated water level change caused by barometric efficiency effect in M36/8381 (m)
Estimated water level change with barometric efficiency effect removed in M36/8381 (m)
Measured barometric pressure change (m of water)
Change in water level from start of pumping test (m)
Baromteric Pressure (converted from hPa to equivalent m of water)
0.00
-0.50
-1.00
-1.50
-2.00
-0.10
0.40
0.90
1.40
1.90
0.0
0.5
1.0
2.0
2.5
4.5
5.0
5.5
6.0

Appendix B: Water quality results

Eurofins ELS Limited

Analytical Report

Clemence Drilling
PO Box 191
Kaiapoi
7691

Report Number: 15/20483
Issue: 1
03 July 2015

Sample	Site	Map Ref.	Date Sampled	Date Received	Order No.
15/20483-01	Domestic Water Supply		26/06/2015 3:25	27/06/2015 09:00	BW24/0262

Notes: Bradleys Road, Ohoka
Sample taken at 20 L/S

	Test	Result	Units	Comments	Signatory
0001	pH	7.8		Passes GV of 7.0 to 8.5	Marylou Cabral KTP
0002	Suspended Solids - Total	< 3	g/m³		Marylou Cabral KTP
0002B	Total Sediment Concentration	2	g/m³		Marylou Cabral KTP
0052	Alkalinity - Total	93	g CaCO3/m³	Not a NZDWS test	Marylou Cabral KTP
0055	Conductivity at 25°C	23.4	mS/m	Not a NZDWS test	Gordon McArthur KTP
0055B	Total Dissolved Solids	128	g/m³	Below GV of 1000	Alexandra Black KTP
0073	Bicarbonate	92	g CaCO3/m³	Not a NZDWS test	Marylou Cabral .
0074	Carbonate	< 1	g CaCO3/m³	Not a NZDWS test	Marylou Cabral .
0076	Free CO2	3	g CO2/m³	Not a NZDWS test	Marylou Cabral .
0084	Turbidity	3.71	NTU	Above GV of 2.5	Gordon McArthur KTP
0701	Fluoride	0.069	g/m³	See Notes Below	Kavita KTP
0702	Chloride	10.2	g/m³	Below GV of 250	Kavita KTP
0704	Bromide	0.034	g/m³	Not a NZDWS test	Kavita KTP
0705	Nitrate Nitrogen	0.351	g/m³	Passes MAV Limit of 11.3	Kavita KTP
0707	Sulphate	2.84	g/m³	Below GV of 250	Kavita KTP
0711	Nitrite-Nitrogen	0.003	g/m³	Passes MAV Limit of 0.9	Kavita KTP
0752	Absorbance at 270 nm	0.02			Gordon McArthur KTP
0755	Absorbance at 254 nm	0.03			Gordon McArthur KTP
0760	Ammonia Nitrogen	0.02	g/m³	Below GV of 1.5	Tracy Morrison KTP
0777	Colour	2.4	TCU		Gordon McArthur KTP
1003	Aerated pH	8.4			Gordon McArthur KTP
1610	Calcium - Acid Soluble	20.5	g/m³	See Total Hardness	Shanel Kumar KTP
1622	Magnesium - Acid Soluble	7.59	g/m³	See Total Hardness	Shanel Kumar KTP
1629	Potassium - Acid Soluble	1.36	g/m³	Not a NZDWS test	Shanel Kumar KTP
1634	Sodium - Acid Soluble	17.9	g/m³	Below GV of 200	Shanel Kumar KTP
1642	Total Hardness	83	g CaCO3/m³	Below Moderate Hardness Level of 100	Shanel Kumar KTP
1643	Silica	19.2	g/m³		Shanel Kumar KTP
2088	Dissolved Reactive Phosphorus	0.039	g/m³		Tracy Morrison KTP
6003	Arsenic - Acid Soluble	< 0.001	g/m³	Passes MAV Limit of 0.01	Sharon van Soest KTP
6007	Boron - Acid Soluble	< 0.03	g/m³	Passes MAV Limit of 1.4	Sharon van Soest KTP
6008	Cadmium - Acid Soluble	< 0.0002	g/m³	Passes MAV Limit of 0.004	Sharon van Soest KTP
6011	Chromium - Acid Soluble	< 0.001	g/m³	Passes MAV Limit of 0.05	Sharon van Soest KTP
6013	Copper - Acid Soluble	< 0.0005	g/m³	Below GV of 1	Sharon van Soest KTP
6017	Iron - Acid Soluble	0.08	g/m³	Below GV of 0.2	Sharon van Soest KTP
6018	Lead - Acid Soluble	< 0.0005	g/m³	Passes MAV Limit of 0.01	Sharon van Soest KTP
6021	Manganese - Acid Soluble	0.0076	g/m³	Below GV of 0.04	Sharon van Soest KTP
6024	Nickel - Acid Soluble	< 0.0005	g/m³	Passes MAV Limit of 0.08	Sharon van Soest KTP

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Sample	Site	Map Ref.	Date Sampled	Date Received	Order No.
15/20483-01	Domestic Water Supply		26/06/2015 3:25	27/06/2015 09:00	BW24/0262

Notes: Bradleys Road, Ohoka
Sample taken at 20 L/S

	Test	Result	Units	Comments	Signatory
6028	Selenium - Acid Soluble	< 0.002	g/m³	Passes MAV Limit of 0.01	Sharon van Soest KTP
6038	Zinc - Acid Soluble	0.007	g/m³	Below GV of 1.5	Sharon van Soest KTP
M0402	E. coli	<1	/100mL	Complies	Maria Norris KTP

Comments:

Sampled by customer using ELS approved containers.

Comments on Individual Test Results

pH

pH measures how acidic or basic the water sample is. Waters with low pH can be corrosive and those with a high pH can promote scale formation in pipes and hot water cylinders. The guideline value for pH in the NZ Drinking Water Standards is 7.0 to 8.5 so the pH of this sample complies with this value.

Alkalinity - Total

Alkalinity is a measure of a waters ability to neutralise acid and is not listed in the NZ Drinking Water Standards. It is included here as a general water quality parameter and can be used as part of the Saturation Index calculation.

Conductivity at 25°C

Conductivity is not listed in the NZ Drinking Water Standards and is an indicator of how many ions are dissolved in the water such as chloride, sulphate and iron. The result is used to calculate the Total Dissolved Solids content of a sample.

Total Dissolved Solids

Total Dissolved Solids is calculated from the conductivity result and has a Guideline Value in the NZ Drinking Water Standards of 1,000 g/m3. The result for this sample complies with this limit.

Bicarbonate

Bicarbonate Alkalinity is the portion of alkalinity attributable to bicarbonate ions and is not listed in the NZ Drinking Water Standards. It is included here as a general water quality parameter.

Carbonate

Carbonate Alkalinity is the portion of alkalinity attributable to carbonate ions which is usually the dominant portion of the total alkalinity. It is not listed in the NZ Drinking Water Standards and is included here as a general water quality parameter.

Free CO2

Free CO2 is a measure of the carbon dioxide dissolved in the water and is not listed in the NZ Drinking Water Standards. It is included here because it can cause the water to become acidic leading to the corrosion of pipes and fittings.

Turbidity

Turbidity in water is caused by the presence of fine suspended matter such as clay, silt, and other particles. The result for this sample is above the NZ Drinking Water Standards limit of 2.5 NTU.

Fluoride

Non-fluoridated supplies can have naturally occurring fluoride levels ranging from zero to 0.5 g/m3. The Ministry of Health recommends that the concentration of fluoride in fluoridated drinking-water supplies be between 0.7 and 1.0 g/m3 and lists a Maximum Allowable Value of 1.5 g/m3. The level of fluoride in this sample complies with this limit.

Chloride

Chloride is usually present in water sources as sodium chloride - or salt. The NZ Drinking Water Standards lists a Guideline Value of 250 g/m3, above which the water can taste salty and cause corrosion. The level of chloride in this sample is below the limit.

Bromide

Bromide ions occur naturally in surface water and groundwater and can increase due to saltwater intrusion or pollution. Bromide is introduced into New Zealand surface waters usually by wind blown seaspray. This test is not included in the NZ Drinking Water Standards and is included here because it can form harmful

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bromate if the water is treated with ozone.

Nitrate Nitrogen

Nitrate-Nitrogen is introduced to water supplies through fertiliser run-off, the breakdown of organic matter, and from septic tanks and effluent ponds. The NZ Drinking Water Standards lists a Maximum Allowable Value of 11.3 g/m3. The level of nitrate-nitrogen in this sample complies with this limit.

Sulphate

Sulphate is present in some New Zealand soils and can cause taste problems at high levels. The NZ Drinking Water Standards lists a Guideline Value of 250 g/m3, above which the water can taste bad and smell of sulphur. The level of sulphate in this sample is below the limit.

Nitrite-Nitrogen

Nitrite-Nitrogen can enter a water source through the breakdown of animal and plant matter and from faecal contamination. The NZ Drinking Water Standards lists a Maximum Allowable Value of 0.9 g/m3. The level of nitrite-nitrogen in this sample complies with this limit.

Ammonia Nitrogen

Ammonia may be found in natural surface waters, but is more frequently found at elevated concentrations in anaerobic groundwaters. The NZ Drinking Water Standards lists a Guideline Value of 1.5 g/m3 above which the odour may be detected. The level of ammonia in this sample is below the limit.

Potassium - Acid Soluble

Potassium is not listed in the NZ Drinking Water Standards and is included here as a likely indicator of dairy farm contamination.

Sodium - Acid Soluble

Sodium is usually present in water sources as sodium chloride - or salt. The NZ Drinking Water Standards lists a Guideline Value of 200 g/m3, above which the water can taste salty and cause corrosion. The level of sodium in this sample is below the limit.

Total Hardness

Hardness is derived from the calcium and magnesium content of the water and indicates the likelihood of scale formation inside pipes and kettles. The level of hardness in this sample indicates a soft to moderate water.

Arsenic - Acid Soluble

Arsenic is found in some soils around New Zealand and this can lead to elevated arsenic levels in some bore waters. The NZ Drinking Water Standards lists a Maximum Allowable Value of 0.01 g/m3. The level of arsenic in this sample complies with this limit.

Boron - Acid Soluble

Boron is introduced to water supplies through the weathering of rocks or from geothermal processes. The NZ Drinking Water Standards lists a Maximum Acceptable Value of 1.4 g/m3. The level of boron in this sample complies with this limit.

Cadmium - Acid Soluble

Cadmium is found at elevated levels in some industrial and domestic effluents as well as street and industrial run-off. The NZ Drinking Water Standards lists a Maximum Allowable Value of 0.004 g/m3. The level of cadmium in this sample complies with this limit.

Chromium - Acid Soluble

Chromium is present in most New Zealand soils and rocks and can also enter water supplies through some industrial processes. The NZ Drinking Water Standards lists a Maximum Allowable Value of 0.05 g/m3. The level of chromium in this sample complies with this limit.

Copper - Acid Soluble

Copper is introduced to water supplies through the weathering of rocks, from geothermal processes and from copper pipes and can cause a blue stain at elevated levels. The NZ Drinking Water Standards lists a Guideline Value of 1 g/m3 and Maximum Acceptable Value of 2 g/m3. The level of copper in this sample complies with both limits.

Iron - Acid Soluble

Iron is an essential element and is very common in NZ water. The NZ Drinking Water Standards lists a Guideline Value of 0.2 g/m3. The level of iron in this sample is below the limit.

Lead - Acid Soluble

Lead is found naturally in some New Zealand soils however the majority of lead in the environment comes from legacy sources such as paint and petrol. Brass plumbing fittings also contain lead, which is why the Ministry of Health advises consumers to run a mugfull of water to waste each morning before pouring a drink of water. The NZ Drinking Water Standards lists a Maximum Allowable Value of 0.01 g/m3. The level of lead in this sample complies with this limit.

Manganese - Acid Soluble

Manganese is introduced to water supplies through the weathering of rocks and is common in NZ. The NZ Drinking Water Standards lists a Guideline Value of

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0.04 g/m3 and a Maximum Allowable Value of 0.4 g/m3. The level of manganese in this sample is below both limits.

Nickel - Acid Soluble

Nickel can be found in New Zealand soils however its main release to the environment is through the burning of fossil fuels. The NZ Drinking Water Standards lists a Maximum Allowable Value of 0.08 g/m3. The level of nickel in this sample complies with this limit.

Selenium - Acid Soluble

Selenium is present in New Zealand soils in low concentrations and is not commonly found in drinking water. The NZ Drinking Water Standards lists a Maximum Allowable Value of 0.01 g/m3. The level of selenium in this sample complies with this limit.

Zinc - Acid Soluble

Zinc is introduced to water supplies through the weathering of rocks and from galvanised pipes. The NZ Drinking Water Standards lists a Guideline Value of 1.5 g/m3. The level of zinc in this sample is below this limit.

Test Methodology:

Test	Methodology	Detection Limit
pH	Dedicated pH meter following APHA 22nd Edition Method 4500 H.	0.1
Suspended Solids - Total	APHA 22nd Edition Method 2540 D	3 g/m³
Total Sediment Concentration	ASTM D3977-97	1 g/m³
Alkalinity - Total	APHA 22nd Edition Method 2320 B	1 g CaCO3/m³
Conductivity at 25°C	APHA 22nd Edition Method 2510 B.	0.1 mS/m
Total Dissolved Solids	Conductivity reading in mS/m x 5.5. The result by this method should be considered approximate only.	1 g/m³
Bicarbonate	Calculated from alkalinity and pH following APHA 22nd Edition Method 4500-CO2. The sample TDS must be <500 g/m3 and all alkalinity derived from hydroxides, carbonates or bicarbonates.	1 g CaCO3/m³
Carbonate	Calculated from alkalinity and pH following APHA 22nd Edition Method 4500-CO2. The sample TDS must be <500 g/m3 and all alkalinity derived from hydroxides, carbonates or bicarbonates.	1 g CaCO3/m³
Free CO2	Calculated from alkalinity and pH following APHA 22nd Edition Method 4500-CO2. The sample TDS must be <500 g/m3 and all alkalinity derived from hydroxides, carbonates or bicarbonates.	1 g CO2/m³
Turbidity	Turbidity Meter following APHA 22nd Edition Method 2130 B.	0.01 NTU
Fluoride	Ion Chromatography following USEPA 300.0 (modified)	0.005 g/m³
Chloride	Ion Chromatography following USEPA 300.0 (modified)	0.005 g/m³
Bromide	Ion Chromatography following USEPA 300.0 (modified)	0.005 g/m³
Nitrate Nitrogen	Ion Chromatography following USEPA 300.0 (modified)	0.002 g/m³
Sulphate	Ion Chromatography following USEPA 300.0 (modified)	0.005 g/m³
Nitrite-Nitrogen	Ion Chromatography following USEPA 300.0 (modified)	0.002 g/m³
Absorbance at 270 nm	In house method.	0.01
Absorbance at 254 nm	In house method	0.01
Ammonia Nitrogen	Flow Injection Autoanalyser following APHA 22nd Edition Method 4500 NH3-H.	0.01 g/m³
Colour	Calculated from Absorbance @ 270nm.	0.1 TCU
Aerated pH	APHA 22nd Edition Method 4500 H	0.1
Calcium - Acid Soluble	ICP-OES following APHA 22nd Edition Method 3120 B (modified).	0.05 g/m³
Magnesium - Acid Soluble	ICP-OES following APHA 22nd Edition Method 3120 B (modified).	0.01 g/m³
Potassium - Acid Soluble	ICP-OES following APHA 22nd Edition Method 3120 B (modified).	0.05 g/m³
Sodium - Acid Soluble	ICP-OES following APHA 22nd Edition Method 3120 B (modified).	0.05 g/m³
Total Hardness	ICP-OES following APHA 22nd Edition Method 3120 B (modified).	1 g CaCO3/m³
Silica	ICP-OES following APHA 22nd Edition Method 3120 B (modified)	0.02 g/m³
Dissolved Reactive Phosphorus	Flow Injection Autoanalyser following APHA 22nd Edition Method 4500-P G.	0.005 g/m³
Arsenic - Acid Soluble	ICP-MS following APHA 22nd edition method 3125 (modified).	0.001 g/m³
Boron - Acid Soluble	ICP-MS following APHA 22nd edition method 3125 (modified).	0.03 g/m³
Cadmium - Acid Soluble	ICP-MS following APHA 22nd edition method 3125 (modified).	0.0002 g/m³
Chromium - Acid Soluble	ICP-MS following APHA 22nd edition method 3125 (modified).	0.001 g/m³
Copper - Acid Soluble	ICP-MS following APHA 22nd edition method 3125 (modified).	0.0005 g/m³

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Test	Methodology	Detection Limit
Iron - Acid Soluble	ICP-MS following APHA 22nd edition method 3125 (modified).	0.01 g/m³
Lead - Acid Soluble	ICP-MS following APHA 22nd edition method 3125 (modified).	0.0005 g/m³
Manganese - Acid Soluble	ICP-MS following APHA 22nd edition method 3125 (modified).	0.0005 g/m³
Nickel - Acid Soluble	ICP-MS following APHA 22nd edition method 3125 (modified).	0.0005 g/m³
Selenium - Acid Soluble	ICP-MS following APHA 22nd edition method 3125 (modified).	0.002 g/m³
Zinc - Acid Soluble	ICP-MS following APHA 22nd edition method 3125 (modified).	0.002 g/m³
E. coli	APHA 22nd Edition, 9223B:2012.	1 /100mL

"<" means that no analyte was found in the sample at the level of detection shown. Detection limits are based on a clean matrix and may vary according to individual sample.

g/m3 is the equivalent to mg/L and ppm.

Samples will be retained for a period of time, in suitable conditions appropriate to the analyses requested.

All test methods and confidence limits are available on request. This report must not be reproduced except in full, without the written consent of the laboratory.

Report Released By

Rob Deacon

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Appendix C: WQN10 Results sheets

Input file used J:\C03300-C03399\C03371_WDC Ohoka Public S | Applicants wells | Standard Screen length : 3m

Model Parameters for drawdown calculations | DD Affected Wells | Standard Pump length : 2m

Transmissivity 110m²/d | Over Thresholds | Depth Range of pumped Aquifer taken from :31m till 999m

Storativity 3.5e-4

Leakage 1982m OR K'B' : 2.8e-5

Sigma 0.1

T0 975 and shallow aquifer less than 31m (W_11 and Eta_11 modules with flow in overlaying layer)

Parameters based on analysis of drawdown in bore M36/8381

Future scenario

Well	Owner	Depth	Adopt Dep	Top Screen	Cutoff	Calc80Min	Available	Protected	DD4 interferenc	TotalDD - Future scenario	TotalDD Current Scenario	Difference
BW24/0262	Waimakari	84.7	84.7	78	76	-2.59	73.41	58.73	14.68	0	0	
M35/5609	Waimakari	18.8	18.8	16.8	14.8	-3.6	11.2	8.96	2.24	0.88	0.88	
BW24/0095	WICKLOW	50	50	47	45	-2.47	42.53	34.02	8.51	3.56	0	Yes
M35/8381	Parker	88	88	86.5	84.5	-3.71	80.79	64.63	16.16	2.13	0	Yes
M35/7701	HJ SMITH	86	86	84	82	-3.98	78.02	62.42	15.6	1.74	0	Yes
BW24/0251	Michael Hu	48.1	48.1	45.1	43.1	-2.61	40.49	32.39	8.1	1.6	0	Yes
M35/17683	MR & MRS	77	77	71.1	69.1	-4.56	64.54	51.63	12.91	1.2	0	Yes
M35/17793	MR & MRS	76.5	76.5	71.8	69.8	-0.42	69.38	55.5	13.88	1.04	0	Yes
M35/17685	MR H & MI	97.7	97.7	94.7	92.7	-2.03	90.67	72.54	18.13	2.08	1.19	Yes
M35/7153	MARWICK	38	38	37	35	-0.19	34.81	27.85	6.96	0.68	0	Yes
BW24/0048	MR & MRS	48.4	48.4	46.4	44.4	-1.44	42.96	34.37	8.59	1.84	1.19	Yes
BW24/0122	WILLOWS I	65.4	65.4	60.5	58.5	-1.43	57.07	45.66	11.41	0.61	0	Yes
M35/11071	MACRAE L	42	42	38.5	36.5	-1.67	34.83	27.86	6.97	2.82	2.21	Yes
BW24/0047	MR & MRS	65.6	65.6	63.6	61.6	-1.43	60.17	48.14	12.03	0.58	0	Yes
BW24/0046	MR & MRS	76.2	76.2	74.2	72.2	-1.55	70.65	56.52	14.13	0.52	0	Yes
BW23/0046	MR T D PA	60	60	56.5	54.5	-4.12	50.38	40.3	10.08	0	0	
BW23/0047	MR T D PA	23.5	23.5	19.5	17.5	-4.05	13.45	10.76	2.69	0	0	
BW23/0048	MR T D PA	23.9	23.9	19.7	17.7	-4.03	13.67	10.94	2.73	0	0	
BW23/0049	MR T D PA	24.1	24.1	18.3	16.3	-4.02	12.28	9.82	2.46	0	0	
BW23/0050	MR T D PA	59.5	59.5	57.5	55.5	-4.01	51.49	41.19	10.3	0	0	
BW23/0058	MR ROSS V	23.5	23.5	21.5	19.5	-3.89	15.61	12.49	3.12	0	0	
BW23/0061	Mr G F & M	18	18	15	13	-4.25	8.75	7	1.75	0.11	0.11	
BW23/0071	MR & MRS	26	26	23	21	-3.82	17.18	13.74	3.44	0.13	0.13	
BW23/0073	BRENT CHA	25	25	22	20	-4.12	15.88	12.7	3.18	0	0	
BW23/0074	MR DAVID	12	13.5	10.5	8.5	-4.4	4.1	3.28	0.82	0.11	0.11	
BW23/0111	MR & MRS	18	18	15	13	-4.23	8.77	7.02	1.75	0	0	
BW23/0149	MR & MRS	24	24	21	19	-4.49	14.51	11.61	2.9	0.12	0.12	
BW23/0162	MR & MRS	24	24	21	19	-4.59	14.41	11.53	2.88	0.11	0.11	
BW23/0194	J.E. & E.N.	24	24	21	19	-4.49	14.51	11.61	2.9	0.14	0.14	
BW23/0202	Jane & Joh	24	24	21	19	-5.42	13.58	10.86	2.72	0	0	
BW23/0218	Sarah Craig	24	24	21	19	-6.48	12.52	10.02	2.5	0.27	0.27	
BW23/0226	Daryl Edwa	0	13.5	10.5	8.5	-4.63	3.87	3.1	0.77	0.13	0.13	
BW23/0233	RS Scott	24	24	21	19	-4.52	14.48	11.58	2.9	0.14	0.14	
BW23/0238	Mr J and M	24	24	21	19	-4.63	14.37	11.5	2.87	0.11	0.11	
BW23/0239	Brent and I	24	24	21	19	-4.71	14.29	11.43	2.86	0.13	0.13	
BW23/0240	C K Kayes	24	24	21	19	-4.48	14.52	11.62	2.9	0.13	0.13	
BW23/0244	Blair James	24	24	21	19	-4.64	14.36	11.49	2.87	0.12	0.12	
BW23/0246	K Hartshor	24	24	22	20	-4.94	15.06	12.05	3.01	0.12	0.12	
BW23/0250	Deryck Joh	24	24	21	19	-5.35	13.65	10.92	2.73	0	0	
BW23/0254	Mr MJ & M	18	18	15	13	-4.56	8.44	6.75	1.69	0	0	
BW23/0261	Mr A & Mr	12	13.5	10.5	8.5	-4.39	4.11	3.29	0.82	0.18	0.18	
BW23/0266	Mr J A & M	24	24	21	19	-4.72	14.28	11.42	2.86	0.14	0.14	
BW23/0278	Mr N D & M	24	24	22	20	-4.47	15.53	12.42	3.11	0.19	0.19	
BW23/0322	Anthony Al	24	24	22	20	-4.47	15.53	12.42	3.11	0.17	0.17	
BW23/0334	Simon Fam	29.4	29.4	27.9	25.9	-6.32	19.58	15.66	3.92	0.12	0.12	
BW23/0335	Tony & Sha	24	24	21	19	-4.62	14.38	11.5	2.88	0.12	0.12	
BW23/0338	Yvonne & F	24	24	21	19	-4.69	14.31	11.45	2.86	0.12	0.12	
BW23/0340	Brenda Mil	24	24	22	20	-4.61	15.39	12.31	3.08	0.12	0.12	
BW23/0342	David and	24	24	22.5	20.5	-4.53	15.97	12.78	3.19	0.2	0.2	
BW23/0346	Dennis and	24	24	22.5	20.5	-4.43	16.07	12.86	3.21	0.22	0.22	
BW23/0348	Darryl and	24	24	22	20	-4.65	15.35	12.28	3.07	0.13	0.13	
BW23/0350	Peter & An	18	18	16	14	-4.45	9.55	7.64	1.91	0	0	
BW23/0351	Danny Bro	24	24	22	20	-5.68	14.32	11.46	2.86	0.21	0.21	
BW24/0024	MR K T BR	22.1	22.1	20.1	18.1	-1.88	16.22	12.98	3.24	0	0	
BW24/0025	MR K T BR	23.4	23.4	21.4	19.4	-2.28	17.12	13.7	3.42	0	0	
BW24/0028	DAVE ASHE	36	36	30	28	-1.76	26.24	20.99	5.25	0	0	
BW24/0032	MR P BAGI	2.5	13.5	10.5	8.5	-1.62	6.88	5.5	1.38	0	0	
BW24/0033	MR P BAGI	2.5	13.5	10.5	8.5	-1.87	6.63	5.3	1.33	0	0	
BW24/0034	MR P BAGI	2.5	13.5	10.5	8.5	-1.89	6.61	5.29	1.32	0.11	0.11	
BW24/0035	MR P BAGI	2.5	13.5	10.5	8.5	-2.52	5.98	4.78	1.2	0	0	
BW24/0036	MR P BAGI	2.5	13.5	10.5	8.5	-2.35	6.15	4.92	1.23	0.15	0.15	
BW24/0049	MR & MRS	30	30	27	25	-1.7	23.3	18.64	4.66	0	0	
BW24/0050	MR & MRS	30	30	27	25	-1.7	23.3	18.64	4.66	0	0	
BW24/0052	MR M CHR	65	65	62	60	-1.5	58.5	46.8	11.7	3.01	3.01	
BW24/0053	GAVIN FEA	0	13.5	10.5	8.5	-1.47	7.03	5.62	1.41	0	0	
BW24/0056	MR WAYNI	0	13.5	10.5	8.5	-1.18	7.32	5.86	1.46	0.14	0.14	
BW24/0057	MR & MRS	18	18	16.5	14.5	-4.68	9.82	7.86	1.96	0	0	
BW24/0091	BRUCE & B	16	16	13	11	-1.62	9.38	7.5	1.88	0.56	0.56	
BW24/0103	MR & MRS	23.6	23.6	20	18	-2.34	15.66	12.53	3.13	0	0	
BW24/0118	MR WARRI	65	65	62	60	-2.23	57.77	46.22	11.55	0	0	
BW24/0120	MR DEAN S	23.5	23.5	21.5	19.5	-2.89	16.61	13.29	3.32	0	0	
BW24/0121	MR DEAN S	29.9	29.9	21.5	19.5	-2.89	16.61	13.29	3.32	0	0	
BW24/0124	MR & MRS	16	16	13	11	-1.48	9.52	7.62	1.9	0	0	
BW24/0134	MR & MRS	20	20	17	15	-1.43	13.57	10.86	2.71	0	0	
BW24/0139	MR H B & M	18	18	15	13	-4.83	8.17	6.54	1.63	0	0	
BW24/0164	Chris Bailey	75.5	75.5	63.5	61.5	-1.58	59.92	47.94	11.98	3.11	3.11	
BW24/0190	Edward Bru	98.4	98.4	95.4	93.4	-1.59	91.81	73.45	18.36	2.8	2.8	
BW24/0202	Tim and Ka	30	30	27	25	-1.27	23.73	18.98	4.75	0.39	0.39	
BW24/0204	Stephen Jo	21.7	21.7	19.7	17.7	-2.28	15.42	12.34	3.08	0	0	
BW24/0215	Ohoka Serv	4	13.5	10.5	8.5	-2.57	5.93	4.74	1.19	0.27	0.38	
BW24/0216	Ohoka Serv	4	13.5	10.5	8.5	-2.55	5.95	4.76	1.19	0.28	0.39	
BW24/0217	Ohoka Serv	4	13.5	10.5	8.5	-2.57	5.93	4.74	1.19	0.27	0.38	
BW24/0218	Ohoka Serv	4	13.5	10.5	8.5	-2.56	5.94	4.75	1.19	0.27	0.38	
BW24/0219	Ohoka Serv	4	13.5	10.5	8.5	-2.59	5.91	4.73	1.18	0.27	0.37	
BW24/0220	Bruce Willi	95.1	95.1	93	91	-1.21	89.79	71.83	17.96	2.64	2.64	
BW24/0224	LaGallie Pr	71.3	71.3	69.3	67.3	-1.54	65.76	52.61	13.15	3.3	3.3	
BW24/0246	Inglewood	18.3	18.3	16.3	14.3	-1.61	12.69	10.15	2.54	0.58	0.58	

		Future scenario										
Well	Owner	Depth	Adopt Dep	Top Screen	Cutoff	Calc80Min	Available	Protected	DD4 interferenc	TotalDD - Future scenario	TotalDD Current Scenario	Difference
BW24/0250	A M & C A	21	21	19.5	17.5	-1.4	16.1	12.88	3.22	0.19	0.19	
BW24/0252	Mark Alexa	16.7	16.7	14.7	12.7	-1.22	11.48	9.18	2.3	0.29	0.29	
BW24/0276	Mrs Julie B	54	54	51	49	-2.38	46.62	37.3	9.32	0	0	
BW24/0293	Katie Carvi	23	23	19.2	17.2	-1.8	15.4	12.32	3.08	0.2	0.2	
M35/0297	Billing S	73.2	73.2	70.2	68.2	-2.6	65.6	52.48	13.12	0	0	
M35/0298	RAINEY	78.9	78.9	75.9	73.9	-1.23	72.67	58.14	14.53	2.58	2.58	
M35/0302	DUNCAN I	5.9	13.5	10.5	8.5	-2.5	6	4.8	1.2	0	0	
M35/0305	LESLIE D.H	5.8	13.5	10.5	8.5	-0.45	8.05	6.44	1.61	0.86	1.06	
M35/0308	Mr E A And	9.5	13.5	10.5	8.5	-5.83	2.67	2.14	0.53	0.23	0.23	
M35/0309	Keilyn Farn	7.3	13.5	10.5	8.5	-3.02	5.48	4.38	1.1	0.53	0.53	
M35/0312	Dalley R G	9.1	13.5	10.5	8.5	-1.93	6.57	5.26	1.31	0.12	0.12	
M35/0314	BAGRIE W	15.8	15.8	11	9	-1.34	7.66	6.13	1.53	0.1	0.1	
M35/0320	OFFWOOD	9.1	13.5	10.5	8.5	-0.63	7.87	6.3	1.57	0.3	0.41	
M35/0324	BENNETT I	9.1	13.5	10.5	8.5	-8.53	-0.03	-0.02	-0.01	0	0	
M35/0326	Mr & Mrs I	13.7	13.7	10.7	8.7	-1.74	6.96	5.57	1.39	0.55	0.73	
M35/0330	BONIFANT	5.7	13.5	10.5	8.5	-1.45	7.05	5.64	1.41	0	0	
M35/0334	USSHER H	8.6	13.5	10.5	8.5	-0.68	7.82	6.26	1.56	0	0	
M35/0336	BUTTERFIE	9.8	13.5	10.5	8.5	-0.86	7.64	6.11	1.53	0	0	
M35/0340	MCINTOSH	3.7	13.5	10.5	8.5	-1.25	7.25	5.8	1.45	0	0	
M35/0342	BOOTH M	4.3	13.5	10.5	8.5	-1.59	6.91	5.52	1.38	0	0	
M35/0350	Ohoka Util	11.6	13.5	10.5	8.5	-6.34	2.16	1.72	0.43	0	0	
M35/0351	Keilyn Farn	11.4	13.5	10.5	8.5	-2.75	5.75	4.6	1.15	0.23	0.23	
M35/0367	Mr & Mrs I	9.4	13.5	10.5	8.5	-1.22	7.28	5.83	1.46	0.92	1.18	
M35/0382	JARMON	7	13.5	10.5	8.5	-1.48	7.02	5.62	1.4	0	0	
M35/0385	FLINTOFT	6.5	13.5	10.5	8.5	-2.61	5.89	4.71	1.18	0.16	0.16	
M35/0386	LESLIE D.H	4	13.5	10.5	8.5	-1.56	6.94	5.55	1.39	0.55	0.73	
M35/0387	REGNAULT	6	13.5	10.5	8.5	-3.23	5.27	4.22	1.05	1.07	1.33	
M35/0388	WALLS G.D	0	13.5	10.5	8.5	-2.45	6.05	4.84	1.21	0.7	0.97	
M35/0390	KAPPELLE	7	13.5	10.5	8.5	-6.28	2.22	1.78	0.44	0.16	0.16	
M35/0394	WIGLEY N.	9.1	13.5	10.5	8.5	-5.88	2.62	2.1	0.52	0.25	0.25	
M35/0396	FORREST E	9.2	13.5	10.5	8.5	-6.03	2.47	1.98	0.49	0.14	0.14	
M35/0397	SULZBERGI	8	13.5	10.5	8.5	-2.35	6.15	4.92	1.23	0	0	
M35/0586	BAILEY E.J.	18.3	18.3	15.3	13.3	-4.14	9.16	7.33	1.83	0.25	0.25	
M35/0592	STEPHENS	9.4	13.5	10.5	8.5	-2.3	6.2	4.96	1.24	0	0	
M35/0593	SANDERS I	9.1	13.5	10.5	8.5	-5.61	2.89	2.31	0.58	0.26	0.26	
M35/0596	Canterbury	2.9	13.5	10.5	8.5	-0.65	7.85	6.28	1.57	0.58	0.68	
M35/0597	Mr Peter G	17.4	17.4	14.4	12.4	-3.79	8.61	6.89	1.72	0	0	
M35/0601	Threlkeld E	12.8	13.5	10.5	8.5	-0.54	7.96	6.37	1.59	0.35	0.35	
M35/0602	ARMSTRON	14	14	11	9	-5.24	3.76	3.01	0.75	0.57	0.57	
M35/0603	MacRae La	12.8	13.5	10.5	8.5	-1.79	6.71	5.37	1.34	0.39	0.39	
M35/0611	MEHRTENS	12.2	13.5	10.5	8.5	-1.96	6.54	5.24	1.31	0	0	
M35/0614	Mr M J & M	18.3	18.3	15.3	13.3	-2.68	10.62	8.5	2.12	0.11	0.11	
M35/0616	A D & E H C	12.8	13.5	10.5	8.5	-4.43	4.07	3.26	0.81	0.13	0.13	
M35/0617	Mr & Mrs I	13.1	13.5	10.5	8.5	-5.41	3.09	2.47	0.62	0	0	
M35/0643	Mrs V F Do	19.8	19.8	16.8	14.8	-6.07	8.73	6.98	1.75	0.1	0.1	
M35/0651	J H & I M D	9.4	13.5	10.5	8.5	-4.18	4.32	3.46	0.86	0	0	
M35/0676	BEZZANT A	15.5	15.5	12.5	10.5	-7.33	3.17	2.53	0.63	0	0	
M35/0677	Mr C G & M	23.5	23.5	20.5	18.5	-11.34	7.16	5.72	1.43	0	0	
M35/0682	Hawker Jo	12.8	13.5	10.5	8.5	-4.1	4.4	3.52	0.88	0.14	0.14	
M35/0683	MEREDITH	11.8	13.5	10.5	8.5	-6.76	1.74	1.39	0.35	0.11	0.11	
M35/0696	MULLIGAN	6.1	13.5	10.5	8.5	-6.46	2.04	1.63	0.41	0	0	
M35/0697	Willowgrov	22.9	22.9	19.9	17.9	-10.5	7.4	5.92	1.48	0.31	0.31	
M35/0699	MACDONA	6.1	13.5	10.5	8.5	-3.36	5.14	4.11	1.03	0.11	0.11	
M35/0701	Waimakari	18.8	18.8	17.3	15.3	-8.52	6.78	5.42	1.36	0.15	0.15	
M35/10114	Ginnever I	53	53	50	48	-0.1	47.9	38.32	9.58	2.04	2.04	
M35/10115	Hayward M	58	58	56	54	-1.03	52.97	42.38	10.59	2.22	2.22	
M35/10116	Bond M &	12.2	13.5	10.5	8.5	-3.27	5.23	4.18	1.05	0.21	0.21	
M35/10117	Millcroft Li	65.8	65.8	63.8	61.8	-1.11	60.69	48.55	12.14	2.14	2.14	
M35/10118	Sinclair-Th	52.8	52.8	49.7	47.7	-1.15	46.55	37.24	9.31	1.79	1.79	
M35/10119	Millcroft Li	65.8	65.8	63.8	61.8	-1.1	60.7	48.56	12.14	1.93	1.93	
M35/10120	White	22.3	22.3	20.3	18.3	-1.09	17.21	13.77	3.44	0.22	0.22	
M35/10122	Tull L	21.2	21.2	19.1	17.1	-2.19	14.91	11.93	2.98	0.35	0.35	
M35/10129	Ohoka Parl	17.6	17.6	15.6	13.6	-6.79	6.81	5.45	1.36	0	0	
M35/10130	Ohoka Parl	17.5	17.5	14.5	12.5	-6.23	6.27	5.02	1.25	0	0	
M35/10177	Mr PRR Mu	17.9	17.9	16.4	14.4	-5.77	8.63	6.9	1.73	0	0	
M35/10179	Mr & Mrs I	23.5	23.5	21.5	19.5	-7.94	11.56	9.25	2.31	0.69	0.69	
M35/10219	Mr & Mrs I	17.6	17.6	16.6	14.6	-5.7	8.9	7.12	1.78	0	0	
M35/10220	Mr & Mrs I	17.8	17.8	16.8	14.8	-6.05	8.75	7	1.75	0	0	
M35/10221	Mr & Mrs I	17.6	17.6	16.6	14.6	-4.21	10.39	8.31	2.08	0.11	0.11	
M35/10333	Mr & Mrs C	8.3	13.5	10.5	8.5	-3.58	4.92	3.94	0.98	0.15	0.15	
M35/10336	Mr & Mrs C	6.5	13.5	10.5	8.5	-1.99	6.51	5.21	1.3	0.14	0.14	
M35/10339	Mr & Mrs C	6.5	13.5	10.5	8.5	-3.13	5.37	4.3	1.07	0.13	0.13	
M35/10349	Denham Gi	17.5	17.5	15.5	13.5	-0.83	12.67	10.14	2.53	0.25	0.25	
M35/10362	Mr RK Frye	34.3	34.3	32	30	-1.05	28.95	23.16	5.79	0	0	
M35/10363	Mr RK Frye	26.4	26.4	24.4	22.4	-0.53	21.87	17.5	4.37	0	0	
M35/10364	Mr RK Frye	22.9	22.9	20.9	18.9	-1.75	17.15	13.72	3.43	0	0	
M35/10365	Mr RK Frye	16.2	16.2	14.2	12.2	-1.33	10.87	8.7	2.17	0	0	
M35/10366	Mr RK Frye	40.6	40.6	38.6	36.6	-0.55	36.05	28.84	7.21	0	0	
M35/10445	Mr & Ms I	42	42	39	37	-4.36	32.64	26.11	6.53	1.14	1.14	
M35/10461	MR & MRS	21	21	19	17	-1.78	15.22	12.18	3.04	0	0	
M35/10462	MR & MRS	21	21	19	17	-1.83	15.17	12.14	3.03	0	0	
M35/10463	MR & MRS	22	22	20	18	-1.92	16.08	12.86	3.22	0	0	
M35/10464	MR & MRS	22	22	20	18	-1.96	16.04	12.83	3.21	0	0	
M35/10465	MR & MRS	20	20	18	16	-0.7	15.3	12.24	3.06	0	0	
M35/10472	Mr & Mrs I	24	24	23	21	-4.36	16.64	13.31	3.33	0	0	
M35/10479	Mills S	54	54	51.7	49.7	-0.1	49.6	39.68	9.92	2.27	2.27	
M35/10480	Mr & Mrs I	23.7	23.7	21.7	19.7	-7.74	11.96	9.57	2.39	0.3	0.3	
M35/10486	Waters Ov	18.4	18.4	16.4	14.4	-1.86	12.54	10.03	2.51	0.23	0.23	
M35/10487	Denham Gi	17.9	17.9	15.9	13.9	-1.86	12.04	9.63	2.41	0.2	0.2	
M35/10489	MacMillan	18.3	18.3	16.3	14.3	-5.26	9.04	7.23	1.81	0.15	0.15	
M35/10507	Mr GA Bro	24.2	24.2	22.2	20.2	-8.39	11.81	9.45	2.36	0.63	0.63	
M35/10516	Mr & Mrs I	23	23	20.7	18.7	-9.84	8.86	7.09	1.77	0.25	0.25	
M35/10517	Union Spec	23.2	23.2	21.2	19.2	-8.08	11.12	8.9	2.22	0.78	0.78	
M35/10520	Mr & Mrs I	17.9	17.9	15.9	13.9	-6.31	7.59	6.07	1.52	0.1	0.1	

			Future scenario										
Well	Owner	Depth	Adopt Dep	Top Screen	Cutoff	Calc80Min	Available	Protected	DD4 interferenc	TotalDD - Future scenario	TotalDD Current Scenario	Difference
M35/10524	Mr & Ms B	25.9	25.9	23.9	21.9	-7.84	14.06	11.25	2.81	0.36	0.36	
M35/10530	Mr & Mrs (	24.1	24.1	22.1	20.1	-5.09	15.01	12.01	3	0.46	0.46	
M35/10536	Mr & Mrs (	23.5	23.5	21.5	19.5	-10.84	8.66	6.93	1.73	0.26	0.26	
M35/10567	INGLEWOC	60.1	60.1	58.1	56.1	-1.1	55	44	11	3.43	3.43	
M35/10568	INGLEWOC	59.5	59.5	57.5	55.5	-1.4	54.1	43.28	10.82	3.06	3.06	
M35/10569	INGLEWOC	58.8	58.8	56.8	54.8	-1.06	53.74	42.99	10.75	3.11	3.11	
M35/10570	INGLEWOC	17.4	17.4	15.4	13.4	-3.9	9.5	7.6	1.9	0.7	0.7	
M35/10610	MR E J BAI	23.1	23.1	21.1	19.1	-6.03	13.07	10.46	2.61	0.23	0.23	
M35/10611	MR & MRS	25.6	25.6	23.6	21.6	-5.65	15.95	12.76	3.19	0.18	0.18	
M35/10612	MR & MRS	17.7	17.7	15.7	13.7	-3.95	9.75	7.8	1.95	0.14	0.14	
M35/10614	MR & MRS	18	18	16	14	-0.99	13.01	10.41	2.6	0.28	0.28	
M35/10624	MR J D MC	20.5	20.5	18.5	16.5	-1.85	14.65	11.72	2.93	0.14	0.14	
M35/10625	MR J D MC	20	20	18	16	-6.17	9.83	7.86	1.97	0.25	0.25	
M35/10626	MR J D MC	19.9	19.9	17.9	15.9	-5.17	10.73	8.58	2.15	0.15	0.15	
M35/10627	MR J D MC	18.1	18.1	16.1	14.1	-4.17	9.93	7.94	1.99	0.22	0.22	
M35/10628	MR J D MC	21.2	21.2	19.2	17.2	-2.17	15.03	12.02	3.01	0.16	0.16	
M35/10629	MR J D MC	17.8	17.8	15.8	13.8	-3.17	10.63	8.5	2.13	0.14	0.14	
M35/10634	MR & MRS	18	18	17	15	-8.81	6.19	4.95	1.24	0.53	0.53	
M35/10702	Charlton A	21	21	19	17	-1.9	15.1	12.08	3.02	0.64	0.64	
M35/10731	MR & MRS	22	22	21	19	-8.59	10.41	8.33	2.08	0.89	0.89	
M35/10740	MR & MRS	18	18	16	14	-7.93	6.07	4.86	1.21	0	0	
M35/10764	MR CLIVE I	11.6	13.5	10.5	8.5	-4.04	4.46	3.57	0.89	0.13	0.13	
M35/10982	MR & MRS	18	18	16.5	14.5	-3.67	10.83	8.66	2.17	0.15	0.15	
M35/11048	MR & MRS	18	18	16	14	-3	11	8.8	2.2	0.5	0.5	
M35/11063	MR & MRS	25	25	22	20	-8.21	11.79	9.43	2.36	0.6	0.6	
M35/11066	MACRAE L	21	21	19.5	17.5	-6.3	11.2	8.96	2.24	0.49	0.49	
M35/11067	MACRAE L	20	20	18.5	16.5	-1.71	14.79	11.83	2.96	0.4	0.4	
M35/11068	MACRAE L	19	19	17.5	15.5	-1.74	13.76	11.01	2.75	0.51	0.51	
M35/11069	MACRAE L	18	18	16.5	14.5	-3.89	10.61	8.49	2.12	0.33	0.33	
M35/11070	MACRAE L	20.4	20.4	18.9	16.9	-4.63	12.27	9.82	2.45	0.35	0.35	
M35/11072	MACRAE L	18	18	16.5	14.5	-0.15	14.35	11.48	2.87	0.25	0.25	
M35/11073	Jenkins M	20.3	20.3	18.8	16.8	-0.39	16.41	13.13	3.28	0.24	0.24	
M35/11074	MACRAE L	17	17	15.5	13.5	-2.02	11.48	9.18	2.3	0	0	
M35/11075	MACRAE L	20	20	17	15	-1.23	13.77	11.02	2.75	0.23	0.23	
M35/11077	MACRAE L	18	18	16.5	14.5	-0.54	13.96	11.17	2.79	0.27	0.27	
M35/11084	MR & MRS	24	24	22.5	20.5	-11.32	9.18	7.34	1.84	0.1	0.1	
M35/11103	MR & MS I	18	18	17	15	-3.18	11.82	9.46	2.36	0.67	0.67	
M35/11106	MR & MRS	17	17	16	14	-8.06	5.94	4.75	1.19	0.72	0.72	
M35/11107	MR & MRS	26.2	26.2	24.2	22.2	-7.19	15.01	12.01	3	0.23	0.23	
M35/11179	MR & MRS	47	47	45	43	-1.38	41.62	33.3	8.32	4.14	4.14	
M35/11186	MR & MRS	23.1	23.1	21.1	19.1	-3.85	15.25	12.2	3.05	0	0	
M35/11187	MR & MRS	21.6	21.6	19.6	17.6	-3.32	14.28	11.42	2.86	0	0	
M35/11188	MR & MRS	20.6	20.6	18.6	16.6	-7.44	9.16	7.33	1.83	0	0	
M35/11189	MR & MRS	20.1	20.1	18.1	16.1	-9.36	6.74	5.39	1.35	0	0	
M35/11190	MR & MRS	21.9	21.9	19.9	17.9	-8.68	9.22	7.38	1.84	0	0	
M35/11191	MR & MRS	22.3	22.3	20.2	18.2	-3.88	14.32	11.46	2.86	0	0	
M35/11192	MR & MRS	20.6	20.6	18.6	16.6	-3.82	12.78	10.22	2.56	0	0	
M35/11193	MR & MRS	69.7	69.7	65.7	63.7	-0.45	63.25	50.6	12.65	0	0	
M35/11227	KAVANAGI	18	18	17	15	-7.03	7.97	6.38	1.59	0.65	0.65	
M35/11286	Macrae Lai	15.3	15.3	14.3	12.3	-0.17	12.13	9.7	2.43	0.26	0.26	
M35/11371	MR & MRS	17.5	17.5	16	14	-2.44	11.56	9.25	2.31	0.16	0.16	
M35/11372	MR & MRS	17.9	17.9	16.4	14.4	-6.27	8.13	6.5	1.63	0.12	0.12	
M35/11409	MR KEVIN	17.4	17.4	15.4	13.4	-2.89	10.51	8.41	2.1	0.48	0.48	
M35/11593	MR DC & M	17.9	17.9	16.4	14.4	-2.29	12.11	9.69	2.42	0.21	0.21	
M35/11622	North Cant	12.8	13.5	10.5	8.5	-6.06	2.44	1.95	0.49	0	0	
M35/11641	MR PE & M	23.4	23.4	21.4	19.4	-10.48	8.92	7.14	1.78	0.12	0.12	
M35/11671	MR T & MS	24	24	21	19	-6.94	12.06	9.65	2.41	0	0	
M35/11677	INGLEWOC	24	24	21	19	-1.29	17.71	14.17	3.54	0.71	0.71	
M35/11678	INGLEWOC	24	24	21	19	-1.19	17.81	14.25	3.56	0.46	0.46	
M35/11711	MR WT MC	17.4	17.4	15.4	13.4	-4.03	9.37	7.5	1.87	0.43	0.43	
M35/11735	MR R MAU	17.3	17.3	16.3	14.3	-2.87	11.43	9.14	2.29	0	0	
M35/11736	MR & MRS	18.5	18.5	16.5	14.5	-1.98	12.52	10.02	2.5	0	0	
M35/11737	MR & MRS	41.2	41.2	39.2	37.2	-0.96	36.24	28.99	7.25	0	0	
M35/11738	MR & MRS	22.3	22.3	20.3	18.3	-2.89	15.41	12.33	3.08	0	0	
M35/11739	MR & MRS	22.1	22.1	19.1	17.1	-1.99	15.11	12.09	3.02	0	0	
M35/11740	Mr L J Scot	18	18	16.3	14.3	-3.81	10.49	8.39	2.1	0	0	
M35/11822	Mr B Y Bigg	18	18	15	13	-1.86	11.14	8.91	2.23	0	0	
M35/11823	Mr B Y Bigg	18	18	15	13	-1.79	11.21	8.97	2.24	0	0	
M35/11904	MR & MRS	74.4	74.4	67.1	65.1	-1.97	63.13	50.5	12.63	7.12	7.12	
M35/11918	Bradshaw I	70.5	70.5	66	64	-1.94	62.06	49.65	12.41	0	0	
M35/11932	MR & MS (	39.8	39.8	37.8	35.8	-0.14	35.66	28.53	7.13	0	0	
M35/11965	MR D CLEM	20	20	17	15	-1.27	13.73	10.98	2.75	0.19	0.19	
M35/11966	MR D CLEM	21.1	21.1	19.1	17.1	-0.14	16.96	13.57	3.39	0.18	0.18	
M35/17681	SOUTHERN	24.1	24.1	21.7	19.7	-3.88	15.82	12.66	3.16	0	0	
M35/17733	MR & MRS	18	18	16	14	-5.92	8.08	6.46	1.62	0.14	0.14	
M35/17863	MR & MRS	24	24	22	20	-7.05	12.95	10.36	2.59	0.26	0.26	
M35/17873	MR G EDGI	24	24	20	18	-0.52	17.48	13.98	3.5	0	0	
M35/17875	MR S W HA	24	24	21	19	-4.88	14.12	11.3	2.82	0.17	0.17	
M35/17966	MR & MRS	10	13.5	10.5	8.5	-1.34	7.16	5.73	1.43	0	0	
M35/17977	MR U VAN	25.6	25.6	22.1	20.1	-9.04	11.06	8.85	2.21	0.13	0.13	
M35/18023	MR & MRS	12	13.5	10.5	8.5	-1.49	7.01	5.61	1.4	0	0	
M35/18053	WITHER HI	19.2	19.2	18.2	16.2	-5.1	11.1	8.88	2.22	0.36	0.36	
M35/18054	MR G J & M	18.8	18.8	17.8	15.8	-5.1	10.7	8.56	2.14	0.49	0.49	
M35/18064	MR & MRS	18	18	17	15	-4.16	10.84	8.67	2.17	0.14	0.14	
M35/18131	MR JG & M	23.5	23.5	22.8	20.8	-6.98	13.82	11.06	2.76	0.15	0.15	
M35/18153	MR D THOI	36	36	35	33	-1.53	31.47	25.18	6.29	1.38	1.38	
M35/18154	MR G C TYI	17.7	17.7	15.7	13.7	-0.91	12.79	10.23	2.56	0.23	0.23	
M35/18172	MR GRAEM	65.3	65.3	61.3	59.3	-0.48	58.82	47.06	11.76	0	0	
M35/18183	MR GILES L	53.7	53.7	50.7	48.7	-5.41	43.29	34.63	8.66	0	0	
M35/18188	MR M P EM	18	18	16.9	14.9	-3.09	11.81	9.45	2.36	0	0	
M35/1820	Mr R G & M	4.6	13.5	10.5	8.5	-4.14	4.36	3.49	0.87	0	0	
M35/18231	MR & MRS	18	18	17	15	-8.19	6.81	5.45	1.36	0.75	0.75	
M35/18232	T M & K A	24	24	22.5	20.5	-9.79	10.71	8.57	2.14	0.19	0.19	
M35/18259	MR M I & I	47	47	43.5	41.5	-1.45	40.05	32.04	8.01	2.14	2.14	

			Future scenario										
Well	Owner	Depth	Adopt Dep	Top Screen	Cutoff	Calc80Min	Available	Protected	DD4 interferenc	TotalDD - Future scenario	TotalDD Current Scenario	Difference
M35/18260	MR M I & M	24	24	20.6	18.6	-1.45	17.15	13.72	3.43	0	0	
M35/18261	MR J D & M	24	24	20.6	18.6	-5.96	12.64	10.11	2.53	0	0	
M35/1827	CAMMOCK	7.6	13.5	10.5	8.5	-1.47	7.03	5.62	1.41	0	0	
M35/1836	Mr & Mrs I	16.8	16.8	1	-1	-3.29	-4.29	-3.43	-0.86	0	0	
M35/18360	MR D T & M	24	24	21	19	-1.66	17.34	13.87	3.47	0.18	0.18	
M35/18394	Mrs J A O'C	23.9	23.9	21.9	19.9	-3.25	16.65	13.32	3.33	0	0	
M35/18395	Mrs J A O'C	24	24	21	19	-2.25	16.75	13.4	3.35	0	0	
M35/18492	MR & MRS	25	25	22.5	20.5	-0.16	20.34	16.27	4.07	0	0	
M35/18520	PINELEIGH	36	36	30	28	-1.24	26.76	21.41	5.35	0	0	
M35/18525	Southbrool	0	13.5	10.5	8.5	-1.46	7.04	5.63	1.41	0	0	
M35/18540	KA Lamb	16	16	14	12	-1.28	10.72	8.58	2.14	0	0	
M35/18746	MR G BROS	26.3	26.3	21.3	19.3	-3.95	15.35	12.28	3.07	0	0	
M35/18781	MR M TUR	23.9	23.9	21.9	19.9	-4	15.9	12.72	3.18	0.17	0.17	
M35/18806	MR & MRS	23	23	22	20	-5.29	14.71	11.77	2.94	0.27	0.27	
M35/2598	LOUGHNAI	22.4	22.4	19.3	17.3	-2.3	15	12	3	0.12	0.12	
M35/2620	Mr Troy D	14.2	14.2	11.2	9.2	-2.93	6.27	5.02	1.25	0	0	
M35/2625	Mr C O Ma	12.8	13.5	10.5	8.5	-3.25	5.25	4.2	1.05	0.1	0.1	
M35/2699	Mr & Mrs J	13.3	13.5	10.5	8.5	-5.24	3.26	2.61	0.65	0	0	
M35/2726	Mr D S & M	12	13.5	10.5	8.5	-0.78	7.72	6.18	1.54	0.1	0.1	
M35/2728	Mr H C & M	12.2	13.5	10.5	8.5	-4.44	4.06	3.25	0.81	0	0	
M35/2730	Mr A D & M	7.3	13.5	10.5	8.5	-5.7	2.8	2.24	0.56	0.11	0.11	
M35/2756	JOHNSTON	12.5	13.5	10.5	8.5	-2.48	6.02	4.82	1.2	0	0	
M35/2759	Mr T N Bas	4.8	13.5	10.5	8.5	-4.42	4.08	3.26	0.82	0.21	0.21	
M35/2847	SMITH	0	13.5	10.5	8.5	-3.67	4.83	3.86	0.97	0.11	0.11	
M35/2915	WALDIE (E	16	16	13	11	-7.95	3.05	2.44	0.61	0.29	0.29	
M35/2918	A D & E H (	8.5	13.5	10.5	8.5	-4.15	4.35	3.48	0.87	0.11	0.11	
M35/2919	RICHARDS	24.2	24.2	21.2	19.2	-6.24	12.96	10.37	2.59	0	0	
M35/2920	RICHARDS	10.6	13.5	10.5	8.5	-6.98	1.52	1.22	0.3	0	0	
M35/3019	MacRae La	15.4	15.4	12.4	10.4	-1.21	9.19	7.35	1.84	0.25	0.25	
M35/3032	Kate Mullir	19.7	19.7	16.7	14.7	-4.11	10.59	8.47	2.12	0.1	0.1	
M35/3036	BONIFANT	13	13.5	10.5	8.5	-5.26	3.24	2.59	0.65	0	0	
M35/3053	SEARLE M.	0	13.5	10.5	8.5	-1.49	7.01	5.61	1.4	0	0	
M35/3064	Mr & Mrs I	12.5	13.5	10.5	8.5	-5.79	2.71	2.17	0.54	0.3	0.3	
M35/3065	Mr & Mrs I	12	13.5	10.5	8.5	-3.26	5.24	4.19	1.05	0.28	0.28	
M35/3066	MASON W	6.7	13.5	10.5	8.5	-2.65	5.85	4.68	1.17	0.44	0.44	
M35/3072	Dr T B Tayl	19	19	16	14	-7.73	6.27	5.02	1.25	0	0	
M35/3077	Mr R G & M	14.5	14.5	11.5	9.5	-0.5	9	7.2	1.8	0.27	0.27	
M35/3078	Mr R G & M	13	13.5	10.5	8.5	-5.03	3.47	2.78	0.69	0	0	
M35/3080	DM & AD S	15.4	15.4	12.4	10.4	-1.48	8.92	7.14	1.78	0	0	
M35/3081	WOOD S.M	0	13.5	10.5	8.5	-1.48	7.02	5.62	1.4	0	0	
M35/3172	BARLASS M	24	24	21	19	-9.94	9.06	7.25	1.81	0.12	0.12	
M35/3235	BYRNE M.I	11	13.5	10.5	8.5	-3.04	5.46	4.37	1.09	0	0	
M35/3241	SANDERS I	24.2	24.2	21.2	19.2	-11.18	8.02	6.42	1.6	0.26	0.26	
M35/3245	FRASER L.J	26	26	23	21	-5.78	15.22	12.18	3.04	0	0	
M35/3247	VERKERK S	9.1	13.5	10.5	8.5	-1.15	7.35	5.88	1.47	1.15	1.34	
M35/3257	Mr & Mrs (	12	13.5	10.5	8.5	-3.45	5.05	4.04	1.01	0	0	
M35/3271	FREWER (E	5.6	13.5	10.5	8.5	-3.22	5.28	4.22	1.06	0.51	0.51	
M35/3273	COKER N.	30	30	27	25	-1.45	23.55	18.84	4.71	0.56	0.56	
M35/3281	MARSH P.J	5	13.5	10.5	8.5	-3.18	5.32	4.26	1.06	0	0	
M35/3290	T D & P J P	9.4	13.5	10.5	8.5	-8.7	-0.2	-0.16	-0.04	0	0	
M35/3306	Emms Farn	17	17	14	12	-4.01	7.99	6.39	1.6	0	0	
M35/3307	CROFT W.I	17	17	14	12	-3.55	8.45	6.76	1.69	0.11	0.11	
M35/3308	CROFT W.I	17.2	17.2	14.2	12.2	-3.78	8.42	6.74	1.68	0.12	0.12	
M35/3309	J G & S Wri	12	13.5	10.5	8.5	-4.31	4.19	3.35	0.84	0	0	
M35/3332	Mr M K & I	18	18	16.9	14.9	-5.44	9.46	7.57	1.89	0.24	0.24	
M35/3672	I N & E L Tu	13.8	13.8	11.8	9.8	-5.01	4.79	3.83	0.96	0.16	0.16	
M35/3772	The Green	16	16	13	11	-3.86	7.14	5.71	1.43	0	0	
M35/4085	Lawrence	0	13.5	10.5	8.5	-1.26	7.24	5.79	1.45	0	0	
M35/4099	CAMERON	11.5	13.5	10.5	8.5	-5.28	3.22	2.58	0.64	0.4	0.4	
M35/4184	COMBRIDG	11	13.5	10.5	8.5	-4.63	3.87	3.1	0.77	0	0	
M35/4238	Timperley	12.2	13.5	10.5	8.5	-4.61	3.89	3.11	0.78	0.42	0.42	
M35/4239	Timperley	12.3	13.5	10.5	8.5	-8.24	0.26	0.21	0.05	0.4	0.4	
M35/4377		11.5	13.5	10.5	8.5	-7.42	1.08	0.86	0.22	0	0	
M35/4428	HARRIS I.R	19.4	19.4	16.4	14.4	-5.53	8.87	7.1	1.77	0	0	
M35/4438	JURY R.J.&	9.1	13.5	10.5	8.5	-1.81	6.69	5.35	1.34	0	0	
M35/4467	Wards Roa	18.8	18.8	16.1	14.1	-9.62	4.48	3.58	0.9	0.1	0.1	
M35/4552	Mr & Mrs I	9	13.5	10.5	8.5	-4.23	4.27	3.42	0.85	0.42	0.42	
M35/4554	A Verkerk I	7.5	13.5	10.5	8.5	-1.88	6.62	5.3	1.32	0.56	0.72	
M35/4556	Mr E Luiset	22	22	19	17	-1.18	15.82	12.66	3.16	0.18	0.18	
M35/4605	PARROTT	13	13.5	10.5	8.5	-8.45	0.05	0.04	0.01	0	0	
M35/4606	PARROTT	8	13.5	10.5	8.5	-6.59	1.91	1.53	0.38	0.11	0.11	
M35/4611	FRYER R.K	6.1	13.5	10.5	8.5	-2.6	5.9	4.72	1.18	0	0	
M35/4614	TOZER N.A	0	13.5	10.5	8.5	-2.6	5.9	4.72	1.18	0.15	0.15	
M35/4668	Mr & Mrs I	8.6	13.5	10.5	8.5	-6.84	1.66	1.33	0.33	0.28	0.28	
M35/4669	WARD L.G	11	13.5	10.5	8.5	-5.98	2.52	2.02	0.5	0.29	0.29	
M35/4672	BROWN K.	12.2	13.5	10.5	8.5	-2.2	6.3	5.04	1.26	0	0	
M35/4673	BROWN K.	0	13.5	10.5	8.5	-1.84	6.66	5.33	1.33	0	0	
M35/4678	MCINTYRE	20.1	20.1	17.1	15.1	-8.21	6.89	5.51	1.38	0.88	0.88	
M35/4679	SOUTHERN	0	13.5	10.5	8.5	-4.38	4.12	3.3	0.82	0.28	0.28	
M35/4680	ABBOTT W	16.7	16.7	13.7	11.7	-7.57	4.13	3.3	0.83	0.18	0.18	
M35/4681	SANDERS I	12.8	13.5	10.5	8.5	-6.69	1.81	1.45	0.36	0.78	0.78	
M35/4682	SEARLE M	15.8	15.8	12.8	10.8	-5.95	4.85	3.88	0.97	0.82	0.82	
M35/4683	HARRIS I.R	9.3	13.5	10.5	8.5	-2.89	5.61	4.49	1.12	0.34	0.34	
M35/4699	MCKENZIE	10.4	13.5	10.5	8.5	-5.06	3.44	2.75	0.69	0.31	0.31	
M35/4700	KIVI B.	12.2	13.5	10.5	8.5	-3.23	5.27	4.22	1.05	0.67	0.67	
M35/4707	Mr D A Ma	13.3	13.5	10.5	8.5	-0.58	7.92	6.34	1.58	0	0	
M35/4716	MOORE E.	13.7	13.7	10.7	8.7	-7.38	1.32	1.06	0.26	0.11	0.11	
M35/4717	IRELAND V	9.1	13.5	10.5	8.5	-1.08	7.42	5.94	1.48	0.44	0.56	
M35/4718	LEMON W	6.1	13.5	10.5	8.5	-2.62	5.88	4.7	1.18	0	0	
M35/4719	POWER G.	8.5	13.5	10.5	8.5	-3	5.5	4.4	1.1	1.14	1.25	
M35/4720	MOORE E.	5.4	13.5	10.5	8.5	-2.37	6.13	4.9	1.23	0.64	0.79	
M35/4722	Wicklow Fa	12	13.5	10.5	8.5	-3.81	4.69	3.75	0.94	0.53	0.74	
M35/4723	ARMITAGE	0	13.5	10.5	8.5	-2.33	6.17	4.94	1.23	0.22	0.22	
M35/4724	ALEXANDE	13.5	13.5	11.5	9.5	-2.8	6.7	5.36	1.34	0.1	0.1	

			Future scenario										
Well	Owner	Depth	Adopt Dep	Top Screen	Cutoff	Calc80Min	Available	Protected	DD4 interferenc	TotalDD - Future scenario	TotalDD Current Scenario	Difference
M35/4725	ROBSON V	19.8	19.8	16.8	14.8	-3.39	11.41	9.13	2.28	0	0	
M35/4726	MARSHELL	5.7	13.5	10.5	8.5	-3.36	5.14	4.11	1.03	0.27	0.27	
M35/4727	THIELE G.J	9.1	13.5	10.5	8.5	-4.32	4.18	3.34	0.84	0.66	0.66	
M35/4728	ADAMS R.	27.4	27.4	24.4	22.4	-6.84	15.56	12.45	3.11	0	0	
M35/4729	ADAMS R.	27.4	27.4	24.4	22.4	-6.84	15.56	12.45	3.11	0	0	
M35/4730	RUTHERFO	12.1	13.5	10.5	8.5	-4.08	4.42	3.54	0.88	0	0	
M35/4731	FREWER K	12.2	13.5	10.5	8.5	-5.54	2.96	2.37	0.59	0.25	0.25	
M35/4732	SINCOCK (	15.2	15.2	12.2	10.2	-1.94	8.26	6.61	1.65	0	0	
M35/4734	BENNETT I	9.1	13.5	10.5	8.5	-8.42	0.08	0.06	0.02	0	0	
M35/4735	GOTTERME	8.2	13.5	10.5	8.5	-1.93	6.57	5.26	1.31	0	0	
M35/4736	BRYNE M.I	12	13.5	10.5	8.5	-0.83	7.67	6.14	1.53	0.11	0.11	
M35/4737	Messrs J G	27.9	27.9	23.1	21.1	-9.21	11.89	9.51	2.38	0	0	
M35/4738	A. Smith	13.7	13.7	10.7	8.7	-5.92	2.78	2.22	0.56	0.24	0.24	
M35/4739	WARD L.G	11.2	13.5	10.5	8.5	-6.19	2.31	1.85	0.46	0.23	0.23	
M35/4740	CAMERON	0	13.5	10.5	8.5	-2.57	5.93	4.74	1.19	0.82	0.82	
M35/4741	SCOTT J.H.	9.1	13.5	10.5	8.5	-3.93	4.57	3.66	0.91	0.55	0.55	
M35/4742	SCOTT J.H.	9.1	13.5	10.5	8.5	-5.82	2.68	2.14	0.54	0.41	0.41	
M35/4743	ARMSTRON	13.7	13.7	10.7	8.7	-3.3	5.4	4.32	1.08	0.11	0.11	
M35/4744	ARMSTRON	0	13.5	10.5	8.5	-2.66	5.84	4.67	1.17	0.14	0.14	
M35/4745	ARMSTRON	0	13.5	10.5	8.5	-2.3	6.2	4.96	1.24	0.58	0.74	
M35/4746	VERKERK A	9.1	13.5	10.5	8.5	-1.67	6.83	5.46	1.37	0.96	1.11	
M35/4747	LESLIE D.H	5.4	13.5	10.5	8.5	-1.93	6.57	5.26	1.31	0.59	0.79	
M35/4748	REID R.C.	9.1	13.5	10.5	8.5	-7.01	1.49	1.19	0.3	0.26	0.26	
M35/4751	FREE D.R.&	5	13.5	10.5	8.5	-2.19	6.31	5.05	1.26	0.14	0.14	
M35/4752	MAUGER S	7.6	13.5	10.5	8.5	-4.43	4.07	3.26	0.81	0.1	0.1	
M35/4764	GERARD R	23.7	23.7	20.7	18.7	-5.05	13.65	10.92	2.73	0.1	0.1	
M35/4766	HINDS P.J.	5.4	13.5	10.5	8.5	-2.82	5.68	4.54	1.14	0	0	
M35/4767	HINDS P.J.	3.6	13.5	10.5	8.5	-3.9	4.6	3.68	0.92	0	0	
M35/4768	Southern C	14.3	14.3	11.3	9.3	-5.91	3.39	2.71	0.68	0.74	0.74	
M35/4770	DELLOW P	0	13.5	10.5	8.5	-2.38	6.12	4.9	1.22	0.76	0.99	
M35/4771	CROZIER N	6.7	13.5	10.5	8.5	-2.32	6.18	4.94	1.24	0.33	0.33	
M35/4772	Robin Ame	0	13.5	10.5	8.5	-2.64	5.86	4.69	1.17	0	0	
M35/4774	BURROWS	11.2	13.5	10.5	8.5	-5.99	2.51	2.01	0.5	0	0	
M35/4776	JOHNSON	6.7	13.5	10.5	8.5	-7.25	1.25	1	0.25	0.36	0.36	
M35/4777	BAGRIE W	15.2	15.2	12.2	10.2	-0.65	9.55	7.64	1.91	0	0	
M35/4778	P D & A G	10.7	13.5	10.5	8.5	-4.17	4.33	3.46	0.87	0.1	0.1	
M35/4779	HARRISON	12.7	13.5	10.5	8.5	-3.82	4.68	3.74	0.94	0.44	0.44	
M35/4782	BISMAN I.	20.4	20.4	20.4	18.4	-1.52	16.88	13.5	3.38	0.52	0.7	
M35/4785	THACKWEL	6.1	13.5	10.5	8.5	-2.38	6.12	4.9	1.22	0.74	1	
M35/4788	WRAPSON	0	13.5	10.5	8.5	-2.41	6.09	4.87	1.22	0.74	1	
M35/4789	MURRAY IF	13.7	13.7	10.7	8.7	-0.7	8	6.4	1.6	0.33	0.46	
M35/4790	WALLS C.A	10.2	13.5	10.5	8.5	-0.27	8.23	6.58	1.65	0.29	0.4	
M35/4792	OLSEN M.	9.1	13.5	10.5	8.5	-2.39	6.11	4.89	1.22	0.14	0.14	
M35/4794	HEATLEY K	6.1	13.5	10.5	8.5	-0.27	8.23	6.58	1.65	0.29	0.4	
M35/4795	IRRIGATIOI	13.8	13.8	10.8	8.8	-0.69	8.11	6.49	1.62	0.34	0.47	
M35/4821	COKER N.	0	13.5	10.5	8.5	-1.52	6.98	5.58	1.4	0.42	0.42	
M35/4823	BONIFANT	19.1	19.1	16.1	14.1	-2.99	11.11	8.89	2.22	0	0	
M35/4826	USSHER D.	24.2	24.2	21.2	19.2	-2.97	16.23	12.98	3.25	0	0	
M35/4827	S & L C BA	13.1	13.5	10.5	8.5	-2.4	6.1	4.88	1.22	0	0	
M35/4828	FROST E.M	4.9	13.5	10.5	8.5	-2.3	6.2	4.96	1.24	0	0	
M35/4832	RANDS B.V	9.1	13.5	10.5	8.5	-5.46	3.04	2.43	0.61	0.11	0.11	
M35/4836	WATHERST	9.1	13.5	10.5	8.5	-2.4	6.1	4.88	1.22	0	0	
M35/4837	BONNINGT	10.6	13.5	10.5	8.5	-5.52	2.98	2.38	0.6	0	0	
M35/4838	BONNINGT	0	13.5	10.5	8.5	-2.58	5.92	4.74	1.18	0	0	
M35/4839	CAIN J.W.	6.1	13.5	10.5	8.5	-1.6	6.9	5.52	1.38	0	0	
M35/4841	MAUNSELL	6.1	13.5	10.5	8.5	-0.27	8.23	6.58	1.65	0.29	0.4	
M35/4851	SCHLUTER	6.7	13.5	10.5	8.5	-1.51	6.99	5.59	1.4	0	0	
M35/4852	H J USSHEF	15.2	15.2	12.2	10.2	-0.16	10.04	8.03	2.01	0	0	
M35/4853	RICHARDS	3.6	13.5	10.5	8.5	-2.54	5.96	4.77	1.19	0	0	
M35/4855	ROOS M.	0	13.5	10.5	8.5	-1.95	6.55	5.24	1.31	0	0	
M35/4857	ROWLAND	13	13.5	10.5	8.5	-3.74	4.76	3.81	0.95	0.65	0.65	
M35/4858	Mr & Mrs (	13.7	13.7	10.7	8.7	-4.31	4.39	3.51	0.88	0.38	0.38	
M35/4865	PAWSON (	9.5	13.5	10.5	8.5	-3.01	5.49	4.39	1.1	0	0	
M35/4866	VAN BEEK	0	13.5	10.5	8.5	-2.37	6.13	4.9	1.23	0	0	
M35/4867	PLASKETT	6	13.5	10.5	8.5	-2.35	6.15	4.92	1.23	0	0	
M35/4868	LAMARE J.	12.8	13.5	10.5	8.5	-5.85	2.65	2.12	0.53	0	0	
M35/4877	SINCLAIR I	9.8	13.5	10.5	8.5	-5.03	3.47	2.78	0.69	0.13	0.13	
M35/4879	MCQUILLA	13.7	13.7	10.7	8.7	-4.01	4.69	3.75	0.94	0.11	0.11	
M35/4885	CROWE A.	4.4	13.5	10.5	8.5	-1.34	7.16	5.73	1.43	0.2	0.2	
M35/4905	STEVENSOI	9.5	13.5	10.5	8.5	-4.14	4.36	3.49	0.87	0	0	
M35/4906	STEVENSOI	38	38	35	33	-1.25	31.75	25.4	6.35	13.39	13.39	
M35/4907	STEVENSOI	3.2	13.5	10.5	8.5	-3.38	5.12	4.1	1.02	0.11	0.11	
M35/4924	TURNER R	19.7	19.7	18.8	16.8	-2.39	14.41	11.53	2.88	0	0	
M35/4972	MILL RD FA	2	13.5	10.5	8.5	-0.93	7.57	6.06	1.51	0.21	0.21	
M35/4978	KINGSCOTI	8.5	13.5	10.5	8.5	-4.66	3.84	3.07	0.77	0	0	
M35/4979	Ms M E Ho	20	20	17	15	-4.24	10.76	8.61	2.15	0.51	0.51	
M35/4984	CLEEVE L.A	4.2	13.5	10.5	8.5	-4.01	4.49	3.59	0.9	0.67	0.67	
M35/5021	SCOTT R.S	12.8	13.5	10.5	8.5	-5.78	2.72	2.18	0.54	0.13	0.13	
M35/5041	KINGSTON	6.4	13.5	10.5	8.5	-1.48	7.02	5.62	1.4	0	0	
M35/5054	MARSH P.'	3.1	13.5	10.5	8.5	-3.31	5.19	4.15	1.04	0	0	
M35/5076	GIBB J.D.&	0	13.5	10.5	8.5	-1.59	6.91	5.53	1.38	0	0	
M35/5111	Mr M J & M	16.5	16.5	13.5	11.5	-3.6	7.9	6.32	1.58	0	0	
M35/5133	MARSHALL	20	20	17	15	-6.65	8.35	6.68	1.67	0.1	0.1	
M35/5134	MURRAY IF	0	13.5	10.5	8.5	-2.34	6.16	4.93	1.23	0.33	0.46	
M35/5147	BOULTON	12	13.5	10.5	8.5	-1.18	7.32	5.86	1.46	0.49	0.65	
M35/5190	TUANUI B.	9	13.5	10.5	8.5	-6.39	2.11	1.69	0.42	0.42	0.42	
M35/5191	TRANSPAC	5	13.5	10.5	8.5	-5.34	3.16	2.53	0.63	0	0	
M35/5239	TAYLOR H.	19.5	19.5	16.5	14.5	-6.07	8.43	6.74	1.69	0.17	0.17	
M35/5240	Warman T	14.3	14.3	11.3	9.3	-5.94	3.36	2.69	0.67	0.17	0.17	
M35/5241	FORD (EX (	18.3	18.3	15.3	13.3	-8.18	5.12	4.1	1.02	0.32	0.32	
M35/5282	Rae & Willi	7	13.5	10.5	8.5	-1.15	7.35	5.88	1.47	0	0	
M35/5290	CHARTERIS	19.8	19.8	16.8	14.8	-5.32	9.48	7.58	1.9	0.15	0.15	
M35/5291	HASSELL D	18.3	18.3	15.3	13.3	-4.77	8.53	6.82	1.71	0.13	0.13	
M35/5294	WRIGHT G	16.1	16.1	13.1	11.1	-7.88	3.22	2.58	0.64	0	0	

			Future scenario										
Well	Owner	Depth	Adopt Dep	Top Screen	Cutoff	Calc80Min	Available	Protected	DD4 interferenc	TotalDD - Future scenario	TotalDD Current Scenario	Difference
M35/5298	NEATE K.C	19.8	19.8	16.8	14.8	-5.17	9.63	7.7	1.93	0.12	0.12	
M35/5300	SEED S.L.&	15.7	15.7	12.7	10.7	-6.08	4.62	3.7	0.92	0.17	0.17	
M35/5301	RICHARDS	16.1	16.1	13.1	11.1	-6.33	4.77	3.82	0.95	0	0	
M35/5308	DORNABEL	16.4	16.4	13.4	11.4	-8.61	2.79	2.23	0.56	0	0	
M35/5309	DEAN E.M	20.4	20.4	17.4	15.4	-4.26	11.14	8.91	2.23	0.13	0.13	
M35/5310	ANDERSON	12.2	13.5	10.5	8.5	-9.1	-0.6	-0.48	-0.12	0.47	0.47	
M35/5311	Mr R G & M	12	13.5	10.5	8.5	-0.5	8	6.4	1.6	0.37	0.37	
M35/5313	PEARCE F.	24	24	22.4	20.4	-10.56	9.84	7.87	1.97	0	0	
M35/5315	GILES I J	6.1	13.5	10.5	8.5	-1.09	7.41	5.93	1.48	0	0	
M35/5322	GILES R.L.	9.1	13.5	10.5	8.5	-5.69	2.81	2.25	0.56	0.16	0.16	
M35/5324	STEPHENSI	17	17	14	12	-2.62	9.38	7.5	1.88	0	0	
M35/5325	STEPHENS	8.5	13.5	10.5	8.5	-2.62	5.88	4.7	1.18	0	0	
M35/5326	STEPHENS	7.6	13.5	10.5	8.5	-2.36	6.14	4.91	1.23	0	0	
M35/5330	Mr S J Higg	15.5	15.5	14	12	-2.08	9.92	7.94	1.98	0	0	
M35/5332	Ohoka Dov	35.2	35.2	32.5	30.5	-9.65	20.85	16.68	4.17	0	0	
M35/5349	DALLEY R.(	6	13.5	10.5	8.5	-4.64	3.86	3.09	0.77	0.41	0.41	
M35/5356	GRAY J.E.&	15.2	15.2	9.5	7.5	-1.49	6.01	4.81	1.2	0	0	
M35/5430	Messrs D C	12.3	13.5	10.5	8.5	-1.06	7.44	5.95	1.49	0.4	0.4	
M35/5448	COURTNEY	14.5	14.5	11.5	9.5	-0.7	8.8	7.04	1.76	0	0	
M35/5497	ROSSITER	0	13.5	10.5	8.5	-2.33	6.17	4.94	1.23	0	0	
M35/5608	ARCHIBALI	15	15	13.5	11.5	-3.59	7.91	6.33	1.58	0	0	
M35/5652	Wilsons Mi	13.6	13.6	10.6	8.6	-1.57	7.03	5.62	1.41	0.14	0.14	
M35/5677	POPE A &	95.2	95.2	92.2	90.2	-5.27	84.93	67.94	16.99	1.53	1.53	
M35/5704	ROSSITER (	0	13.5	10.5	8.5	-2.4	6.1	4.88	1.22	0	0	
M35/5705	ROSSITER (	12	13.5	10.5	8.5	-0.74	7.76	6.21	1.55	0	0	
M35/5736	Canterbury	15.5	15.5	12.5	10.5	-4.72	5.78	4.62	1.16	0.51	0.51	
M35/5807	Mr J E Den	10	13.5	10.5	8.5	-3.33	5.17	4.14	1.03	0	0	
M35/5936	Mr & Mrs I	15	15	12	10	-1.95	8.05	6.44	1.61	0	0	
M35/5972	Mr & Mrs J	13.9	13.9	9.9	7.9	-2.22	5.68	4.54	1.14	0.29	0.29	
M35/5981	MCLAUGH	15	15	12	10	-2.97	7.03	5.62	1.41	0	0	
M35/5988	SEED SL &	15	15	14	12	-6.39	5.61	4.49	1.12	0.18	0.18	
M35/6008	HUTHINSO	15	15	14	12	-1.76	10.24	8.19	2.05	0	0	
M35/6009	FLITCROFT	20	20	17	15	-7.44	7.56	6.05	1.51	0	0	
M35/6011	GARLICK V	15.2	15.2	13.2	11.2	-5.96	5.24	4.19	1.05	0	0	
M35/6026	Mr & Mrs S	24	24	22	20	-1.37	18.63	14.9	3.73	0	0	
M35/6046	BARRY M.E	4.9	13.5	10.5	8.5	-4.94	3.56	2.85	0.71	0	0	
M35/6061	CAMERON	20.8	20.8	17.8	15.8	-4.57	11.23	8.98	2.25	0	0	
M35/6070	FORD (EX (	18	18	17	15	-8.18	6.82	5.46	1.36	0.32	0.32	
M35/6076	Mr J Pearc	22	22	19	17	-2.32	14.68	11.74	2.94	0	0	
M35/6077	Mr & Mrs I	20.5	20.5	17.5	15.5	-9.58	5.92	4.74	1.18	0.25	0.25	
M35/6087	FOSTER M.	12	13.5	10.5	8.5	-0.94	7.56	6.05	1.51	0	0	
M35/6096	Wyndarra (	12	13.5	10.5	8.5	-3.74	4.76	3.81	0.95	0.1	0.1	
M35/6097	FROST E.M	12	13.5	10.5	8.5	-2.6	5.9	4.72	1.18	0	0	
M35/6116	CAIN J.W.	5.4	13.5	10.5	8.5	-1.04	7.46	5.97	1.49	0	0	
M35/6123	ALLISON .R	13.6	13.6	10.6	8.6	-4.92	3.68	2.94	0.74	0	0	
M35/6142	GOLD M.N	20.4	20.4	14.4	12.4	-6.51	5.89	4.71	1.18	0	0	
M35/6167	PRICE S (E.	12.5	13.5	10.5	8.5	-2.15	6.35	5.08	1.27	0.52	0.52	
M35/6178	JOHNSON	0	13.5	10.5	8.5	-1.59	6.91	5.53	1.38	0	0	
M35/6179	JOHNSON	20	20	17	15	-3.74	11.26	9.01	2.25	0	0	
M35/6181	WALKER D	12	13.5	10.5	8.5	-3.71	4.79	3.83	0.96	0.2	0.2	
M35/6191	CUSICK D.J	11.7	13.5	10.5	8.5	-5.53	2.97	2.38	0.59	0.1	0.1	
M35/6231	SINGER DJ	17.5	17.5	16.5	14.5	-6.52	7.98	6.38	1.6	0	0	
M35/6268	A Verkerk I	12	13.5	10.5	8.5	-3.16	5.34	4.27	1.07	0.54	0.65	
M35/6279	HEWITT SJ	5.5	13.5	10.5	8.5	-0.75	7.75	6.2	1.55	0	0	
M35/6280	Mr D A L M	16.4	16.4	15.4	13.4	-2.65	10.75	8.6	2.15	0.13	0.13	
M35/6282	Mr J Kreise	20.4	20.4	16.4	14.4	-5.07	9.33	7.46	1.87	0.15	0.15	
M35/6320	CAMMOCK	6.1	13.5	10.5	8.5	-1.46	7.04	5.63	1.41	0	0	
M35/6324	PRICE O.J.	0	13.5	10.5	8.5	-1.24	7.26	5.81	1.45	0.14	0.14	
M35/6361	MOUNTFO	42	42	36	34	-0.14	33.86	27.09	6.77	0	0	
M35/6400	BOOTH M.	15	15	12	10	-2.95	7.05	5.64	1.41	0	0	
M35/6433	CHARLTON	12	13.5	10.5	8.5	-2.55	5.95	4.76	1.19	0.44	0.44	
M35/6462	HACK BAV	18	18	13.3	11.3	-2.74	8.56	6.85	1.71	0.24	0.24	
M35/6468	Mr & Mrs /	19.3	19.3	16.3	14.3	-4.42	9.88	7.9	1.98	0.13	0.13	
M35/6483	GRAINGER	20	20	18	16	-4.51	11.49	9.19	2.3	0	0	
M35/6484	BRADLEY .I	15.5	15.5	13.5	11.5	-3.82	7.68	6.14	1.54	0.39	0.39	
M35/6507	Mr R & Mr	10	13.5	10.5	8.5	-0.37	8.13	6.5	1.63	0.28	0.28	
M35/6534	WEBSTER	18	18	15	13	-5.51	7.49	5.99	1.5	0	0	
M35/6547	CLARK DG	15	15	12	10	-4.49	5.51	4.41	1.1	0	0	
M35/6573	O'GRADY T	16.2	16.2	14.2	12.2	-0.79	11.41	9.13	2.28	0	0	
M35/6587	WARREN A	15	15	12	10	-6.58	3.42	2.74	0.68	0.21	0.21	
M35/6622	GILLMAN K	15	15	13	11	-2.67	8.33	6.66	1.67	0.14	0.14	
M35/6631	Mr E J Baile	20.2	20.2	16.2	14.2	-3.5	10.7	8.56	2.14	0	0	
M35/6650	COKER N.&	11	13.5	10.5	8.5	-3.13	5.37	4.3	1.07	0.54	0.54	
M35/6659	SPICER M.J	8.5	13.5	10.5	8.5	-2.28	6.22	4.98	1.24	0.11	0.11	
M35/6687	BECK RE &	12.7	13.5	10.5	8.5	-1.48	7.02	5.62	1.4	0	0	
M35/6688	MASON W	18	18	15	13	-6.32	6.68	5.34	1.34	0.27	0.27	
M35/6711	GANTLEY T	36	36	32.5	30.5	-1.46	29.04	23.23	5.81	3.68	3.68	
M35/6712	Denham G	17.5	17.5	14.5	12.5	-1.4	11.1	8.88	2.22	0.28	0.28	
M35/6713	Carville D	20	20	17	15	-3.42	11.58	9.26	2.32	0.48	0.48	
M35/6740	ADAMS R.I	12.4	13.5	10.5	8.5	-1.49	7.01	5.61	1.4	0	0	
M35/6763	DENTON	36	36	33	31	-1.45	29.55	23.64	5.91	4.56	4.56	
M35/6768	TRENGROV	20	20	17	15	-5.89	9.11	7.29	1.82	0.11	0.11	
M35/6773	BLACK P.C	24	24	22	20	-5.88	14.12	11.3	2.82	0	0	
M35/6774	STEWART	20	20	17	15	-6.84	8.16	6.53	1.63	0	0	
M35/6778	GRAY J & G	8	13.5	10.5	8.5	-1.47	7.03	5.62	1.41	0	0	
M35/6794	BROWN K.	15	15	12	10	-3.46	6.54	5.23	1.31	0	0	
M35/6795	AIKIN GW	18	18	16	14	-1.97	12.03	9.62	2.41	0	0	
M35/6797	WITHERS I	20	20	17	15	-4.33	10.67	8.54	2.13	0	0	
M35/6826	SOUTHBRO	10.6	13.5	10.5	8.5	-1.46	7.04	5.63	1.41	0	0	
M35/6830	Mr R J Fife	13.9	13.9	12.9	10.9	-3.68	7.22	5.78	1.44	0	0	
M35/6839	HOTHERSA	30	30	14	12	-3.81	8.19	6.55	1.64	0	0	
M35/6851	Mr S T Han	18	18	15	13	-6.03	6.97	5.58	1.39	0.1	0.1	
M35/6863	BARRINGT	15	15	12	10	-4.9	5.1	4.08	1.02	0.12	0.12	
M35/6867	HARRIS I. R	20	20	17	15	-5.19	9.81	7.85	1.96	0.94	0.94	

			Future scenario										
Well	Owner	Depth	Adopt Dep	Top Screen	Cutoff	Calc80Min	Available	Protected	DD4 interferenc	TotalDD - Future scenario	TotalDD Current Scenario	Difference
M35/6883	PLIMMER	20.6	20.6	18.6	16.6	-3.46	13.14	10.51	2.63	0	0	
M35/6888	BECK R.E.	25.5	25.5	24	22	-1.48	20.52	16.42	4.1	0	0	
M35/6891	RICHARDS	19.5	19.5	17.4	15.4	-4.79	10.61	8.49	2.12	0	0	
M35/6892	RICHARDS	20	20	17	15	-5.28	9.72	7.78	1.94	0	0	
M35/6893	RICHARDS	20	20	17	15	-5.8	9.2	7.36	1.84	0	0	
M35/6894	RICHARDS	20	20	17	15	-6.4	8.6	6.88	1.72	0	0	
M35/6895	RICHARDS	20	20	17	15	-7.04	7.96	6.37	1.59	0	0	
M35/6899	ANTONIUK	20	20	17	15	-8.1	6.9	5.52	1.38	0.1	0.1	
M35/6905	TONKIN G.	20	20	17	15	-6.37	8.63	6.9	1.73	0.14	0.14	
M35/6916	Mr & Mrs I	14.1	14.1	12.1	10.1	-5.66	4.44	3.55	0.89	0.11	0.11	
M35/6932	J T X Lindsa	12	13.5	10.5	8.5	-9.86	-1.36	-1.09	-0.27	0	0	
M35/6973	Mr J R Dun	19.7	19.7	17.1	15.1	-4.47	10.63	8.5	2.13	0	0	
M35/7023	BLACK PC &	0	13.5	10.5	8.5	-3.04	5.46	4.37	1.09	0	0	
M35/7069	JARMON I.	15	15	12	10	-1.47	8.53	6.82	1.71	0	0	
M35/7073	WALKER D	18.8	18.8	16.8	14.8	-2.58	12.22	9.78	2.44	0	0	
M35/7102	FRYER R.K.	12.4	13.5	10.5	8.5	-3.75	4.75	3.8	0.95	0	0	
M35/7107	HANSEN L	15	15	12	10	-2.52	7.48	5.98	1.5	0.18	0.18	
M35/7113	CLEMENTS	17.7	17.7	15	13	-6.11	6.89	5.51	1.38	0	0	
M35/7162	HARBECK	18	18	16.5	14.5	-6.72	7.78	6.22	1.56	0	0	
M35/7171	Glenalbany	13	13.5	10.5	8.5	-4.72	3.78	3.02	0.76	0.51	0.51	
M35/7194	Mr M R & I	24	24	22	20	-2.01	17.99	14.39	3.6	0.35	0.35	
M35/7198	BROWN K.	16	16	13	11	-3.3	7.7	6.16	1.54	0	0	
M35/7204	COKER N.	15	15	12	10	-3.76	6.24	4.99	1.25	0.55	0.55	
M35/7205	TONKIN G.	12	13.5	10.5	8.5	-2.99	5.51	4.41	1.1	0.15	0.15	
M35/7222	WAIMAKA	20	20	17	15	-1.45	13.55	10.84	2.71	0	0	
M35/7225	PROSSER I	11	13.5	10.5	8.5	-2.9	5.6	4.48	1.12	0.12	0.12	
M35/7287	Wyndarra	30	30	27	25	-1.83	23.17	18.54	4.63	0.1	0.1	
M35/7288	POLSON A	12	13.5	10.5	8.5	-3.62	4.88	3.9	0.98	0	0	
M35/7349	HAWKINS	24	24	21	19	-4.95	14.05	11.24	2.81	0	0	
M35/7368	IRRIGATIOI	17	17	14	12	-3.28	8.72	6.98	1.74	0	0	
M35/7444	DAVIES J &	21	21	19.5	17.5	-5.63	11.87	9.5	2.37	0	0	
M35/7507	Mr & Mr G	81	81	75	73	-0.44	72.56	58.05	14.51	0	0	
M35/7533	LYALL T.M	6	13.5	10.5	8.5	-2.33	6.17	4.94	1.23	0.32	0.45	
M35/7575	VERBERN I	18	18	16.5	14.5	-3.82	10.68	8.54	2.14	0	0	
M35/7618	Ohoka Utili	25.8	25.8	22.8	20.8	-12.14	8.66	6.93	1.73	0.41	0.41	
M35/7619	Ohoka Utili	26.8	26.8	23.8	21.8	-8.86	12.94	10.35	2.59	0.74	0.74	
M35/7687	ORR G.B &	21	21	19.5	17.5	-1.3	16.2	12.96	3.24	0	0	
M35/7692	ORR G.B &	21	21	17	15	-2.61	12.39	9.91	2.48	0	0	
M35/7710	HARRIS IR	24.2	24.2	22.2	20.2	-11.46	8.74	6.99	1.75	0.23	0.23	
M35/7716	Brakenridg	8	13.5	10.5	8.5	-0.8	7.7	6.16	1.54	0.32	0.32	
M35/7754	WILKINSOI	24	24	23	21	-1.53	19.47	15.58	3.89	0.11	0.11	
M35/7761	Mr & Mrs I	22.8	22.8	20.8	18.8	-5.08	13.72	10.98	2.74	0.11	0.11	
M35/7778	Mr & Mrs	21	21	18	16	-8.73	7.27	5.82	1.45	0	0	
M35/7796	Greenwoo	10	13.5	10.5	8.5	-1.85	6.65	5.32	1.33	0.39	0.39	
M35/7800	LAGALLIE F	39.2	39.2	35.9	33.9	-1.49	32.41	25.93	6.48	3.18	3.18	
M35/7801	Mr & Mrs I	20	20	18	16	-2	14	11.2	2.8	0	0	
M35/7898	QUAIFE AE	17.9	17.9	16.9	14.9	-8.57	6.33	5.06	1.27	0.16	0.16	
M35/7899	QUAIFE AE	18	18	17	15	-8	7	5.6	1.4	0.17	0.17	
M35/7903	DAVIDSON	18	18	16.5	14.5	-3.2	11.3	9.04	2.26	0	0	
M35/7905	MCINTOSH	14.3	14.3	12.3	10.3	-0.5	9.8	7.84	1.96	0	0	
M35/7909	MOORE EI	20	20	17	15	-2.83	12.17	9.74	2.43	0.74	0.9	
M35/7997	SHIINO Y &	24	24	22.5	20.5	-8.44	12.06	9.65	2.41	0.14	0.14	
M35/7998	SHIINO Y &	26	26	24.5	22.5	-8.77	13.73	10.98	2.75	0.18	0.18	
M35/8013	POPENHAC	14	14	8	6	-2.93	3.07	2.46	0.61	0.12	0.12	
M35/8032	ALLAN DJ	24	24	21	19	-11.59	7.41	5.93	1.48	0.26	0.26	
M35/8045	Mr M W FI	15	15	12	10	-1.92	8.08	6.46	1.62	0	0	
M35/8112	Walker DJ	20.3	20.3	18.3	16.3	-3.15	13.15	10.52	2.63	0	0	
M35/8114	WELLS GR	16.8	16.8	14.8	12.8	-3.79	9.01	7.21	1.8	0.18	0.18	
M35/8115	MANN LJ	20	20	17	15	-5.49	9.51	7.61	1.9	0.11	0.11	
M35/8156	IZARD JMA	16.8	16.8	14.8	12.8	-2.48	10.32	8.26	2.06	0.32	0.32	
M35/8160	Ohoka Utili	28.7	28.7	25.8	23.8	-8.7	15.1	12.08	3.02	0.75	0.75	
M35/8170	Mr & Mrs I	11.9	13.5	10.5	8.5	-1.93	6.57	5.26	1.31	0.3	0.3	
M35/8188	FACOORY	24	24	22.5	20.5	-10.28	10.22	8.18	2.04	0.1	0.1	
M35/8191	Mr & Mrs I	12	13.5	10.5	8.5	-1.82	6.68	5.34	1.34	0.18	0.18	
M35/8199	LAURIE CS	24.6	24.6	22.6	20.6	-12.5	8.1	6.48	1.62	0.28	0.28	
M35/8285	CAMMOCK	14.6	14.6	12.6	10.6	-1.49	9.11	7.29	1.82	0	0	
M35/8286	GIBB JD &	44.4	44.4	38	36	-1.57	34.43	27.54	6.89	0	0	
M35/8304	S J & T A D	17.1	17.1	14.6	12.6	-4.51	8.09	6.47	1.62	0.15	0.15	
M35/8311	HENDREN	18	18	16.5	14.5	-4.76	9.74	7.79	1.95	0	0	
M35/8341	Mr & Mrs I	23.9	23.9	21.4	19.4	-5.48	13.92	11.14	2.78	0.11	0.11	
M35/8343	AIKIN GW	14	14	12.5	10.5	-1.61	8.89	7.11	1.78	0	0	
M35/8399	LYNN RJ	10.5	13.5	10.5	8.5	-2.58	5.92	4.74	1.18	0.15	0.15	
M35/8409	ARCHIBALL	23.2	23.2	22.2	20.2	-6.25	13.95	11.16	2.79	0	0	
M35/8410	MR B M DA	23.9	23.9	21.9	19.9	-6.66	13.24	10.59	2.65	0	0	
M35/8414	SANDERS	17.8	17.8	16.4	14.4	-6.6	7.8	6.24	1.56	0.84	0.84	
M35/8442	HARRISON	17.8	17.8	16.3	14.3	-4	10.3	8.24	2.06	0.19	0.19	
M35/8454	Mr & Mrs I	21	21	19.5	17.5	-4.89	12.61	10.09	2.52	0	0	
M35/8456	KESSELER	30	30	27	25	-2.02	22.98	18.38	4.6	0	0	
M35/8461	ANDERSON	23.9	23.9	22.4	20.4	-11.1	9.3	7.44	1.86	0.44	0.44	
M35/8480	Mr & Mrs I	24	24	22.5	20.5	-9.9	10.6	8.48	2.12	0.23	0.23	
M35/8508	Timperley	29	29	14.5	12.5	-10.39	2.11	1.69	0.42	0.31	0.31	
M35/8536	OHOKA PA	18	18	16.5	14.5	-5.33	9.17	7.34	1.83	0	0	
M35/8537	OHOKA PA	18	18	16.5	14.5	-5.08	9.42	7.54	1.88	0	0	
M35/8539	OHOKA PA	18	18	16.5	14.5	-2.17	12.33	9.86	2.47	0	0	
M35/8585	RICHARD B	15.4	15.4	14.4	12.4	-2.64	9.76	7.81	1.95	0	0	
M35/8586	T B & K B S	14.9	14.9	13.9	11.9	-2.28	9.62	7.7	1.92	0	0	
M35/8587	RICHARDS	14.9	14.9	13.9	11.9	-3.01	8.89	7.11	1.78	0	0	
M35/8594	Ohoka Utili	28.3	28.3	25.3	23.3	-8.15	15.15	12.12	3.03	0.65	0.65	
M35/8606	BURNEY R	24.8	24.8	23.3	21.3	-7.74	13.56	10.85	2.71	0.21	0.21	
M35/8647	RADOVONI	23	23	22	20	-0.58	19.42	15.54	3.88	0	0	
M35/8649	WILTON R	16.5	16.5	14.5	12.5	-3.42	9.08	7.26	1.82	0	0	
M35/8662	WHYTE GI	19	19	17	15	-5.03	9.97	7.98	1.99	0	0	
M35/8664	Wigley N	17.3	17.3	15.3	13.3	-2.99	10.31	8.25	2.06	0.64	0.64	
M35/8694	CHADDERT	24	24	22	20	-12.73	7.27	5.82	1.45	0.27	0.27	

			Future scenario										
Well	Owner	Depth	Adopt Dep	Top Screen	Cutoff	Calc80Min	Available	Protected	DD4 interferenc	TotalDD - Future scenario	TotalDD Current Scenario	Difference
M35/8699	BUCK FARM	16	16	10	8	-3.69	4.31	3.45	0.86	0	0	
M35/8700	BUCK FARM	16	16	10	8	-3.51	4.49	3.59	0.9	0	0	
M35/8701	BUCK FARM	16	16	10	8	-3.14	4.86	3.89	0.97	0	0	
M35/8702	BUCK FARM	12	13.5	10.5	8.5	-3.33	5.17	4.14	1.03	0	0	
M35/8709	Storer GA	21.8	21.8	20.3	18.3	-2.76	15.54	12.43	3.11	0	0	
M35/8710	Buck Farms	11	13.5	10.5	8.5	-1.93	6.57	5.26	1.31	0	0	
M35/8786	Myers JC	12	13.5	10.5	8.5	-2.88	5.62	4.5	1.12	0	0	
M35/8842	Mr J C Mck	19.9	19.9	18.4	16.4	-0.61	15.79	12.63	3.16	0	0	
M35/8843	Richard Bro	14	14	13	11	-2.22	8.78	7.02	1.76	0	0	
M35/8862	Ms PM Plas	42.3	42.3	40.3	38.3	-3.33	34.97	27.98	6.99	0	0	
M35/8900	Mr & Mrs I	20.2	20.2	17.2	15.2	-2.3	12.9	10.32	2.58	0	0	
M35/8901	Mares Proj	91	91	84.2	82.2	-1.17	81.03	64.82	16.21	2.55	2.55	
M35/8935	Mr M K & I	18	18	17	15	-5.88	9.12	7.3	1.82	0.11	0.11	
M35/8936	Mr M K & I	18	18	17	15	-6.3	8.7	6.96	1.74	0.11	0.11	
M35/8951	J D & K A M	18.1	18.1	16.1	14.1	-2.32	11.78	9.42	2.36	0	0	
M35/8975	P A & P L T	22	22	20.5	18.5	-7.54	10.96	8.77	2.19	0.25	0.25	
M35/8984	L G & E D T	21	21	16.5	14.5	-2.41	12.09	9.67	2.42	0.15	0.15	
M35/9007	GJ Allison &	24	24	22.5	20.5	-1.93	18.57	14.86	3.71	0	0	
M35/9024	Brooklea D	38.3	38.3	37.3	35.3	-1.67	33.63	26.9	6.73	0	0	
M35/9025	Brooklea D	18.1	18.1	17.1	15.1	-0.7	14.4	11.52	2.88	0	0	
M35/9026	Brooklea D	17	17	16	14	-0.36	13.64	10.91	2.73	0	0	
M35/9038	Amy Major	20.7	20.7	18.7	16.7	-3.29	13.41	10.73	2.68	0.36	0.36	
M35/9071	Watson A	12	13.5	10.5	8.5	-3.97	4.53	3.62	0.91	0.13	0.13	
M35/9081	Mr C G & M	71.3	71.3	65.3	63.3	-1.76	61.54	49.23	12.31	0	0	
M35/9120	Paul & Ruth	77.9	77.9	71.9	69.9	-1.26	68.64	54.91	13.73	3.69	3.69	
M35/9126	Van't Veen	30.5	30.5	19	17	-2.97	14.03	11.22	2.81	0	0	
M35/9179	Mills PC &	47.9	47.9	41.9	39.9	-8.67	31.23	24.98	6.25	0	0	
M35/9184	Osikai J & S	23.6	23.6	21.6	19.6	-8.25	11.35	9.08	2.27	0.17	0.17	
M35/9199	G S & B A C	23.7	23.7	21.7	19.7	-11.69	8.01	6.41	1.6	0.27	0.27	
M35/9201	Peters HG	42	42	40	38	-1.49	36.51	29.21	7.3	3.62	3.62	
M35/9202	Peters HG	41.8	41.8	39.8	37.8	-1.5	36.3	29.04	7.26	3.2	3.2	
M35/9203	Peters HG	43.8	43.8	41.8	39.8	-1.52	38.28	30.62	7.66	2.76	2.76	
M35/9218	Sparrow K	24	24	22.5	20.5	-8.37	12.13	9.7	2.43	0.28	0.28	
M35/9222	Mr A & Mr	24	24	22.5	20.5	-8.25	12.25	9.8	2.45	0	0	
M35/9226	R A Edwarc	23.9	23.9	21.9	19.9	-10.2	9.7	7.76	1.94	0.1	0.1	
M35/9230	P W & T E J	22	22	19	17	-5.53	11.47	9.18	2.29	0	0	
M35/9257	Mr M D & I	18	18	16.5	14.5	-3.49	11.01	8.81	2.2	0	0	
M35/9258	Mr M D & I	18	18	16.5	14.5	-2.93	11.57	9.26	2.31	0	0	
M35/9262	Mr G D & M	21.4	21.4	19.4	17.4	-7.69	9.71	7.77	1.94	0.13	0.13	
M35/9288	MR R MAN	33.9	33.9	30.9	28.9	-3.19	25.71	20.57	5.14	0	0	
M35/9295	Smith C B	20.4	20.4	18.4	16.4	-7.59	8.81	7.05	1.76	0.26	0.26	
M35/9313	MR J GRAY	45	45	43	41	-1.5	39.5	31.6	7.9	3.12	3.12	
M35/9314	MR J GRAY	45	45	43	41	-1.5	39.5	31.6	7.9	2.85	2.85	
M35/9315	MR J GRAY	45	45	43	41	-1.51	39.49	31.59	7.9	2.52	2.52	
M35/9316	MR J GRAY	45	45	42	40	-1.52	38.48	30.78	7.7	2.37	2.37	
M35/9389	MR R I & M	20	20	17	15	-8.11	6.89	5.51	1.38	0	0	
M35/9398	MR D A BO	17.8	17.8	15.8	13.8	-7.5	6.3	5.04	1.26	0.15	0.15	
M35/9417	OHOKA VIE	13	13.5	10.5	8.5	-5.69	2.81	2.25	0.56	0.21	0.21	
M35/9418	OHOKA VIE	13	13.5	10.5	8.5	-1.07	7.43	5.94	1.49	0.18	0.18	
M35/9419	OHOKA VIE	17	17	15	13	-1.31	11.69	9.35	2.34	0.17	0.17	
M35/9420	OHOKA VIE	18	18	16	14	-2.39	11.61	9.29	2.32	0.34	0.34	
M35/9434	MR W D CI	17.9	17.9	16.9	14.9	-2.87	12.03	9.62	2.41	1.1	1.1	
M35/9445	PC & SA M	18	18	9	7	-4.16	2.84	2.27	0.57	0	0	
M35/9558	MR & MRS	24	24	22.5	20.5	-6.8	13.7	10.96	2.74	0.22	0.22	
M35/9592	Mr NA Har	21	21	18.9	16.9	-4.06	12.84	10.27	2.57	0.27	0.27	
M35/9598	MR & MRS	17.3	17.3	15.3	13.3	-6.7	6.6	5.28	1.32	0	0	
M35/9599	Mr & Mrs (	17.4	17.4	15.4	13.4	-1.69	11.71	9.37	2.34	0	0	
M35/9600	MR & MRS	17.5	17.5	15.5	13.5	-1.91	11.59	9.27	2.32	0	0	
M35/9601	MR & MRS	23.5	23.5	21.5	19.5	-3.59	15.91	12.73	3.18	0	0	
M35/9602	MR & MRS	17.4	17.4	15.4	13.4	-4.68	8.72	6.98	1.74	0.22	0.22	
M35/9603	MR & MRS	17.7	17.7	15.7	13.7	-3.03	10.67	8.54	2.13	0.28	0.28	
M35/9612	STONEHOU	17.4	17.4	14.9	12.9	-1.72	11.18	8.94	2.24	0	0	
M35/9613	STONEHOU	17.4	17.4	14.9	12.9	-7.01	5.89	4.71	1.18	0	0	
M35/9614	MR L P WH	21.1	21.1	19.6	17.6	-3.69	13.91	11.13	2.78	0.29	0.29	
M35/9626	S H & P J M	23.9	23.9	21.9	19.9	-9.77	10.13	8.1	2.03	0.22	0.22	
M35/9630	MR B T LEI	16.6	16.6	14.6	12.6	-4.11	8.49	6.79	1.7	0.84	0.84	
M35/9631	MR & MRS	27	27	25	23	-7.6	15.4	12.32	3.08	0.27	0.27	
M35/9632	MR & MRS	17.4	17.4	15.4	13.4	-7.46	5.94	4.75	1.19	0	0	
M35/9633	MR & MRS	17.6	17.6	15.6	13.6	-7.29	6.31	5.05	1.26	0	0	
M35/9634	MR & MRS	17.4	17.4	14.9	12.9	-5.28	7.62	6.1	1.52	0.11	0.11	
M35/9635	MR & MRS	17.9	17.9	15.4	13.4	-4	9.4	7.52	1.88	0.12	0.12	
M35/9636	MR & MRS	17.8	17.8	15.8	13.8	-4.82	8.98	7.18	1.8	0.1	0.1	
M35/9637	MR & MRS	17.6	17.6	15.1	13.1	-1.54	11.56	9.25	2.31	0	0	
M35/9638	MR & MRS	17.8	17.8	15.3	13.3	-6.89	6.41	5.13	1.28	0	0	
M35/9639	MR & MRS	17.5	17.5	15	13	-6.38	6.62	5.3	1.32	0	0	
M35/9640	MR & MRS	16.5	16.5	14.5	12.5	-5.6	6.9	5.52	1.38	0	0	
M35/9641	MR & MRS	16.1	16.1	14.1	12.1	-5.16	6.94	5.55	1.39	0.1	0.1	
M35/9642	MR & MRS	17.3	17.3	15.3	13.3	-4.95	8.35	6.68	1.67	0.11	0.11	
M35/9643	MR & MRS	17.5	17.5	15.5	13.5	-4.35	9.15	7.32	1.83	0.12	0.12	
M35/9666	MR & MRS	24	24	21	19	-8.3	10.7	8.56	2.14	0.11	0.11	
M35/9682	LEE FAMILY	36	36	34.5	32.5	-2.66	29.84	23.87	5.97	0	0	
M35/9698	Ohoka Utili	27.2	27.2	24.2	22.2	-9.88	12.32	9.86	2.46	0.29	0.29	
M35/9710	WAIMAKAI	258	258	255	253	-1.47	251.53	201.22	50.31	0	0	
M35/9740	MR & MRS	17.8	17.8	15.3	13.3	-4.94	8.36	6.69	1.67	0	0	
M35/9741	MR O W PI	22	22	20	18	-4.99	13.01	10.41	2.6	0.28	0.28	
M35/9760	RMO INVES	12	13.5	10.5	8.5	-1.71	6.79	5.43	1.36	0	0	
M35/9812	MR A K CU	23.8	23.8	21.8	19.8	-7.52	12.28	9.82	2.46	0.26	0.26	
M35/9829	SUBDIVISIC	18	18	12	10	-4.31	5.69	4.55	1.14	0	0	
M35/9831	Dymock	18	18	16.5	14.5	-0.2	14.3	11.44	2.86	0	0	
M35/9834	SUBDIVISIC	18	18	12	10	-3.09	6.91	5.53	1.38	0	0	
M35/9871	Mr Warwic	17.4	17.4	15.4	13.4	-0.99	12.41	9.93	2.48	0.24	0.24	
M35/9875	Mr & Mrs I	20.8	20.8	18.8	16.8	-9.12	7.68	6.14	1.54	0.23	0.23	
M35/9876	Mr & Ms M	20.5	20.5	18.5	16.5	-5.9	10.6	8.48	2.12	0.16	0.16	
M35/9916	Mr & Mrs I	24	24	18	16	-6.72	9.28	7.42	1.86	0	0	

			Future scenario									
Well	Owner	Depth	Adopt Dep	Top Screen	Cutoff	Calc80Min	Available	Protected	DD4 interferenc	TotalDD - Future scenario	TotalDD Current Scenario	Difference
M35/9946	Mr & Mrs I	20.7	20.7	18.7	16.7	-6.77	9.93	7.94	1.99	0.27	0.27	
M35/9983	Mr & Mrs I	24	24	20	18	-2.94	15.06	12.05	3.01	0	0	
M35/9995	Mr SD Sym	23.6	23.6	21.6	19.6	-8.99	10.61	8.49	2.12	0.23	0.23	
M35/9996	Ms DJ Suth	20	20	17	15	-3.37	11.63	9.3	2.33	0	0	

Input file used J:\C03300-C03399\C03371_WDC Ohoka Public Supply
Model Parameters for drawdown calculations
Transmissivity 120m²/d
Storativity 9e-4
Leakage 490m OR K'B' : 5e-4
Sigma 0.1
T0 975 and shallow aquifer less than 31m (W_11 and Eta_11 modules with flow in overlaying layer)

Applicants wells
DD Affected Wells
Over Thresholds
Depth not adequate <13.5m

Standard Screen length : 3m
Standard Pump length : 2m
Depth Range of pumped Aquifer taken from :31m till 999m

Based on parameters from analysis of drawdown in Bore M36/7701

			Future scenario										
Well	Owner	Depth	Adopt Dep	Top Screen	Cutoff	Calc80Min	Available	Protected	DD4 interference	TotalDD Future Scenario	Total DD Existing Scenario	Increase?
BW24/0262	Waimakariri Distr	84.7	84.7	78	76	-2.59	73.41	58.73	14.68	0		
M35/5609	Waimakariri Distr	18.8	18.8	16.8	14.8	-3.6	11.2	8.96	2.24	0.98	0.88	
BW24/0095	WICKLOW FARMI	50	50	47	45	-2.47	42.53	34.02	8.51	1.27	0	Yes
M35/8381	Parker	88	88	86.5	84.5	-3.71	80.79	64.63	16.16	0.45	0	Yes
M35/7701	HJ SMITH	86	86	84	82	-3.98	78.02	62.42	15.6	0.29	0	Yes
BW24/0251	Michael Hussey	48.1	48.1	45.1	43.1	-2.61	40.49	32.39	8.1	0.24	0	Yes
M35/17683	MR & MRS I L & J	77	77	71.1	69.1	-4.56	64.54	51.63	12.91	0.13	0	Yes
M35/4785	THACKWELL G.M	6.1	13.5	10.5	8.5	-2.38	6.12	4.9	1.22	0.85	1	
M35/4788	WRAPSON J.	0	13.5	10.5	8.5	-2.41	6.09	4.87	1.22	0.85	1	
M35/0387	REGNAULT C.R.	6	13.5	10.5	8.5	-3.23	5.27	4.22	1.05	1.18	1.33	
M35/0388	WALLS G.D.	0	13.5	10.5	8.5	-2.45	6.05	4.84	1.21	0.81	0.97	
M35/4770	DELLOW P.K.	0	13.5	10.5	8.5	-2.38	6.12	4.9	1.22	0.87	0.99	
BW23/0046	MR T D PARROTT	60	60	56.5	54.5	-4.12	50.38	40.3	10.08	0	0	
BW23/0047	MR T D PARROTT	23.5	23.5	19.5	17.5	-4.05	13.45	10.76	2.69	0	0	
BW23/0048	MR T D PARROTT	23.9	23.9	19.7	17.7	-4.03	13.67	10.94	2.73	0	0	
BW23/0049	MR T D PARROTT	24.1	24.1	18.3	16.3	-4.02	12.28	9.82	2.46	0	0	
BW23/0050	MR T D PARROTT	59.5	59.5	57.5	55.5	-4.01	51.49	41.19	10.3	0	0	
BW23/0058	MR ROSS WARD	23.5	23.5	21.5	19.5	-3.89	15.61	12.49	3.12	0	0	
BW23/0061	Mr G F & Mrs J D	18	18	15	13	-4.25	8.75	7	1.75	0.11	0.11	
BW23/0071	MR & MRS P J & J	26	26	23	21	-3.82	17.18	13.74	3.44	0.13	0.13	
BW23/0073	BRENT CHARLES F	25	25	22	20	-4.12	15.88	12.7	3.18	0	0	
BW23/0074	MR DAVID IAN NE	12	13.5	10.5	8.5	-4.4	4.1	3.28	0.82	0.11	0.11	
BW23/0111	MR & MRS R A F	18	18	15	13	-4.23	8.77	7.02	1.75	0	0	
BW23/0149	MR & MRS S & C	24	24	21	19	-4.49	14.51	11.61	2.9	0.12	0.12	
BW23/0162	MR & MRS W P &	24	24	21	19	-4.59	14.41	11.53	2.88	0.11	0.11	
BW23/0194	J.E. & E.N. Tapp	24	24	21	19	-4.49	14.51	11.61	2.9	0.14	0.14	
BW23/0202	Jane & John Skipp	24	24	21	19	-5.42	13.58	10.86	2.72	0	0	
BW23/0218	Sarah Craig Trust	24	24	21	19	-6.48	12.52	10.02	2.5	0.42	0.42	
BW23/0226	Daryl Edward Clar	0	13.5	10.5	8.5	-4.63	3.87	3.1	0.77	0.13	0.13	
BW23/0233	RS Scott	24	24	21	19	-4.52	14.48	11.58	2.9	0.14	0.14	
BW23/0238	Mr J and Mrs T St	24	24	21	19	-4.63	14.37	11.5	2.87	0.11	0.11	
BW23/0239	Brent and Helen M	24	24	21	19	-4.71	14.29	11.43	2.86	0.13	0.13	
BW23/0240	C K Kayes	24	24	21	19	-4.48	14.52	11.62	2.9	0.13	0.13	
BW23/0244	Blair James Piggo	24	24	21	19	-4.64	14.36	11.49	2.87	0.12	0.12	
BW23/0246	K Hartshorne	24	24	22	20	-4.94	15.06	12.05	3.01	0.12	0.12	
BW23/0250	Deryck John Adco	24	24	21	19	-5.35	13.65	10.92	2.73	0	0	
BW23/0254	Mr MJ & Mrs SE E	18	18	15	13	-4.56	8.44	6.75	1.69	0	0	
BW23/0261	Mr A & Mrs K M S	12	13.5	10.5	8.5	-4.39	4.11	3.29	0.82	0.18	0.18	
BW23/0266	Mr J A & Mrs K M	24	24	21	19	-4.72	14.28	11.42	2.86	0.14	0.14	
BW23/0278	Mr N D & Mrs L R	24	24	22	20	-4.47	15.53	12.42	3.11	0.19	0.19	
BW23/0322	Anthony Ali	24	24	22	20	-4.47	15.53	12.42	3.11	0.17	0.17	
BW23/0334	Simon Family Trus	29.4	29.4	27.9	25.9	-6.32	19.58	15.66	3.92	0.24	0.24	
BW23/0335	Tony & Sharon Re	24	24	21	19	-4.62	14.38	11.5	2.88	0.12	0.12	
BW23/0338	Yvonne & Reg Edv	24	24	21	19	-4.69	14.31	11.45	2.86	0.12	0.12	
BW23/0340	Brenda Mills & Cc	24	24	22	20	-4.61	15.39	12.31	3.08	0.12	0.12	
BW23/0342	David and Adrienı	24	24	22.5	20.5	-4.53	15.97	12.78	3.19	0.2	0.2	
BW23/0346	Dennis and Jacki J	24	24	22.5	20.5	-4.43	16.07	12.86	3.21	0.22	0.22	
BW23/0348	Darryl and Raewy	24	24	22	20	-4.65	15.35	12.28	3.07	0.13	0.13	
BW23/0350	Peter & Angela Sh	18	18	16	14	-4.45	9.55	7.64	1.91	0	0	
BW23/0351	Danny Brown	24	24	22	20	-5.68	14.32	11.46	2.86	0.21	0.21	
BW24/0024	MR K T BROWN	22.1	22.1	20.1	18.1	-1.88	16.22	12.98	3.24	0	0	
BW24/0025	MR K T BROWN	23.4	23.4	21.4	19.4	-2.28	17.12	13.7	3.42	0	0	
BW24/0028	DAVE ASHBY	36	36	30	28	-1.76	26.24	20.99	5.25	0	0	
BW24/0032	MR P BAGRIE	2.5	13.5	10.5	8.5	-1.62	6.88	5.5	1.38	0.13	0.13	
BW24/0033	MR P BAGRIE	2.5	13.5	10.5	8.5	-1.87	6.63	5.3	1.33	0	0	
BW24/0034	MR P BAGRIE	2.5	13.5	10.5	8.5	-1.89	6.61	5.29	1.32	0.11	0.11	
BW24/0035	MR P BAGRIE	2.5	13.5	10.5	8.5	-2.52	5.98	4.78	1.2	0	0	
BW24/0036	MR P BAGRIE	2.5	13.5	10.5	8.5	-2.35	6.15	4.92	1.23	0.15	0.15	
BW24/0046	MR & MRS B P &	76.2	76.2	74.2	72.2	-1.55	70.65	56.52	14.13	0	0	
BW24/0047	MR & MRS B P &	65.6	65.6	63.6	61.6	-1.43	60.17	48.14	12.03	0	0	
BW24/0048	MR & MRS B P &	48.4	48.4	46.4	44.4	-1.44	42.96	34.37	8.59	0	0	
BW24/0049	MR & MRS B P &	30	30	27	25	-1.7	23.3	18.64	4.66	0	0	
BW24/0050	MR & MRS B P &	30	30	27	25	-1.7	23.3	18.64	4.66	0	0	
BW24/0052	MR M CHRISTISOI	65	65	62	60	-1.5	58.5	46.8	11.7	0.38	0.38	
BW24/0053	GAVIN FEARY	0	13.5	10.5	8.5	-1.47	7.03	5.62	1.41	0.12	0.12	
BW24/0056	MR WAYNE HAW	0	13.5	10.5	8.5	-1.18	7.32	5.86	1.46	0.28	0.28	
BW24/0057	MR & MRS T & K	18	18	16.5	14.5	-4.68	9.82	7.86	1.96	0	0	
BW24/0091	BRUCE & BARBAR	16	16	13	11	-1.62	9.38	7.5	1.88	0.56	0.56	
BW24/0103	MR & MRS C E &	23.6	23.6	20	18	-2.34	15.66	12.53	3.13	0	0	
BW24/0118	MR WARREN JAM	65	65	62	60	-2.23	57.77	46.22	11.55	0	0	
BW24/0120	MR DEAN STEPHE	23.5	23.5	21.5	19.5	-2.89	16.61	13.29	3.32	0	0	
BW24/0121	MR DEAN STEPHE	29.9	29.9	21.5	19.5	-2.89	16.61	13.29	3.32	0	0	
BW24/0122	WILLOWS FARM I	65.4	65.4	60.5	58.5	-1.43	57.07	45.66	11.41	0	0	
BW24/0124	MR & MRS J G P &	16	16	13	11	-1.48	9.52	7.62	1.9	0	0	
BW24/0134	MR & MRS A K &	20	20	17	15	-1.43	13.57	10.86	2.71	0.23	0.23	
BW24/0139	MR H B & MRS J H	18	18	15	13	-4.83	8.17	6.54	1.63	0	0	
BW24/0164	Chris Bailey	75.5	75.5	63.5	61.5	-1.58	59.92	47.94	11.98	0.4	0.4	
BW24/0190	Edward Bruce Mil	98.4	98.4	95.4	93.4	-1.59	91.81	73.45	18.36	0.32	0.32	
BW24/0202	Tim and Karen Gr	30	30	27	25	-1.27	23.73	18.98	4.75	0.51	0.51	
BW24/0204	Stephen John Wa	21.7	21.7	19.7	17.7	-2.28	15.42	12.34	3.08	0	0	
BW24/0215	Ohoka Service Sta	4	13.5	10.5	8.5	-2.57	5.93	4.74	1.19	0.27	0.38	
BW24/0216	Ohoka Service Sta	4	13.5	10.5	8.5	-2.55	5.95	4.76	1.19	0.28	0.39	
BW24/0217	Ohoka Service Sta	4	13.5	10.5	8.5	-2.57	5.93	4.74	1.19	0.27	0.38	
BW24/0218	Ohoka Service Sta	4	13.5	10.5	8.5	-2.56	5.94	4.75	1.19	0.27	0.38	
BW24/0219	Ohoka Service Sta	4	13.5	10.5	8.5	-2.59	5.91	4.73	1.18	0.27	0.37	
BW24/0220	Bruce William Bel	95.1	95.1	93	91	-1.21	89.79	71.83	17.96	0.28	0.28	
BW24/0224	LaGallie Propertie	71.3	71.3	69.3	67.3	-1.54	65.76	52.61	13.15	0.46	0.46	
BW24/0246	Inglewood Holdin	18.3	18.3	16.3	14.3	-1.61	12.69	10.15	2.54	0.58	0.58	
BW24/0250	A M & C A Kebbel	21	21	19.5	17.5	-1.4	16.1	12.88	3.22	0.19	0.19	
BW24/0252	Mark Alexander C	16.7	16.7	14.7	12.7	-1.22	11.48	9.18	2.3	0.29	0.29	
BW24/0276	Mrs Julie Bradsha	54	54	51	49	-2.38	46.62	37.3	9.32	0	0	
BW24/0293	Katie Carville	23	23	19.2	17.2	-1.8	15.4	12.32	3.08	0.2	0.2	
M35/0297	Billing S	73.2	73.2	70.2	68.2	-2.6	65.6	52.48	13.12	0	0	
M35/0298	RAINEY	78.9	78.9	75.9	73.9	-1.23	72.67	58.14	14.53	0.27	0.27	
M35/0302	DUNCAN D.P.& A	5.9	13.5	10.5	8.5	-2.5	6	4.8	1.2	0	0	
M35/0305	LESLIE D.H.& M.A	5.8	13.5	10.5	8.5	-0.45	8.05	6.44	1.61	0.86	1.06	

			Future scenario										
Well	Owner	Depth	Adopt Dep	Top Screen	Cutoff	Calc80Min	Available	Protected	DD4 interference	TotalDD Future Scenario	Total DD Existing Scenario	Increase?
M35/0308	Mr E A Anderson	9.5	13.5	10.5	8.5	-5.83	2.67	2.14	0.53	0.23	0.23	
M35/0309	Keilyn Farms Limi	7.3	13.5	10.5	8.5	-3.02	5.48	4.38	1.1	0.53	0.53	
M35/0312	Dalley R G (Ron)	9.1	13.5	10.5	8.5	-1.93	6.57	5.26	1.31	0.12	0.12	
M35/0314	BAGRIE WL	15.8	15.8	11	9	-1.34	7.66	6.13	1.53	0.1	0.1	
M35/0320	OFFWOOD D.	9.1	13.5	10.5	8.5	-0.63	7.87	6.3	1.57	0.3	0.41	
M35/0324	BENNETT E.A.	9.1	13.5	10.5	8.5	-8.53	-0.03	-0.02	-0.01	0	0	
M35/0326	Mr & Mrs P J & R	13.7	13.7	10.7	8.7	-1.74	6.96	5.57	1.39	0.55	0.73	
M35/0330	BONIFANT R.A.&	5.7	13.5	10.5	8.5	-1.45	7.05	5.64	1.41	0	0	
M35/0334	USSHER H & J	8.6	13.5	10.5	8.5	-0.68	7.82	6.26	1.56	0	0	
M35/0336	BUTTERFIELD D	9.8	13.5	10.5	8.5	-0.86	7.64	6.11	1.53	0	0	
M35/0340	MCINTOSH MA	3.7	13.5	10.5	8.5	-1.25	7.25	5.8	1.45	0	0	
M35/0342	BOOTH MI & EJ	4.3	13.5	10.5	8.5	-1.59	6.91	5.52	1.38	0	0	
M35/0350	Ohoka Utilities Lir	11.6	13.5	10.5	8.5	-6.34	2.16	1.72	0.43	0	0	
M35/0351	Keilyn Farms Limi	11.4	13.5	10.5	8.5	-2.75	5.75	4.6	1.15	0.23	0.23	
M35/0367	Mr & Mrs P J & R	9.4	13.5	10.5	8.5	-1.22	7.28	5.83	1.46	0.92	1.18	
M35/0382	JARMON	7	13.5	10.5	8.5	-1.48	7.02	5.62	1.4	0	0	
M35/0385	FLINTOFT W.L.	6.5	13.5	10.5	8.5	-2.61	5.89	4.71	1.18	0.16	0.16	
M35/0386	LESLIE D.H.& M.A	4	13.5	10.5	8.5	-1.56	6.94	5.55	1.39	0.55	0.73	
M35/0390	KAPPELLE	7	13.5	10.5	8.5	-6.28	2.22	1.78	0.44	0.16	0.16	
M35/0394	WIGLEY N.G.	9.1	13.5	10.5	8.5	-5.88	2.62	2.1	0.52	0.38	0.38	
M35/0396	FORREST B.E.	9.2	13.5	10.5	8.5	-6.03	2.47	1.98	0.49	0.34	0.34	
M35/0397	SULZBERGHER B.	8	13.5	10.5	8.5	-2.35	6.15	4.92	1.23	0.13	0.13	
M35/0586	BAILEY E.J.	18.3	18.3	15.3	13.3	-4.14	9.16	7.33	1.83	0.25	0.25	
M35/0592	STEPHENS S.L.	9.4	13.5	10.5	8.5	-2.3	6.2	4.96	1.24	0	0	
M35/0593	SANDERS E.W.&	9.1	13.5	10.5	8.5	-5.61	2.89	2.31	0.58	0.26	0.26	
M35/0596	Canterbury Regio	2.9	13.5	10.5	8.5	-0.65	7.85	6.28	1.57	0.58	0.68	
M35/0597	Mr Peter G Harris	17.4	17.4	14.4	12.4	-3.79	8.61	6.89	1.72	0	0	
M35/0601	Threlkeld Estate L	12.8	13.5	10.5	8.5	-0.54	7.96	6.37	1.59	0.35	0.35	
M35/0602	ARMSTRONG MA	14	14	11	9	-5.24	3.76	3.01	0.75	0.57	0.57	
M35/0603	MacRae Land Cor	12.8	13.5	10.5	8.5	-1.79	6.71	5.37	1.34	0.39	0.39	
M35/0611	MEHRTENS G	12.2	13.5	10.5	8.5	-1.96	6.54	5.24	1.31	0	0	
M35/0614	Mr M J & Mrs P S	18.3	18.3	15.3	13.3	-2.68	10.62	8.5	2.12	0.11	0.11	
M35/0616	A D & E H CORNIS	12.8	13.5	10.5	8.5	-4.43	4.07	3.26	0.81	0.13	0.13	
M35/0617	Mr & Mrs P W & (	13.1	13.5	10.5	8.5	-5.41	3.09	2.47	0.62	0	0	
M35/0643	Mrs V F Downs	19.8	19.8	16.8	14.8	-6.07	8.73	6.98	1.75	0.1	0.1	
M35/0651	J H & I M Dugdale	9.4	13.5	10.5	8.5	-4.18	4.32	3.46	0.86	0	0	
M35/0676	BEZZANT AM & J	15.5	15.5	12.5	10.5	-7.33	3.17	2.53	0.63	0.13	0.13	
M35/0677	Mr C G & Mrs M S	23.5	23.5	20.5	18.5	-11.34	7.16	5.72	1.43	0	0	
M35/0682	Hawker John & K	12.8	13.5	10.5	8.5	-4.1	4.4	3.52	0.88	0.14	0.14	
M35/0683	MEREDITH A (EX	11.8	13.5	10.5	8.5	-6.76	1.74	1.39	0.35	0.24	0.24	
M35/0696	MULLIGAN P.R.R	6.1	13.5	10.5	8.5	-6.46	2.04	1.63	0.41	0	0	
M35/0697	Willowgrove Past	22.9	22.9	19.9	17.9	-10.5	7.4	5.92	1.48	0.31	0.31	
M35/0699	MACDONALD C.C	6.1	13.5	10.5	8.5	-3.36	5.14	4.11	1.03	0.11	0.11	
M35/0701	Waimakariri Distr	18.8	18.8	17.3	15.3	-8.52	6.78	5.42	1.36	0.15	0.15	
M35/10114	Ginnever M & L	53	53	50	48	-0.1	47.9	38.32	9.58	0.16	0.16	
M35/10115	Hayward N	58	58	56	54	-1.03	52.97	42.38	10.59	0.19	0.19	
M35/10116	Bond M & T	12.2	13.5	10.5	8.5	-3.27	5.23	4.18	1.05	0.32	0.32	
M35/10117	Millcroft Limited	65.8	65.8	63.8	61.8	-1.11	60.69	48.55	12.14	0.18	0.18	
M35/10118	Sinclair-Thompsor	52.8	52.8	49.7	47.7	-1.15	46.55	37.24	9.31	0.13	0.13	
M35/10119	Millcroft Limited	65.8	65.8	63.8	61.8	-1.1	60.7	48.56	12.14	0.15	0.15	
M35/10120	White	22.3	22.3	20.3	18.3	-1.09	17.21	13.77	3.44	0.22	0.22	
M35/10122	Tull L	21.2	21.2	19.1	17.1	-2.19	14.91	11.93	2.98	0.35	0.35	
M35/10129	Ohoka Park Truffi	17.6	17.6	15.6	13.6	-6.79	6.81	5.45	1.36	0.11	0.11	
M35/10130	Ohoka Park Truffi	17.5	17.5	14.5	12.5	-6.23	6.27	5.02	1.25	0	0	
M35/10177	Mr PRR Mulligan	17.9	17.9	16.4	14.4	-5.77	8.63	6.9	1.73	0	0	
M35/10179	Mr & Mrs DA & JA	23.5	23.5	21.5	19.5	-7.94	11.56	9.25	2.31	0.69	0.69	
M35/10219	Mr & Mrs IJ & BJ (	17.6	17.6	16.6	14.6	-5.7	8.9	7.12	1.78	0	0	
M35/10220	Mr & Mrs IJ & BJ (	17.8	17.8	16.8	14.8	-6.05	8.75	7	1.75	0	0	
M35/10221	Mr & Mrs IJ & BJ (	17.6	17.6	16.6	14.6	-4.21	10.39	8.31	2.08	0.11	0.11	
M35/10333	Mr & Mrs CO & D	8.3	13.5	10.5	8.5	-3.58	4.92	3.94	0.98	0.15	0.15	
M35/10336	Mr & Mrs CO & D	6.5	13.5	10.5	8.5	-1.99	6.51	5.21	1.3	0.14	0.14	
M35/10339	Mr & Mrs CO & D	6.5	13.5	10.5	8.5	-3.13	5.37	4.3	1.07	0.13	0.13	
M35/10349	Denham Green Li	17.5	17.5	15.5	13.5	-0.83	12.67	10.14	2.53	0.25	0.25	
M35/10362	Mr RK Fryer	34.3	34.3	32	30	-1.05	28.95	23.16	5.79	0	0	
M35/10363	Mr RK Fryer	26.4	26.4	24.4	22.4	-0.53	21.87	17.5	4.37	0	0	
M35/10364	Mr RK Fryer	22.9	22.9	20.9	18.9	-1.75	17.15	13.72	3.43	0	0	
M35/10365	Mr RK Fryer	16.2	16.2	14.2	12.2	-1.33	10.87	8.7	2.17	0	0	
M35/10366	Mr RK Fryer	40.6	40.6	38.6	36.6	-0.55	36.05	28.84	7.21	0	0	
M35/10445	Mr & Ms I & M W	42	42	39	37	-4.36	32.64	26.11	6.53	0.13	0.13	
M35/10461	MR & MRS W J S (	21	21	19	17	-1.78	15.22	12.18	3.04	0	0	
M35/10462	MR & MRS W J S (	21	21	19	17	-1.83	15.17	12.14	3.03	0	0	
M35/10463	MR & MRS W J S (	22	22	20	18	-1.92	16.08	12.86	3.22	0	0	
M35/10464	MR & MRS W J S (	22	22	20	18	-1.96	16.04	12.83	3.21	0	0	
M35/10465	MR & MRS W J S (	20	20	18	16	-0.7	15.3	12.24	3.06	0	0	
M35/10472	Mr & Mrs KM & D	24	24	23	21	-4.36	16.64	13.31	3.33	0	0	
M35/10479	Mills S	54	54	51.7	49.7	-0.1	49.6	39.68	9.92	0.2	0.2	
M35/10480	Mr & Mrs DW & T	23.7	23.7	21.7	19.7	-7.74	11.96	9.57	2.39	0.42	0.42	
M35/10486	Waters Owen	18.4	18.4	16.4	14.4	-1.86	12.54	10.03	2.51	0.23	0.23	
M35/10487	Denham Green Li	17.9	17.9	15.9	13.9	-1.86	12.04	9.63	2.41	0.2	0.2	
M35/10489	MacMillan I & C	18.3	18.3	16.3	14.3	-5.26	9.04	7.23	1.81	0.15	0.15	
M35/10507	Mr GA Brown	24.2	24.2	22.2	20.2	-8.39	11.81	9.45	2.36	0.63	0.63	
M35/10516	Mr & Mrs MD & M	23	23	20.7	18.7	-9.84	8.86	7.09	1.77	0.25	0.25	
M35/10517	Union Specialties	23.2	23.2	21.2	19.2	-8.08	11.12	8.9	2.22	0.78	0.78	
M35/10520	Mr & Mrs RW & H	17.9	17.9	15.9	13.9	-6.31	7.59	6.07	1.52	0.1	0.1	
M35/10524	Mr & Ms BR & DV	25.9	25.9	23.9	21.9	-7.84	14.06	11.25	2.81	0.5	0.5	
M35/10530	Mr & Mrs CW & C	24.1	24.1	22.1	20.1	-5.09	15.01	12.01	3	0.46	0.46	
M35/10536	Mr & Mrs GM & E	23.5	23.5	21.5	19.5	-10.84	8.66	6.93	1.73	0.26	0.26	
M35/10567	INGLEWOOD HOL	60.1	60.1	58.1	56.1	-1.1	55	44	11	0.5	0.5	
M35/10568	INGLEWOOD HOL	59.5	59.5	57.5	55.5	-1.4	54.1	43.28	10.82	0.39	0.39	
M35/10569	INGLEWOOD HOL	58.8	58.8	56.8	54.8	-1.06	53.74	42.99	10.75	0.4	0.4	
M35/10570	INGLEWOOD HOL	17.4	17.4	15.4	13.4	-3.9	9.5	7.6	1.9	0.7	0.7	
M35/10610	MR E J BAILEY	23.1	23.1	21.1	19.1	-6.03	13.07	10.46	2.61	0.23	0.23	
M35/10611	MR & MRS EJ & A	25.6	25.6	23.6	21.6	-5.65	15.95	12.76	3.19	0.18	0.18	
M35/10612	MR & MRS EJ & A	17.7	17.7	15.7	13.7	-3.95	9.75	7.8	1.95	0.14	0.14	
M35/10614	MR & MRS EJ & A	18	18	16	14	-0.99	13.01	10.41	2.6	0.28	0.28	
M35/10624	MR J D MCKENZIE	20.5	20.5	18.5	16.5	-1.85	14.65	11.72	2.93	0.14	0.14	
M35/10625	MR J D MCKENZIE	20	20	18	16	-6.17	9.83	7.86	1.97	0.25	0.25	
M35/10626	MR J D MCKENZIE	19.9	19.9	17.9	15.9	-5.17	10.73	8.58	2.15	0.15	0.15	
M35/10627	MR J D MCKENZIE	18.1	18.1	16.1	14.1	-4.17	9.93	7.94	1.99	0.22	0.22	
M35/10628	MR J D MCKENZIE	21.2	21.2	19.2	17.2	-2.17	15.03	12.02	3.01	0.16	0.16	
M35/10629	MR J D MCKENZIE	17.8	17.8	15.8	13.8	-3.17	10.63	8.5	2.13	0.14	0.14	
M35/10634	MR & MRS C D &	18	18	17	15	-8.81	6.19	4.95	1.24	0.53	0.53	
M35/10702	Charlton A & C	21	21	19	17	-1.9	15.1	12.08	3.02	0.64	0.64	

			Future scenario										
Well	Owner	Depth	Adopt Dep	Top Screen	Cutoff	Calc80Min	Available	Protected	DD4 interference	TotalDD Future Scenario	Total DD Existing Scenario	Increase?
M35/10731	MR & MRS PJ & R	22	22	21	19	-8.59	10.41	8.33	2.08	0.89	0.89	
M35/10740	MR & MRS M K J	18	18	16	14	-7.93	6.07	4.86	1.21	0	0	
M35/10764	MR CLIVE DUNCA	11.6	13.5	10.5	8.5	-4.04	4.46	3.57	0.89	0.33	0.33	
M35/10982	MR & MRS IL & JI	18	18	16.5	14.5	-3.67	10.83	8.66	2.17	0.15	0.15	
M35/11048	MR & MRS CP & I	18	18	16	14	-3	11	8.8	2.2	0.63	0.63	
M35/11063	MR & MRS EJ & JI	25	25	22	20	-8.21	11.79	9.43	2.36	0.6	0.6	
M35/11066	MACRAE LAND CO	21	21	19.5	17.5	-6.3	11.2	8.96	2.24	0.49	0.49	
M35/11067	MACRAE LAND CO	20	20	18.5	16.5	-1.71	14.79	11.83	2.96	0.4	0.4	
M35/11068	MACRAE LAND CO	19	19	17.5	15.5	-1.74	13.76	11.01	2.75	0.51	0.51	
M35/11069	MACRAE LAND CO	18	18	16.5	14.5	-3.89	10.61	8.49	2.12	0.45	0.45	
M35/11070	MACRAE LAND CO	20.4	20.4	18.9	16.9	-4.63	12.27	9.82	2.45	0.45	0.45	
M35/11071	MACRAE LAND CO	42	42	38.5	36.5	-1.67	34.83	27.86	6.97	0.19	0.19	
M35/11072	MACRAE LAND CO	18	18	16.5	14.5	-0.15	14.35	11.48	2.87	0.25	0.25	
M35/11073	Jenkins M	20.3	20.3	18.8	16.8	-0.39	16.41	13.13	3.28	0.24	0.24	
M35/11074	MACRAE LAND CO	17	17	15.5	13.5	-2.02	11.48	9.18	2.3	0	0	
M35/11075	MACRAE LAND CO	20	20	17	15	-1.23	13.77	11.02	2.75	0.23	0.23	
M35/11077	MACRAE LAND CO	18	18	16.5	14.5	-0.54	13.96	11.17	2.79	0.27	0.27	
M35/11084	MR & MRS RJW &	24	24	22.5	20.5	-11.32	9.18	7.34	1.84	0.1	0.1	
M35/11103	MR & MS DS & DJ	18	18	17	15	-3.18	11.82	9.46	2.36	0.67	0.67	
M35/11106	MR & MRS RJ & L	17	17	16	14	-8.06	5.94	4.75	1.19	0.72	0.72	
M35/11107	MR & MRS CD & (	26.2	26.2	24.2	22.2	-7.19	15.01	12.01	3	0.23	0.23	
M35/11179	MR & MRS BJ & L	47	47	45	43	-1.38	41.62	33.3	8.32	0.75	0.75	
M35/11186	MR & MRS MAC &	23.1	23.1	21.1	19.1	-3.85	15.25	12.2	3.05	0	0	
M35/11187	MR & MRS MAC &	21.6	21.6	19.6	17.6	-3.32	14.28	11.42	2.86	0	0	
M35/11188	MR & MRS MAC &	20.6	20.6	18.6	16.6	-7.44	9.16	7.33	1.83	0	0	
M35/11189	MR & MRS MAC &	20.1	20.1	18.1	16.1	-9.36	6.74	5.39	1.35	0	0	
M35/11190	MR & MRS MAC &	21.9	21.9	19.9	17.9	-8.68	9.22	7.38	1.84	0	0	
M35/11191	MR & MRS MAC &	22.3	22.3	20.2	18.2	-3.88	14.32	11.46	2.86	0	0	
M35/11192	MR & MRS MAC &	20.6	20.6	18.6	16.6	-3.82	12.78	10.22	2.56	0	0	
M35/11193	MR & MRS MAC &	69.7	69.7	65.7	63.7	-0.45	63.25	50.6	12.65	0	0	
M35/11227	KAVANAGH FAMI	18	18	17	15	-7.03	7.97	6.38	1.59	0.65	0.65	
M35/11286	Macrae Land Con	15.3	15.3	14.3	12.3	-0.17	12.13	9.7	2.43	0.26	0.26	
M35/11371	MR & MRS IJ & BJ	17.5	17.5	16	14	-2.44	11.56	9.25	2.31	0.16	0.16	
M35/11372	MR & MRS IJ & BJ	17.9	17.9	16.4	14.4	-6.27	8.13	6.5	1.63	0.12	0.12	
M35/11409	MR KEVIN PERCIV	17.4	17.4	15.4	13.4	-2.89	10.51	8.41	2.1	0.48	0.48	
M35/11593	MR DC & MRS NE	17.9	17.9	16.4	14.4	-2.29	12.11	9.69	2.42	0.21	0.21	
M35/11622	North Canterbury	12.8	13.5	10.5	8.5	-6.06	2.44	1.95	0.49	0	0	
M35/11641	MR PE & MRS SD	23.4	23.4	21.4	19.4	-10.48	8.92	7.14	1.78	0.12	0.12	
M35/11671	MR T & MS H MC	24	24	21	19	-6.94	12.06	9.65	2.41	0.15	0.15	
M35/11677	INGLEWOOD HOL	24	24	21	19	-1.29	17.71	14.17	3.54	0.71	0.71	
M35/11678	INGLEWOOD HOL	24	24	21	19	-1.19	17.81	14.25	3.56	0.46	0.46	
M35/11711	MR WT MCLAUGI	17.4	17.4	15.4	13.4	-4.03	9.37	7.5	1.87	0.55	0.55	
M35/11735	MR R MAUNSELL	17.3	17.3	16.3	14.3	-2.87	11.43	9.14	2.29	0	0	
M35/11736	MR & MRS WJS &	18.5	18.5	16.5	14.5	-1.98	12.52	10.02	2.5	0	0	
M35/11737	MR & MRS WJS &	41.2	41.2	39.2	37.2	-0.96	36.24	28.99	7.25	0	0	
M35/11738	MR & MRS WJS &	22.3	22.3	20.3	18.3	-2.89	15.41	12.33	3.08	0	0	
M35/11739	MR & MRS WJS &	22.1	22.1	19.1	17.1	-1.99	15.11	12.09	3.02	0	0	
M35/11740	Mr L J Scott	18	18	16.3	14.3	-3.81	10.49	8.39	2.1	0	0	
M35/11822	Mr B Y Biggs	18	18	15	13	-1.86	11.14	8.91	2.23	0	0	
M35/11823	Mr B Y Biggs	18	18	15	13	-1.79	11.21	8.97	2.24	0	0	
M35/11904	MR & MRS CG & I	74.4	74.4	67.1	65.1	-1.97	63.13	50.5	12.63	2.3	2.3	
M35/11918	Bradshaw P.N.	70.5	70.5	66	64	-1.94	62.06	49.65	12.41	0	0	
M35/11932	MR & MS C A & A	39.8	39.8	37.8	35.8	-0.14	35.66	28.53	7.13	0	0	
M35/11965	MR D CLEMENCE	20	20	17	15	-1.27	13.73	10.98	2.75	0.19	0.19	
M35/11966	MR D CLEMENCE	21.1	21.1	19.1	17.1	-0.14	16.96	13.57	3.39	0.18	0.18	
M35/17681	SOUTHERN CROS	24.1	24.1	21.7	19.7	-3.88	15.82	12.66	3.16	0	0	
M35/17685	MR H & MRS V J \	97.7	97.7	94.7	92.7	-2.03	90.67	72.54	18.13	0	0	
M35/17733	MR & MRS R W &	18	18	16	14	-5.92	8.08	6.46	1.62	0.14	0.14	
M35/17793	MR & MRS D L &	76.5	76.5	71.8	69.8	-0.42	69.38	55.5	13.88	0	0	
M35/17863	MR & MRS R A &	24	24	22	20	-7.05	12.95	10.36	2.59	0.26	0.26	
M35/17873	MR G EDGE	24	24	20	18	-0.52	17.48	13.98	3.5	0	0	
M35/17875	MR S W HAMMO	24	24	21	19	-4.88	14.12	11.3	2.82	0.17	0.17	
M35/17966	MR & MRS G J &	10	13.5	10.5	8.5	-1.34	7.16	5.73	1.43	0.19	0.19	
M35/17977	MR U VAN NEK	25.6	25.6	22.1	20.1	-9.04	11.06	8.85	2.21	0.13	0.13	
M35/18023	MR & MRS N J &	12	13.5	10.5	8.5	-1.49	7.01	5.61	1.4	0.2	0.2	
M35/18053	WITHER HILLS HO	19.2	19.2	18.2	16.2	-5.1	11.1	8.88	2.22	0.36	0.36	
M35/18054	MR G J & MRS J M	18.8	18.8	17.8	15.8	-5.1	10.7	8.56	2.14	0.49	0.49	
M35/18064	MR & MRS M K &	18	18	17	15	-4.16	10.84	8.67	2.17	0.14	0.14	
M35/18131	MR JG & MRS S J	23.5	23.5	22.8	20.8	-6.98	13.82	11.06	2.76	0.25	0.25	
M35/18153	MR D THORNE &	36	36	35	33	-1.53	31.47	25.18	6.29	0	0	
M35/18154	MR G C TYRELL	17.7	17.7	15.7	13.7	-0.91	12.79	10.23	2.56	0.23	0.23	
M35/18172	MR GRAEME McM	65.3	65.3	61.3	59.3	-0.48	58.82	47.06	11.76	0	0	
M35/18183	MR GILES LANCAS	53.7	53.7	50.7	48.7	-5.41	43.29	34.63	8.66	0	0	
M35/18188	MR M P EMMS	18	18	16.9	14.9	-3.09	11.81	9.45	2.36	0	0	
M35/1820	Mr R G & Mrs D	4.6	13.5	10.5	8.5	-4.14	4.36	3.49	0.87	0	0	
M35/18231	MR & MRS MWH	18	18	17	15	-8.19	6.81	5.45	1.36	0.75	0.75	
M35/18232	T M & K A WILSOI	24	24	22.5	20.5	-9.79	10.71	8.57	2.14	0.19	0.19	
M35/18259	MR M I & MRS E J	47	47	43.5	41.5	-1.45	40.05	32.04	8.01	0.18	0.18	
M35/18260	MR M I & MRS E J	24	24	20.6	18.6	-1.45	17.15	13.72	3.43	0	0	
M35/18261	MR J D & MRS S H	24	24	20.6	18.6	-5.96	12.64	10.11	2.53	0	0	
M35/1827	CAMMOCK J.D.&	7.6	13.5	10.5	8.5	-1.47	7.03	5.62	1.41	0	0	
M35/1836	Mr & Mrs R S & C	16.8	16.8	1	-1	-3.29	-4.29	-3.43	-0.86	0	0	
M35/18360	MR D T & MRS K J	24	24	21	19	-1.66	17.34	13.87	3.47	0.18	0.18	
M35/18394	Mrs J A O'Callagh	23.9	23.9	21.9	19.9	-3.25	16.65	13.32	3.33	0	0	
M35/18395	Mrs J A O'Callagh	24	24	21	19	-2.25	16.75	13.4	3.35	0	0	
M35/18492	MR & MRS SS & D	25	25	22.5	20.5	-0.16	20.34	16.27	4.07	0	0	
M35/18520	PINELEIGH FARM	36	36	30	28	-1.24	26.76	21.41	5.35	0	0	
M35/18525	Southbrook Servi	0	13.5	10.5	8.5	-1.46	7.04	5.63	1.41	0	0	
M35/18540	KA Lamb	16	16	14	12	-1.28	10.72	8.58	2.14	0.17	0.17	
M35/18746	MR G BROSNAN	26.3	26.3	21.3	19.3	-3.95	15.35	12.28	3.07	0	0	
M35/18781	MR M TURNER	23.9	23.9	21.9	19.9	-4	15.9	12.72	3.18	0.17	0.17	
M35/18806	MR & MRS R K &	23	23	22	20	-5.29	14.71	11.77	2.94	0.27	0.27	
M35/2598	LOUGHNAN RG	22.4	22.4	19.3	17.3	-2.3	15	12	3	0.12	0.12	
M35/2620	Mr Troy D & Mrs	14.2	14.2	11.2	9.2	-2.93	6.27	5.02	1.25	0	0	
M35/2625	Mr C O MacDonal	12.8	13.5	10.5	8.5	-3.25	5.25	4.2	1.05	0.1	0.1	
M35/2699	Mr & Mrs J D & K	13.3	13.5	10.5	8.5	-5.24	3.26	2.61	0.65	0	0	
M35/2726	Mr D S & Mrs R A	12	13.5	10.5	8.5	-0.78	7.72	6.18	1.54	0.1	0.1	
M35/2728	Mr H C & Mrs J A	12.2	13.5	10.5	8.5	-4.44	4.06	3.25	0.81	0	0	
M35/2730	Mr A D & Ms A Sn	7.3	13.5	10.5	8.5	-5.7	2.8	2.24	0.56	0.11	0.11	
M35/2756	JOHNSTON N.J.&	12.5	13.5	10.5	8.5	-2.48	6.02	4.82	1.2	0	0	
M35/2759	Mr T N Bassett	4.8	13.5	10.5	8.5	-4.42	4.08	3.26	0.82	0.21	0.21	
M35/2847	SMITH	0	13.5	10.5	8.5	-3.67	4.83	3.86	0.97	0.11	0.11	
M35/2915	WALDIE (EX BAILE	16	16	13	11	-7.95	3.05	2.44	0.61	0.29	0.29	

			Future scenario										
Well	Owner	Depth	Adopt Dep	Top Screen	Cutoff	Calc80Min	Available	Protected	DD4 interference	TotalDD Future Scenario	Total DD Existing Scenario	Increase?
M35/2918	A D & E H CORNIS	8.5	13.5	10.5	8.5	-4.15	4.35	3.48	0.87	0.11	0.11	
M35/2919	RICHARDS M.E.	24.2	24.2	21.2	19.2	-6.24	12.96	10.37	2.59	0.11	0.11	
M35/2920	RICHARDS M.E.	10.6	13.5	10.5	8.5	-6.98	1.52	1.22	0.3	0.11	0.11	
M35/3019	MacRae Land Cor	15.4	15.4	12.4	10.4	-1.21	9.19	7.35	1.84	0.25	0.25	
M35/3032	Kate Mullins	19.7	19.7	16.7	14.7	-4.11	10.59	8.47	2.12	0.1	0.1	
M35/3036	BONIFANT M.P.D	13	13.5	10.5	8.5	-5.26	3.24	2.59	0.65	0	0	
M35/3053	SEARLE M.B.& J.C	0	13.5	10.5	8.5	-1.49	7.01	5.61	1.4	0.17	0.17	
M35/3064	Mr & Mrs P J & R	12.5	13.5	10.5	8.5	-5.79	2.71	2.17	0.54	0.3	0.3	
M35/3065	Mr & Mrs P J & R	12	13.5	10.5	8.5	-3.26	5.24	4.19	1.05	0.28	0.28	
M35/3066	MASON W.I.G.	6.7	13.5	10.5	8.5	-2.65	5.85	4.68	1.17	0.44	0.44	
M35/3072	Dr T B Taylor	19	19	16	14	-7.73	6.27	5.02	1.25	0.1	0.1	
M35/3077	Mr R G & Mrs D F	14.5	14.5	11.5	9.5	-0.5	9	7.2	1.8	0.27	0.27	
M35/3078	Mr R G & Mrs D F	13	13.5	10.5	8.5	-5.03	3.47	2.78	0.69	0	0	
M35/3080	DM & AD Smith Ir	15.4	15.4	12.4	10.4	-1.48	8.92	7.14	1.78	0	0	
M35/3081	WOOD S.M.& J.A	0	13.5	10.5	8.5	-1.48	7.02	5.62	1.4	0	0	
M35/3172	BARLASS N.S.	24	24	21	19	-9.94	9.06	7.25	1.81	0.12	0.12	
M35/3235	BYRNE M.H.	11	13.5	10.5	8.5	-3.04	5.46	4.37	1.09	0	0	
M35/3241	SANDERS E.W.&	24.2	24.2	21.2	19.2	-11.18	8.02	6.42	1.6	0.26	0.26	
M35/3245	FRASER L.J.A.& D	26	26	23	21	-5.78	15.22	12.18	3.04	0	0	
M35/3247	VERKERK SETTLEN	9.1	13.5	10.5	8.5	-1.15	7.35	5.88	1.47	1.15	1.34	
M35/3257	Mr & Mrs G S & H	12	13.5	10.5	8.5	-3.45	5.05	4.04	1.01	0	0	
M35/3271	FREWER (EX BLAI	5.6	13.5	10.5	8.5	-3.22	5.28	4.22	1.06	0.51	0.51	
M35/3273	COKER N.	30	30	27	25	-1.45	23.55	18.84	4.71	0.67	0.67	
M35/3281	MARSH P.W.& G.	5	13.5	10.5	8.5	-3.18	5.32	4.26	1.06	0	0	
M35/3290	T D & P J Parrott	9.4	13.5	10.5	8.5	-8.7	-0.2	-0.16	-0.04	0	0	
M35/3306	Emms Farm Limit	17	17	14	12	-4.01	7.99	6.39	1.6	0	0	
M35/3307	CROFT W.D.	17	17	14	12	-3.55	8.45	6.76	1.69	0.11	0.11	
M35/3308	CROFT W.D.	17.2	17.2	14.2	12.2	-3.78	8.42	6.74	1.68	0.12	0.12	
M35/3309	J G & S Wright	12	13.5	10.5	8.5	-4.31	4.19	3.35	0.84	0	0	
M35/3332	Mr M K & Mrs S M	18	18	16.9	14.9	-5.44	9.46	7.57	1.89	0.24	0.24	
M35/3672	I N & E L Turner	13.8	13.8	11.8	9.8	-5.01	4.79	3.83	0.96	0.16	0.16	
M35/3772	The Greene Famil	16	16	13	11	-3.86	7.14	5.71	1.43	0.13	0.13	
M35/4085	Lawrence H H	0	13.5	10.5	8.5	-1.26	7.24	5.79	1.45	0	0	
M35/4099	CAMERON J.G.&	11.5	13.5	10.5	8.5	-5.28	3.22	2.58	0.64	0.4	0.4	
M35/4184	COMBRIDGE K.	11	13.5	10.5	8.5	-4.63	3.87	3.1	0.77	0	0	
M35/4238	Timperley Enterp	12.2	13.5	10.5	8.5	-4.61	3.89	3.11	0.78	0.42	0.42	
M35/4239	Timperley Enterp	12.3	13.5	10.5	8.5	-8.24	0.26	0.21	0.05	0.4	0.4	
M35/4377		11.5	13.5	10.5	8.5	-7.42	1.08	0.86	0.22	0	0	
M35/4428	HARRIS I.R.	19.4	19.4	16.4	14.4	-5.53	8.87	7.1	1.77	0	0	
M35/4438	JURY R.J.& B.J.	9.1	13.5	10.5	8.5	-1.81	6.69	5.35	1.34	0	0	
M35/4467	Wards Road Irriga	18.8	18.8	16.1	14.1	-9.62	4.48	3.58	0.9	0.1	0.1	
M35/4552	Mr & Mrs D K & E	9	13.5	10.5	8.5	-4.23	4.27	3.42	0.85	0.42	0.42	
M35/4554	A Verkerk Limited	7.5	13.5	10.5	8.5	-1.88	6.62	5.3	1.32	0.56	0.72	
M35/4556	Mr E Luisetti	22	22	19	17	-1.18	15.82	12.66	3.16	0.18	0.18	
M35/4605	PARROTT T.D.	13	13.5	10.5	8.5	-8.45	0.05	0.04	0.01	0	0	
M35/4606	PARROTT T.D.	8	13.5	10.5	8.5	-6.59	1.91	1.53	0.38	0.11	0.11	
M35/4611	FRYER R.K.& R.A.	6.1	13.5	10.5	8.5	-2.6	5.9	4.72	1.18	0	0	
M35/4614	TOZER N.A.	0	13.5	10.5	8.5	-2.6	5.9	4.72	1.18	0.15	0.15	
M35/4668	Mr & Mrs I L & J H	8.6	13.5	10.5	8.5	-6.84	1.66	1.33	0.33	0.28	0.28	
M35/4669	WARD L.G.	11	13.5	10.5	8.5	-5.98	2.52	2.02	0.5	0.29	0.29	
M35/4672	BROWN K.T.	12.2	13.5	10.5	8.5	-2.2	6.3	5.04	1.26	0	0	
M35/4673	BROWN K.T.	0	13.5	10.5	8.5	-1.84	6.66	5.33	1.33	0	0	
M35/4678	MCINTYRE J.L.	20.1	20.1	17.1	15.1	-8.21	6.89	5.51	1.38	0.88	0.88	
M35/4679	SOUTHERN CHICK	0	13.5	10.5	8.5	-4.38	4.12	3.3	0.82	0.28	0.28	
M35/4680	ABBOTT W.E.L.	16.7	16.7	13.7	11.7	-7.57	4.13	3.3	0.83	0.18	0.18	
M35/4681	SANDERS E.W.&	12.8	13.5	10.5	8.5	-6.69	1.81	1.45	0.36	0.78	0.78	
M35/4682	SEARLE M & R	15.8	15.8	12.8	10.8	-5.95	4.85	3.88	0.97	0.82	0.82	
M35/4683	HARRIS I.R.	9.3	13.5	10.5	8.5	-2.89	5.61	4.49	1.12	0.45	0.45	
M35/4699	MCKENZIE J.D.&	10.4	13.5	10.5	8.5	-5.06	3.44	2.75	0.69	0.31	0.31	
M35/4700	KIVI B.	12.2	13.5	10.5	8.5	-3.23	5.27	4.22	1.05	0.67	0.67	
M35/4707	Mr D A Mackinto	13.3	13.5	10.5	8.5	-0.58	7.92	6.34	1.58	0	0	
M35/4716	MOORE E.H.& SC	13.7	13.7	10.7	8.7	-7.38	1.32	1.06	0.26	0.11	0.11	
M35/4717	IRELAND W.P.& F	9.1	13.5	10.5	8.5	-1.08	7.42	5.94	1.48	0.44	0.56	
M35/4718	LEMON W.A.	6.1	13.5	10.5	8.5	-2.62	5.88	4.7	1.18	0	0	
M35/4719	POWER G.J.	8.5	13.5	10.5	8.5	-3	5.5	4.4	1.1	1.14	1.25	
M35/4720	MOORE E.H.	5.4	13.5	10.5	8.5	-2.37	6.13	4.9	1.23	0.64	0.79	
M35/4722	Wicklow Farming	12	13.5	10.5	8.5	-3.81	4.69	3.75	0.94	0.53	0.74	
M35/4723	ARMITAGE P.L.	0	13.5	10.5	8.5	-2.33	6.17	4.94	1.23	0.22	0.22	
M35/4724	ALEXANDER	13.5	13.5	11.5	9.5	-2.8	6.7	5.36	1.34	0.1	0.1	
M35/4725	ROBSON W.J.	19.8	19.8	16.8	14.8	-3.39	11.41	9.13	2.28	0	0	
M35/4726	MARSHELL J.J.	5.7	13.5	10.5	8.5	-3.36	5.14	4.11	1.03	0.27	0.27	
M35/4727	THIELE G.J.	9.1	13.5	10.5	8.5	-4.32	4.18	3.34	0.84	0.66	0.66	
M35/4728	ADAMS R.D.	27.4	27.4	24.4	22.4	-6.84	15.56	12.45	3.11	0.12	0.12	
M35/4729	ADAMS R.D.	27.4	27.4	24.4	22.4	-6.84	15.56	12.45	3.11	0.12	0.12	
M35/4730	RUTHERFORD K.A	12.1	13.5	10.5	8.5	-4.08	4.42	3.54	0.88	0	0	
M35/4731	FREWER K.P.	12.2	13.5	10.5	8.5	-5.54	2.96	2.37	0.59	0.25	0.25	
M35/4732	SINCOCK G.J.	15.2	15.2	12.2	10.2	-1.94	8.26	6.61	1.65	0	0	
M35/4734	BENNETT E.A.& K	9.1	13.5	10.5	8.5	-8.42	0.08	0.06	0.02	0	0	
M35/4735	GOTTERMEYER (E	8.2	13.5	10.5	8.5	-1.93	6.57	5.26	1.31	0	0	
M35/4736	BRYNE M.H. (EX S	12	13.5	10.5	8.5	-0.83	7.67	6.14	1.53	0.11	0.11	
M35/4737	Messrs J G & G B	27.9	27.9	23.1	21.1	-9.21	11.89	9.51	2.38	0.15	0.15	
M35/4738	A. Smith	13.7	13.7	10.7	8.7	-5.92	2.78	2.22	0.56	0.24	0.24	
M35/4739	WARD L.G.& I.L.	11.2	13.5	10.5	8.5	-6.19	2.31	1.85	0.46	0.23	0.23	
M35/4740	CAMERON J G (E	0	13.5	10.5	8.5	-2.57	5.93	4.74	1.19	0.82	0.82	
M35/4741	SCOTT J.H.	9.1	13.5	10.5	8.5	-3.93	4.57	3.66	0.91	0.55	0.55	
M35/4742	SCOTT J.H.	9.1	13.5	10.5	8.5	-5.82	2.68	2.14	0.54	0.41	0.41	
M35/4743	ARMSTRONG M.J	13.7	13.7	10.7	8.7	-3.3	5.4	4.32	1.08	0.11	0.11	
M35/4744	ARMSTRONG M.J	0	13.5	10.5	8.5	-2.66	5.84	4.67	1.17	0.14	0.14	
M35/4745	ARMSTRONG M.J	0	13.5	10.5	8.5	-2.3	6.2	4.96	1.24	0.58	0.74	
M35/4746	VERKERK A.	9.1	13.5	10.5	8.5	-1.67	6.83	5.46	1.37	0.96	1.11	
M35/4747	LESLIE D.H.& M.A	5.4	13.5	10.5	8.5	-1.93	6.57	5.26	1.31	0.59	0.79	
M35/4748	REID R.C.	9.1	13.5	10.5	8.5	-7.01	1.49	1.19	0.3	0.26	0.26	
M35/4751	FREE D.R.& I.C.	5	13.5	10.5	8.5	-2.19	6.31	5.05	1.26	0.14	0.14	
M35/4752	MAUGER S.W. &	7.6	13.5	10.5	8.5	-4.43	4.07	3.26	0.81	0.1	0.1	
M35/4764	GERARD R.J.	23.7	23.7	20.7	18.7	-5.05	13.65	10.92	2.73	0.1	0.1	
M35/4766	HINDS P.J.& W.R.	5.4	13.5	10.5	8.5	-2.82	5.68	4.54	1.14	0	0	
M35/4767	HINDS P.J.& W.R.	3.6	13.5	10.5	8.5	-3.9	4.6	3.68	0.92	0	0	
M35/4768	Southern Chicks L	14.3	14.3	11.3	9.3	-5.91	3.39	2.71	0.68	0.74	0.74	
M35/4771	CROZIER N.J.	6.7	13.5	10.5	8.5	-2.32	6.18	4.94	1.24	0.33	0.33	
M35/4772	Robin Ames	0	13.5	10.5	8.5	-2.64	5.86	4.69	1.17	0	0	
M35/4774	BURROWS T.F.	11.2	13.5	10.5	8.5	-5.99	2.51	2.01	0.5	0	0	
M35/4776	JOHNSON L.H.M.	6.7	13.5	10.5	8.5	-7.25	1.25	1	0.25	0.36	0.36	
M35/4777	BAGRIE W.L.	15.2	15.2	12.2	10.2	-0.65	9.55	7.64	1.91	0	0	

			Future scenario										
Well	Owner	Depth	Adopt Dep	Top Screen	Cutoff	Calc	80Min Available	Protected	DD4 interference	TotalDD Future Scenario	Total DD Existing Scenario	Increase?
M35/4778	P D & A G Bagrie	10.7	13.5	10.5	8.5	-4.17	4.33	3.46	0.87	0.1	0.1	
M35/4779	HARRISON R.G.	12.7	13.5	10.5	8.5	-3.82	4.68	3.74	0.94	0.44	0.44	
M35/4782	BISMAN I.W.	20.4	20.4	20.4	18.4	-1.52	16.88	13.5	3.38	0.52	0.7	
M35/4789	MURRAY IMPLEM	13.7	13.7	10.7	8.7	-0.7	8	6.4	1.6	0.33	0.46	
M35/4790	WALLS C.A.S.	10.2	13.5	10.5	8.5	-0.27	8.23	6.58	1.65	0.29	0.4	
M35/4792	OLSEN M.	9.1	13.5	10.5	8.5	-2.39	6.11	4.89	1.22	0.14	0.14	
M35/4794	HEATLEY K.	6.1	13.5	10.5	8.5	-0.27	8.23	6.58	1.65	0.29	0.4	
M35/4795	IRRIGATION & PU	13.8	13.8	10.8	8.8	-0.69	8.11	6.49	1.62	0.34	0.47	
M35/4821	COKER N.	0	13.5	10.5	8.5	-1.52	6.98	5.58	1.4	0.55	0.55	
M35/4823	BONIFANT R.A.	19.1	19.1	16.1	14.1	-2.99	11.11	8.89	2.22	0	0	
M35/4826	USSHER D.H.	24.2	24.2	21.2	19.2	-2.97	16.23	12.98	3.25	0	0	
M35/4827	S & L C BATCHELC	13.1	13.5	10.5	8.5	-2.4	6.1	4.88	1.22	0	0	
M35/4828	FROST E.M.	4.9	13.5	10.5	8.5	-2.3	6.2	4.96	1.24	0	0	
M35/4832	RANDS B.W.	9.1	13.5	10.5	8.5	-5.46	3.04	2.43	0.61	0.11	0.11	
M35/4836	WATHERSTON R.	9.1	13.5	10.5	8.5	-2.4	6.1	4.88	1.22	0	0	
M35/4837	BONNINGTON R.	10.6	13.5	10.5	8.5	-5.52	2.98	2.38	0.6	0	0	
M35/4838	BONNINGTON R.	0	13.5	10.5	8.5	-2.58	5.92	4.74	1.18	0	0	
M35/4839	CAIN J.W.	6.1	13.5	10.5	8.5	-1.6	6.9	5.52	1.38	0	0	
M35/4841	MAUNSELL R.& J.	6.1	13.5	10.5	8.5	-0.27	8.23	6.58	1.65	0.29	0.4	
M35/4851	SCHLUTER M.P.	6.7	13.5	10.5	8.5	-1.51	6.99	5.59	1.4	0	0	
M35/4852	H J USSHER	15.2	15.2	12.2	10.2	-0.16	10.04	8.03	2.01	0	0	
M35/4853	RICHARDS BROS	3.6	13.5	10.5	8.5	-2.54	5.96	4.77	1.19	0	0	
M35/4855	ROOS M.	0	13.5	10.5	8.5	-1.95	6.55	5.24	1.31	0	0	
M35/4857	ROWLANDS W.R.	13	13.5	10.5	8.5	-3.74	4.76	3.81	0.95	0.65	0.65	
M35/4858	Mr & Mrs G G & S	13.7	13.7	10.7	8.7	-4.31	4.39	3.51	0.88	0.49	0.49	
M35/4865	PAWSON G.J.	9.5	13.5	10.5	8.5	-3.01	5.49	4.39	1.1	0	0	
M35/4866	VAN BEEK J.H.M.	0	13.5	10.5	8.5	-2.37	6.13	4.9	1.23	0	0	
M35/4867	PLASKETT J.	6	13.5	10.5	8.5	-2.35	6.15	4.92	1.23	0	0	
M35/4868	LAMARE J.W.& M	12.8	13.5	10.5	8.5	-5.85	2.65	2.12	0.53	0	0	
M35/4877	SINCLAIR M (EX C	9.8	13.5	10.5	8.5	-5.03	3.47	2.78	0.69	0.13	0.13	
M35/4879	MCQUILLAN R.	13.7	13.7	10.7	8.7	-4.01	4.69	3.75	0.94	0.11	0.11	
M35/4885	CROWE A.J.	4.4	13.5	10.5	8.5	-1.34	7.16	5.73	1.43	0.36	0.36	
M35/4905	STEVENSON	9.5	13.5	10.5	8.5	-4.14	4.36	3.49	0.87	0.27	0.27	
M35/4906	STEVENSON K.D.	38	38	35	33	-1.25	31.75	25.4	6.35	7.19	7.19	
M35/4907	STEVENSON K.D.	3.2	13.5	10.5	8.5	-3.38	5.12	4.1	1.02	0.31	0.31	
M35/4924	TURNER R.J.	19.7	19.7	18.8	16.8	-2.39	14.41	11.53	2.88	0	0	
M35/4972	MILL RD FARM LT	2	13.5	10.5	8.5	-0.93	7.57	6.06	1.51	0.21	0.21	
M35/4978	KINGSCOTE W.	8.5	13.5	10.5	8.5	-4.66	3.84	3.07	0.77	0	0	
M35/4979	Ms M E Hopkinso	20	20	17	15	-4.24	10.76	8.61	2.15	0.51	0.51	
M35/4984	CLEEVE L.A.& J.E.	4.2	13.5	10.5	8.5	-4.01	4.49	3.59	0.9	0.67	0.67	
M35/5021	SCOTT R.S.	12.8	13.5	10.5	8.5	-5.78	2.72	2.18	0.54	0.13	0.13	
M35/5041	KINGSTON R.C.	6.4	13.5	10.5	8.5	-1.48	7.02	5.62	1.4	0	0	
M35/5054	MARSH P.W.& G.	3.1	13.5	10.5	8.5	-3.31	5.19	4.15	1.04	0	0	
M35/5076	GIBB J.D.& S.Y.	0	13.5	10.5	8.5	-1.59	6.91	5.53	1.38	0	0	
M35/5111	Mr M J & Mrs H M	16.5	16.5	13.5	11.5	-3.6	7.9	6.32	1.58	0.14	0.14	
M35/5133	MARSHALL J.J.	20	20	17	15	-6.65	8.35	6.68	1.67	0.1	0.1	
M35/5134	MURRAY IMPLEM	0	13.5	10.5	8.5	-2.34	6.16	4.93	1.23	0.33	0.46	
M35/5147	BOULTON I.W.	12	13.5	10.5	8.5	-1.18	7.32	5.86	1.46	0.49	0.65	
M35/5190	TUANUI B.V.	9	13.5	10.5	8.5	-6.39	2.11	1.69	0.42	0.42	0.42	
M35/5191	TRANSPAC HOLDI	5	13.5	10.5	8.5	-5.34	3.16	2.53	0.63	0	0	
M35/5239	TAYLOR H.J.	19.5	19.5	16.5	14.5	-6.07	8.43	6.74	1.69	0.17	0.17	
M35/5240	Warman T G	14.3	14.3	11.3	9.3	-5.94	3.36	2.69	0.67	0.17	0.17	
M35/5241	FORD (EX CARTER	18.3	18.3	15.3	13.3	-8.18	5.12	4.1	1.02	0.32	0.32	
M35/5282	Rae & Williams	7	13.5	10.5	8.5	-1.15	7.35	5.88	1.47	0	0	
M35/5290	CHARTERIS	19.8	19.8	16.8	14.8	-5.32	9.48	7.58	1.9	0.15	0.15	
M35/5291	HASSELL D.B.	18.3	18.3	15.3	13.3	-4.77	8.53	6.82	1.71	0.13	0.13	
M35/5294	WRIGHT G.M.	16.1	16.1	13.1	11.1	-7.88	3.22	2.58	0.64	0	0	
M35/5298	NEATE K.C.	19.8	19.8	16.8	14.8	-5.17	9.63	7.7	1.93	0.24	0.24	
M35/5300	SEED S.L.& M.	15.7	15.7	12.7	10.7	-6.08	4.62	3.7	0.92	0.27	0.27	
M35/5301	RICHARDS A.R.&	16.1	16.1	13.1	11.1	-6.33	4.77	3.82	0.95	0	0	
M35/5308	DORNABELL W.P	16.4	16.4	13.4	11.4	-8.61	2.79	2.23	0.56	0.13	0.13	
M35/5309	DEAN E.M.	20.4	20.4	17.4	15.4	-4.26	11.14	8.91	2.23	0.13	0.13	
M35/5310	ANDERSON (EX BA	12.2	13.5	10.5	8.5	-9.1	-0.6	-0.48	-0.12	0.47	0.47	
M35/5311	Mr R G & Mrs D F	12	13.5	10.5	8.5	-0.5	8	6.4	1.6	0.37	0.37	
M35/5313	PEARCE F.M.	24	24	22.4	20.4	-10.56	9.84	7.87	1.97	0	0	
M35/5315	GILES I J	6.1	13.5	10.5	8.5	-1.09	7.41	5.93	1.48	0	0	
M35/5322	GILES R.L.	9.1	13.5	10.5	8.5	-5.69	2.81	2.25	0.56	0.16	0.16	
M35/5324	STEPHENSM S.L.	17	17	14	12	-2.62	9.38	7.5	1.88	0	0	
M35/5325	STEPHENS S.L.	8.5	13.5	10.5	8.5	-2.62	5.88	4.7	1.18	0	0	
M35/5326	STEPHENS S.L.	7.6	13.5	10.5	8.5	-2.36	6.14	4.91	1.23	0	0	
M35/5330	Mr S J Higgs	15.5	15.5	14	12	-2.08	9.92	7.94	1.98	0	0	
M35/5332	Ohoka Downs Soc	35.2	35.2	32.5	30.5	-9.65	20.85	16.68	4.17	0	0	
M35/5349	DALLEY R.G.& D.I	6	13.5	10.5	8.5	-4.64	3.86	3.09	0.77	0.41	0.41	
M35/5356	GRAY J.E.& G.C.	15.2	15.2	9.5	7.5	-1.49	6.01	4.81	1.2	0.13	0.13	
M35/5430	Messrs D G & D B	12.3	13.5	10.5	8.5	-1.06	7.44	5.95	1.49	0.4	0.4	
M35/5448	COURTNEY R.C.	14.5	14.5	11.5	9.5	-0.7	8.8	7.04	1.76	0	0	
M35/5497	ROSSITER C.M.	0	13.5	10.5	8.5	-2.33	6.17	4.94	1.23	0	0	
M35/5608	ARCHIBALD T.R. &	15	15	13.5	11.5	-3.59	7.91	6.33	1.58	0	0	
M35/5652	Wilsons Mill Limit	13.6	13.6	10.6	8.6	-1.57	7.03	5.62	1.41	0.14	0.14	
M35/5677	POPE A & S	95.2	95.2	92.2	90.2	-5.27	84.93	67.94	16.99	0.23	0.23	
M35/5704	ROSSITER C.M.	0	13.5	10.5	8.5	-2.4	6.1	4.88	1.22	0	0	
M35/5705	ROSSITER C.M.	12	13.5	10.5	8.5	-0.74	7.76	6.21	1.55	0	0	
M35/5736	Canterbury Pet Fc	15.5	15.5	12.5	10.5	-4.72	5.78	4.62	1.16	0.51	0.51	
M35/5807	Mr J E Denton	10	13.5	10.5	8.5	-3.33	5.17	4.14	1.03	0.18	0.18	
M35/5936	Mr & Mrs H N & F	15	15	12	10	-1.95	8.05	6.44	1.61	0	0	
M35/5972	Mr & Mrs J D & K	13.9	13.9	9.9	7.9	-2.22	5.68	4.54	1.14	0.29	0.29	
M35/5981	MCLAUGHLAN W	15	15	12	10	-2.97	7.03	5.62	1.41	0	0	
M35/5988	SEED SL & M	15	15	14	12	-6.39	5.61	4.49	1.12	0.18	0.18	
M35/6008	HUTHINSON GK &	15	15	14	12	-1.76	10.24	8.19	2.05	0	0	
M35/6009	FLITCROFT A.J.	20	20	17	15	-7.44	7.56	6.05	1.51	0	0	
M35/6011	GARLICK V & P	15.2	15.2	13.2	11.2	-5.96	5.24	4.19	1.05	0	0	
M35/6026	Mr & Mrs S & R G	24	24	22	20	-1.37	18.63	14.9	3.73	0	0	
M35/6046	BARRY M.E.	4.9	13.5	10.5	8.5	-4.94	3.56	2.85	0.71	0	0	
M35/6061	CAMERON N & A	20.8	20.8	17.8	15.8	-4.57	11.23	8.98	2.25	0.1	0.1	
M35/6070	FORD (EX CARTER	18	18	17	15	-8.18	6.82	5.46	1.36	0.32	0.32	
M35/6076	Mr J Pearce	22	22	19	17	-2.32	14.68	11.74	2.94	0	0	
M35/6077	Mr & Mrs I L & J H	20.5	20.5	17.5	15.5	-9.58	5.92	4.74	1.18	0.25	0.25	
M35/6087	FOSTER M.J.	12	13.5	10.5	8.5	-0.94	7.56	6.05	1.51	0	0	
M35/6096	Wyndarra Farm Li	12	13.5	10.5	8.5	-3.74	4.76	3.81	0.95	0.1	0.1	
M35/6097	FROST E.M.	12	13.5	10.5	8.5	-2.6	5.9	4.72	1.18	0	0	
M35/6116	CAIN J.W.	5.4	13.5	10.5	8.5	-1.04	7.46	5.97	1.49	0	0	
M35/6123	ALLISON .R.	13.6	13.6	10.6	8.6	-4.92	3.68	2.94	0.74	0	0	
M35/6142	GOLD M.N.	20.4	20.4	14.4	12.4	-6.51	5.89	4.71	1.18	0	0	

			Future scenario										
Well	Owner	Depth	Adopt Dep	Top Screen	Cutoff	Calc80Min	Available	Protected	DD4 interference	TotalDD Future Scenario	Total DD Existing Scenario	Increase?
M35/6167	PRICE S (EX TOM	12.5	13.5	10.5	8.5	-2.15	6.35	5.08	1.27	0.52	0.52	
M35/6178	JOHNSON R.& G.	0	13.5	10.5	8.5	-1.59	6.91	5.53	1.38	0	0	
M35/6179	JOHNSON R.& G.	20	20	17	15	-3.74	11.26	9.01	2.25	0.1	0.1	
M35/6181	WALKER D.J.	12	13.5	10.5	8.5	-3.71	4.79	3.83	0.96	0.2	0.2	
M35/6191	CUSICK D.J.	11.7	13.5	10.5	8.5	-5.53	2.97	2.38	0.59	0.1	0.1	
M35/6231	SINGER DJ & CG	17.5	17.5	16.5	14.5	-6.52	7.98	6.38	1.6	0	0	
M35/6268	A Verkerk Limited	12	13.5	10.5	8.5	-3.16	5.34	4.27	1.07	0.54	0.65	
M35/6279	HEWITT SJ & AJ	5.5	13.5	10.5	8.5	-0.75	7.75	6.2	1.55	0	0	
M35/6280	Mr D A L MacKen	16.4	16.4	15.4	13.4	-2.65	10.75	8.6	2.15	0.3	0.3	
M35/6282	Mr J Kreisel	20.4	20.4	16.4	14.4	-5.07	9.33	7.46	1.87	0.15	0.15	
M35/6320	CAMMOCK JD & F	6.1	13.5	10.5	8.5	-1.46	7.04	5.63	1.41	0	0	
M35/6324	PRICE O.J.	0	13.5	10.5	8.5	-1.24	7.26	5.81	1.45	0.3	0.3	
M35/6361	MOUNTFORD ENT	42	42	36	34	-0.14	33.86	27.09	6.77	0	0	
M35/6400	BOOTH M.I.	15	15	12	10	-2.95	7.05	5.64	1.41	0	0	
M35/6433	CHARLTON CR & A	12	13.5	10.5	8.5	-2.55	5.95	4.76	1.19	0.44	0.44	
M35/6462	HACK BAW	18	18	13.3	11.3	-2.74	8.56	6.85	1.71	0.24	0.24	
M35/6468	Mr & Mrs A T & J	19.3	19.3	16.3	14.3	-4.42	9.88	7.9	1.98	0.23	0.23	
M35/6483	GRAINGER .P.	20	20	18	16	-4.51	11.49	9.19	2.3	0	0	
M35/6484	BRADLEY .D.	15.5	15.5	13.5	11.5	-3.82	7.68	6.14	1.54	0.39	0.39	
M35/6507	Mr R & Mrs N Mc	10	13.5	10.5	8.5	-0.37	8.13	6.5	1.63	0.28	0.28	
M35/6534	WEBSTER C.G & I	18	18	15	13	-5.51	7.49	5.99	1.5	0	0	
M35/6547	CLARK DG & EM	15	15	12	10	-4.49	5.51	4.41	1.1	0	0	
M35/6573	O'GRADY TP	16.2	16.2	14.2	12.2	-0.79	11.41	9.13	2.28	0.14	0.14	
M35/6587	WARREN AH & BL	15	15	12	10	-6.58	3.42	2.74	0.68	0.32	0.32	
M35/6622	GILLMAN KJ & SR	15	15	13	11	-2.67	8.33	6.66	1.67	0.14	0.14	
M35/6631	Mr E J Bailey	20.2	20.2	16.2	14.2	-3.5	10.7	8.56	2.14	0	0	
M35/6650	COKER N.& R.G.L.	11	13.5	10.5	8.5	-3.13	5.37	4.3	1.07	0.65	0.65	
M35/6659	SPICER M.J	8.5	13.5	10.5	8.5	-2.28	6.22	4.98	1.24	0.28	0.28	
M35/6687	BECK RE & JM	12.7	13.5	10.5	8.5	-1.48	7.02	5.62	1.4	0	0	
M35/6688	MASON W.I.G	18	18	15	13	-6.32	6.68	5.34	1.34	0.27	0.27	
M35/6711	GANTLEY T.C.& L	36	36	32.5	30.5	-1.46	29.04	23.23	5.81	0.58	0.58	
M35/6712	Denham Green Lt	17.5	17.5	14.5	12.5	-1.4	11.1	8.88	2.22	0.28	0.28	
M35/6713	Carville D & K	20	20	17	15	-3.42	11.58	9.26	2.32	0.48	0.48	
M35/6740	ADAMS R.H	12.4	13.5	10.5	8.5	-1.49	7.01	5.61	1.4	0	0	
M35/6763	DENTON	36	36	33	31	-1.45	29.55	23.64	5.91	0.92	0.92	
M35/6768	TRENGROVE J & A	20	20	17	15	-5.89	9.11	7.29	1.82	0.11	0.11	
M35/6773	BLACK P.C.	24	24	22	20	-5.88	14.12	11.3	2.82	0	0	
M35/6774	STEWART	20	20	17	15	-6.84	8.16	6.53	1.63	0	0	
M35/6778	GRAY J & G	8	13.5	10.5	8.5	-1.47	7.03	5.62	1.41	0	0	
M35/6794	BROWN K.T.	15	15	12	10	-3.46	6.54	5.23	1.31	0	0	
M35/6795	AIKIN GW	18	18	16	14	-1.97	12.03	9.62	2.41	0	0	
M35/6797	WITHERS D	20	20	17	15	-4.33	10.67	8.54	2.13	0	0	
M35/6826	SOUTHBROOK SEI	10.6	13.5	10.5	8.5	-1.46	7.04	5.63	1.41	0	0	
M35/6830	Mr R J Fife and D	13.9	13.9	12.9	10.9	-3.68	7.22	5.78	1.44	0	0	
M35/6839	HOTHERSALL R.J	30	30	14	12	-3.81	8.19	6.55	1.64	0	0	
M35/6851	Mr S T Hampton	18	18	15	13	-6.03	6.97	5.58	1.39	0.22	0.22	
M35/6863	BARRINGTON W.J	15	15	12	10	-4.9	5.1	4.08	1.02	0.12	0.12	
M35/6867	HARRIS I. R.	20	20	17	15	-5.19	9.81	7.85	1.96	0.94	0.94	
M35/6883	PLIMMER D.	20.6	20.6	18.6	16.6	-3.46	13.14	10.51	2.63	0	0	
M35/6888	BECK R.E.	25.5	25.5	24	22	-1.48	20.52	16.42	4.1	0	0	
M35/6891	RICHARDS M.E.	19.5	19.5	17.4	15.4	-4.79	10.61	8.49	2.12	0	0	
M35/6892	RICHARDS M.E.	20	20	17	15	-5.28	9.72	7.78	1.94	0	0	
M35/6893	RICHARDS M.E.	20	20	17	15	-5.8	9.2	7.36	1.84	0	0	
M35/6894	RICHARDS M.E.	20	20	17	15	-6.4	8.6	6.88	1.72	0	0	
M35/6895	RICHARDS M.E.	20	20	17	15	-7.04	7.96	6.37	1.59	0.1	0.1	
M35/6899	ANTONIUK R.M.&	20	20	17	15	-8.1	6.9	5.52	1.38	0.1	0.1	
M35/6905	TONKIN G.D.	20	20	17	15	-6.37	8.63	6.9	1.73	0.14	0.14	
M35/6916	Mr & Mrs L J & G	14.1	14.1	12.1	10.1	-5.66	4.44	3.55	0.89	0.11	0.11	
M35/6932	J T X Lindsay	12	13.5	10.5	8.5	-9.86	-1.36	-1.09	-0.27	0	0	
M35/6973	Mr J R Dunlop	19.7	19.7	17.1	15.1	-4.47	10.63	8.5	2.13	0	0	
M35/7023	BLACK PC & KL	0	13.5	10.5	8.5	-3.04	5.46	4.37	1.09	0	0	
M35/7069	JARMON IAN.	15	15	12	10	-1.47	8.53	6.82	1.71	0	0	
M35/7073	WALKER D.J.H.&	18.8	18.8	16.8	14.8	-2.58	12.22	9.78	2.44	0	0	
M35/7102	FRYER R.K.	12.4	13.5	10.5	8.5	-3.75	4.75	3.8	0.95	0	0	
M35/7107	HANSEN L.J.& B.C	15	15	12	10	-2.52	7.48	5.98	1.5	0.18	0.18	
M35/7113	CLEMENTS K.S.	17.7	17.7	15	13	-6.11	6.89	5.51	1.38	0	0	
M35/7153	MARWICK A.J.& (	38	38	37	35	-0.19	34.81	27.85	6.96	0	0	
M35/7162	HARBECK A.D.& A	18	18	16.5	14.5	-6.72	7.78	6.22	1.56	0	0	
M35/7171	Glenalbany Deer I	13	13.5	10.5	8.5	-4.72	3.78	3.02	0.76	0.51	0.51	
M35/7194	Mr M R & Mrs S J	24	24	22	20	-2.01	17.99	14.39	3.6	0.35	0.35	
M35/7198	BROWN K.T.	16	16	13	11	-3.3	7.7	6.16	1.54	0	0	
M35/7204	COKER N.	15	15	12	10	-3.76	6.24	4.99	1.25	0.67	0.67	
M35/7205	TONKIN G.D. & S.	12	13.5	10.5	8.5	-2.99	5.51	4.41	1.1	0.15	0.15	
M35/7222	WAIMAKARIRI DIS	20	20	17	15	-1.45	13.55	10.84	2.71	0	0	
M35/7225	PROSSER M.A.C.	11	13.5	10.5	8.5	-2.9	5.6	4.48	1.12	0.29	0.29	
M35/7287	Wyndarra Farm Li	30	30	27	25	-1.83	23.17	18.54	4.63	0.1	0.1	
M35/7288	POLSON AH DR	12	13.5	10.5	8.5	-3.62	4.88	3.9	0.98	0	0	
M35/7349	HAWKINS A.J & P	24	24	21	19	-4.95	14.05	11.24	2.81	0	0	
M35/7368	IRRIGATION PUM	17	17	14	12	-3.28	8.72	6.98	1.74	0	0	
M35/7444	DAVIES J & WK	21	21	19.5	17.5	-5.63	11.87	9.5	2.37	0	0	
M35/7507	Mr & Mr G J & I D	81	81	75	73	-0.44	72.56	58.05	14.51	0	0	
M35/7533	LYALL T.M	6	13.5	10.5	8.5	-2.33	6.17	4.94	1.23	0.32	0.45	
M35/7575	VERBERN F.W	18	18	16.5	14.5	-3.82	10.68	8.54	2.14	0	0	
M35/7618	Ohoka Utilities Lir	25.8	25.8	22.8	20.8	-12.14	8.66	6.93	1.73	0.41	0.41	
M35/7619	Ohoka Utilities Lir	26.8	26.8	23.8	21.8	-8.86	12.94	10.35	2.59	0.74	0.74	
M35/7687	ORR G.B &C.E	21	21	19.5	17.5	-1.3	16.2	12.96	3.24	0	0	
M35/7692	ORR G.B & C.E	21	21	17	15	-2.61	12.39	9.91	2.48	0	0	
M35/7710	HARRIS IR	24.2	24.2	22.2	20.2	-11.46	8.74	6.99	1.75	0.23	0.23	
M35/7716	Brakenridge S	8	13.5	10.5	8.5	-0.8	7.7	6.16	1.54	0.32	0.32	
M35/7754	WILKINSON PB	24	24	23	21	-1.53	19.47	15.58	3.89	0.11	0.11	
M35/7761	Mr & Mrs K A & D	22.8	22.8	20.8	18.8	-5.08	13.72	10.98	2.74	0.11	0.11	
M35/7778	Mr & Mrs A J & D	21	21	18	16	-8.73	7.27	5.82	1.45	0	0	
M35/7796	Greenwood Kare	10	13.5	10.5	8.5	-1.85	6.65	5.32	1.33	0.51	0.51	
M35/7800	LAGALLIE FAMILY	39.2	39.2	35.9	33.9	-1.49	32.41	25.93	6.48	0.42	0.42	
M35/7801	Mr & Mrs P G & L	20	20	18	16	-2	14	11.2	2.8	0	0	
M35/7898	QUAIFE AB	17.9	17.9	16.9	14.9	-8.57	6.33	5.06	1.27	0.16	0.16	
M35/7899	QUAIFE AB	18	18	17	15	-8	7	5.6	1.4	0.17	0.17	
M35/7903	DAVIDSON LA & .	18	18	16.5	14.5	-3.2	11.3	9.04	2.26	0	0	
M35/7905	MCINTOSH MA &	14.3	14.3	12.3	10.3	-0.5	9.8	7.84	1.96	0	0	
M35/7909	MOORE EH	20	20	17	15	-2.83	12.17	9.74	2.43	0.74	0.9	
M35/7997	SHIINO Y & Y	24	24	22.5	20.5	-8.44	12.06	9.65	2.41	0.26	0.26	
M35/7998	SHIINO Y & Y	26	26	24.5	22.5	-8.77	13.73	10.98	2.75	0.18	0.18	
M35/8013	POPENHAGEN DJ	14	14	8	6	-2.93	3.07	2.46	0.61	0.12	0.12	

			Future scenario										
Well	Owner	Depth	Adopt Dep	Top Screen	Cutoff	Calc80Min	Available	Protected	DD4 interference	TotalDD Future Scenario	Total DD Existing Scenario	Increase?
M35/8032	ALLAN DJ & ML	24	24	21	19	-11.59	7.41	5.93	1.48	0.26	0.26	
M35/8045	Mr M W Flavell M	15	15	12	10	-1.92	8.08	6.46	1.62	0	0	
M35/8112	Walker DJH and (	20.3	20.3	18.3	16.3	-3.15	13.15	10.52	2.63	0	0	
M35/8114	WELLS GR & DAV	16.8	16.8	14.8	12.8	-3.79	9.01	7.21	1.8	0.18	0.18	
M35/8115	MANN LJ	20	20	17	15	-5.49	9.51	7.61	1.9	0.11	0.11	
M35/8156	IZARD JMA	16.8	16.8	14.8	12.8	-2.48	10.32	8.26	2.06	0.32	0.32	
M35/8160	Ohoka Utilities Lir	28.7	28.7	25.8	23.8	-8.7	15.1	12.08	3.02	0.75	0.75	
M35/8170	Mr & Mrs D B & C	11.9	13.5	10.5	8.5	-1.93	6.57	5.26	1.31	0.3	0.3	
M35/8188	FACOORY NF	24	24	22.5	20.5	-10.28	10.22	8.18	2.04	0.1	0.1	
M35/8191	Mr & Mrs D B & C	12	13.5	10.5	8.5	-1.82	6.68	5.34	1.34	0.18	0.18	
M35/8199	LAURIE CS & VC	24.6	24.6	22.6	20.6	-12.5	8.1	6.48	1.62	0.28	0.28	
M35/8285	CAMMOCK JD	14.6	14.6	12.6	10.6	-1.49	9.11	7.29	1.82	0	0	
M35/8286	GIBB JD & SY	44.4	44.4	38	36	-1.57	34.43	27.54	6.89	0	0	
M35/8304	S J & T A DUFF	17.1	17.1	14.6	12.6	-4.51	8.09	6.47	1.62	0.15	0.15	
M35/8311	HENDREN LP & G	18	18	16.5	14.5	-4.76	9.74	7.79	1.95	0	0	
M35/8341	Mr & Mrs H & E J	23.9	23.9	21.4	19.4	-5.48	13.92	11.14	2.78	0.11	0.11	
M35/8343	AIKIN GW MK	14	14	12.5	10.5	-1.61	8.89	7.11	1.78	0	0	
M35/8399	LYNN RJ	10.5	13.5	10.5	8.5	-2.58	5.92	4.74	1.18	0.15	0.15	
M35/8409	ARCHIBALD TR	23.2	23.2	22.2	20.2	-6.25	13.95	11.16	2.79	0	0	
M35/8410	MR B M DAVEY	23.9	23.9	21.9	19.9	-6.66	13.24	10.59	2.65	0	0	
M35/8414	SANDERS SW & L	17.8	17.8	16.4	14.4	-6.6	7.8	6.24	1.56	0.84	0.84	
M35/8442	HARRISON R S	17.8	17.8	16.3	14.3	-4	10.3	8.24	2.06	0.19	0.19	
M35/8454	Mr & Mrs D A & (	21	21	19.5	17.5	-4.89	12.61	10.09	2.52	0	0	
M35/8456	KESSELER DA & G	30	30	27	25	-2.02	22.98	18.38	4.6	0	0	
M35/8461	ANDERSON SJ KJI	23.9	23.9	22.4	20.4	-11.1	9.3	7.44	1.86	0.44	0.44	
M35/8480	Mr & Mrs R & S W	24	24	22.5	20.5	-9.9	10.6	8.48	2.12	0.23	0.23	
M35/8508	Timperley Investr	29	29	14.5	12.5	-10.39	2.11	1.69	0.42	0.31	0.31	
M35/8536	OHOKA PARK TRL	18	18	16.5	14.5	-5.33	9.17	7.34	1.83	0	0	
M35/8537	OHOKA PARK TRL	18	18	16.5	14.5	-5.08	9.42	7.54	1.88	0	0	
M35/8539	OHOKA PARK TRL	18	18	16.5	14.5	-2.17	12.33	9.86	2.47	0	0	
M35/8585	RICHARD BROS LT	15.4	15.4	14.4	12.4	-2.64	9.76	7.81	1.95	0	0	
M35/8586	T B & K B STOKES	14.9	14.9	13.9	11.9	-2.28	9.62	7.7	1.92	0	0	
M35/8587	RICHARDS BROTH	14.9	14.9	13.9	11.9	-3.01	8.89	7.11	1.78	0	0	
M35/8594	Ohoka Utilities Lir	28.3	28.3	25.3	23.3	-8.15	15.15	12.12	3.03	0.65	0.65	
M35/8606	BURNEY RT	24.8	24.8	23.3	21.3	-7.74	13.56	10.85	2.71	0.37	0.37	
M35/8647	RADOVONICH B	23	23	22	20	-0.58	19.42	15.54	3.88	0	0	
M35/8649	WILTON RG & JN	16.5	16.5	14.5	12.5	-3.42	9.08	7.26	1.82	0.14	0.14	
M35/8662	WHYTE GK & C	19	19	17	15	-5.03	9.97	7.98	1.99	0	0	
M35/8664	Wigley N	17.3	17.3	15.3	13.3	-2.99	10.31	8.25	2.06	0.64	0.64	
M35/8694	CHADDERTON DE	24	24	22	20	-12.73	7.27	5.82	1.45	0.27	0.27	
M35/8699	BUCK FARMS LIM	16	16	10	8	-3.69	4.31	3.45	0.86	0	0	
M35/8700	BUCK FARMS LIM	16	16	10	8	-3.51	4.49	3.59	0.9	0.11	0.11	
M35/8701	BUCK FARMS LIM	16	16	10	8	-3.14	4.86	3.89	0.97	0.11	0.11	
M35/8702	BUCK FARMS LIM	12	13.5	10.5	8.5	-3.33	5.17	4.14	1.03	0.14	0.14	
M35/8709	Storer GA	21.8	21.8	20.3	18.3	-2.76	15.54	12.43	3.11	0	0	
M35/8710	Buck Farms Limite	11	13.5	10.5	8.5	-1.93	6.57	5.26	1.31	0.12	0.12	
M35/8786	Myers JC	12	13.5	10.5	8.5	-2.88	5.62	4.5	1.12	0	0	
M35/8842	Mr J C McKenzie	19.9	19.9	18.4	16.4	-0.61	15.79	12.63	3.16	0	0	
M35/8843	Richard Brothers	14	14	13	11	-2.22	8.78	7.02	1.76	0	0	
M35/8862	Ms PM Plaskett	42.3	42.3	40.3	38.3	-3.33	34.97	27.98	6.99	0	0	
M35/8900	Mr & Mrs B P & P	20.2	20.2	17.2	15.2	-2.3	12.9	10.32	2.58	0	0	
M35/8901	Mares Properties	91	91	84.2	82.2	-1.17	81.03	64.82	16.21	0.26	0.26	
M35/8935	Mr M K & Mrs S M	18	18	17	15	-5.88	9.12	7.3	1.82	0.11	0.11	
M35/8936	Mr M K & Mrs S M	18	18	17	15	-6.3	8.7	6.96	1.74	0.11	0.11	
M35/8951	J D & K A McKenz	18.1	18.1	16.1	14.1	-2.32	11.78	9.42	2.36	0	0	
M35/8975	P A & P L Trumic	22	22	20.5	18.5	-7.54	10.96	8.77	2.19	0.38	0.38	
M35/8984	L G & E D Thomas	21	21	16.5	14.5	-2.41	12.09	9.67	2.42	0.15	0.15	
M35/9007	GJ Allison & EM K	24	24	22.5	20.5	-1.93	18.57	14.86	3.71	0	0	
M35/9024	Brooklea Develop	38.3	38.3	37.3	35.3	-1.67	33.63	26.9	6.73	0	0	
M35/9025	Brooklea Develop	18.1	18.1	17.1	15.1	-0.7	14.4	11.52	2.88	0	0	
M35/9026	Brooklea Develop	17	17	16	14	-0.36	13.64	10.91	2.73	0	0	
M35/9038	Amy Major	20.7	20.7	18.7	16.7	-3.29	13.41	10.73	2.68	0.36	0.36	
M35/9071	Watson A A	12	13.5	10.5	8.5	-3.97	4.53	3.62	0.91	0.13	0.13	
M35/9081	Mr C G & Mrs M S	71.3	71.3	65.3	63.3	-1.76	61.54	49.23	12.31	0	0	
M35/9120	Paul & Ruth Tagg	77.9	77.9	71.9	69.9	-1.26	68.64	54.91	13.73	0.59	0.59	
M35/9126	Van't Veen G B &	30.5	30.5	19	17	-2.97	14.03	11.22	2.81	0.16	0.16	
M35/9179	Mills PC & SA	47.9	47.9	41.9	39.9	-8.67	31.23	24.98	6.25	0	0	
M35/9184	Osikai J & SK	23.6	23.6	21.6	19.6	-8.25	11.35	9.08	2.27	0.17	0.17	
M35/9199	G S & B A COATES	23.7	23.7	21.7	19.7	-11.69	8.01	6.41	1.6	0.27	0.27	
M35/9201	Peters HG & PR	42	42	40	38	-1.49	36.51	29.21	7.3	0.56	0.56	
M35/9202	Peters HG & PR	41.8	41.8	39.8	37.8	-1.5	36.3	29.04	7.26	0.43	0.43	
M35/9203	Peters HG & PR	43.8	43.8	41.8	39.8	-1.52	38.28	30.62	7.66	0.31	0.31	
M35/9218	Sparrow K & H	24	24	22.5	20.5	-8.37	12.13	9.7	2.43	0.41	0.41	
M35/9222	Mr A & Mrs F A M	24	24	22.5	20.5	-8.25	12.25	9.8	2.45	0.16	0.16	
M35/9226	R A Edwards	23.9	23.9	21.9	19.9	-10.2	9.7	7.76	1.94	0.1	0.1	
M35/9230	P W & T E Jordan	22	22	19	17	-5.53	11.47	9.18	2.29	0	0	
M35/9257	Mr M D & Mrs N I	18	18	16.5	14.5	-3.49	11.01	8.81	2.2	0	0	
M35/9258	Mr M D & Mrs N I	18	18	16.5	14.5	-2.93	11.57	9.26	2.31	0	0	
M35/9262	Mr G D & Mrs L J	21.4	21.4	19.4	17.4	-7.69	9.71	7.77	1.94	0.13	0.13	
M35/9288	MR R MANSELL	33.9	33.9	30.9	28.9	-3.19	25.71	20.57	5.14	0	0	
M35/9295	Smith C B	20.4	20.4	18.4	16.4	-7.59	8.81	7.05	1.76	0.26	0.26	
M35/9313	MR J GRAY	45	45	43	41	-1.5	39.5	31.6	7.9	0.41	0.41	
M35/9314	MR J GRAY	45	45	43	41	-1.5	39.5	31.6	7.9	0.33	0.33	
M35/9315	MR J GRAY	45	45	43	41	-1.51	39.49	31.59	7.9	0.25	0.25	
M35/9316	MR J GRAY	45	45	42	40	-1.52	38.48	30.78	7.7	0.22	0.22	
M35/9389	MR R I & MRS F V	20	20	17	15	-8.11	6.89	5.51	1.38	0	0	
M35/9398	MR D A BOARD &	17.8	17.8	15.8	13.8	-7.5	6.3	5.04	1.26	0.15	0.15	
M35/9417	OHOKA VIEWS HC	13	13.5	10.5	8.5	-5.69	2.81	2.25	0.56	0.36	0.36	
M35/9418	OHOKA VIEWS HC	13	13.5	10.5	8.5	-1.07	7.43	5.94	1.49	0.35	0.35	
M35/9419	OHOKA VIEWS HC	17	17	15	13	-1.31	11.69	9.35	2.34	0.33	0.33	
M35/9420	OHOKA VIEWS HC	18	18	16	14	-2.39	11.61	9.29	2.32	0.5	0.5	
M35/9434	MR W D CROFT	17.9	17.9	16.9	14.9	-2.87	12.03	9.62	2.41	1.1	1.1	
M35/9445	PC & SA Mills	18	18	9	7	-4.16	2.84	2.27	0.57	0	0	
M35/9558	MR & MRS A F &	24	24	22.5	20.5	-6.8	13.7	10.96	2.74	0.35	0.35	
M35/9592	Mr NA Harrison	21	21	18.9	16.9	-4.06	12.84	10.27	2.57	0.27	0.27	
M35/9598	MR & MRS J D & I	17.3	17.3	15.3	13.3	-6.7	6.6	5.28	1.32	0	0	
M35/9599	Mr & Mrs G.J & T.	17.4	17.4	15.4	13.4	-1.69	11.71	9.37	2.34	0	0	
M35/9600	MR & MRS J D & I	17.5	17.5	15.5	13.5	-1.91	11.59	9.27	2.32	0	0	
M35/9601	MR & MRS J D & I	23.5	23.5	21.5	19.5	-3.59	15.91	12.73	3.18	0	0	
M35/9602	MR & MRS J D & I	17.4	17.4	15.4	13.4	-4.68	8.72	6.98	1.74	0.22	0.22	
M35/9603	MR & MRS J D & I	17.7	17.7	15.7	13.7	-3.03	10.67	8.54	2.13	0.28	0.28	
M35/9612	STONEHOUSE TRL	17.4	17.4	14.9	12.9	-1.72	11.18	8.94	2.24	0	0	
M35/9613	STONEHOUSE TRL	17.4	17.4	14.9	12.9	-7.01	5.89	4.71	1.18	0	0	

			Future scenario										
Well	Owner	Depth	Adopt Dep	Top Screen	Cutoff	Calc80Min	Available	Protected	DD4 interference	TotalDD Future Scenario	Total DD Existing Scenario	Increase?
M35/9614	MR L P WHELAN	21.1	21.1	19.6	17.6	-3.69	13.91	11.13	2.78	0.29	0.29	
M35/9626	S H & P J MITCHEI	23.9	23.9	21.9	19.9	-9.77	10.13	8.1	2.03	0.22	0.22	
M35/9630	MR B T LENNOX	16.6	16.6	14.6	12.6	-4.11	8.49	6.79	1.7	0.84	0.84	
M35/9631	MR & MRS SH & S	27	27	25	23	-7.6	15.4	12.32	3.08	0.27	0.27	
M35/9632	MR & MRS D J & I	17.4	17.4	15.4	13.4	-7.46	5.94	4.75	1.19	0	0	
M35/9633	MR & MRS D J & I	17.6	17.6	15.6	13.6	-7.29	6.31	5.05	1.26	0	0	
M35/9634	MR & MRS D J & I	17.4	17.4	14.9	12.9	-5.28	7.62	6.1	1.52	0.11	0.11	
M35/9635	MR & MRS D J & I	17.9	17.9	15.4	13.4	-4	9.4	7.52	1.88	0.12	0.12	
M35/9636	MR & MRS D J & I	17.8	17.8	15.8	13.8	-4.82	8.98	7.18	1.8	0.1	0.1	
M35/9637	MR & MRS D J & I	17.6	17.6	15.1	13.1	-1.54	11.56	9.25	2.31	0	0	
M35/9638	MR & MRS D J & I	17.8	17.8	15.3	13.3	-6.89	6.41	5.13	1.28	0	0	
M35/9639	MR & MRS D J & I	17.5	17.5	15	13	-6.38	6.62	5.3	1.32	0	0	
M35/9640	MR & MRS D J & I	16.5	16.5	14.5	12.5	-5.6	6.9	5.52	1.38	0	0	
M35/9641	MR & MRS D J & I	16.1	16.1	14.1	12.1	-5.16	6.94	5.55	1.39	0.1	0.1	
M35/9642	MR & MRS D J & I	17.3	17.3	15.3	13.3	-4.95	8.35	6.68	1.67	0.11	0.11	
M35/9643	MR & MRS D J & I	17.5	17.5	15.5	13.5	-4.35	9.15	7.32	1.83	0.12	0.12	
M35/9666	MR & MRS T B &	24	24	21	19	-8.3	10.7	8.56	2.14	0.11	0.11	
M35/9682	LEE FAMILY TRUS	36	36	34.5	32.5	-2.66	29.84	23.87	5.97	0	0	
M35/9698	Ohoka Utilities Lir	27.2	27.2	24.2	22.2	-9.88	12.32	9.86	2.46	0.29	0.29	
M35/9710	WAIMAKARIRI DIS	258	258	255	253	-1.47	251.53	201.22	50.31	0	0	
M35/9740	MR & MRS K & L I	17.8	17.8	15.3	13.3	-4.94	8.36	6.69	1.67	0.12	0.12	
M35/9741	MR O W PIMM &	22	22	20	18	-4.99	13.01	10.41	2.6	0.28	0.28	
M35/9760	RMO INVESTMEN	12	13.5	10.5	8.5	-1.71	6.79	5.43	1.36	0	0	
M35/9812	MR A K CUSSONS	23.8	23.8	21.8	19.8	-7.52	12.28	9.82	2.46	0.26	0.26	
M35/9829	SUBDIVISION MA	18	18	12	10	-4.31	5.69	4.55	1.14	0	0	
M35/9831	Dymock	18	18	16.5	14.5	-0.2	14.3	11.44	2.86	0	0	
M35/9834	SUBDIVISION MA	18	18	12	10	-3.09	6.91	5.53	1.38	0	0	
M35/9871	Mr Warwick Croft	17.4	17.4	15.4	13.4	-0.99	12.41	9.93	2.48	0.24	0.24	
M35/9875	Mr & Mrs B M & I	20.8	20.8	18.8	16.8	-9.12	7.68	6.14	1.54	0.23	0.23	
M35/9876	Mr & Ms M C & P	20.5	20.5	18.5	16.5	-5.9	10.6	8.48	2.12	0.16	0.16	
M35/9916	Mr & Mrs D L & S	24	24	18	16	-6.72	9.28	7.42	1.86	0	0	
M35/9946	Mr & Mrs R A & M	20.7	20.7	18.7	16.7	-6.77	9.93	7.94	1.99	0.27	0.27	
M35/9983	Mr & Mrs MA & M	24	24	20	18	-2.94	15.06	12.05	3.01	0	0	
M35/9995	Mr SD Syme	23.6	23.6	21.6	19.6	-8.99	10.61	8.49	2.12	0.23	0.23	
M35/9996	Ms DJ Sutherland	20	20	17	15	-3.37	11.63	9.3	2.33	0.2	0.2	

Appendix D: WDC Water Conservation Strategy

WAIMAKARIRI DISTRICT COUNCIL

MEMO

FILE NO AND TRIM NO: WAT-03 / 140214013911

DATE: 14 February 2014

FROM: Colin Roxburgh, Civil Engineer, Project Delivery Unit

SUBJECT: Waimakariri District Council Water Conservation and Restrictions Policy Summary

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1. Purpose

This memo has been prepared to summarise the water conservation initiatives carried out by the Waimakariri District Council (based on the 2010 Water Conservation Strategy Document), and to document Council's strategy for managing demand during periods of high flow through the use of water restrictions.

2. Water Conservation Strategy

In 2010 the Waimakariri District Council adopted a water conservation policy that included three primary conservation techniques, and three other techniques. Note that these techniques below were recommended as a result of the 2010 Water Conservation Strategy, and hence have been implemented for the last 3.5 years. Is should be noted that this document is in the process of being reviewed and updated at present.

PRIMARY MEASURES

Community Awareness Programme

The Council will develop and implement a Community Awareness Programme. This will typically involve such things as:

- Preparing a media campaign on water conservation
- Development of a school education programme
- Distributing water conservation kits

The programme will be developed during the 2010/11 year and then implemented from 2011/12 onwards.

The Council proposes to budget $25,000 for two years to establish the programme and then an ongoing annual budget of $10,000.

The main benefits of implementing this measure are that it can significantly reduce the peak water use at a relatively low cost and it can change public perception and awareness of the importance and value of conserving water.

Leak Reduction

The Council will develop and implement a comprehensive Leak Reduction Programme. This will involve Minimum Night Flow Monitoring, an assessment of the Economic Level of Leakage, and Active Leak Detection & Repair.

The Council proposes to invest approximately $90,000 in 2010/11 and then an ongoing budget of between 60,000 and $80,000 per year in the Leak Reduction Programme.

The benefits of implementing this measure are that it does not rely on customer participation, it may have an immediate and dramatic effect on water use on some specific schemes, and it will provide a good method for monitoring the condition of the reticulation system.

Further Investigation of Metering of Extraordinary Users

The Council proposes to carry out further investigation of water metering of extra-ordinary users on all on-demand schemes over the next 12 months. This will involve the following work:

- Undertaking a random public survey on water metering and volumetric charging
- Installing sample water meters on different user groups to gain consumption data
- Providing feedback and a recommendation to Council on the outcomes of the survey and sample metering

The drivers for installing water meters and establishing a volumetric based charging regime are wider than just water conservation. The Council has acknowledged for some time that the existing rating structure that charges all consumers the same water rate, regardless of water use, is inequitable.

Additionally, the establishment of a metering programme for extra-ordinary users will greatly assist in providing robust data to accurately identify the volume of water being used by extra-ordinary users and therefore provide a far more reliable assessment of the volume of water used by domestic customers.

The survey will gauge the views of the community on the use of water meters to allow volumetric charging for water and the different charging regimes available prior to adopting a position relating to water metering. Prior to any implementation of water metering and volumetric charging the community will be consulted.

The Council proposes to spend $150,000 in 2010/11. $140,000 of this is to be spent on installing and reading water meters on approximately 10% of extraordinary users in the District connected to on demand schemes and a small number of residential properties. The remaining $10,000 will be spent on a random survey to seek views on the level of support or opposition for metering.

In summary, the advantages of adopting this measure are that it will:

- Allow community views to be considered prior to Council adopting a position relating to water metering
- Allow data to be collected on water usage to assist in defining extraordinary users

OTHER MEASURES

There are a number of other measures that the Council is already using, or will either implement or investigate in the future, these include:

Water Restrictions

The Council will continue to use water restrictions as a tool to reduce demand during critical times. The water restrictions will be used to:

- Comply with resource consent conditions
- Keep demand within the capacity of the infrastructure

Restrictor Checks

The Council currently undertakes inspections of restrictors on restricted water supplies, to ensure that excessive wear or damage has not occurred that could increase the flow allocation to each property. These restrictor checks will continue and will be programmed and undertaken in a more routine manner.

Investigations into Alternative Sources of Non-Potable Water

While the first three years of the Water Conservation Strategy are being implemented, the Council will undertake investigations into on-site options of non-potable water. These will primarily include rain water collection and grey water reuse for garden water use.

The investigations will consider the feasibility of these options within the Waimakariri District and methods for implementing them. This will include options such as doing nothing (if these options are found to be unsuitable), encouraging their use through the Community Awareness Programme, or regulating for their use through the District Plan or a Bylaw.

3. Water Restrictions Policy

Background

Water restrictions are one of the active water conservation methods currently used by Waimakariri District Council. Water restrictions enable significant water savings on peak flows with quick implementation, low cost and relative simplicity. Council has adopted a Water Supply Bylaw which enables these restrictions to be enforced. These restrictions are advertised through community newspapers. An example advertisement has been attached.

There are three levels of restrictions which can be applied.

LEVEL 1 Restriction Conditions:

1) Properties with a street address that ends with an odd number may only water gardens and lawns when the day of the month is an odd number.

   For example, a property with a street number of 21 can only water gardens and lawns when the date is an odd number, such as 1st, 3rd, 5th February, etc.

2) Properties with a street address that ends with an even number may only water gardens and lawns when the day of the month is an even number.

LEVEL 2 Restriction Conditions:

1) The use of automated watering systems is prohibited at all times. This includes rotary, pop-up, dripper, or other types of watering systems.
2) Hand Held hoses only may be used for watering of gardens and lawns. The use of hand held hoses is permitted at all times.

LEVEL 3 Restriction Conditions:

1) There is a complete ban on all watering systems. Water may only be used for domestic purposes such as drinking and washing and to provide drinking water for stock.

Appendix E: Drillers logs

Bore or Well No: BW24/0262
Well Name:
Owner: Waimakariri District Council

Environment Canterbury
Your regional council

Street of Well: Bradleys Road
File No: CRC155885
Locality: Ohoka
Allocation Zone: Cust
NZTM Grid Reference: BW24:65127-99015 QAR 4
CWMS Zone: Waimakariri
NZTM X-Y: 1565127 - 5199015
Location Description:
Uses: Public Water Supply
ECan Monitoring:
Well Status: Active (exist, present)

Drill Date: 02 May 2015
Water Level Count: 0
Well Depth: 84.70m -GL
Strata Layers: 38
Initial Water Depth: 0.00m -MP
Aquifer Tests: 2
Diameter: 300mm
Yield/Drawdown Tests: 5

Measuring Point Ait:
Highest GW Level:
GL Around Well: -1.26m -MP
Lowest GW Level:
MP Description: Top of Casing
First Reading:
Last Reading:
Driller: Clemence Drilling Contractors
Calc. Min. (Below MP):
Drilling Method: Unknown
Last Updated: 09 Sep 2015
Casing Material: Steel
Last Field Check:
Pump Type:
Yield:
Aquifer Type:
Drawdown:
Aquifer Name:
Specific Capacity: 0.41 l/s/m

Screens:

Screen No.	Screen Type	Top (m)	Bottom (m)	Diameter (mm)	Leader Length (mm)	Slot Size (mm)	Slot Length (mm)
1	Slotted Casing	78	84				

Step Tests:

Step Test Date	Step	Yield (l/s)	Drawdown	Duration (mins)
25 Jun 2015	1	12	29.09	109
25 Jun 2015	2	14	38.16	104
25 Jun 2015	3	16	46.39	108
25 Jun 2015	4	18	53.28	103
25 Jun 2015	5	20	57.17	102

Date	Comments
28 Aug 2015	NZTM Easting/Northing updated from:1565129-5199009 shifted 6m Grid ref from aquifer test report (BW24/0262).

Aquifer test date(s) where this is the pump bore

25 Jun 2015 - step

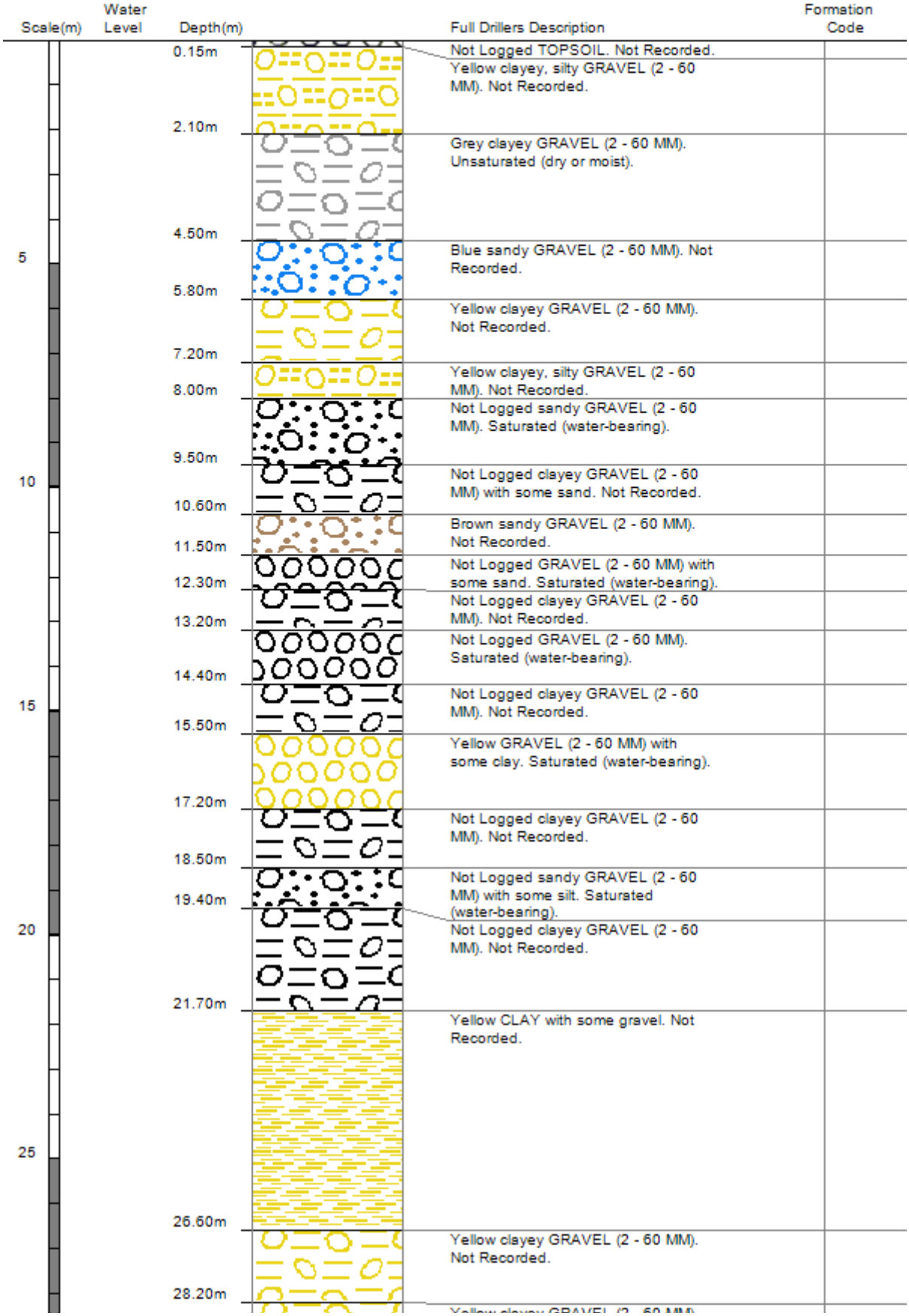
25 Jun 2015 - constant

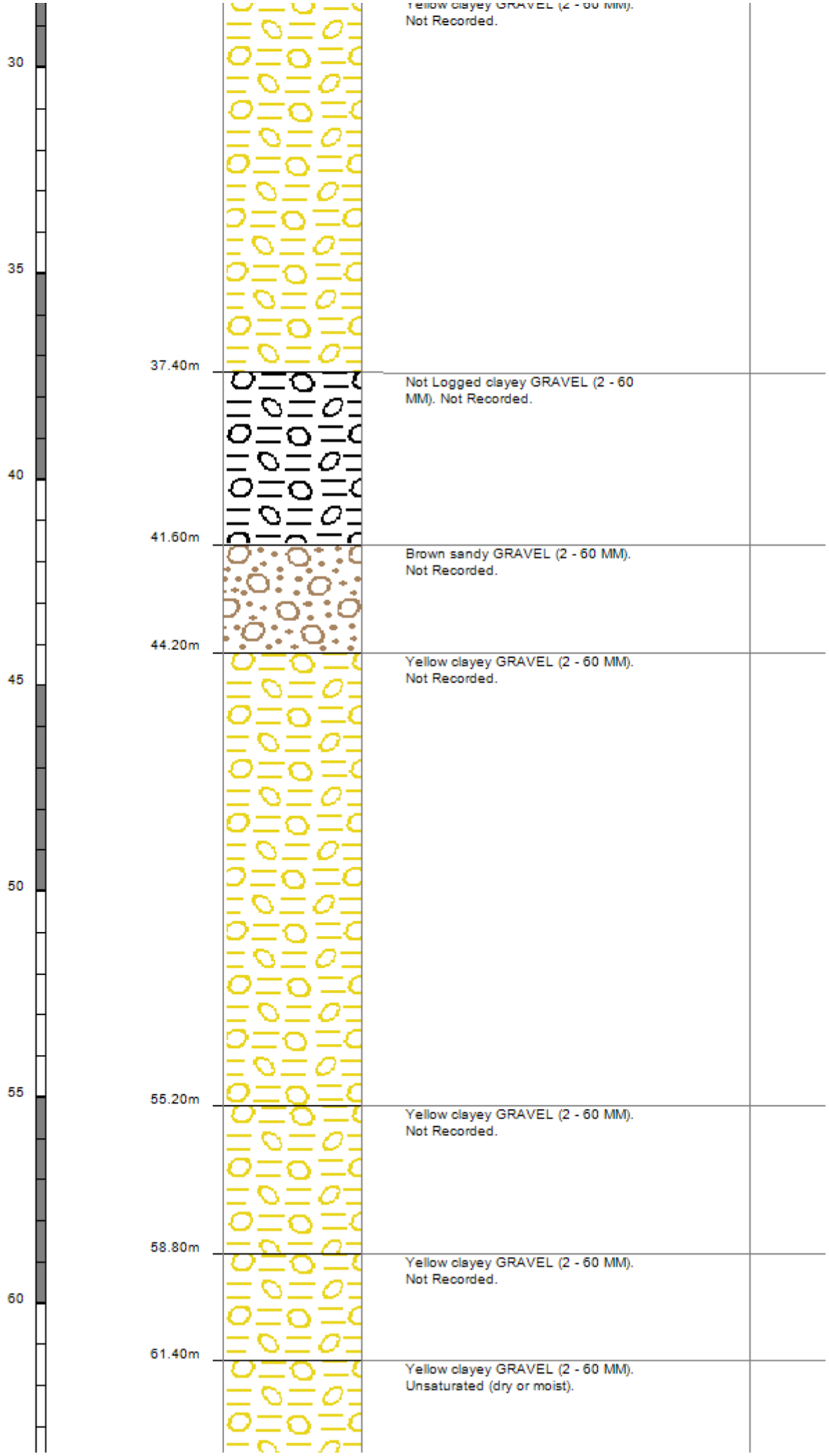
Aquifer test date(s) where this is an observation bore

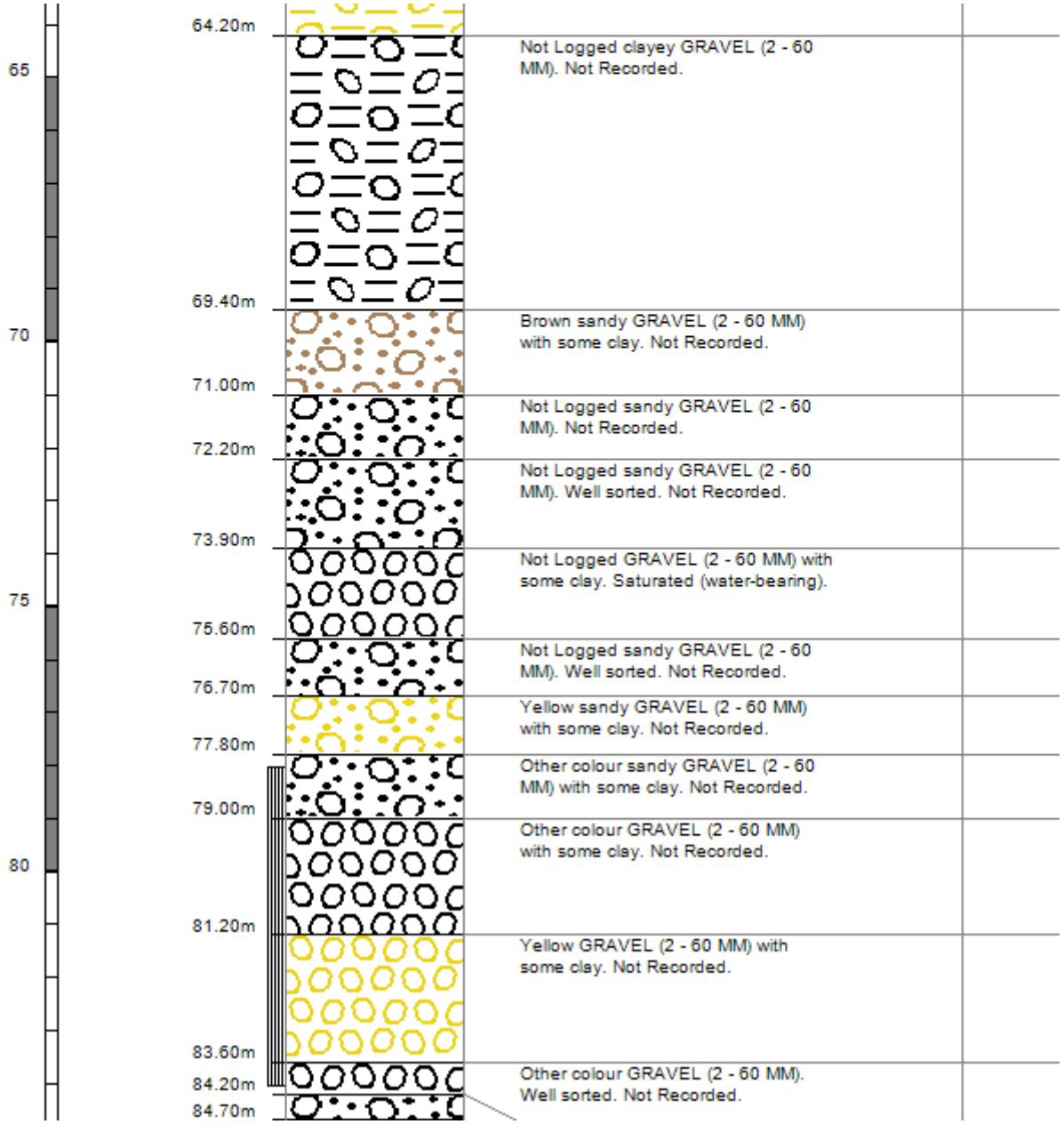
Borelog for well BW24/0262

Grid Reference (NZTM): 1565127 mE, 5199015 mN
Location Accuracy: 50 - 300m
Ground Level Altitude: m +MSD Accuracy:
Driller: Clemence Drilling Contractors
Drill Method: Unknown
Borelog Depth: 84.7 m Drill Date: 02-May-2015

Environment Canterbury Regional Council
Kaunihera Taiao ki Waitaha




30
35
40
45
50
55
60
Yellow clayey GRAVEL (2 - 60 MM).
Not Recorded.
37.40m
Not Logged clayey GRAVEL (2 - 60 MM). Not Recorded.
41.60m
Brown sandy GRAVEL (2 - 60 MM).
Not Recorded.
44.20m
Yellow clayey GRAVEL (2 - 60 MM).
Not Recorded.
55.20m
Yellow clayey GRAVEL (2 - 60 MM).
Not Recorded.
58.80m
Yellow clayey GRAVEL (2 - 60 MM).
Not Recorded.
61.40m
Yellow clayey GRAVEL (2 - 60 MM).
Unsaturated (dry or moist).


65
70
75
80
64.20m
Not Logged clayey GRAVEL (2 - 60 MM). Not Recorded.
69.40m
Brown sandy GRAVEL (2 - 60 MM) with some clay. Not Recorded.
71.00m
Not Logged sandy GRAVEL (2 - 60 MM). Not Recorded.
72.20m
Not Logged sandy GRAVEL (2 - 60 MM). Well sorted. Not Recorded.
73.90m
Not Logged GRAVEL (2 - 60 MM) with some clay. Saturated (water-bearing).
75.60m
Not Logged sandy GRAVEL (2 - 60 MM). Well sorted. Not Recorded.
76.70m
Yellow sandy GRAVEL (2 - 60 MM) with some clay. Not Recorded.
77.80m
Other colour sandy GRAVEL (2 - 60 MM) with some clay. Not Recorded.
79.00m
Other colour GRAVEL (2 - 60 MM) with some clay. Not Recorded.
81.20m
Yellow GRAVEL (2 - 60 MM) with some clay. Not Recorded.
83.60m
84.20m
Other colour GRAVEL (2 - 60 MM). Well sorted. Not Recorded.
84.70m

Bore or Well No: M35/7701
Well Name:
Owner: HJ SMITH

Environment Canterbury
Your regional council

Street of Well: 10 KEETLY PLACE
File No: CO6C/12993
Locality: OHOKA
Allocation Zone: Cust
NZTM Grid Reference: BW24:65981-98731 QAR 4
CWMS Zone: Waimakariri
NZTM X-Y: 1565981 - 5198731
Location Description: 3M FROM RIGHT-OF-WAY DRIVEWAY
Uses: Domestic Supply
ECan Monitoring:
Well Status: Active (exist, present)

Drill Date: 14 Apr 1997
Water Level Count: 0
Well Depth: 86.00m -GL
Strata Layers: 11
Initial Water Depth: -0.90m -MP
Aquifer Tests: 0
Diameter: 100mm
Yield/Drawdown Tests: 1

Measuring Point Ait: 21.74m MSD QAR 4
Highest GW Level:
GL Around Well: 0.00m -MP
Lowest GW Level:
MP Description:
First Reading:
Last Reading:
Driller: Smiths Welldrilling
Calc. Min. (Below MP): -14.80m -MP
Drilling Method: Rotary Rig
Last Updated: 08 Nov 2013
Casing Material: STEEL
Last Field Check:
Pump Type: Unknown
Yield: 3 l/s
Aquifer Type: Unknown
Drawdown: 5 m
Aquifer Name:
Specific Capacity: 0.68 l/s/m

Screens:

Screen No.	Screen Type	Top (m)	Bottom (m)	Diameter (mm)	Leader Length (mm)	Slot Size (mm)	Slot Length (mm)
1	Stainless steel	84	86				

Step Tests:

Step Test Date	Step	Yield (l/s)	Drawdown	Duration (mins)
14 Apr 1997	1	3.46	5.1	90

Date	Comments
	The screen is both stainless steel and slotted pipe, however specific dimensions of each is unknown.

Aquifer test date(s) where this is the pump bore

Aquifer test date(s) where this is an observation bore

Borelog for well M35/7701

Grid Reference (NZTM): 1565981 mE, 5198731 mN
Location Accuracy: 50 - 300m
Ground Level Altitude: 21.7 m +MSD Accuracy: < 0.5 m
Driller: Smiths Welldrilling
Drill Method: Rotary Rig
Borelog Depth: 86.0 m Drill Date: 14-Apr-1997

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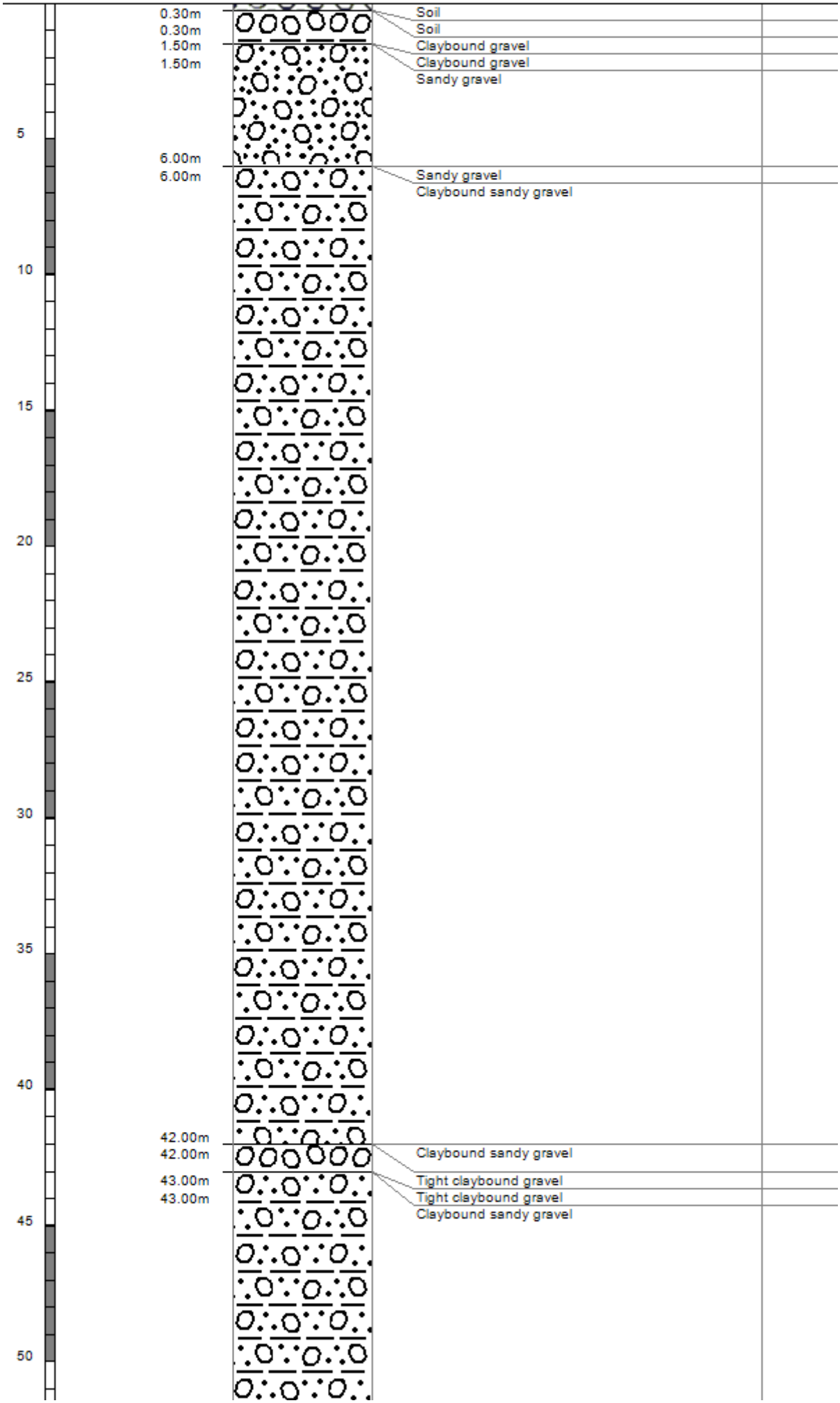
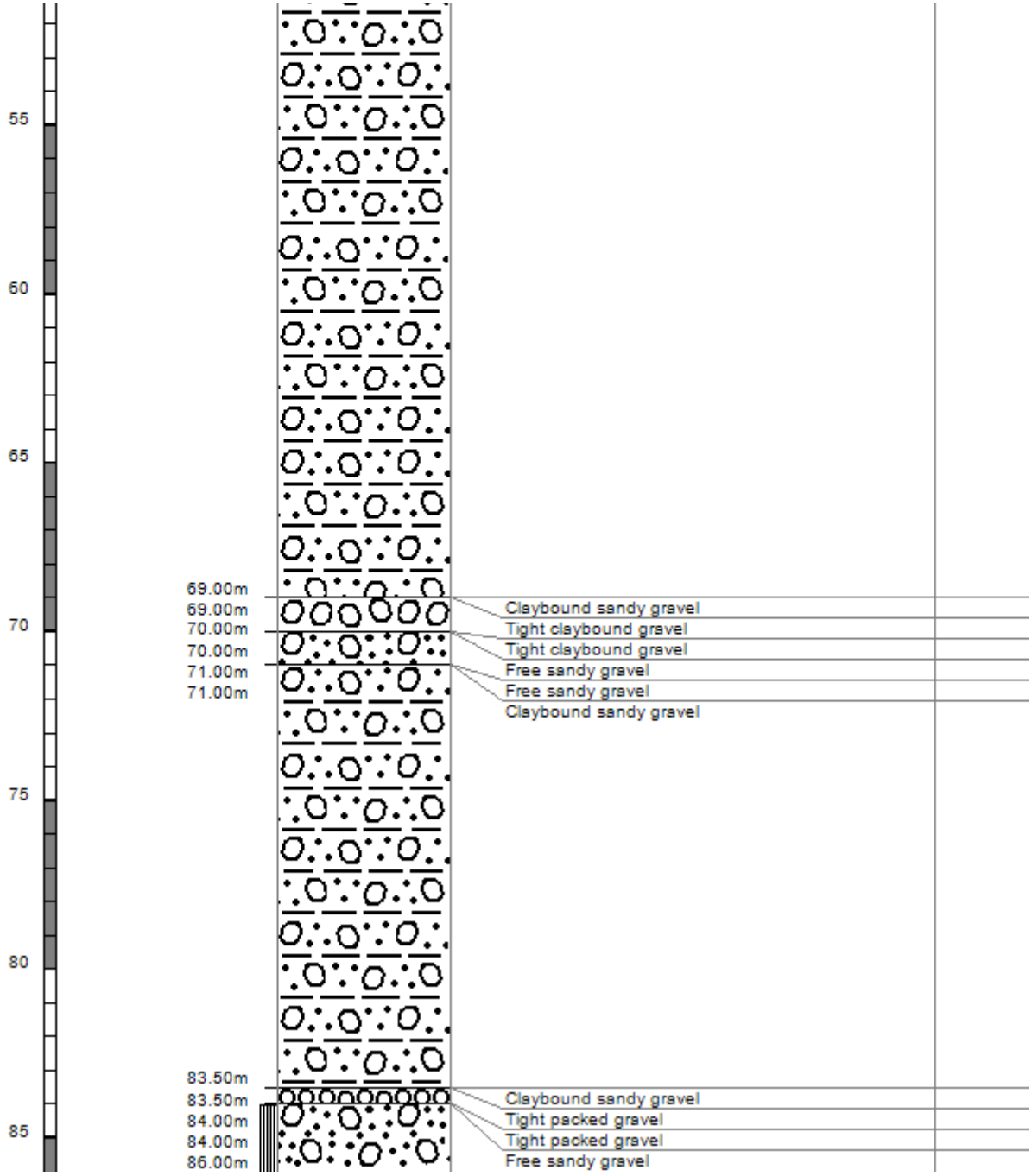

Scale(m)
Water Level
Depth(m)
Full Drillers Description
Formation Code
0.30m
Soil
0.30m
Soil
1.50m
Claybound gravel
1.50m
Claybound gravel
Sandy gravel
5
6.00m
6.00m
Sandy gravel
Claybound sandy gravel
10
15
20
25
30
35
40
42.00m
42.00m
Claybound sandy gravel
43.00m
Tight claybound gravel
43.00m
Tight claybound gravel
Claybound sandy gravel
45
50


55
60
65
69.00m
69.00m
70
70.00m
70.00m
71.00m
71.00m
Claybound sandy gravel
Tight claybound gravel
Tight claybound gravel
Free sandy gravel
Free sandy gravel
Claybound sandy gravel
75
80
83.50m
83.50m
84.00m
84.00m
86.00m
85
Claybound sandy gravel
Tight packed gravel
Tight packed gravel
Free sandy gravel

Bore or Well No: M35/8381
Well Name:
Owner: Parker

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Your regional council

Street of Well: 39 KEETLY PLACE
File No: CO6C/12993
Locality: OHOKA
Allocation Zone: Cust
NZTM Grid Reference: BW24:65860-99001 QAR 2
CWMS Zone: Waimakariri
NZTM X-Y: 1565860 - 5199001
Location Description: UNDERNEATH OUTSIDE LIGHT 3 M FROM CREEK
Uses: Domestic and Stockwater
ECan Monitoring:
Well Status: Active (exist, present)

Drill Date: 23 Apr 1999
Water Level Count: 0
Well Depth: 88.00m -GL
Strata Layers: 9
Initial Water Depth: -4.00m -MP
Aquifer Tests: 0
Diameter: 100mm
Yield/Drawdown Tests: 1

Measuring Point Ait: 22.69m MSD QAR 4
Highest GW Level:
GL Around Well: 0.00m -MP
Lowest GW Level:
MP Description: GROUND LEVEL
First Reading:
Last Reading:
Driller: Smiths Welldrilling
Calc. Min. (Below MP): -15.50m -MP
Drilling Method: Rotary Rig
Last Updated: 08 Nov 2013
Casing Material: STEEL
Last Field Check:
Pump Type: Submersible
Yield: 4 l/s
Aquifer Type:
Drawdown: 4 m
Aquifer Name:
Specific Capacity: 0.90 l/s/m

Screens:

Screen No.	Screen Type	Top (m)	Bottom (m)	Diameter (mm)	Leader Length (mm)	Slot Size (mm)	Slot Length (mm)
1	Stainless steel	86.5	88				

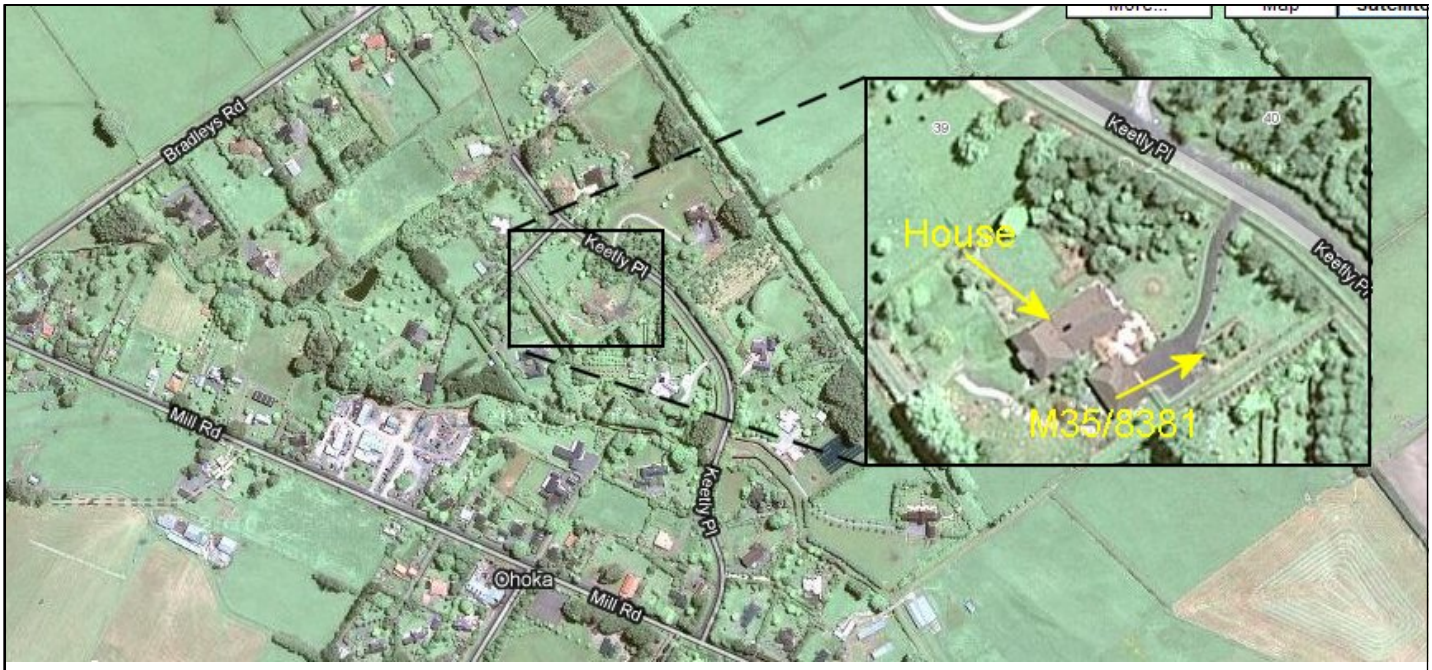
Step Tests:

Step Test Date	Step	Yield (l/s)	Drawdown	Duration (mins)
23 Apr 1999	1	3.76	4.2	90

Date	Comments
16 Sep 1999	Screen details: slot size is 0.1 m, diamter is 75 mm, length is 1.5 m. Leader length is 500 mm.
27 Apr 2010	Gridref changed from: M35:7586-6061 to M35:75859-60620 and set to an accuracy of QAR 2

Aquifer test date(s) where this is the pump bore

Aquifer test date(s) where this is an observation bore



Borelog for well M35/8381

Grid Reference (NZTM): 1565860 mE, 5199001 mN
Location Accuracy: 2 - 15m
Ground Level Altitude: 22.7 m +MSD Accuracy: < 0.5 m
Driller: Smiths Welldrilling
Drill Method: Rotary Rig
Borelog Depth: 88.0 m Drill Date: 23-Apr-1999

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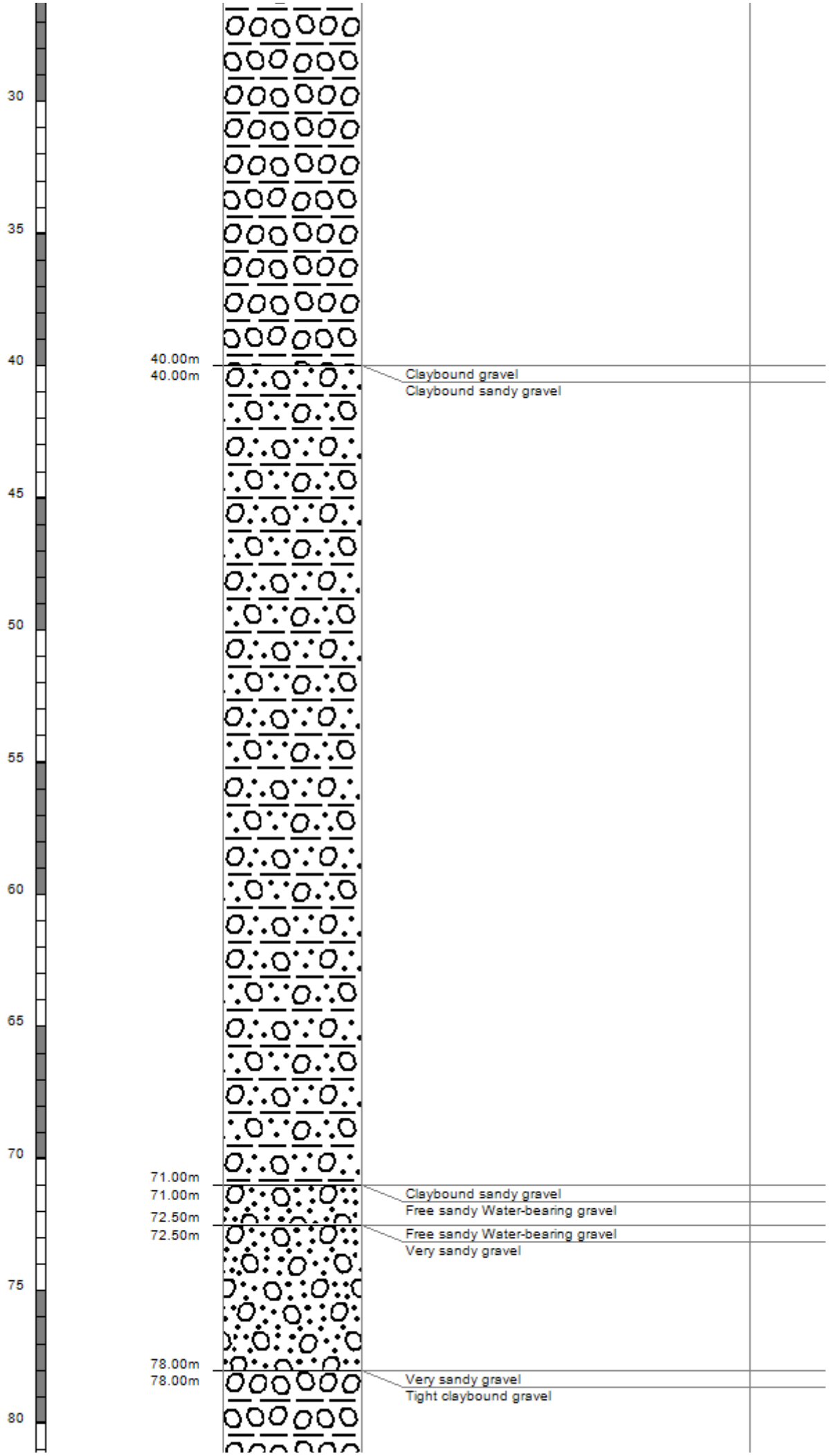
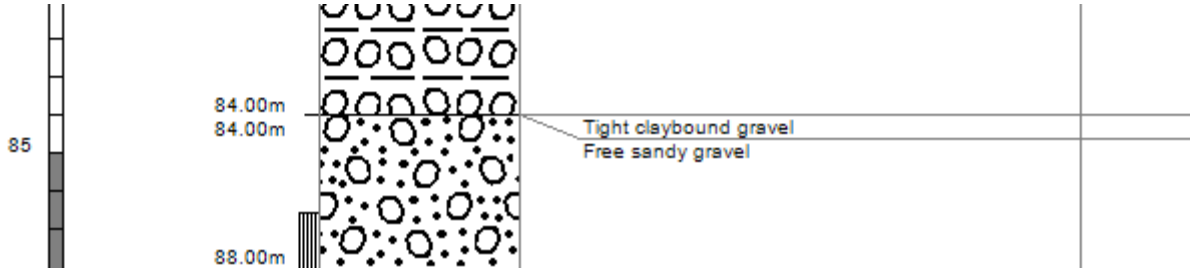
Scale(m)	Water Level	Depth(m)	Full Drillers Description	Formation Code
		0.25m	Soil	
		0.25m	Soil	
			Claybound sandy gravel	
5				
		9.00m		
		9.00m	Claybound sandy gravel	
10			Free sandy Water-bearing gravel	
		11.00m		
		11.00m	Free sandy Water-bearing gravel	
			Claybound gravel	
15				
20				
25				


30
35
40
45
50
55
60
65
70
75
80
40.00m
40.00m
Claybound gravel
Claybound sandy gravel
71.00m
71.00m
Claybound sandy gravel
Free sandy Water-bearing gravel
72.50m
72.50m
Free sandy Water-bearing gravel
Very sandy gravel
78.00m
78.00m
Very sandy gravel
Tight claybound gravel


85
84.00m
84.00m
88.00m
Tight claybound gravel
Free sandy gravel