



Environmental Protection Agency

Establishment of Groundwater Source Protection Zones

Carrigbyrne Water Scheme

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PROJECT DESCRIPTION

Since the 1980's, the Geological Survey of Ireland (GSI) has undertaken a considerable amount of work developing Groundwater Protection Schemes throughout the country. Groundwater Source Protection Zones are the surface and subsurface areas surrounding a groundwater source, i.e. a well, well field or spring, in which water and contaminants may enter groundwater and move towards the source. Knowledge of where the water is coming from is critical when trying to interpret water quality data at the groundwater source. The Source Protection Zone also provides an area in which to focus further investigation and is an area where protective measures can be introduced to maintain or improve the quality of groundwater.

The project "Establishment of Groundwater Source Protection Zones", led by the Environmental Protection Agency (EPA), represents a continuation of the GSI's work. A CDM/TOBIN/OCM project team has been retained by the EPA to establish Groundwater Source Protection Zones at monitoring points in the EPA's National Groundwater Quality Network.

A suite of maps and digital GIS layers accompany this report and the reports and maps are hosted on the EPA and GSI websites (www.epa.ie; www.gsi.ie).



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1 Introduction

Groundwater Source Protection Zones (SPZ) have been delineated for the Carrigbyrne Water Scheme according to the principles and methodologies set out in 'Groundwater Protection Schemes' (DELG/EPA/GSI, 1999) and in the GSI/EPA/IGI Training course on Groundwater SPZ Delineation.

The Carrigbyrne Scheme consists of two boreholes (IE_SE_G_001_26_002) that are approximately 45 m apart. Only one borehole is used at a time to supply the scheme. The boreholes are usually pumped on alternate months.

The objectives of the study were:

- To outline the principal hydrogeological characteristics of the Carrigbyrne area where the supply well is located.
- To delineate source protection zones for the well.
- To assist the Environmental Protection Agency (EPA) and Wexford County Council in protecting the water supply from contamination.

SPZs are intended to provide a guide in the planning and regulation of development and human activities to ensure groundwater quality is protected. More details on SPZ are presented in 'Groundwater Protection Schemes' (DELG/EPA/GSI, 1999).

2 Methodology

The methodology applied to delineate the SPZ consisted of data collection, desk studies, site visits and field mapping and subsequent data analysis and interpretation.

An initial interview with the caretaker of the supply scheme and the field mapping of the study area were undertaken on 16//09/2011.

While specific fieldwork was carried out in the development of this report, the maps produced are based largely on the readily available information and mapping techniques using inferences and judgements from experience at other sites. As such, the maps may not be definitively accurate across the whole area covered, and should not be used as the sole basis for site-specific decisions, which will usually require the collection of additional site-specific data.

3 Location, Site Description and Well Head Protection

The site is approximately 12 km east of New Ross and 21 km west of Wexford Town, in the townland of Scullaboge. The boreholes are 70 m north of the National Road N25 and just south of Carrickbyrne Forest Park.

The site is accessed from a third class road running northwest from the N25. It consists of a hardcore covered laneway approximately 90 m in length with a locked farmyard gate at the site entrance.

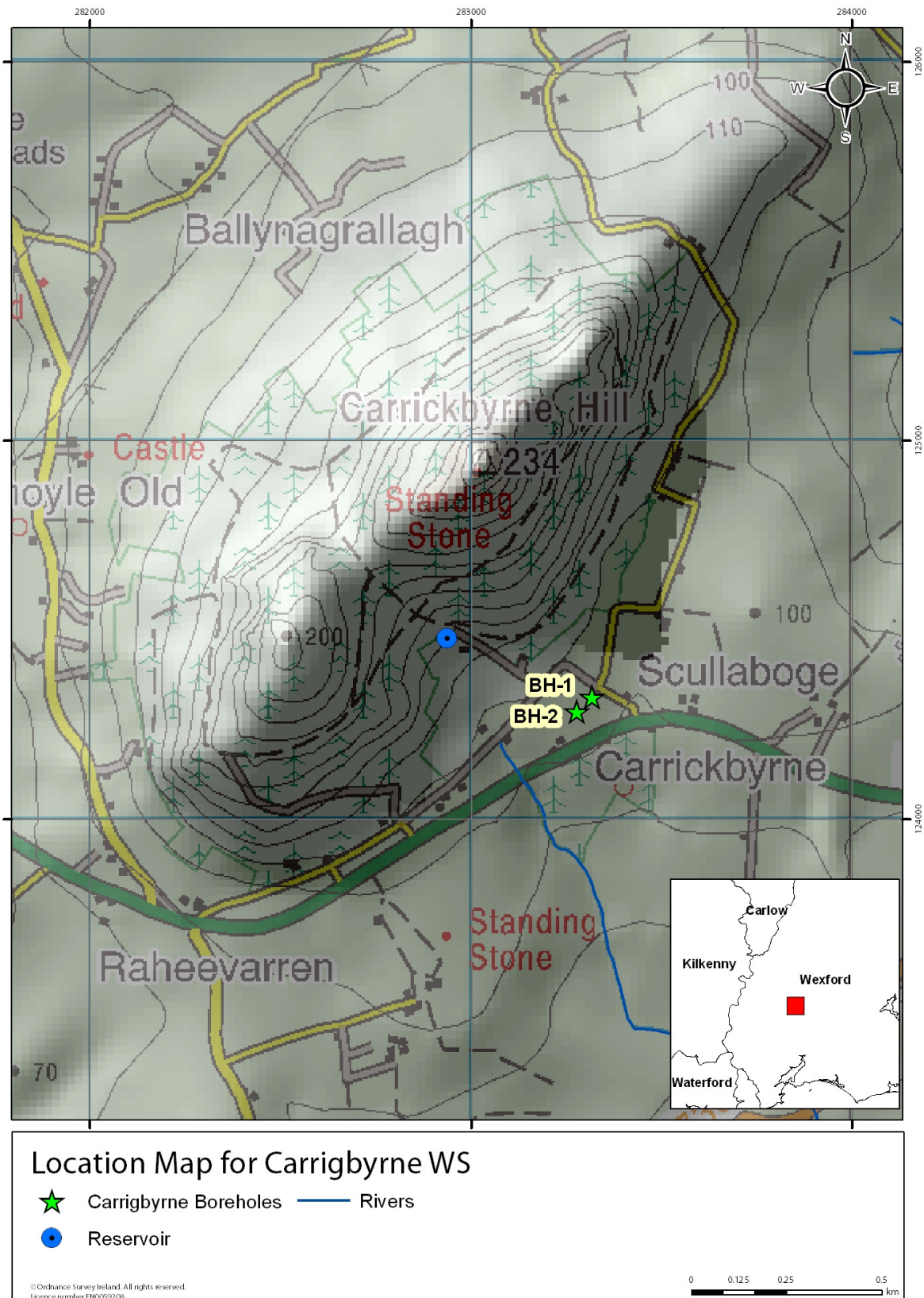


Figure 1: Location Map

There are two abstraction wells (boreholes) at the site with the pump house situated between the boreholes. BH-1 is closest to the site entrance on the eastern side of the pump house and is 30 m from the road. BH-2 is at the western boundary of the laneway, c.90 m from the road (Photo 1). Each well is located in a concrete chamber. The chambers are 2.05 m wide, 1.87 m deep and 0.87 m high with locked steel covers (Photo 2). The chambers were constructed approximately three years ago and replaced temporary steel sheds.

Both wells have had new pumps installed within the last two years. Metal plates were fitted at the well heads to secure the pumps in place at depth in the wells. These plates also prevent debris from falling into the wells (photos 3 and 4).



Photo 1: Site viewed from the entrance at public road



Photo 2 Concrete Chamber enclosing BH-1



Photo 3 BH-1



Photo 4 BH-2

4 Summary of Well Details

The boreholes were installed in the mid 1960's as part of a local group water scheme. Wexford County Council took over the scheme in the mid 1970's. There are no borehole records. Based on discussions with the caretaker, it is assumed that the 203 mm casing extends to the bedrock and that the remainder of the boreholes were drilled as open hole. The depth to bedrock is unknown. Before the new pumps were installed the total depths of the wells were measured at approximately 33.5 m (110 ft) in order to site the pumps at an appropriate depth. The pumps were placed at 33.5 m (110 ft) below ground level.

Only one borehole is pumped at a time. The boreholes are switched generally every month. The water is treated by chlorination and with sodium carbonate to correct the pH. The pump in use is activated by a float switch at the reservoir. The water is then pumped, at a rate of 22 m³/hr, to the reservoir for distribution to the network. The maximum total daily abstraction is 410 m³/d (18.6 hours pumping) due to the size of the reservoir. The reservoir is approximately 420 m northwest of the boreholes at the end of a laneway leading to Carrickbyrne Hill (Photo 5).

Information on the pumping regime was gleaned from a three day pumping test which is discussed further in Section 9.2 below. During the pumping test the water level ranged from 18.16 m bgl to 20.13 m bgl although this was during an extended recovery and pumping period. Under normal conditions, pumping lasts between three to five hours until the reservoir is full, depending on demand. This is followed by a recovery period between 0.75 hours and 1.5 hours. The average change in water level under normal conditions is 1.5 m. The temperature rises slightly from 10.78 to 10.92 °C with the rising water level. The pumping regime can be seen on Figure 2 below. This figure indicates that the on-off cycle for the pumping regime is very short and this could shorten the life span of the pumps in the long term.

Table 4-1 provides a summary of the details as currently known.

Table -4-1: Well Details

	BH-1	BH-2
EU Reporting Code	IE_SE_G_001_26_002	
National Drinking Water Code	3300PUB1012	
Grid ref.	283319, 124322	283278, 124283
Townland	Scullabogue	
Source type	Borehole	Borehole
Drilled	1960's	
Owner	Wexford County Council	
Elevation (Ground Level)	~94 m OD	
Depth (m)	Estimated 33.5 m (110 feet)	Estimated 33.5 m (110 feet)
Depth of casing	Unknown but assumed to bedrock	
Diameter	203 mm (8 inch) at surface. 4 inch rising main	
Depth to rock	Unknown	Unknown
Static water level	Unknown	Unknown
Pumping water level	18.5-20.2 m bgl for yield 22 m ³ /hr	Unknown
Consumption (Co. Co. records)	300-340 m ³ /d	
Pumping test summary:		
(i) abstraction rate	22 m ³ /hr (528 m ³ /d)	
(ii) specific capacity	268 m ³ /d/m	
(iii) transmissivity	205-220 m ² /d	



Photo 5: Reservoir

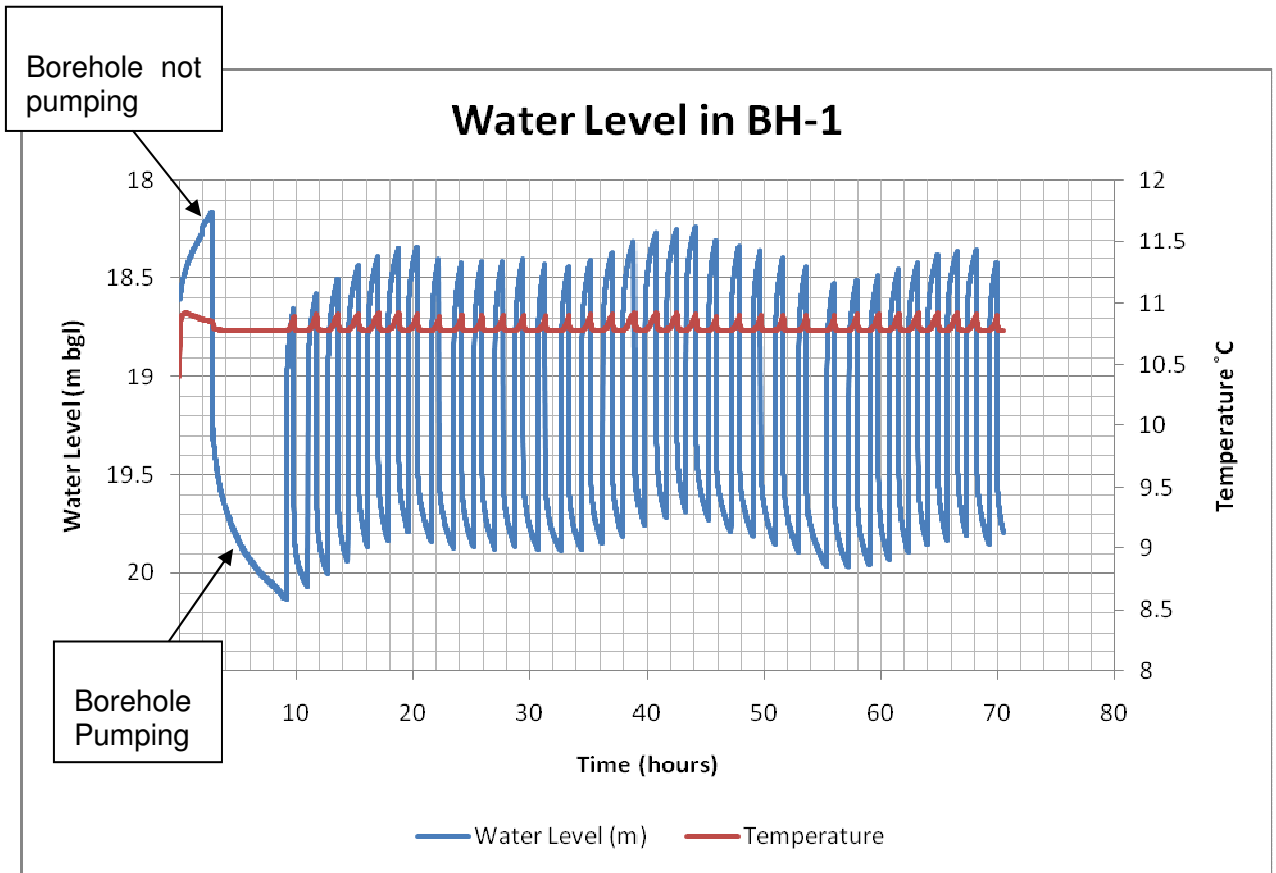


Figure 2: Pumping Regime in BH-1 for 72 hours

5 Topography, Surface Hydrology & Landuse

The borehole is located on the southern footslopes of Carrickbyrne Hill, at approximately 94 m OD. Carrickbyrne Hill is the highest point in the sub-catchment at 234 m OD, and is located 680 m northwest of the source. The land slopes from the hill to the south east, towards a tributary of the Corock River. The topographic gradient from the top of the hill to 110 m OD is steep, at approximately 0.27, before decreasing from this point to the boreholes to c.0.07. The overall gradient is 0.21. There are road gullies along the public roads immediately to the east and north of the site along the break in slope. These drains appear to have been constructed to take rainfall run-off where infiltration is low due to the change from exposed or shallow bedrock to gley soils. There are also drains along the field boundaries in the surrounding lands. In the fields immediately up hydraulic gradient of the site the drains discharge to a local stream tributary of the Corock River situated 220 m west of the site. The tributary flows to the south and joins the Corock approximately 4.6 km southeast of the site. The Corock River flows southwards into Bannow Bay just west of Wellington Bridge approximately 10.8 km south of the site. At the time of the site visit, in October, the upper parts of the tributary were mostly dry with some standing water in places.

Land use in the high ground to the northwest of the site is dominated by mixed conifer and broadleaf forestry. This area is part of the Coilte operated Carrickbyrne Hill amenity walking trail. Details on the trails can be found on <http://www.coilteoutdoors.ie/>. Lower down in the catchment the landuse is grassland for dairy farming. Photo 6 shows the landuse in the low lying land taken from Carrickbyrne Hill. There are 19 no of houses, Cedar Lodge Hotel, a petting farm and a repair and sales garage located within 500m of the site. The dwellings are located along the N-25, the local public road which runs from the N-25 north past the site entrance with one branch of the road heading north and the other to the west. The northern branch ends at one of the entrances to the Coilte Trail.

The car garage is 280 m northwest of the site. The main garage area is concrete paved. The activity appears to be well maintained and there was no evidence of oily run off or staining based on observations of the site activity from the public road. This is however, a potential point source of contamination for hydrocarbons or volatile organic compounds. The reservoir for the Carrigbyrne water supply scheme is located 90 m north of the repair garage. The road which forks to the west reconnects with the N-25 approximately 1.1 km to the west of the site. There are 7 no of dwellings along this road including the petting farm which is approximately 180 m from the site. The Cedar Lodge Hotel is located approximately 270 m east of the boreholes. It is considered to be downgradient of the site.



Photo 6: Landuse seen from Carrickbyrne Hill

6 Hydrometeorology

Establishing groundwater SPZs requires an understanding of general meteorological patterns across the area of interest. Meteorological information was obtained from Met Éireann.

Annual rainfall: 1000 mm. The contoured data map of rainfall in Ireland (Met Éireann website, data averaged from 1961–1990) shows that the source is located close to the 1000 mm average annual rainfall isohyet.

Annual evapotranspiration losses: 499 mm. Average potential evapotranspiration (P.E.) is estimated to be 525 mm/yr based on the contoured data map of potential evapotranspiration in Ireland (Met Éireann website, data averaged from 1971–2000) which shows that the source is located close to the 530 mm average annual evapotranspiration isohyet. Actual evapotranspiration (A.E.) is then estimated as 95% of P.E., to allow for seasonal soil moisture deficits.

Annual Effective Rainfall: 501 mm. The annual average effective rainfall is calculated by subtracting actual evapotranspiration from rainfall. Potential recharge is therefore equivalent to this, or 501 mm/year.

7 Geology

7.1 Introduction

This section briefly describes the relevant characteristics of the geological materials that underlie the site. It provides a framework for the assessment of groundwater flow and delineation of the source protection zones. The desk study data used comprised the following:

- Geology of South Wexford. Bedrock Geology 1 : 100,000 Map series, Sheet 23, Geological Survey of Ireland (D. Tietzsch-Tyler, A.G. Sleeman 1994)
- Forest Inventory and planning system – Integrated Forestry Information System (FIPS-IFS) Soils Parent Material Map, Teagasc (Meehan, 2002).
- Geological Survey of Ireland (2004) 1st Draft Adamstown GWB Description.

7.2 Bedrock geology

The boreholes are drilled into the Campile Formation which is classified as being part of the Ordovician Volcanics Rock Unit Group. This formation comprises rhyolitic volcanic rock and grey & brown slates. There is a change in the bedrock approximately 250m north of the boreholes. The mapped change in bedrock corresponds to a break in the topographic slope. The high ground at Carrickbyrne Hill comprises felsic volcanic bedrock that was intruded into the Campile Formation. The outcrops in the catchment appear to be the felsic intrusions at Carrickbyrne Hill. A typical outcrop is shown on Photo 7. A quarry is located 3.1 km northeast of the site and is mapped in the felsic intrusion (Photo 8).

Northeast of Campile these volcanic rocks occur only as large lenticular bodies which are isolated within a Campile Formation succession dominated by mudstones (Geology of South Wexford). The bedrock Geology is illustrated in Figure 3.



Photo 7: Outcrop on Carrickbyrne Hill



Photo 8: Nearby Quarry

The geological map (GSI Sheet No. 23) indicates that the rocks have been folded and faulted by compression that occurred with the creation of the Caledonian Mountains during the Silurian period. This event is known as the Caledonian Orogeny. The Campile Formation is in the centre of a syncline and is flanked by the older Ordovician Metasediments to the north and south. Either side of the boreholes is a series of north-south trending faults. These are perpendicular to the regional synclinal feature.

The Adamstown Groundwater Body (GWB) description, compiled by the GSI, indicates that Campile Formation in Wexford reacted in a brittle manner to orogenic deformation, allowing the development of a network of fracturing and fracture permeability. This extensive fracturing and faulting has most likely given rise to zones of enhanced permeability in the formation. This is discussed further in Section 9. The GSI GWB Report is included in Appendix 1.

7.3 Soil and Subsoil geology

The soil and subsoil distributions are illustrated in Figures 4 and 5, respectively. According to the EPA and Teagasc Soil and Subsoil mapping, the soil is classified over the high ground (c.110m OD) as Acid Mineral Shallow Well Drained Soil (AminSW) and to the south at lower elevations (c.100 m OD) as Acid Mineral Soil Deep Well Drained soil (AminDW).

The bedrock outcrops above 120 m OD at Carrickbyrne Hill and the hill to the southwest of it. Below 120 m OD, the bedrock is overlain by a Lower Palaeozoic Shale Till (TLPS) derived from the underlying Ordovician bedrock, which appears to increase in thickness moving to the southeast to the boreholes. The subsoil thickness at the borehole is unknown but is estimated to be close to 9 m based on the depth to bedrock of a well located 170 m to the west. Another borehole 450 m to the west, but higher in the catchment, has a depth to rock of 5 m according to its borehole log.

The subsoil is characterised as moderate to low permeability on the GSI vulnerability maps. BS5930 field assessment of the soils in the fields around the boreholes indicated poorly drained CLAY dominated gleys.

7.4 Depth to Bedrock

There are no details for the production boreholes. Depth to rock Information was obtained from two nearby boreholes. Approximately 170 m west of BH-2, the depth to rock is estimated at 9.1 m below ground level (bgl) from a domestic borehole. Further to the west, a hydrogeological assessment was done in 1981 on a borehole for a potential bottled water supply (K.T. Cullen 1981). The depth to bedrock in this well was recorded as being 5 m bgl and is located approximately 540 m west of the production boreholes. The location and depths of these points is shown on Figure 5.

8 Groundwater Vulnerability

Groundwater vulnerability is dictated by the nature and thickness of the material overlying the uppermost groundwater 'target', which in this case is the bedrock aquifer. This means that in this area, the vulnerability relates to the permeability and thickness of the subsoil. A detailed description of the vulnerability categories can be found in the Groundwater Protection Schemes document (DELG/EPA/GSI, 1999) and in the draft GSI Guidelines for Assessment and Mapping of Groundwater Vulnerability to Contamination (Fitzsimons et al, 2003).

The vulnerability map is shown in Figure 6. In terms of subsoil coverage within the catchment of the wells, the area can be divided into two zones:

- Over the high ground to the north and northwest, situated between approximately 120 m OD and the top of the catchment, at Carrickbyrne Hill, the subsoil is very thin or absent. Here the vulnerability is classed as Extreme or Extreme with Rock near the surface. This represents the largest portion of the source catchment (around 80%).
- Over the remainder of the catchment, the vulnerability ranges from high to low. Based on the nature of the soil and subsoil material (Gleys and low permeability subsoil) observed during the site visit, and the depth to bedrock of the nearby domestic well, the vulnerability at the boreholes is considered likely to be low.

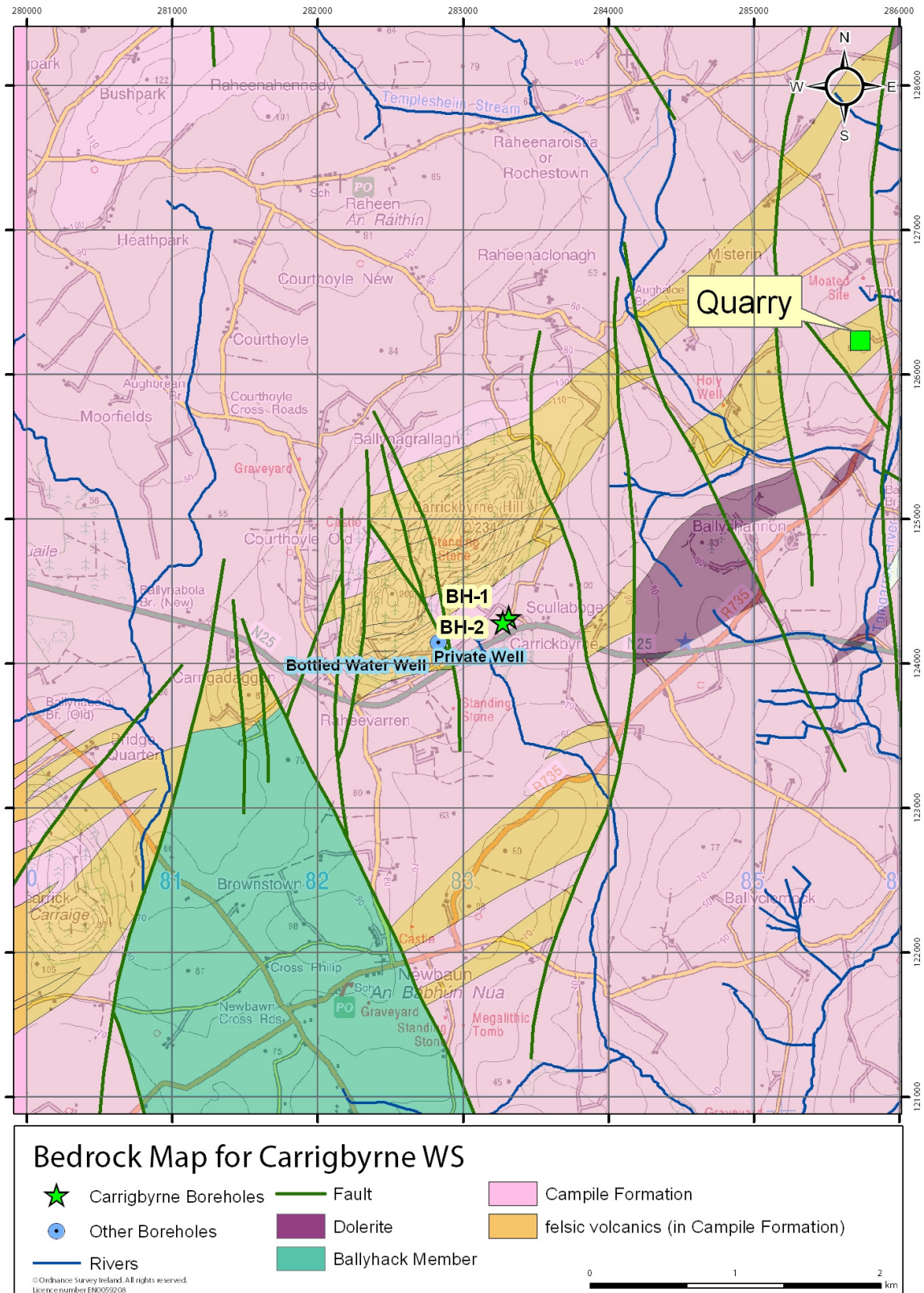


Figure 3: Bedrock Map

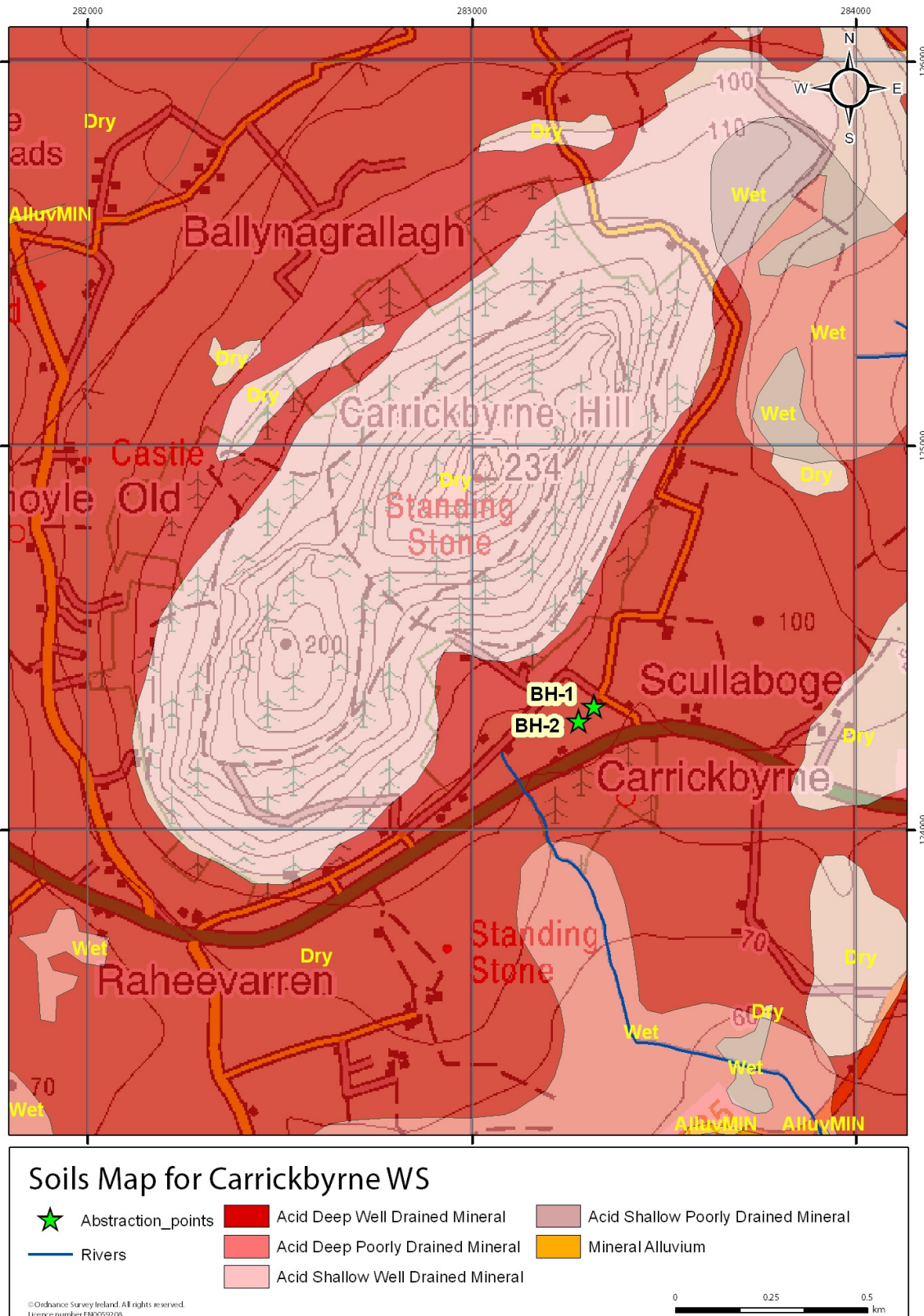


Figure 4: Soils Map

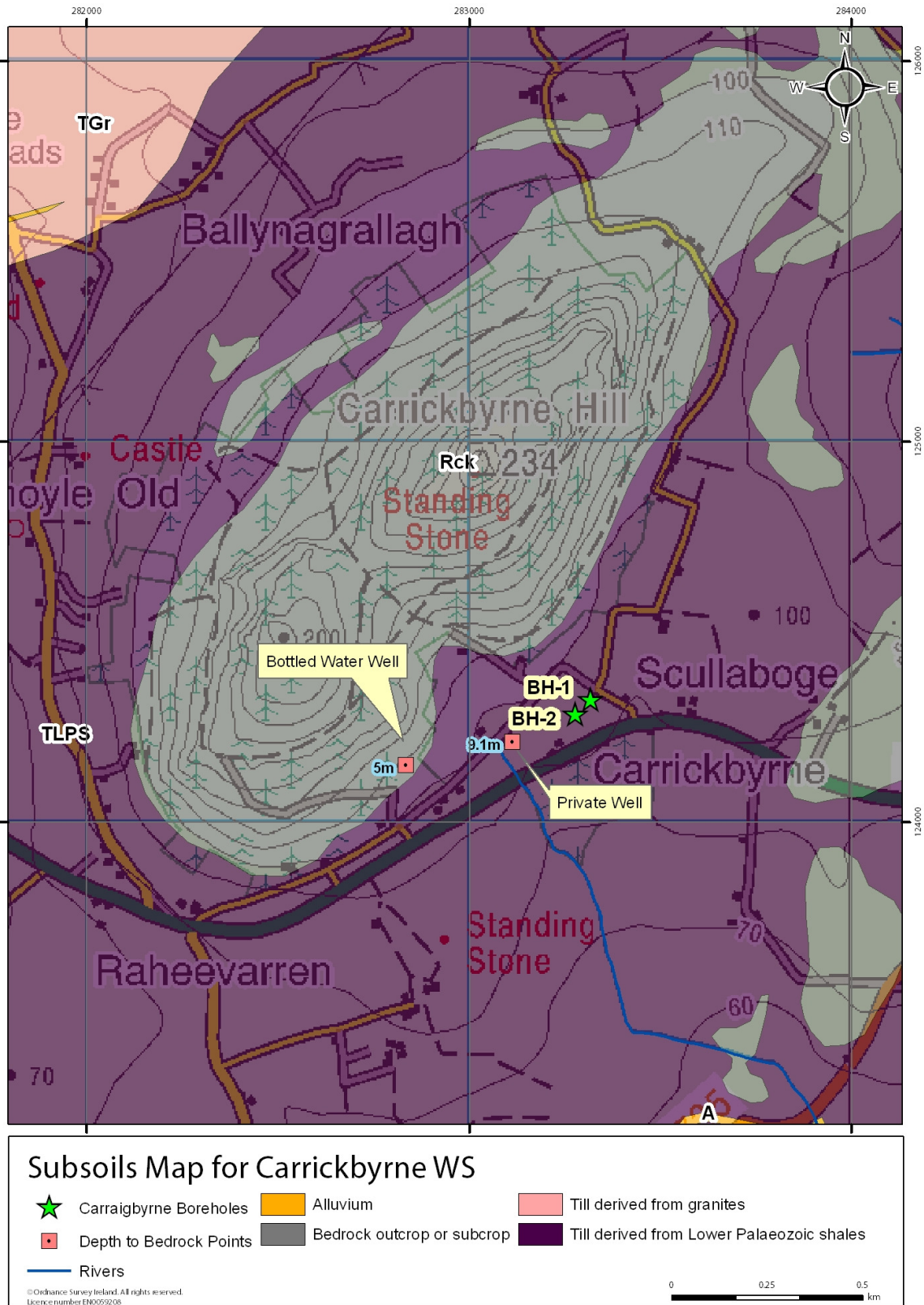


Figure 5: Subsoils Map

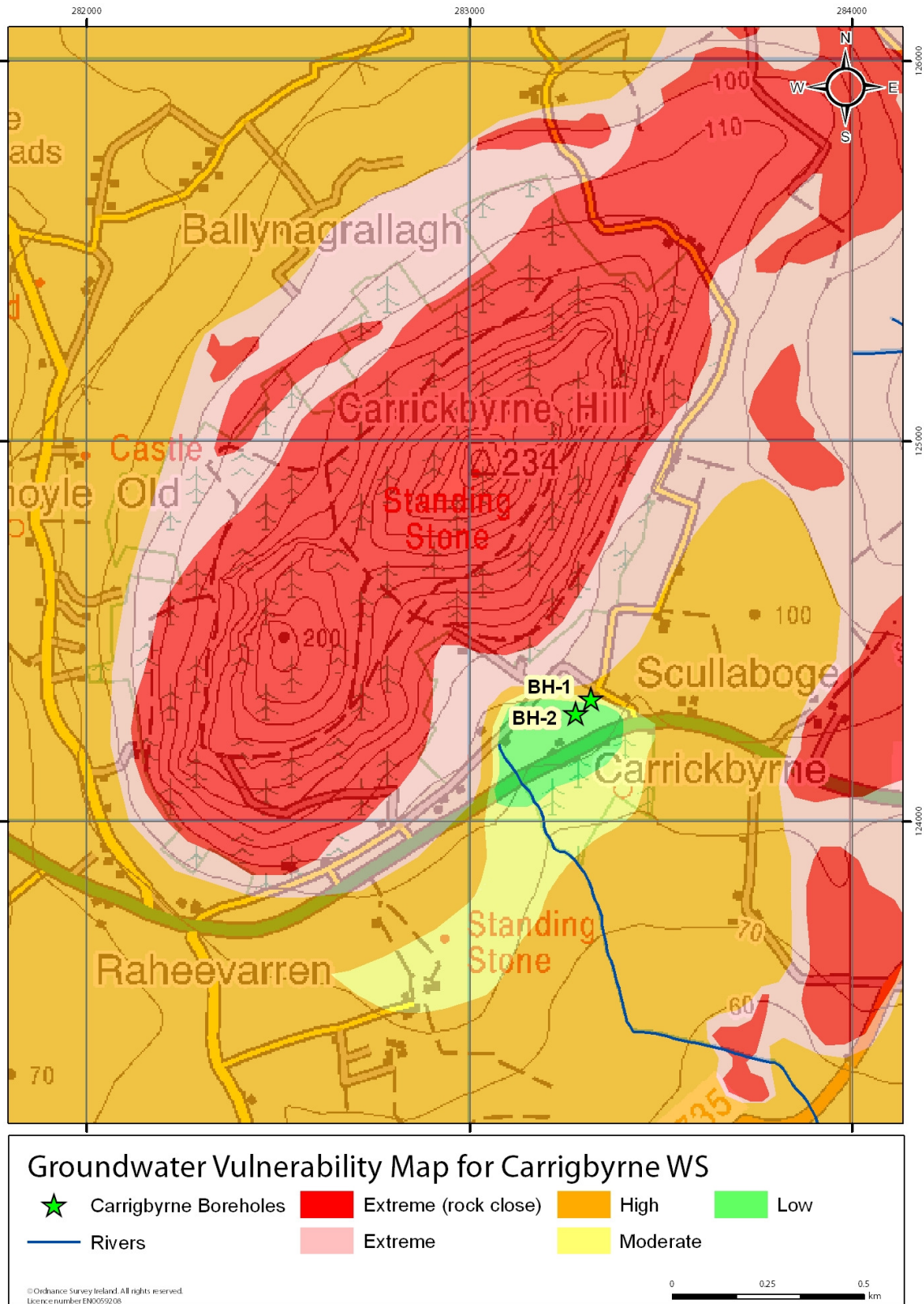


Figure 6: Groundwater Vulnerability Map

9 Hydrogeology

This section describes the current understanding of the hydrogeology in the vicinity of the wells. Hydrogeological and hydrochemical information was obtained from the following sources:

- GSI Website and Database
- County Council Staff
- EPA website and Groundwater Monitoring database
- Local Authority Drinking Water returns
- The Adamstown Groundwater Body initial characterisation report
- Camross Regional Water Supply Scheme Groundwater Investigations (K.T. Cullen 1987)
- Report on the Drilling and Testing of a Trial Well at Carrickbyrne, Co. Wexford (K.T. Cullen 1981)

9.1 Groundwater Body and Status

The boreholes are located within the Adamstown Groundwater Body (IE_SE_G_001) which has been classified as being of Good Status. The groundwater body description is available from the GSI website: www.gsi.ie and is provided in Appendix 1. The 'status' is obtained from the Water Framework Directive website: www.wfdireland.ie/maps.html.

9.2 Groundwater Levels, Flow Directions and Gradients

There are no static water level data available for the wells. A data logger was placed in BH-1 for almost 72 hours to complete a limited pumping test during the supply cycle. The caretaker ensured the reservoir was full before manually switching off the borehole to maximise the initial recovery time. The highest the water level rose to was 18.16 m bgl. This was recorded when the pump was switched off for 177 minutes to undertake the short term recovery test. The lowest level of 20.13 m bgl was recorded when the pump was switched back on again to fill the reservoir after the longer than usual recovery period. During this period BH-1 was pumping for 382.5 minutes (6.22 hours). This was a fluctuation of 2.03 m. Over the remainder of the three day period that the logger was in use, the water level generally fluctuated by c. 1.5 m during the normal on-off pumping cycle.

The closest nearby private borehole could not be dipped. However an attempt was made to dip the test well installed for the Bottled Water project located 500 m to the west. The log for the Bottled Water well indicates it was bored to 51 m bgl. On the day of the site inspection a dip meter could only reach 14.47 m bgl and the well was dry. It is assumed the borehole is blocked. A static water level of 18.05 m bgl was recorded before a pumping test in 1981.

Based on the topography and surface water drainage, groundwater infiltrates mostly directly to the bedrock to the north and northwest of the borehole and flows to the south-east towards the Corock river valley. There is expected to be low recharge to the boreholes from the low lying areas around the borehole due to the low permeability material encountered. The topographic gradient is steep and is estimated at 0.19. Based on the recorded water levels in the above groundwater wells, the groundwater gradient is expected to be shallower. Based on the estimated static water level for BH-1 and the Bottled Water wells located c.500m up hydraulic gradient to the west, the hydraulic gradient is estimated to be 0.08.

9.3 Hydrochemistry and Water Quality

The site has been included in the EPA operational chemical monitoring network since 2003. Raw water sample points are located in each of the borehole chambers. The EPA sample is taken from whichever borehole is being pumped. There is a treated water sample point in the pump house. The laboratory results have been compared to the EU Drinking Water Council Directive 98/83/EC Maximum Admissible Concentrations (MAC) and, where relevant, mean values have been compared to the Threshold Levels in the European Communities Environmental Objectives (Groundwater) Regulations 2010 adopted in Ireland (S.I. No. 9/2010). The EPA data are graphed in Figures 6 to 8 and are summarised below.

- The water has a calcium bicarbonate hydrochemical signature and is soft (Average Total Hardness 46 mg/l CaCO₃). The average conductivity is 184 µS/cm. The pH was lower than the MAC range of between 6.5 and 9.5, on 10 occasions from a total of 12 analyses. The average pH is 6.1 which indicates a mildly acidic water, probably related to the siliceous nature of the bedrock. The water is treated for pH in the pump house before going to the reservoir for distribution.
- Faecal Coliforms were detected twice in 20 EPA analyses and not since 2007. Ammonium values were not recorded above the Threshold Level (0.175 mg/l).

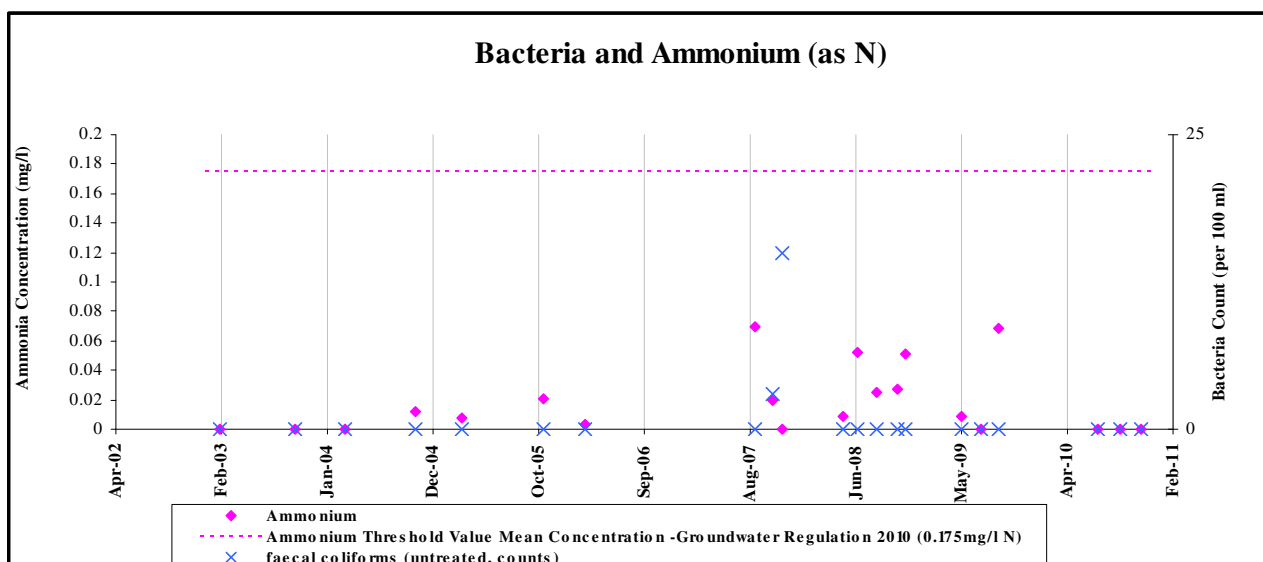


Figure 7: Key Indicators of Agricultural and Domestic Contamination: Bacteria and Ammonium

- The nitrate (as NO₃) level ranges from 12.1 mg/l to 19.9 mg/l, with a mean of 16.6 mg/l. The values are considerably below the MAC (50 mg/l) and Threshold Value of 37.5 mg/l.
- Chloride can be a constituent of organic wastes, sewage discharge and artificial fertilisers, and concentrations higher than 24 mg/l (Groundwater Threshold Value, Groundwater Regulations S.I. No. 9 of 2010) may indicate contamination, with levels higher than 30 mg/l usually indicating significant contamination (Daly, 1996). Chloride concentrations range from 24 mg/l to 47 mg/l with a mean of 29 mg/l.

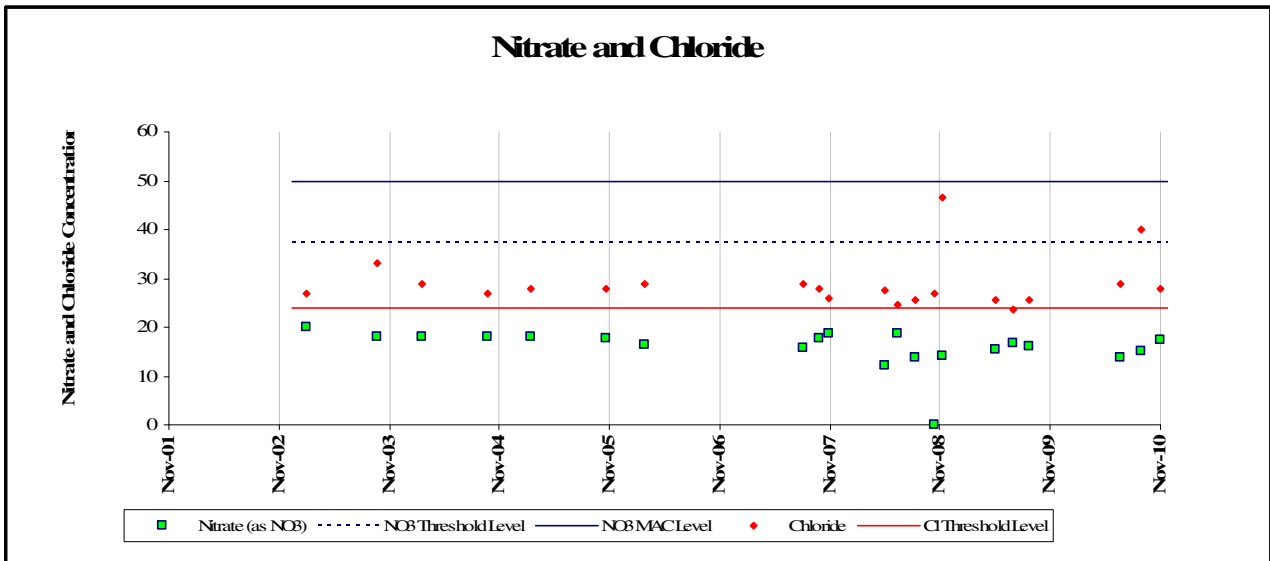


Figure 8: Key Indicators of Agricultural and Domestic Contamination: Nitrate and Chloride Graph

- The sulphate, potassium, sodium, magnesium and calcium levels are within normal ranges. The potassium: sodium ratio has never been above the threshold value of 0.35.

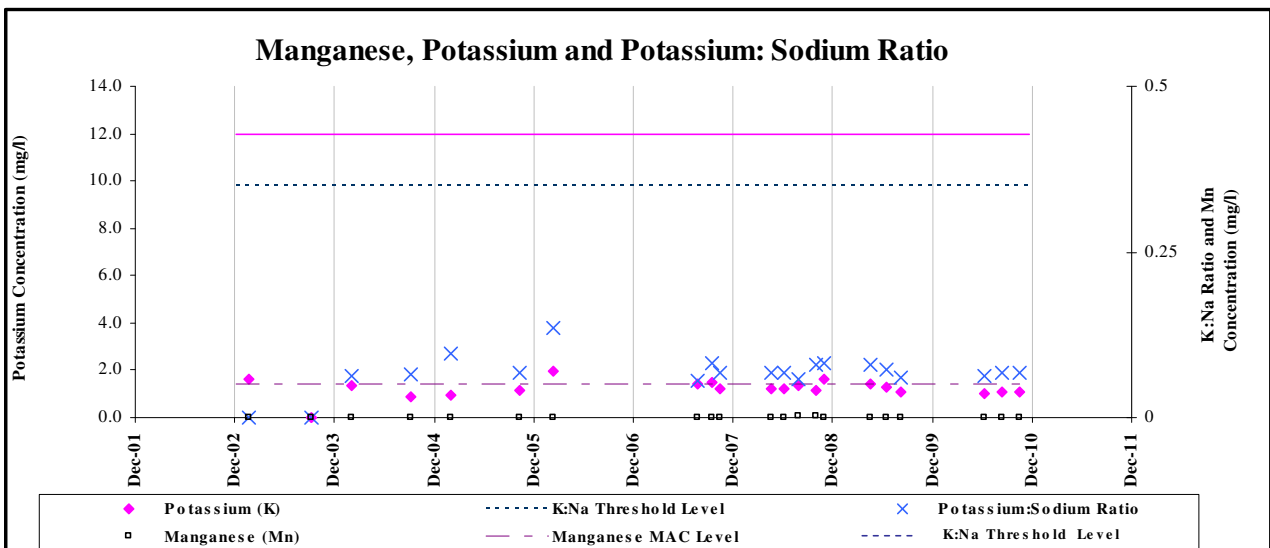


Figure 9: Key Indicators of Agricultural and Domestic Contamination: Manganese, Potassium and K/Na ratio

- Turbidity exceeded the drinking water standard limit of 1 NTU on 5 occasions. This is likely due to the presence of very fine clay particles occasionally entering the borehole.
- The concentrations of iron and manganese are within the normal ranges.
- Other trace metals were within either the normal range for good quality drinking water or were not detected.

In summary, the water is mildly acidic. There were of two incidents of faecal coliform detection in 2007. While the chloride values generally exceed the Threshold Value other potential contamination indicators

(sodium: potassium) are not elevated. Trace levels of pesticides (MCPA and mecoprop) were detected once in 2007 and Trihalomethanes in 2003, 2004 and 2009. However the concentrations of pesticides and trihalomethanes were all below the groundwater regulations threshold values. The monitoring results show that while the aquifer is extremely vulnerable to contaminants the pressures are generally low.

9.4 Aquifer Characteristics

Based on the GSI geology map, the borehole abstracts water from the Campile Formation, which is classified by the GSI as a Regionally Important Fissured bedrock aquifer (Rf), as indicated in Figure 9. Groundwater flow occurs along bedding planes and through faults, fractures and fissures in the bedrock. The well provides in the range of 300–340 m³/d. The yield is sustainable and the scheme has never had problems meeting demand. During the cold weather in December 2010, the borehole was pumping at the maximum output of the pump at 410 m³/d without any observed impact on the supply.

The aquifer is classified as regionally important because of the higher groundwater yields that can be obtained from these rocks due to the presence of a high density of fractures resulting from folding and faulting during the Caledonian Orogeny mountain building phase of deformation. This formed the local Campile Syncline. The aquifer is part of the Adamstown Groundwater Body, as delineated by the GSI.

A transmissivity (T) value for Rf aquifers in this groundwater body is estimated in the Adamstown GWB Report to be 150 m²/d based on information from two supplies in the GWB.

A data logger, which measures water level and temperature, was placed in BH-1 at 10.59 am on 18/10/2011 and removed at 9.28 am on 21/10/2011. The logger measured an initial recovery period and more prolonged pumping than usual due to the manual shutting off of the borehole on the 18th October. T values were calculated for both the recovery (114 m²/d) and the prolonged pumping period (189 m²/d) using the Cooper Jacob approximation. An average value of 150 m²/d was chosen. Due to the short nature of the test the values derived here must be treated with caution as the water level did not stabilise during pumping and the water had not fully recovered.

The Logan Approximation was also used to calculate a T value of 327 m²/d. The higher Logan T value is because of the short duration of pumping and the water level was still falling. Specific capacity is a measure of the discharge of the borehole divided by the drawdown. The specific capacity and Logan T values are probably over estimated due to lack of a precise static water level and the fact that the water level was still dropping before the pump stopped. A specific capacity of 268 m³/d/m was calculated from the pumping test dataset. The results are summarised in Table 9-2 below.

A hydrogeological assessment was undertaken by K.T Cullen (KTC) in 1981 on the Bottled Water borehole which is located within 500 m to the west of the site. This involved an 11 day pumping and recovery test. The test was pumped at a constant rate of 109 m³/d. The pumping test showed a drawdown of 28.72 m after 11 days. When pumping had ceased the water level had only recovered by 17.99 m after 26 hours. Based on this data, a range of T values of 1.6 to 4.6 m²/d was calculated by the Cooper Jacob and Logan approximations. Specific capacities of 11.4 m³/d/m after 3 days and 3.86 m³/d/m at the end of the 11 day test were calculated. This is much lower than the values derived from the testing of the Camross-Adamstown WSS production boreholes. The borehole is located in different rocks, in a different section of the aquifer, and is separated from the Carrigbyrne supply by a major fault, so different hydrogeological conditions may be present locally.

KTC also completed another hydrogeological assessment on a number of boreholes for the Adamstown Water Supply Scheme in the 1980's. The wells are located between 1.7 km and 5.4 km northeast of the abstraction wells. They are also installed in the Campile formation. 9 day high yielding pumping tests were undertaken on the boreholes. The results are summarised in Table 9-2 and the locations are shown on Figure 10. The results indicate much higher T values than for the Bottled Water site ranging from 40 to 400 m²/d and are closer to those estimated for the Carrigbyrne boreholes.

The short duration of the testing on the Carrigbyrne BH-1 means the results should be treated cautiously. Especially when much lower T and specific capacity values were calculated based on a much longer test for the nearby Bottled Water borehole. The lower T values for the Bottled Water site may be influenced by its position higher in the catchment relative to the Carrigbyrne wells. It also has a much smaller zone of contribution.

Because the Logan T value is higher than the Cooper Jacob values, an average T value of 150 m²/d was derived from the values calculated by the Cooper Jacob approximation. The graphs for all the tests are included in Appendix 2.

Table 9-1; Summary of Transmissivity and Specific Capacity Values

	Discharge (m ³ /d)	Transmissivity (T m ² /d)			Specific Capacity (m ³ /d/m)
		Logan Approx.	C-J Pumping	C-J Recovery	
Carraigbyrne BH-1	528*	327	113	190	268
Bottled Water BH	109	4.6	1.6	3	3.86-11.4
TW 35/7	2033	260	406	396	233.7
TW 31/10	2100	149	100	129-409	122
TW 31/1	620	44	65	122	36

* Based on the hourly pumping rate of 22 m³/hr. Due to the reservoir capacity the maximum daily abstraction is 410 m³/d and the average daily abstraction is 300 m³/d.

The bulk hydraulic conductivity K (coefficient of permeability) can also be estimated by dividing the transmissivity by the saturated thickness of the aquifer. The saturated thickness of the aquifer locally is not known as there is no borehole log for the well. As indicated by the GSI in the Adamstown GWB Report, evidence from drilling in the Campile Formation shows that there is an aquifer depth of 50 m for similar rocks in Kilkenny. At this site, the well is thought to be 33.1 m deep and the depth to rock is assumed to be 9 m. This gives a maximum aquifer thickness of 24 m. However, based on the highest water level observed in BH-1 during recovery of 18.16 m and the static water level noted in the Bottled Water well of 18.05 m bgl in 1981, the saturated thickness is unlikely to be 24 m. Assuming a static water level of 18 m bgl the saturated thickness of the aquifer would be 15 m. As a precautionary measure a range of 15 to 24 m has been selected. Based on this assumption, the hydraulic conductivity is estimated to be 6.2 to 10 m/d. The Hydraulic Conductivity (K) estimation is summarised as follows in Table 9.2:

Table 9-2: Summary of Hydraulic Conductivity Values

	Range of values
Transmissivity (m ² /d)	150
Estimated Depth of Aquifer (m)	15.5-24
Hydraulic Conductivity (m/d)	6.2-10

The velocity of water moving through this aquifer to the borehole has been estimated using Darcy's Law:

$$v = \frac{Ki}{n}$$

where v is the groundwater velocity (m/d)

K is the hydraulic conductivity (m/d)

i is the groundwater gradient

n is the estimated effective porosity

The natural gradient is estimated at 0.08 (Section 9.2). The hydraulic conductivity is estimated to be between 6.2-10 m/d. Daly (1982) suggests storage coefficients of 1% for the unconfined state and less than 0.01% for the confined state for the Campile Formation. As the aquifer is considered unconfined a porosity of 1% was used.

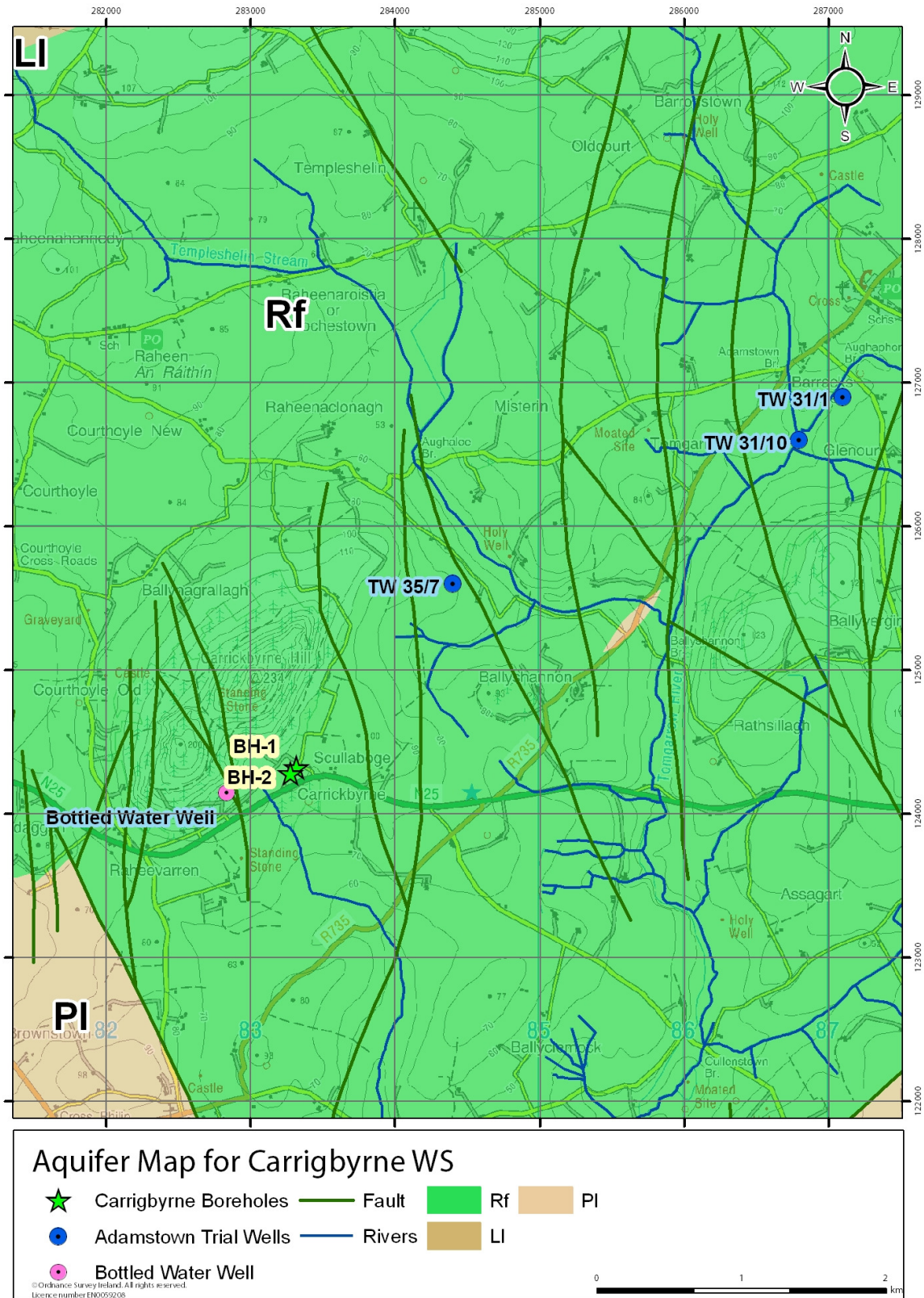


Figure 10 Aquifer Map

The aquifer parameters are summarized in Table 9-3.

Table 9-3: Indicative Parameters for the Campile Formation at Carrigbyrne

Parameters	Source of Data	BH1
Transmissivity (m ² /d)	Calculated from short pumping test	150 m ² /d
Hydraulic Conductivity(m/d)	Estimated from T value divided by aquifer thickness	6.2-10
Effective Porosity	Assumed from similar rock type in Waterford (Daly 1982)	1%
Groundwater gradient	Assumed based on topography and field observations	0.08
Velocity (m/d)	Calculated from Darcy's Law	50-80

10 Zone of contribution

The Zone of Contribution (ZOC) is the complete hydrologic catchment area to the source, or the area required to support an abstraction from long-term recharge. The size and shape of the ZOC is controlled primarily by (a) the total discharge, (b) the groundwater flow direction and gradient, (c) the subsoil and rock permeability and (d) the recharge in the area. This section describes the conceptual model of how groundwater flows to the source, including uncertainties and limitations in the boundaries, and the recharge and water balance calculations which support the hydrogeological mapping techniques used to delineate the ZOC.

10.1 Conceptual Model

The higher transmissivity and specific capacity values calculated for the Carrigbyrne wells compared to other wells in this water body is indicative of a quickly recharging, extremely vulnerable aquifer. Recharge is expected to occur up hydraulic gradient to the north of the boreholes. The majority of the recharge occurs where the felsic volcanics are exposed or close to the surface, Less recharge is expected to occur closer to the borehole because of the presence of gley soil and low permeability subsoils. The steeper gradients in the upper portions of the catchment and the combination of gley soils and shallower gradient lower in the catchment, results in significant run-off to the local streams in periods of high rainfall. The GSI Groundwater Body Report assumes groundwater in the Campile Formation has generally long deep flowpaths with the groundwater moving from north to south. Regional groundwater discharge is expected to the south where the rock type changes from the Regionally Important Fractured Campile Formation to the Poorly Productive Ballyhoge Formation which are Ordovician Metasediments (GSI 2004). The deep static groundwater levels observed in the boreholes locally in the catchment may be indicative of shallow groundwater gradients and deeper regional flow patterns in the Campile Formation. A schematic representation of the conceptual model is shown in Figure 10.

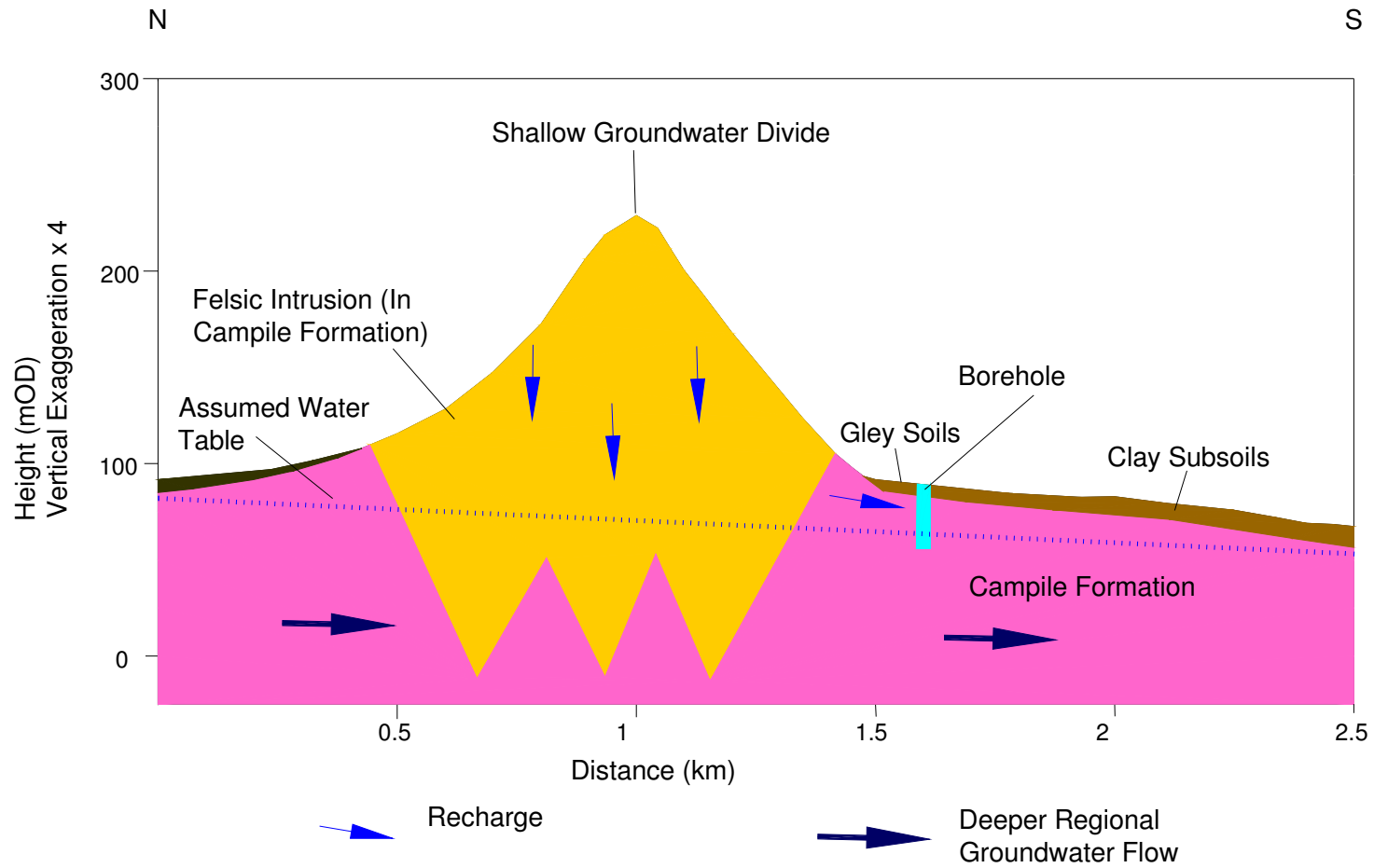


Figure 11: Conceptual Model

10.2 Boundaries of the ZOC

The boundaries of the area contributing to the source are considered to be as follows (Figure 11).

The northern, eastern and south western boundaries are primarily based on, conceptualised groundwater flow-lines, which flow to the south in the direction of the Corock River, and the size of the estimated ZOC using the recharge and water balance equations in Section 10.3. The shape of the ZOC also accounts for the possibility of fracture flow along the north-south trending fault lineaments.

The north eastern boundary is defined by the north south trending fault. Water to the west of this fault is expected to flow along the regional flow paths to the south and is not expected to reach the boreholes.

The southern boundary – the down gradient boundary is the maximum downgradient distance that the borehole can pump water from which is based on the uniform flow equation (Todd, 1980).

$$X_L = \frac{Q}{2\pi Ti}$$

where Q is the daily pumping rate (340 m³/d)

T is Transmissivity (taken from aquifer characteristics 150 m²/d)

i is gradient 0.08

Given the pumping rate is 340 m³/d, the transmissivity is estimated as 150 m²/d and the hydraulic gradient is 0.08 the approximate maximum downgradient distance is 4.5 m. To allow for limited site specific data and associated uncertainties in the calculation of the aquifer parameters, the down gradient limit has been increased to 10 m.

10.3 Recharge and Water Balance

The term 'recharge' refers to the amount of water replenishing the groundwater flow system. The recharge rate is generally estimated on an annual basis, and assumed to consist of input (i.e. annual rainfall) less water loss prior to entry into the groundwater system (i.e. annual evapotranspiration and runoff). The estimation of a realistic recharge rate is critical in source protection delineation, as it will dictate the size of the zone of contribution to the source (i.e. the outer Source Protection Area).

At Carrigbyrne therefore, the main parameters involved in recharge rate estimation are: annual rainfall; annual evapotranspiration and a recharge coefficient. The recharge is estimated as follows.

Potential recharge is equivalent to 475 mm/year i.e. (Annual Effective Rainfall as outlined in Section 6).

Actual recharge: 371 mm/yr. The Campile Formation is classified as a Regionally Important fissured bedrock aquifer (Rf). The majority of the area surrounding the source (95% of the ZOC to the source) is

mapped as Extreme Vulnerability, where the bedrock outcrops. Guidance document GW5 recommends a recharge coefficient in the range of 0.60 to 1 be applied for these conditions, with an inner range of 0.80-0.90 (IWWG, 2005). A coefficient of 0.85 has been assumed for this area.

In the low lying area just upgradient of the boreholes, the material is low permeability CLAY dominated gleys. A range of 0.02 to 0.2 is suggested with an inner range of 0.1-0.2. The value of 0.15 from the inner range was applied.

Runoff losses are assumed to be 18% of the potential recharge (effective rainfall). This value is based on an assumption of c.15% runoff for 95% of the area (extreme vulnerability – rock close to surface) and 85% runoff for 5% of the area (High to Low vulnerability). The **bulk recharge** coefficient for the area is therefore estimated to be 82%.

Runoff losses: 90 mm. Runoff losses are assumed to be 18% of potential recharge.

These calculations are summarised as follows:

Average annual rainfall (R)	1000 mm
Estimated P.E.	525 mm
Estimated A.E. (95% of P.E.)	499 mm
Effective rainfall	501 mm
Potential recharge	501 mm
Runoff losses	18%
Bulk recharge coefficient	82%
Assumed Recharge	410 mm

The water balance calculation indicates that the recharge over the area contributing to the source should equal the discharge at the source. At a recharge of 410 mm/yr, an average yield of 340 m³/day would require a recharge area of 0.302 km².

To allow for daily variations in abstraction, a possible increase in demand, and for the expansion of the ZOC during dry weather periods, the GSI recommends increasing the abstraction rate by 50% for the purposes of delineating the ZOC. Only one borehole can be pumped at one time and the daily abstraction rate is limited by the size of the reservoir. Due to these constraints, a ZOC delineated using the maximum possible abstraction rate of 410 m³/day requires an area of 0.365 km². This ZOC delineated (0.478 km²) is approximately 50% larger than the upper range of the present abstraction and exceeds the area required for the maximum possible abstraction. The boundary of the ZOC is shown in Figure 11.

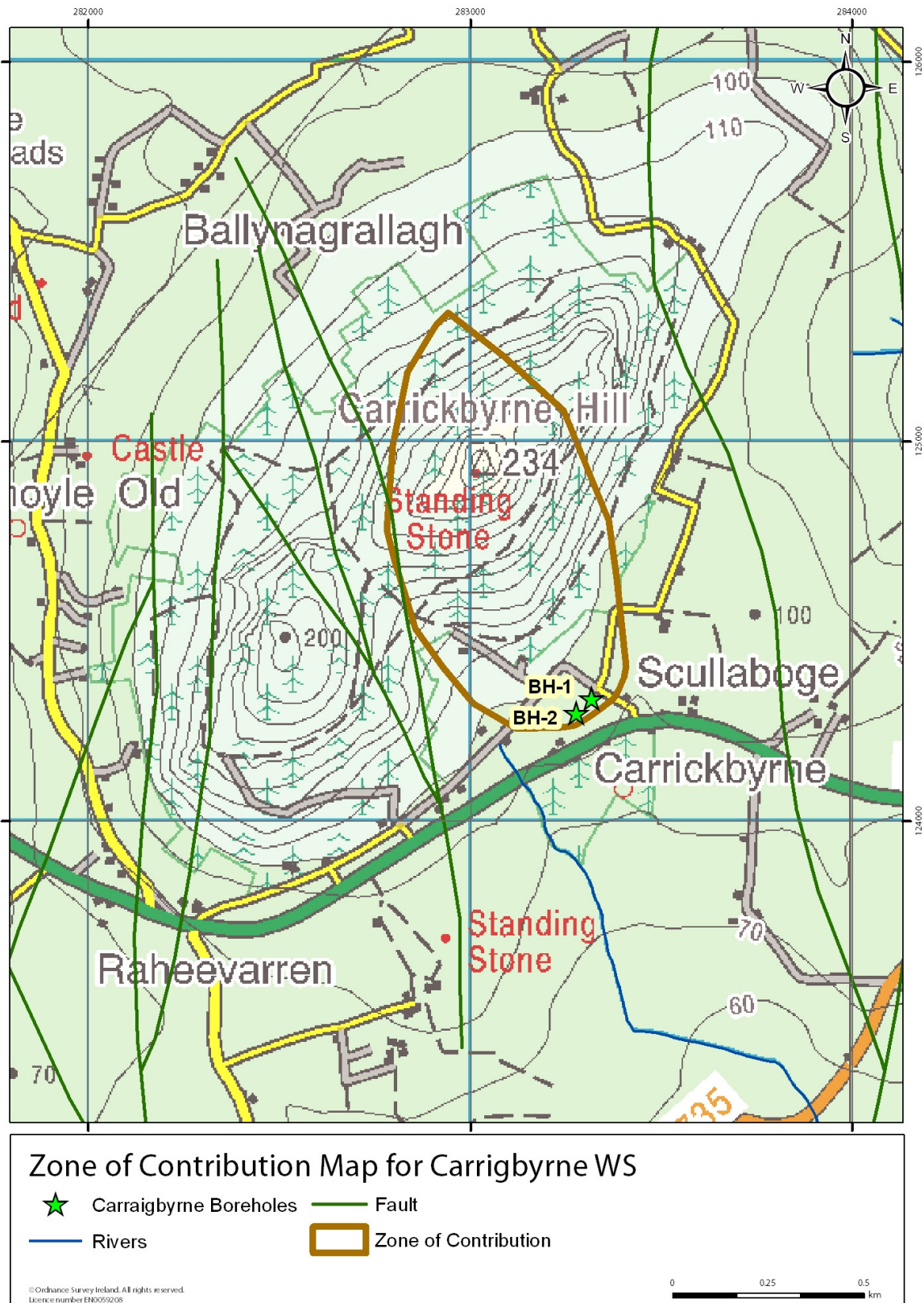


Figure 12: Zone of Contribution

11 Source Protection Zones

The SPZs are a landuse planning tool which enables an objective, geoscientific assessment of the risk to groundwater to be made. The zones are based on an amalgamation of the source protection areas and the aquifer vulnerability. The source protection areas represent the horizontal groundwater pathway to the source, while the vulnerability reflects the vertical pathway. Two source protection areas have been delineated, the Inner Protection Area and the Outer Protection Area.

The Inner Protection Area (SI) is designed to protect the source from microbial and viral contamination and it is based on the 100-day time of travel to the supply (DELG/EPA/GSI 1999). Based on the indicative aquifer parameters presented in Section 9.4, the groundwater velocity is 50-80 m/d. Hence, the minimum 100-day time range of travel would be 5 km. This is much larger than the size of the ZOC. The value is high based on the calculated transmissivity and shallow assumed hydraulic gradient in the catchment. The entire ZOC is deemed to be the Inner Source Protection Area (SI) and there is no Outer Source Protection Area (SO)

The groundwater Source Protection Zones are shown in Figure 13 and are listed in Table 11-1. The whole ZOC is included in the SI and they include SI/X, SI/E, SI/H, SI/M and SI/L. The majority of the ZOC is designated as SO/X.

Table 11-1 Source Protection Zones

Source Protection Zone		% of total area (km ²)
SI/X	Inner Source Protection area / ≤1 m subsoil	76.9% (0.368 km ²)
SI/E	Inner Source Protection area / <3 m subsoil	16.2% (0.077 km ²)
SI/H	Inner Source Protection area / High vulnerability	2.7% (0.013 km ²)
SI/M	Inner Source Protection area / Moderate vulnerability	1.1% (0.005 km ²)
SI/L	Inner Source Protection area / Low vulnerability	3.1% (0.015 km ²)

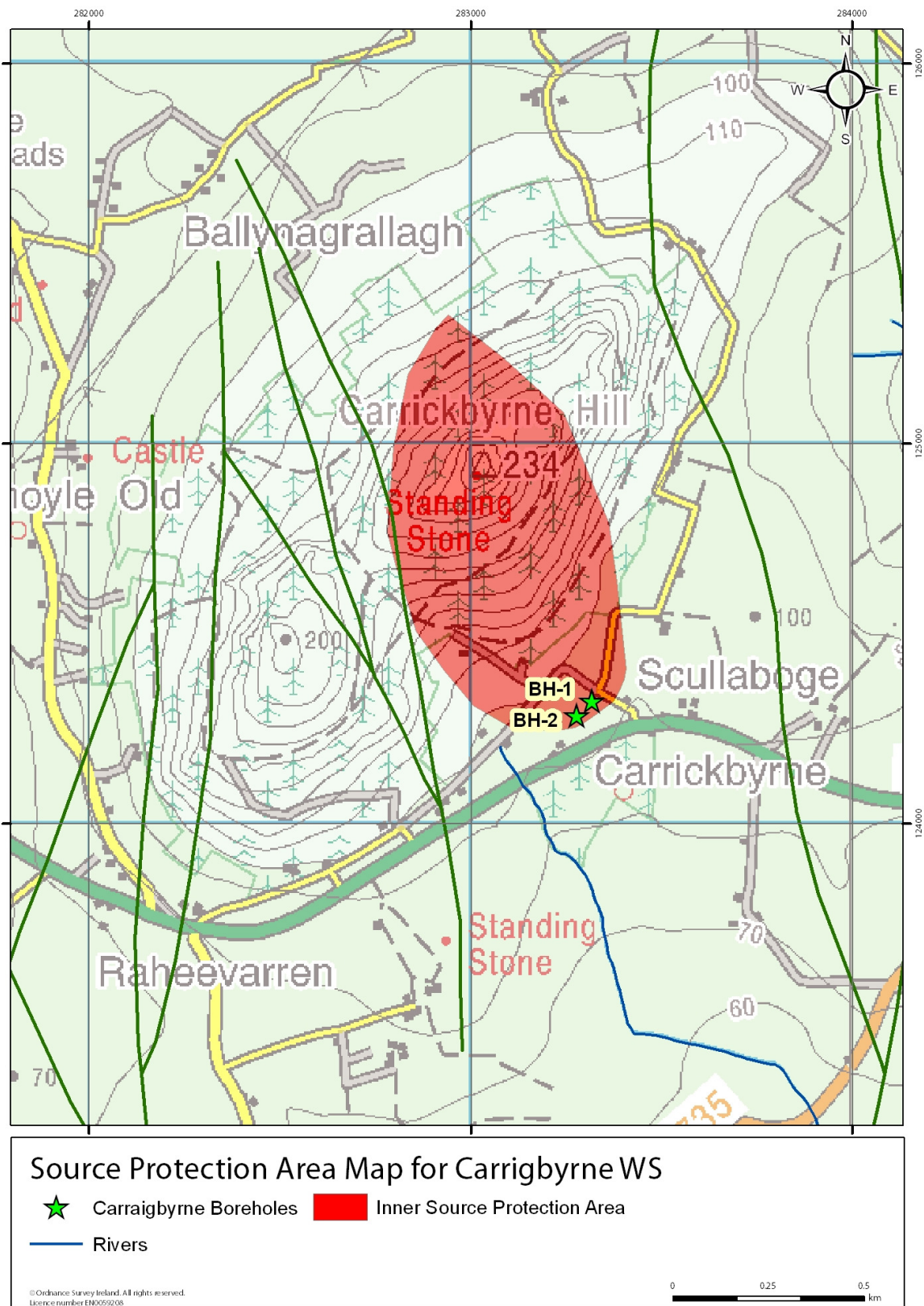


Figure 13: Inner Source Protection Area

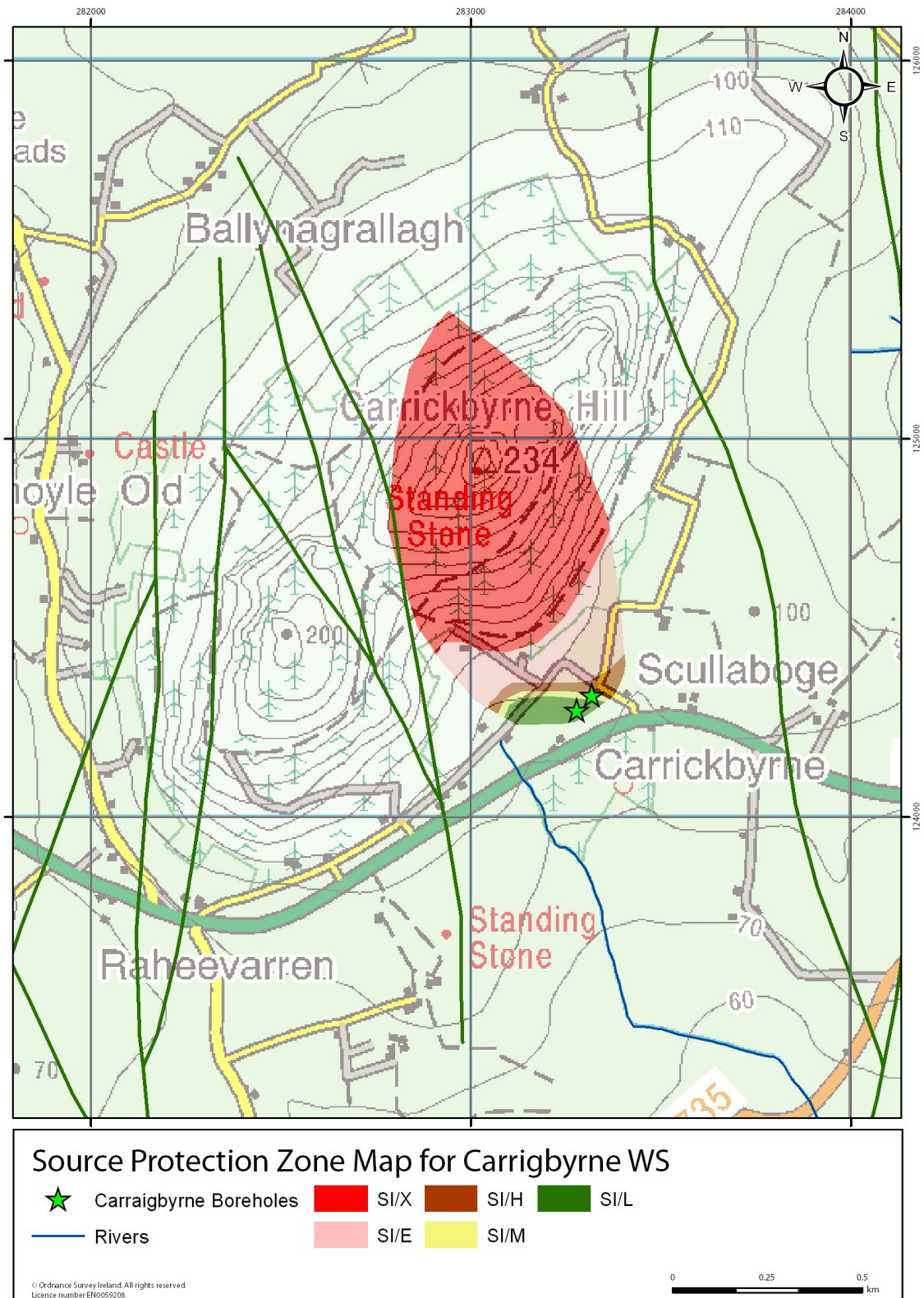


Figure 14: Source Protection Zones

12 Potential Pollution Sources

The borehole is located in a securely fenced and locked compound and the well heads are enclosed in concrete chambers to protect against the inflow of contaminated surface or shallow subsurface water. The ground surface in the compound comprises hardcore gravels.

Due to the high velocity, the entire ZOC is considered an Inner Source Protection Area as groundwater could reach the source from anywhere in the ZOC within 100 days. The main potential microbial pollution sources are individual on-site wastewater treatment systems of the dwellings. There are seven dwellings and a Pet Farm located within the ZOC. Faecal coliforms have been detected twice in 2007 in the well water indicating that these potential pollution sources could probably have an impact on the water supply. There have been no detections since the upgrading of the borehole headworks and construction of the concrete chambers. There is some land for grazing and the Pet Farm located within the ZOC. However these activities are located over poorly permeable soils and subsoils where the vulnerability is low. The rest of the land use up hydraulic gradient of the source is mixed forestry. Combined with the improved well head protection the potential risk from cryptosporidium and viruses is low.

There is a vehicle repair and sales garage located 300 m up hydraulic gradient of the wells where the bedrock is close to or at the surface. While the site appears to be well maintained this is a potential point source of hydrocarbon and or VOC contamination of the water supply well.

13 Conclusions

The Carrigbyrne Water Supply Scheme comprises two boreholes installed in 1960s. Only one borehole is pumped at a time. The borehole abstracts water from the Campile Formation. The aquifer is classified as a Regionally Important fractured bedrock aquifer (Rf). The well provides 300–340 m³/d and is pumped to a reservoir after treatment. The water is chlorinated and corrected for low pH. The well in use generally pumps between three to five hours per cycle depending on demand. This pumping rate has been sustainable since the wells were commissioned in the 1960s. Water quality is generally good but is slightly acidic. They have been occasional detections of faecal coliforms, herbicides and trihalomethanes. The pressures are moderate to low in the catchment with the land use being mainly grazing in the low ground and forestry in the steeper, upper part of the catchment.

The groundwater vulnerability within the ZOC is Extreme and Extreme with Rock close in the steep, high ground to the north. There is a sharp break in slope up gradient of the borehole where the vulnerability changes from high to low. The vulnerability at the boreholes is low and it is the dominant type in the low lying part of the catchment. The delineated ZOC is 0.413 km².

The source protection zones are based on the current understanding of the groundwater conditions and the available data. Additional data obtained in the future may require amendments to the protection zone boundaries.

14 Recommendations

The following actions are recommended:

- That the water quality monitoring programme should include for pesticides on an annual basis.
- Access to the wells to dip water levels is limited. The installation of dip tubes to allow for monitoring of water levels in both boreholes is recommended.
- The pumping cycle should be reviewed to establish if the duration of pumping could be increased to prolong the operational lifespan of the pumps. An assessment of the water levels set in the pumping reservoir to activate the pumping sequence may be required to determine if a longer pumping duration is feasible.

15 References

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APPENDIX 1

**Geological Survey of Ireland: Adamstown Groundwater Body
Description (1st Draft) (2004).**

Adamstown GWB: Summary of Initial Characterisation.

Hydrometric Area Local Authority		Associated surface water bodies	Associated terrestrial ecosystems	Area (km ²)
13 –Coastal area Wexford Co Co		Corock, Owenduff, Tintern Abbey Stream and Barrow estuary.	Boley Fen, Barrow River Estuary	181
Topography		The drainage pattern in this aquifer reflects the reduction in elevation from north to south. The highest point within the groundwater body area is Carrickbyrne Hill at 234m OD. The lowest areas in the groundwater body are to the west at the mouth of the River Barrow around Campile, which is at sea level.		
Geology and Aquifers	Aquifer type(s)	<p>Mostly: Rf: Regionally Important Fractured aquifer. With Smaller areas of: LI: Locally important aquifer which is moderately productive only in local zones PI: Poor aquifer which is generally unproductive except for local zones</p>		
	Main aquifer lithologies	<p>Mostly: Ordovician Volcanics With Smaller areas of: Devonian Old Red Sandstones Granites & other Igneous Intrusive rocks Ordovician Metasediments This rock contains areas of felsic volcanic rock which are believed to be the main water bearing components.</p>		
	Key structures.	The bedrock is highly fractured and broken due to folding and faulting in the Caledonian Orogeny, which formed the Campile Syncline. Superimposed upon this are a series of minor folds giving rise to pronounced cleavage. The crystalline volcanic rocks will have ruptured under the mountain building forces that affected the whole area. The rock units are steeply dipping to the south.		
	Key properties	Wells tested at Adamstown and Carrickbyrne Hill have yields of 1400m ³ /d, specific capacities of 44.7m ³ /d/m and transmissivity values in the region of 150m ² /d		
	Thickness	The effective thickness of this aquifer could be quite large. Well logging data from Kilkenny shows large fractures open at depths of 50m.		
Overlying Strata	Lithologies	The Clogga Till is a stone clay sand based till containing large angular cobbles and boulders chiefly of shale and granite. There are also some significant silty alluvium deposits close to the Barrow River estuary. In places there appear to be sand and gravel layers of about 6.5m between the bedrock and the overlying silt.		
	Thickness	Thickness has been shown to be mostly less than 10m but may increase closer to the Barrow, as alluvial deposits become thicker.		
	% area aquifer near surface	<i>[Information will be added at a later date]</i>		
	Vulnerability	<i>[Information will be added at a later date]</i>		
Recharge	Main recharge mechanisms	Rainfall recharges largely in the north where overlying strata may be thinner in the uplands. Also in locations like Carrickbyrne Hill which appear to coincide with areas where felsic volcanics outcrop.		
	Est. recharge rates	<i>[Information will be added at a later date]</i>		
Discharge	Springs and large known abstractions (m ³ /d)	Adamstown (1400), Carrigbyrne (204).		
	Main discharge mechanisms	The most likely areas for this groundwater body to discharge will be to the associated surface water bodies. This may occur mostly at the geological contact between this groundwater body and the body to the south. It is possible that water could be forced to the surface and into surface water bodies here.		
	Hydrochemical Signature	Low mineralized nature is noteworthy. Waters monitored are shown to be moderately soft to slightly hard. Average electrical conductivity values are Carrickbyrne 418, Tellerought 283 and Ballinamona 384 (µs/cm), low values which confirm low mineralised water. There is evidence of saltwater intrusion at Great Island, Wexford. The bedrock strata of this groundwater body are Siliceous .		
Groundwater Flow Paths		Groundwater flow may be in long flowpaths from north to south. There may be a small/local groundwater divide where some flow will be to the west towards Campile and the Barrow River estuary and the rest will flow south. In areas like Carrickbyrne there will probably be elevated groundwater levels which would radiate from the peak but probably taper towards the south with the regional flow system. Groundwater flow has been estimated at 8m/yr in the extreme west area of the body at Great Island Power Station.		
Groundwater and surface water interactions		There is likely to be an important groundwater connection to Boley Fen, which lies on a geological contact between two groundwater bodies of differing aquifer classification. The relevance of this requires further investigation.		

Conceptual model	<p>This groundwater body is defined to the northwest and southeast by the extent of the Campile Formation. The Barrow River defines the western boundary and the boundary of Hydrometric area 13 defines the northern boundary.</p> <p>Groundwater is mostly recharged in the north and at various hills in the area. Regional flow is mostly north to south. There is probably a local groundwater divide in the area east of Campile. West of this divide, groundwater discharges to the Barrow Estuary and northeast of this, probably discharges to the associated surface water bodies, especially at the geological contact at the southern boundary of the body.</p>
Attachments	
Instrumentation	<p>Stream gauge: 14066</p> <p>Borehole Hydrograph: none</p> <p>EPA Representative Monitoring boreholes: Carrickbyrne WS (#9 - S831245), Tellerought GWS (#49 - S756214), Ballinamona (#37 - S710178).</p>
Information Sources	<p>Pow, S.J., & Brems, D.L. (2001) An Environmental Impact Assessment of Great Island Generating Station upon the Local Soil and Groundwater Quality. ESB International.</p> <p>Cullen, K.T. (1980) Groundwater Development for Urban and Rural Water Supply Schemes. IAH (Irish Group).</p>
Disclaimer	Note that all calculation and interpretations presented in this report represent estimations based on the information sources described above and established hydrogeological formulae

Formation Name	Code	Description	Rock Unit Group	Aquifer Category
Ballylane Formation	BY	Green & grey slate with thin siltstone	Ordovician Metasediments	PI
Campile Formation	CA	Rhyolitic volcanics, grey & brown slates	Ordovician Volcanics	Rf
Dolerite	D		Granites & other Igneous Intrusive rocks	Rf
Granite (undifferentiated)	Gr		Granites & other Igneous Intrusive rocks	Rf
Harrylock Formation	HL	Red conglomerate, sandstone & siltstone	Devonian Old Red Sandstones	LI
Maulin Formation	MN	Dark blue-grey slate, phyllite & schist	Ordovician Metasediments	LI
Oaklands Formation	OA	Green, red-purple, buff slate, siltstone	Ordovician Metasediments	LI

APPENDIX 2

Pumping Test Data

Pumping Test on BH-1 Carrigbyrne

18/10/2012

Carrigbyrne Extended Pumping Data 18/10/2011

Date	Time	Time (mins)	Water Level (m below the casing)
18/10/2011	13:47:07	0	18.16162
18/10/2011	13:47:37	0.5	18.62002
18/10/2011	13:48:07	1	19.234389
18/10/2011	13:48:37	1.5	19.32113
18/10/2011	13:49:07	2	19.2618
18/10/2011	13:49:37	2.5	19.24938
18/10/2011	13:50:07	3	19.24225
18/10/2011	13:50:37	3.5	19.251549
18/10/2011	13:51:07	4	19.26362
18/10/2011	13:51:37	4.5	19.27139
18/10/2011	13:52:07	5	19.28268
18/10/2011	13:52:37	5.5	19.291159
18/10/2011	13:53:07	6	19.29924
18/10/2011	13:53:37	6.5	19.30244
18/10/2011	13:54:07	7	19.314439
18/10/2011	13:54:37	7.5	19.32049
18/10/2011	13:55:07	8	19.32135
18/10/2011	13:55:37	8.5	19.33088
18/10/2011	13:56:07	9	19.338869
18/10/2011	13:56:37	9.5	19.341549
18/10/2011	13:57:07	10	19.34872
18/10/2011	13:57:37	10.5	19.355379
18/10/2011	13:58:07	11	19.35804
18/10/2011	13:58:37	11.5	19.36566
18/10/2011	13:59:07	12	19.36742
18/10/2011	13:59:37	12.5	19.37682
18/10/2011	14:00:07	13	19.38081
18/10/2011	14:00:37	13.5	19.3838
18/10/2011	14:01:07	14	19.3856
18/10/2011	14:01:37	14.5	19.395899
18/10/2011	14:02:07	15	19.401289
18/10/2011	14:02:37	15.5	19.402749
18/10/2011	14:03:07	16	19.40769
18/10/2011	14:03:37	16.5	19.41396
18/10/2011	14:04:07	17	19.41357
18/10/2011	14:04:37	17.5	19.42164
18/10/2011	14:05:07	18	19.42162
18/10/2011	14:05:37	18.5	19.42713
18/10/2011	14:06:07	19	19.432589
18/10/2011	14:06:37	19.5	19.43626
18/10/2011	14:07:07	20	19.43731
18/10/2011	14:07:37	20.5	19.44604
18/10/2011	14:08:07	21	19.44635
18/10/2011	14:08:37	21.5	19.45165
18/10/2011	14:09:07	22	19.44997
18/10/2011	14:09:37	22.5	19.457459
18/10/2011	14:10:07	23	19.46013
18/10/2011	14:10:37	23.5	19.46032

Carrigbyrne Extended Pumping Data 18/10/2011

Date	Time	Time (mins)	Water Level (m below the casing)
18/10/2011	14:11:07	24	19.47204
18/10/2011	14:11:37	24.5	19.464079
18/10/2011	14:12:07	25	19.47779
18/10/2011	14:12:37	25.5	19.47339
18/10/2011	14:13:07	26	19.48026
18/10/2011	14:13:37	26.5	19.48107
18/10/2011	14:14:07	27	19.486629
18/10/2011	14:14:37	27.5	19.488479
18/10/2011	14:15:07	28	19.49258
18/10/2011	14:15:37	28.5	19.48687
18/10/2011	14:16:07	29	19.495089
18/10/2011	14:16:37	29.5	19.507409
18/10/2011	14:17:07	30	19.50735
18/10/2011	14:17:37	30.5	19.50464
18/10/2011	14:18:07	31	19.51166
18/10/2011	14:18:37	31.5	19.5175
18/10/2011	14:19:07	32	19.51402
18/10/2011	14:19:37	32.5	19.52381
18/10/2011	14:20:07	33	19.52578
18/10/2011	14:20:37	33.5	19.52276
18/10/2011	14:21:07	34	19.525119
18/10/2011	14:21:37	34.5	19.52997
18/10/2011	14:22:07	35	19.5287
18/10/2011	14:22:37	35.5	19.53278
18/10/2011	14:23:07	36	19.53284
18/10/2011	14:23:37	36.5	19.537929
18/10/2011	14:24:07	37	19.54182
18/10/2011	14:24:37	37.5	19.54737
18/10/2011	14:25:07	38	19.55141
18/10/2011	14:25:37	38.5	19.550849
18/10/2011	14:26:07	39	19.55323
18/10/2011	14:26:37	39.5	19.55523
18/10/2011	14:27:07	40	19.55605
18/10/2011	14:27:37	40.5	19.560119
18/10/2011	14:28:07	41	19.56628
18/10/2011	14:28:37	41.5	19.56487
18/10/2011	14:29:07	42	19.56594
18/10/2011	14:29:37	42.5	19.57315
18/10/2011	14:30:07	43	19.57244
18/10/2011	14:30:37	43.5	19.57693
18/10/2011	14:31:07	44	19.579309
18/10/2011	14:31:37	44.5	19.57882
18/10/2011	14:32:07	45	19.58182
18/10/2011	14:32:37	45.5	19.58157
18/10/2011	14:33:07	46	19.58547
18/10/2011	14:33:37	46.5	19.585819
18/10/2011	14:34:07	47	19.594099
18/10/2011	14:34:37	47.5	19.58839

Carrigbyrne Extended Pumping Data 18/10/2011

Date	Time	Time (mins)	Water Level (m below the casing)
18/10/2011	14:35:07	48	19.591629
18/10/2011	14:35:37	48.5	19.59968
18/10/2011	14:36:07	49	19.59739
18/10/2011	14:36:37	49.5	19.60243
18/10/2011	14:37:07	50	19.59964
18/10/2011	14:37:37	50.5	19.602669
18/10/2011	14:38:07	51	19.60196
18/10/2011	14:38:37	51.5	19.60449
18/10/2011	14:39:07	52	19.60632
18/10/2011	14:39:37	52.5	19.60812
18/10/2011	14:40:07	53	19.6102
18/10/2011	14:40:37	53.5	19.616209
18/10/2011	14:41:07	54	19.62153
18/10/2011	14:41:37	54.5	19.61675
18/10/2011	14:42:07	55	19.62141
18/10/2011	14:42:37	55.5	19.62471
18/10/2011	14:43:07	56	19.624129
18/10/2011	14:43:37	56.5	19.62381
18/10/2011	14:44:07	57	19.625219
18/10/2011	14:44:37	57.5	19.63083
18/10/2011	14:45:07	58	19.63289
18/10/2011	14:45:37	58.5	19.63563
18/10/2011	14:46:07	59	19.634779
18/10/2011	14:46:37	59.5	19.63381
18/10/2011	14:47:07	60	19.64068
18/10/2011	14:47:37	60.5	19.64398
18/10/2011	14:48:07	61	19.639259
18/10/2011	14:48:37	61.5	19.64886
18/10/2011	14:49:07	62	19.64596
18/10/2011	14:49:37	62.5	19.645249
18/10/2011	14:50:07	63	19.650509
18/10/2011	14:50:37	63.5	19.64774
18/10/2011	14:51:07	64	19.65776
18/10/2011	14:51:37	64.5	19.65364
18/10/2011	14:52:07	65	19.65995
18/10/2011	14:52:37	65.5	19.65575
18/10/2011	14:53:07	66	19.65954
18/10/2011	14:53:37	66.5	19.66369
18/10/2011	14:54:07	67	19.66311
18/10/2011	14:54:37	67.5	19.66777
18/10/2011	14:55:07	68	19.66594
18/10/2011	14:55:37	68.5	19.66852
18/10/2011	14:56:07	69	19.67287
18/10/2011	14:56:37	69.5	19.674179
18/10/2011	14:57:07	70	19.676499
18/10/2011	14:57:37	70.5	19.67725
18/10/2011	14:58:07	71	19.67594
18/10/2011	14:58:37	71.5	19.67699

Carrigbyrne Extended Pumping Data 18/10/2011

Date	Time	Time (mins)	Water Level (m below the casing)
18/10/2011	14:59:07	72	19.67852
18/10/2011	14:59:37	72.5	19.68799
18/10/2011	15:00:07	73	19.68238
18/10/2011	15:00:37	73.5	19.6814
18/10/2011	15:01:07	74	19.682
18/10/2011	15:01:37	74.5	19.6873
18/10/2011	15:02:07	75	19.68925
18/10/2011	15:02:37	75.5	19.69062
18/10/2011	15:03:07	76	19.69406
18/10/2011	15:03:37	76.5	19.68925
18/10/2011	15:04:07	77	19.695559
18/10/2011	15:04:37	77.5	19.69672
18/10/2011	15:05:07	78	19.70106
18/10/2011	15:05:37	78.5	19.70363
18/10/2011	15:06:07	79	19.70193
18/10/2011	15:06:37	79.5	19.70206
18/10/2011	15:07:07	80	19.70698
18/10/2011	15:07:37	80.5	19.7055
18/10/2011	15:08:07	81	19.70475
18/10/2011	15:08:37	81.5	19.70994
18/10/2011	15:09:07	82	19.71196
18/10/2011	15:09:37	82.5	19.71677
18/10/2011	15:10:07	83	19.713739
18/10/2011	15:10:37	83.5	19.719129
18/10/2011	15:11:07	84	19.713869
18/10/2011	15:11:37	84.5	19.7205
18/10/2011	15:12:07	85	19.72211
18/10/2011	15:12:37	85.5	19.72114
18/10/2011	15:13:07	86	19.72398
18/10/2011	15:13:37	86.5	19.72151
18/10/2011	15:14:07	87	19.72846
18/10/2011	15:14:37	87.5	19.72316
18/10/2011	15:15:07	88	19.72877
18/10/2011	15:15:37	88.5	19.72503
18/10/2011	15:16:07	89	19.733659
18/10/2011	15:16:37	89.5	19.729469
18/10/2011	15:17:07	90	19.72739
18/10/2011	15:17:37	90.5	19.732459
18/10/2011	15:18:07	91	19.738059
18/10/2011	15:18:37	91.5	19.73411
18/10/2011	15:19:07	92	19.74023
18/10/2011	15:19:37	92.5	19.739859
18/10/2011	15:20:07	93	19.73619
18/10/2011	15:20:37	93.5	19.73963
18/10/2011	15:21:07	94	19.742539
18/10/2011	15:21:37	94.5	19.7442
18/10/2011	15:22:07	95	19.75055
18/10/2011	15:22:37	95.5	19.74881

Carrigbyrne Extended Pumping Data 18/10/2011

Date	Time	Time (mins)	Water Level (m below the casing)
18/10/2011	15:23:07	96	19.74995
18/10/2011	15:23:37	96.5	19.75454
18/10/2011	15:24:07	97	19.75212
18/10/2011	15:24:37	97.5	19.75081
18/10/2011	15:25:07	98	19.75469
18/10/2011	15:25:37	98.5	19.75532
18/10/2011	15:26:07	99	19.75516
18/10/2011	15:26:37	99.5	19.75869
18/10/2011	15:27:07	100	19.75946
18/10/2011	15:27:37	100.5	19.762459
18/10/2011	15:28:07	101	19.75693
18/10/2011	15:28:37	101.5	19.76555
18/10/2011	15:29:07	102	19.7583
18/10/2011	15:29:37	102.5	19.76882
18/10/2011	15:30:07	103	19.76667
18/10/2011	15:30:37	103.5	19.76873
18/10/2011	15:31:07	104	19.76622
18/10/2011	15:31:37	104.5	19.775379
18/10/2011	15:32:07	105	19.76907
18/10/2011	15:32:37	105.5	19.77255
18/10/2011	15:33:07	106	19.76974
18/10/2011	15:33:37	106.5	19.776239
18/10/2011	15:34:07	107	19.77815
18/10/2011	15:34:37	107.5	19.775429
18/10/2011	15:35:07	108	19.77654
18/10/2011	15:35:37	108.5	19.78281
18/10/2011	15:36:07	109	19.77873
18/10/2011	15:36:37	109.5	19.780689
18/10/2011	15:37:07	110	19.78114
18/10/2011	15:37:37	110.5	19.7836
18/10/2011	15:38:07	111	19.785769
18/10/2011	15:38:37	111.5	19.78779
18/10/2011	15:39:07	112	19.790689
18/10/2011	15:39:37	112.5	19.784829
18/10/2011	15:40:07	113	19.79341
18/10/2011	15:40:37	113.5	19.790949
18/10/2011	15:41:07	114	19.791289
18/10/2011	15:41:37	114.5	19.79341
18/10/2011	15:42:07	115	19.79614
18/10/2011	15:42:37	115.5	19.79455
18/10/2011	15:43:07	116	19.79225
18/10/2011	15:43:37	116.5	19.79779
18/10/2011	15:44:07	117	19.79592
18/10/2011	15:44:37	117.5	19.80148
18/10/2011	15:45:07	118	19.800819
18/10/2011	15:45:37	118.5	19.80294
18/10/2011	15:46:07	119	19.800299
18/10/2011	15:46:37	119.5	19.80451

Carrigbyrne Extended Pumping Data 18/10/2011

Date	Time	Time (mins)	Water Level (m below the casing)
18/10/2011	15:47:07	120	19.80683
18/10/2011	15:47:37	120.5	19.805819
18/10/2011	15:48:07	121	19.80829
18/10/2011	15:48:37	121.5	19.80698
18/10/2011	15:49:07	122	19.80981
18/10/2011	15:49:37	122.5	19.81157
18/10/2011	15:50:07	123	19.80904
18/10/2011	15:50:37	123.5	19.807539
18/10/2011	15:51:07	124	19.818219
18/10/2011	15:51:37	124.5	19.816209
18/10/2011	15:52:07	125	19.815089
18/10/2011	15:52:37	125.5	19.81453
18/10/2011	15:53:07	126	19.82464
18/10/2011	15:53:37	126.5	19.82308
18/10/2011	15:54:07	127	19.82192
18/10/2011	15:54:37	127.5	19.82136
18/10/2011	15:55:07	128	19.82645
18/10/2011	15:55:37	128.5	19.82102
18/10/2011	15:56:07	129	19.8267
18/10/2011	15:56:37	129.5	19.82087
18/10/2011	15:57:07	130	19.82771
18/10/2011	15:57:37	130.5	19.826469
18/10/2011	15:58:07	131	19.825949
18/10/2011	15:58:37	131.5	19.8311
18/10/2011	15:59:07	132	19.82675
18/10/2011	15:59:37	132.5	19.836939
18/10/2011	16:00:07	133	19.82943
18/10/2011	16:00:37	133.5	19.83372
18/10/2011	16:01:07	134	19.83559
18/10/2011	16:01:37	134.5	19.83321
18/10/2011	16:02:07	135	19.836
18/10/2011	16:02:37	135.5	19.84008
18/10/2011	16:03:07	136	19.83872
18/10/2011	16:03:37	136.5	19.84224
18/10/2011	16:04:07	137	19.84739
18/10/2011	16:04:37	137.5	19.83812
18/10/2011	16:05:07	138	19.84563
18/10/2011	16:05:37	138.5	19.84557
18/10/2011	16:06:07	139	19.84739
18/10/2011	16:06:37	139.5	19.84587
18/10/2011	16:07:07	140	19.84617
18/10/2011	16:07:37	140.5	19.84583
18/10/2011	16:08:07	141	19.84482
18/10/2011	16:08:37	141.5	19.85164
18/10/2011	16:09:07	142	19.85001
18/10/2011	16:09:37	142.5	19.85214
18/10/2011	16:10:07	143	19.8533
18/10/2011	16:10:37	143.5	19.84744

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Date	Time	Time (mins)	Water Level (m below the casing)
18/10/2011	16:11:07	144	19.8545
18/10/2011	16:11:37	144.5	19.854259
18/10/2011	16:12:07	145	19.85823
18/10/2011	16:12:37	145.5	19.85783
18/10/2011	16:13:07	146	19.85855
18/10/2011	16:13:37	146.5	19.8583
18/10/2011	16:14:07	147	19.860249
18/10/2011	16:14:37	147.5	19.86073
18/10/2011	16:15:07	148	19.86283
18/10/2011	16:15:37	148.5	19.861469
18/10/2011	16:16:07	149	19.86208
18/10/2011	16:16:37	149.5	19.866
18/10/2011	16:17:07	150	19.86682
18/10/2011	16:17:37	150.5	19.86933
18/10/2011	16:18:07	151	19.86976
18/10/2011	16:18:37	151.5	19.87075
18/10/2011	16:19:07	152	19.869049
18/10/2011	16:19:37	152.5	19.86974
18/10/2011	16:20:07	153	19.873219
18/10/2011	16:20:37	153.5	19.87403
18/10/2011	16:21:07	154	19.87601
18/10/2011	16:21:37	154.5	19.87283
18/10/2011	16:22:07	155	19.87867
18/10/2011	16:22:37	155.5	19.87646
18/10/2011	16:23:07	156	19.87238
18/10/2011	16:23:37	156.5	19.87873
18/10/2011	16:24:07	157	19.87337
18/10/2011	16:24:37	157.5	19.88474
18/10/2011	16:25:07	158	19.87869
18/10/2011	16:25:37	158.5	19.88195
18/10/2011	16:26:07	159	19.88079
18/10/2011	16:26:37	159.5	19.879779
18/10/2011	16:27:07	160	19.88068
18/10/2011	16:27:37	160.5	19.887099
18/10/2011	16:28:07	161	19.88156
18/10/2011	16:28:37	161.5	19.89159
18/10/2011	16:29:07	162	19.88184
18/10/2011	16:29:37	162.5	19.88534
18/10/2011	16:30:07	163	19.88972
18/10/2011	16:30:37	163.5	19.89034
18/10/2011	16:31:07	164	19.89191
18/10/2011	16:31:37	164.5	19.89084
18/10/2011	16:32:07	165	19.890169
18/10/2011	16:32:37	165.5	19.89054
18/10/2011	16:33:07	166	19.891499
18/10/2011	16:33:37	166.5	19.89856
18/10/2011	16:34:07	167	19.88717
18/10/2011	16:34:37	167.5	19.89539

Carrigbyrne Extended Pumping Data 18/10/2011

Date	Time	Time (mins)	Water Level (m below the casing)
18/10/2011	16:35:07	168	19.8912
18/10/2011	16:35:37	168.5	19.890769
18/10/2011	16:36:07	169	19.89766
18/10/2011	16:36:37	169.5	19.89599
18/10/2011	16:37:07	170	19.89745
18/10/2011	16:37:37	170.5	19.89912
18/10/2011	16:38:07	171	19.89872
18/10/2011	16:38:37	171.5	19.90067
18/10/2011	16:39:07	172	19.905559
18/10/2011	16:39:37	172.5	19.90193
18/10/2011	16:40:07	173	19.89906
18/10/2011	16:40:37	173.5	19.90719
18/10/2011	16:41:07	174	19.90316
18/10/2011	16:41:37	174.5	19.90532
18/10/2011	16:42:07	175	19.90586
18/10/2011	16:42:37	175.5	19.90649
18/10/2011	16:43:07	176	19.90402
18/10/2011	16:43:37	176.5	19.90769
18/10/2011	16:44:07	177	19.90917
18/10/2011	16:44:37	177.5	19.90597
18/10/2011	16:45:07	178	19.90693
18/10/2011	16:45:37	178.5	19.911339
18/10/2011	16:46:07	179	19.91149
18/10/2011	16:46:37	179.5	19.910819
18/10/2011	16:47:07	180	19.91724
18/10/2011	16:47:37	180.5	19.91445
18/10/2011	16:48:07	181	19.9132
18/10/2011	16:48:37	181.5	19.91623
18/10/2011	16:49:07	182	19.911889
18/10/2011	16:49:37	182.5	19.91565
18/10/2011	16:50:07	183	19.917069
18/10/2011	16:50:37	183.5	19.91477
18/10/2011	16:51:07	184	19.91679
18/10/2011	16:51:37	184.5	19.9211
18/10/2011	16:52:07	185	19.92005
18/10/2011	16:52:37	185.5	19.91881
18/10/2011	16:53:07	186	19.91934
18/10/2011	16:53:37	186.5	19.9211
18/10/2011	16:54:07	187	19.92213
18/10/2011	16:54:37	187.5	19.9214
18/10/2011	16:55:07	188	19.92368
18/10/2011	16:55:37	188.5	19.92666
18/10/2011	16:56:07	189	19.927
18/10/2011	16:56:37	189.5	19.92554
18/10/2011	16:57:07	190	19.93046
18/10/2011	16:57:37	190.5	19.927669
18/10/2011	16:58:07	191	19.92842
18/10/2011	16:58:37	191.5	19.927409

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Date	Time	Time (mins)	Water Level (m below the casing)
18/10/2011	16:59:07	192	19.92988
18/10/2011	16:59:37	192.5	19.92844
18/10/2011	17:00:07	193	19.93591
18/10/2011	17:00:37	193.5	19.93615
18/10/2011	17:01:07	194	19.93125
18/10/2011	17:01:37	194.5	19.93192
18/10/2011	17:02:07	195	19.93544
18/10/2011	17:02:37	195.5	19.936599
18/10/2011	17:03:07	196	19.9367
18/10/2011	17:03:37	196.5	19.93808
18/10/2011	17:04:07	197	19.9401
18/10/2011	17:04:37	197.5	19.941109
18/10/2011	17:05:07	198	19.94411
18/10/2011	17:05:37	198.5	19.93462
18/10/2011	17:06:07	199	19.93619
18/10/2011	17:06:37	199.5	19.939729
18/10/2011	17:07:07	200	19.94342
18/10/2011	17:07:37	200.5	19.94469
18/10/2011	17:08:07	201	19.94297
18/10/2011	17:08:37	201.5	19.94381
18/10/2011	17:09:07	202	19.94645
18/10/2011	17:09:37	202.5	19.94407
18/10/2011	17:10:07	203	19.94529
18/10/2011	17:10:37	203.5	19.943269
18/10/2011	17:11:07	204	19.950379
18/10/2011	17:11:37	204.5	19.9463
18/10/2011	17:12:07	205	19.94675
18/10/2011	17:12:37	205.5	19.95169
18/10/2011	17:13:07	206	19.94709
18/10/2011	17:13:37	206.5	19.94684
18/10/2011	17:14:07	207	19.95034
18/10/2011	17:14:37	207.5	19.95386
18/10/2011	17:15:07	208	19.94885
18/10/2011	17:15:37	208.5	19.948919
18/10/2011	17:16:07	209	19.94988
18/10/2011	17:16:37	209.5	19.95448
18/10/2011	17:17:07	210	19.95639
18/10/2011	17:17:37	210.5	19.958789
18/10/2011	17:18:07	211	19.95568
18/10/2011	17:18:37	211.5	19.953999
18/10/2011	17:19:07	212	19.95527
18/10/2011	17:19:37	212.5	19.95542
18/10/2011	17:20:07	213	19.96244
18/10/2011	17:20:37	213.5	19.959859
18/10/2011	17:21:07	214	19.95935
18/10/2011	17:21:37	214.5	19.96042
18/10/2011	17:22:07	215	19.958059
18/10/2011	17:22:37	215.5	19.958789

Carrigbyrne Extended Pumping Data 18/10/2011

Date	Time	Time (mins)	Water Level (m below the casing)
18/10/2011	17:23:07	216	19.96139
18/10/2011	17:23:37	216.5	19.958189
18/10/2011	17:24:07	217	19.96596
18/10/2011	17:24:37	217.5	19.961369
18/10/2011	17:25:07	218	19.963399
18/10/2011	17:25:37	218.5	19.96199
18/10/2011	17:26:07	219	19.96102
18/10/2011	17:26:37	219.5	19.96394
18/10/2011	17:27:07	220	19.96461
18/10/2011	17:27:37	220.5	19.96555
18/10/2011	17:28:07	221	19.96718
18/10/2011	17:28:37	221.5	19.9651
18/10/2011	17:29:07	222	19.966369
18/10/2011	17:29:37	222.5	19.96684
18/10/2011	17:30:07	223	19.9695
18/10/2011	17:30:37	223.5	19.97032
18/10/2011	17:31:07	224	19.97519
18/10/2011	17:31:37	224.5	19.971109
18/10/2011	17:32:07	225	19.97399
18/10/2011	17:32:37	225.5	19.973449
18/10/2011	17:33:07	226	19.97817
18/10/2011	17:33:37	226.5	19.973839
18/10/2011	17:34:07	227	19.97476
18/10/2011	17:34:37	227.5	19.978579
18/10/2011	17:35:07	228	19.978579
18/10/2011	17:35:37	228.5	19.97813
18/10/2011	17:36:07	229	19.97899
18/10/2011	17:36:37	229.5	19.9844
18/10/2011	17:37:07	230	19.98041
18/10/2011	17:37:37	230.5	19.98186
18/10/2011	17:38:07	231	19.98081
18/10/2011	17:38:37	231.5	19.9801
18/10/2011	17:39:07	232	19.98367
18/10/2011	17:39:37	232.5	19.98515
18/10/2011	17:40:07	233	19.98511
18/10/2011	17:40:37	233.5	19.98313
18/10/2011	17:41:07	234	19.98367
18/10/2011	17:41:37	234.5	19.983319
18/10/2011	17:42:07	235	19.98807
18/10/2011	17:42:37	235.5	19.98783
18/10/2011	17:43:07	236	19.98309
18/10/2011	17:43:37	236.5	19.98519
18/10/2011	17:44:07	237	19.98882
18/10/2011	17:44:37	237.5	19.991759
18/10/2011	17:45:07	238	19.98873
18/10/2011	17:45:37	238.5	19.99433
18/10/2011	17:46:07	239	19.98555
18/10/2011	17:46:37	239.5	19.987619

Carrigbyrne Extended Pumping Data 18/10/2011

Date	Time	Time (mins)	Water Level (m below the casing)
18/10/2011	17:47:07	240	19.99146
18/10/2011	17:47:37	240.5	19.99251
18/10/2011	17:48:07	241	19.995899
18/10/2011	17:48:37	241.5	19.99244
18/10/2011	17:49:07	242	19.989439
18/10/2011	17:49:37	242.5	19.99302
18/10/2011	17:50:07	243	19.99386
18/10/2011	17:50:37	243.5	19.99251
18/10/2011	17:51:07	244	19.99315
18/10/2011	17:51:37	244.5	19.994569
18/10/2011	17:52:07	245	19.99287
18/10/2011	17:52:37	245.5	19.99942
18/10/2011	17:53:07	246	20.00365
18/10/2011	17:53:37	246.5	19.99882
18/10/2011	17:54:07	247	19.99378
18/10/2011	17:54:37	247.5	19.99695
18/10/2011	17:55:07	248	19.998449
18/10/2011	17:55:37	248.5	20.00195
18/10/2011	17:56:07	249	19.99584
18/10/2011	17:56:37	249.5	20.00047
18/10/2011	17:57:07	250	20.00099
18/10/2011	17:57:37	250.5	20.01172
18/10/2011	17:58:07	251	20.00335
18/10/2011	17:58:37	251.5	20.0029
18/10/2011	17:59:07	252	20.00305
18/10/2011	17:59:37	252.5	20.00745
18/10/2011	18:00:07	253	20.00356
18/10/2011	18:00:37	253.5	20.00925
18/10/2011	18:01:07	254	20.007
18/10/2011	18:01:37	254.5	20.006889
18/10/2011	18:02:07	255	20.00824
18/10/2011	18:02:37	255.5	20.00734
18/10/2011	18:03:07	256	20.00977
18/10/2011	18:03:37	256.5	20.01058
18/10/2011	18:04:07	257	20.00386
18/10/2011	18:04:37	257.5	20.01567
18/10/2011	18:05:07	258	20.00824
18/10/2011	18:05:37	258.5	20.01093
18/10/2011	18:06:07	259	20.012539
18/10/2011	18:06:37	259.5	20.01324
18/10/2011	18:07:07	260	20.01481
18/10/2011	18:07:37	260.5	20.0129
18/10/2011	18:08:07	261	20.00966
18/10/2011	18:08:37	261.5	20.01713
18/10/2011	18:09:07	262	20.01541
18/10/2011	18:09:37	262.5	20.01601
18/10/2011	18:10:07	263	20.0143
18/10/2011	18:10:37	263.5	20.017749

Carrigbyrne Extended Pumping Data 18/10/2011

Date	Time	Time (mins)	Water Level (m below the casing)
18/10/2011	18:11:07	264	20.02131
18/10/2011	18:11:37	264.5	20.01739
18/10/2011	18:12:07	265	20.01558
18/10/2011	18:12:37	265.5	20.01503
18/10/2011	18:13:07	266	20.01919
18/10/2011	18:13:37	266.5	20.02192
18/10/2011	18:14:07	267	20.02198
18/10/2011	18:14:37	267.5	20.0146
18/10/2011	18:15:07	268	20.02106
18/10/2011	18:15:37	268.5	20.0243
18/10/2011	18:16:07	269	20.02138
18/10/2011	18:16:37	269.5	20.02292
18/10/2011	18:17:07	270	20.021419
18/10/2011	18:17:37	270.5	20.02146
18/10/2011	18:18:07	271	20.023999
18/10/2011	18:18:37	271.5	20.02541
18/10/2011	18:19:07	272	20.0238
18/10/2011	18:19:37	272.5	20.0258
18/10/2011	18:20:07	273	20.02355
18/10/2011	18:20:37	273.5	20.02591
18/10/2011	18:21:07	274	20.02632
18/10/2011	18:21:37	274.5	20.02537
18/10/2011	18:22:07	275	20.02638
18/10/2011	18:22:37	275.5	20.03213
18/10/2011	18:23:07	276	20.02451
18/10/2011	18:23:37	276.5	20.02606
18/10/2011	18:24:07	277	20.03086
18/10/2011	18:24:37	277.5	20.03615
18/10/2011	18:25:07	278	20.03157
18/10/2011	18:25:37	278.5	20.02868
18/10/2011	18:26:07	279	20.03263
18/10/2011	18:26:37	279.5	20.03243
18/10/2011	18:27:07	280	20.032669
18/10/2011	18:27:37	280.5	20.03157
18/10/2011	18:28:07	281	20.035689
18/10/2011	18:28:37	281.5	20.03247
18/10/2011	18:29:07	282	20.035089
18/10/2011	18:29:37	282.5	20.03458
18/10/2011	18:30:07	283	20.03378
18/10/2011	18:30:37	283.5	20.032879
18/10/2011	18:31:07	284	20.038269
18/10/2011	18:31:37	284.5	20.03773
18/10/2011	18:32:07	285	20.03125
18/10/2011	18:32:37	285.5	20.04089
18/10/2011	18:33:07	286	20.0413
18/10/2011	18:33:37	286.5	20.042749
18/10/2011	18:34:07	287	20.03323
18/10/2011	18:34:37	287.5	20.03988

Carrigbyrne Extended Pumping Data 18/10/2011

Date	Time	Time (mins)	Water Level (m below the casing)
18/10/2011	18:35:07	288	20.0401
18/10/2011	18:35:37	288.5	20.03524
18/10/2011	18:36:07	289	20.03782
18/10/2011	18:36:37	289.5	20.039389
18/10/2011	18:37:07	290	20.03778
18/10/2011	18:37:37	290.5	20.03902
18/10/2011	18:38:07	291	20.040949
18/10/2011	18:38:37	291.5	20.04235
18/10/2011	18:39:07	292	20.039989
18/10/2011	18:39:37	292.5	20.04196
18/10/2011	18:40:07	293	20.04838
18/10/2011	18:40:37	293.5	20.0414
18/10/2011	18:41:07	294	20.04514
18/10/2011	18:41:37	294.5	20.043059
18/10/2011	18:42:07	295	20.04323
18/10/2011	18:42:37	295.5	20.056599
18/10/2011	18:43:07	296	20.0475
18/10/2011	18:43:37	296.5	20.04958
18/10/2011	18:44:07	297	20.04786
18/10/2011	18:44:37	297.5	20.048269
18/10/2011	18:45:07	298	20.050219
18/10/2011	18:45:37	298.5	20.05014
18/10/2011	18:46:07	299	20.046809
18/10/2011	18:46:37	299.5	20.04984
18/10/2011	18:47:07	300	20.05325
18/10/2011	18:47:37	300.5	20.04967
18/10/2011	18:48:07	301	20.050219
18/10/2011	18:48:37	301.5	20.04709
18/10/2011	18:49:07	302	20.046809
18/10/2011	18:49:37	302.5	20.04896
18/10/2011	18:50:07	303	20.054129
18/10/2011	18:50:37	303.5	20.05211
18/10/2011	18:51:07	304	20.05119
18/10/2011	18:51:37	304.5	20.05113
18/10/2011	18:52:07	305	20.06169
18/10/2011	18:52:37	305.5	20.053059
18/10/2011	18:53:07	306	20.050979
18/10/2011	18:53:37	306.5	20.05776
18/10/2011	18:54:07	307	20.05851
18/10/2011	18:54:37	307.5	20.054859
18/10/2011	18:55:07	308	20.05583
18/10/2011	18:55:37	308.5	20.05205
18/10/2011	18:56:07	309	20.05579
18/10/2011	18:56:37	309.5	20.05593
18/10/2011	18:57:07	310	20.058399
18/10/2011	18:57:37	310.5	20.062799
18/10/2011	18:58:07	311	20.06669
18/10/2011	18:58:37	311.5	20.060979

Carrigbyrne Extended Pumping Data 18/10/2011

Date	Time	Time (mins)	Water Level (m below the casing)
18/10/2011	18:59:07	312	20.05941
18/10/2011	18:59:37	312.5	20.06205
18/10/2011	19:00:07	313	20.06289
18/10/2011	19:00:37	313.5	20.06471
18/10/2011	19:01:07	314	20.06441
18/10/2011	19:01:37	314.5	20.06179
18/10/2011	19:02:07	315	20.06583
18/10/2011	19:02:37	315.5	20.06546
18/10/2011	19:03:07	316	20.06396
18/10/2011	19:03:37	316.5	20.06982
18/10/2011	19:04:07	317	20.065639
18/10/2011	19:04:37	317.5	20.06961
18/10/2011	19:05:07	318	20.06851
18/10/2011	19:05:37	318.5	20.06643
18/10/2011	19:06:07	319	20.06875
18/10/2011	19:06:37	319.5	20.07102
18/10/2011	19:07:07	320	20.071369
18/10/2011	19:07:37	320.5	20.068189
18/10/2011	19:08:07	321	20.07424
18/10/2011	19:08:37	321.5	20.07046
18/10/2011	19:09:07	322	20.0736
18/10/2011	19:09:37	322.5	20.075509
18/10/2011	19:10:07	323	20.07456
18/10/2011	19:10:37	323.5	20.06583
18/10/2011	19:11:07	324	20.07555
18/10/2011	19:11:37	324.5	20.07701
18/10/2011	19:12:07	325	20.07349
18/10/2011	19:12:37	325.5	20.074049
18/10/2011	19:13:07	326	20.07592
18/10/2011	19:13:37	326.5	20.07778
18/10/2011	19:14:07	327	20.076
18/10/2011	19:14:37	327.5	20.07671
18/10/2011	19:15:07	328	20.07592
18/10/2011	19:15:37	328.5	20.07809
18/10/2011	19:16:07	329	20.07909
18/10/2011	19:16:37	329.5	20.07484
18/10/2011	19:17:07	330	20.08122
18/10/2011	19:17:37	330.5	20.0792
18/10/2011	19:18:07	331	20.079049
18/10/2011	19:18:37	331.5	20.08062
18/10/2011	19:19:07	332	20.07727
18/10/2011	19:19:37	332.5	20.08175
18/10/2011	19:20:07	333	20.07778
18/10/2011	19:20:37	333.5	20.07989
18/10/2011	19:21:07	334	20.08283
18/10/2011	19:21:37	334.5	20.07961
18/10/2011	19:22:07	335	20.08691
18/10/2011	19:22:37	335.5	20.080509

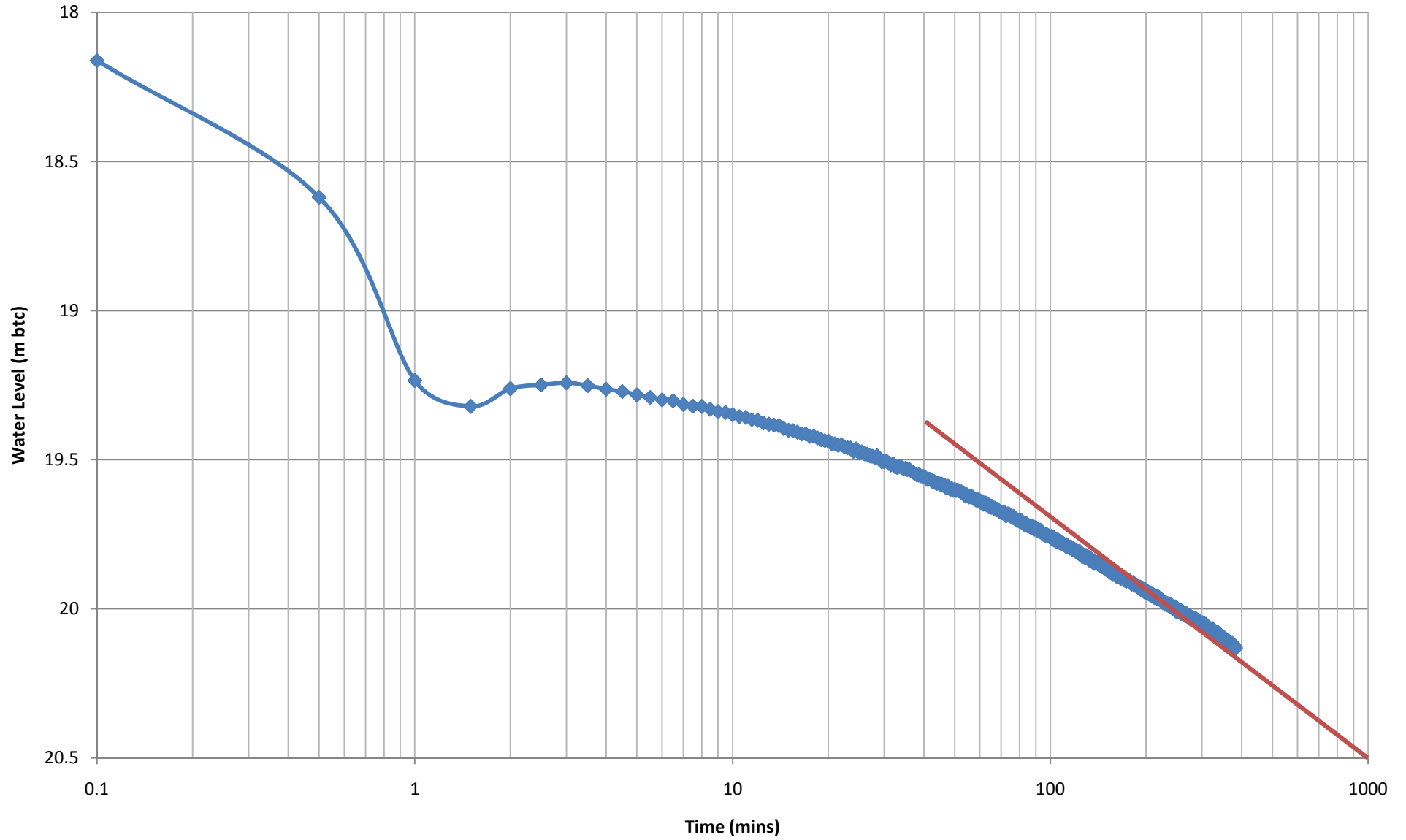
Carrigbyrne Extended Pumping Data 18/10/2011

Date	Time	Time (mins)	Water Level (m below the casing)
18/10/2011	19:23:07	336	20.07729
18/10/2011	19:23:37	336.5	20.08459
18/10/2011	19:24:07	337	20.08821
18/10/2011	19:24:37	337.5	20.08794
18/10/2011	19:25:07	338	20.09081
18/10/2011	19:25:37	338.5	20.08566
18/10/2011	19:26:07	339	20.096239
18/10/2011	19:26:37	339.5	20.0918
18/10/2011	19:27:07	340	20.09347
18/10/2011	19:27:37	340.5	20.09251
18/10/2011	19:28:07	341	20.08914
18/10/2011	19:28:37	341.5	20.08862
18/10/2011	19:29:07	342	20.08753
18/10/2011	19:29:37	342.5	20.08895
18/10/2011	19:30:07	343	20.09197
18/10/2011	19:30:37	343.5	20.09066
18/10/2011	19:31:07	344	20.08974
18/10/2011	19:31:37	344.5	20.09575
18/10/2011	19:32:07	345	20.09146
18/10/2011	19:32:37	345.5	20.09691
18/10/2011	19:33:07	346	20.09343
18/10/2011	19:33:37	346.5	20.09165
18/10/2011	19:34:07	347	20.09601
18/10/2011	19:34:37	347.5	20.09598
18/10/2011	19:35:07	348	20.09817
18/10/2011	19:35:37	348.5	20.09695
18/10/2011	19:36:07	349	20.100089
18/10/2011	19:36:37	349.5	20.09923
18/10/2011	19:37:07	350	20.098709
18/10/2011	19:37:37	350.5	20.102849
18/10/2011	19:38:07	351	20.09787
18/10/2011	19:38:37	351.5	20.09989
18/10/2011	19:39:07	352	20.09609
18/10/2011	19:39:37	352.5	20.09933
18/10/2011	19:40:07	353	20.10144
18/10/2011	19:40:37	353.5	20.10165
18/10/2011	19:41:07	354	20.099829
18/10/2011	19:41:37	354.5	20.10378
18/10/2011	19:42:07	355	20.10326
18/10/2011	19:42:37	355.5	20.10146
18/10/2011	19:43:07	356	20.107749
18/10/2011	19:43:37	356.5	20.10498
18/10/2011	19:44:07	357	20.103
18/10/2011	19:44:37	357.5	20.105169
18/10/2011	19:45:07	358	20.10513
18/10/2011	19:45:37	358.5	20.10831
18/10/2011	19:46:07	359	20.10867
18/10/2011	19:46:37	359.5	20.10685

Carrigbyrne Extended Pumping Data 18/10/2011

Date	Time	Time (mins)	Water Level (m below the casing)
18/10/2011	19:47:07	360	20.1123
18/10/2011	19:47:37	360.5	20.111289
18/10/2011	19:48:07	361	20.107359
18/10/2011	19:48:37	361.5	20.110949
18/10/2011	19:49:07	362	20.10912
18/10/2011	19:49:37	362.5	20.10837
18/10/2011	19:50:07	363	20.11002
18/10/2011	19:50:37	363.5	20.1111
18/10/2011	19:51:07	364	20.10822
18/10/2011	19:51:37	364.5	20.11264
18/10/2011	19:52:07	365	20.116289
18/10/2011	19:52:37	365.5	20.11271
18/10/2011	19:53:07	366	20.124699
18/10/2011	19:53:37	366.5	20.11462
18/10/2011	19:54:07	367	20.1173
18/10/2011	19:54:37	367.5	20.11653
18/10/2011	19:55:07	368	20.11798
18/10/2011	19:55:37	368.5	20.11648
18/10/2011	19:56:07	369	20.11839
18/10/2011	19:56:37	369.5	20.11713
18/10/2011	19:57:07	370	20.122879
18/10/2011	19:57:37	370.5	20.11723
18/10/2011	19:58:07	371	20.12238
18/10/2011	19:58:37	371.5	20.11966
18/10/2011	19:59:07	372	20.12507
18/10/2011	19:59:37	372.5	20.122489
18/10/2011	20:00:07	373	20.118839
18/10/2011	20:00:37	373.5	20.11537
18/10/2011	20:01:07	374	20.12
18/10/2011	20:01:37	374.5	20.12399
18/10/2011	20:02:07	375	20.12093
18/10/2011	20:02:37	375.5	20.12597
18/10/2011	20:03:07	376	20.12002
18/10/2011	20:03:37	376.5	20.12649
18/10/2011	20:04:07	377	20.12505
18/10/2011	20:04:37	377.5	20.127879
18/10/2011	20:05:07	378	20.12732
18/10/2011	20:05:37	378.5	20.12865
18/10/2011	20:06:07	379	20.122539
18/10/2011	20:06:37	379.5	20.12936
18/10/2011	20:07:07	380	20.12809
18/10/2011	20:07:37	380.5	20.12633
18/10/2011	20:08:07	381	20.13232
18/10/2011	20:08:37	381.5	20.13368
18/10/2011	20:09:07	382	20.12839
18/10/2011	20:09:37	382.5	20.131209

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Carrigbyrne Extended Pumping Data 18/10/2011

Date	Time	Time (mins)	Water Level (m below the casing)
18/10/2011	10:50:00	0.0	
18/10/2011	10:59:07	9.0	18.6120
18/10/2011	10:59:37	9.5	18.6056
18/10/2011	11:00:07	10.0	18.6019
18/10/2011	11:00:37	10.5	18.5975
18/10/2011	11:01:07	11.0	18.5936
18/10/2011	11:01:37	11.5	18.5923
18/10/2011	11:02:07	12.0	18.5880
18/10/2011	11:02:37	12.5	18.5863
18/10/2011	11:03:07	13.0	18.5826
18/10/2011	11:03:37	13.5	18.5803
18/10/2011	11:04:07	14.0	18.5786
18/10/2011	11:04:37	14.5	18.5751
18/10/2011	11:05:07	15.0	18.5732
18/10/2011	11:05:37	15.5	18.5708
18/10/2011	11:06:07	16.0	18.5674
18/10/2011	11:06:37	16.5	18.5652
18/10/2011	11:07:07	17.0	18.5630
18/10/2011	11:07:37	17.5	18.5537
18/10/2011	11:08:07	18.0	18.5503
18/10/2011	11:08:37	18.5	18.5499
18/10/2011	11:09:07	19.0	18.5467
18/10/2011	11:09:37	19.5	18.5450
18/10/2011	11:10:07	20.0	18.5432
18/10/2011	11:10:37	20.5	18.5418
18/10/2011	11:11:07	21.0	18.5389
18/10/2011	11:11:37	21.5	18.5353
18/10/2011	11:12:07	22.0	18.5352
18/10/2011	11:12:37	22.5	18.5321
18/10/2011	11:13:07	23.0	18.5301
18/10/2011	11:13:37	23.5	18.5214
18/10/2011	11:14:07	24.0	18.5201
18/10/2011	11:14:37	24.5	18.5186
18/10/2011	11:15:07	25.0	18.5171
18/10/2011	11:15:37	25.5	18.5151
18/10/2011	11:16:07	26.0	18.5127
18/10/2011	11:16:37	26.5	18.5095
18/10/2011	11:17:07	27.0	18.5083
18/10/2011	11:17:37	27.5	18.5078
18/10/2011	11:18:07	28.0	18.5045
18/10/2011	11:18:37	28.5	18.5032
18/10/2011	11:19:07	29.0	18.4991
18/10/2011	11:19:37	29.5	18.4976
18/10/2011	11:20:07	30.0	18.4948
18/10/2011	11:20:37	30.5	18.4949
18/10/2011	11:21:07	31.0	18.4935
18/10/2011	11:21:37	31.5	18.4916
18/10/2011	11:22:07	32.0	18.4883

Carrigbyrne Extended Pumping Data 18/10/2011

Date	Time	Time (mins)	Water Level (m below the casing)
18/10/2011	11:22:37	32.5	18.4861
18/10/2011	11:23:07	33.0	18.4846
18/10/2011	11:23:37	33.5	18.4831
18/10/2011	11:24:07	34.0	18.4817
18/10/2011	11:24:37	34.5	18.4785
18/10/2011	11:25:07	35.0	18.4782
18/10/2011	11:25:37	35.5	18.4761
18/10/2011	11:26:07	36.0	18.4746
18/10/2011	11:26:37	36.5	18.4719
18/10/2011	11:27:07	37.0	18.4706
18/10/2011	11:27:37	37.5	18.4674
18/10/2011	11:28:07	38.0	18.4669
18/10/2011	11:28:37	38.5	18.4645
18/10/2011	11:29:07	39.0	18.4616
18/10/2011	11:29:37	39.5	18.4619
18/10/2011	11:30:07	40.0	18.4607
18/10/2011	11:30:37	40.5	18.4584
18/10/2011	11:31:07	41.0	18.4581
18/10/2011	11:31:37	41.5	18.4553
18/10/2011	11:32:07	42.0	18.4546
18/10/2011	11:32:37	42.5	18.4523
18/10/2011	11:33:07	43.0	18.4499
18/10/2011	11:33:37	43.5	18.4481
18/10/2011	11:34:07	44.0	18.4471
18/10/2011	11:34:37	44.5	18.4465
18/10/2011	11:35:07	45.0	18.4444
18/10/2011	11:35:37	45.5	18.4415
18/10/2011	11:36:07	46.0	18.4432
18/10/2011	11:36:37	46.5	18.4395
18/10/2011	11:37:07	47.0	18.4389
18/10/2011	11:37:37	47.5	18.4382
18/10/2011	11:38:07	48.0	18.4351
18/10/2011	11:38:37	48.5	18.4358
18/10/2011	11:39:07	49.0	18.4323
18/10/2011	11:39:37	49.5	18.4288
18/10/2011	11:40:07	50.0	18.4291
18/10/2011	11:40:37	50.5	18.4287
18/10/2011	11:41:07	51.0	18.4256
18/10/2011	11:41:37	51.5	18.4258
18/10/2011	11:42:07	52.0	18.4237
18/10/2011	11:42:37	52.5	18.4213
18/10/2011	11:43:07	53.0	18.4217
18/10/2011	11:43:37	53.5	18.4195
18/10/2011	11:44:07	54.0	18.4191
18/10/2011	11:44:37	54.5	18.4164
18/10/2011	11:45:07	55.0	18.4169
18/10/2011	11:45:37	55.5	18.4143
18/10/2011	11:46:07	56.0	18.4146

Carrigbyrne Extended Pumping Data 18/10/2011

Date	Time	Time (mins)	Water Level (m below the casing)
18/10/2011	11:46:37	56.5	18.4118
18/10/2011	11:47:07	57.0	18.4104
18/10/2011	11:47:37	57.5	18.4097
18/10/2011	11:48:07	58.0	18.4089
18/10/2011	11:48:37	58.5	18.4073
18/10/2011	11:49:07	59.0	18.4061
18/10/2011	11:49:37	59.5	18.4052
18/10/2011	11:50:07	60.0	18.4034
18/10/2011	11:50:37	60.5	18.4033
18/10/2011	11:51:07	61.0	18.4003
18/10/2011	11:51:37	61.5	18.3992
18/10/2011	11:52:07	62.0	18.3974
18/10/2011	11:52:37	62.5	18.3954
18/10/2011	11:53:07	63.0	18.3968
18/10/2011	11:53:37	63.5	18.3944
18/10/2011	11:54:07	64.0	18.3923
18/10/2011	11:54:37	64.5	18.3918
18/10/2011	11:55:07	65.0	18.3902
18/10/2011	11:55:37	65.5	18.3893
18/10/2011	11:56:07	66.0	18.3899
18/10/2011	11:56:37	66.5	18.3872
18/10/2011	11:57:07	67.0	18.3863
18/10/2011	11:57:37	67.5	18.3861
18/10/2011	11:58:07	68.0	18.3839
18/10/2011	11:58:37	68.5	18.3825
18/10/2011	11:59:07	69.0	18.3819
18/10/2011	11:59:37	69.5	18.3818
18/10/2011	12:00:07	70.0	18.3795
18/10/2011	12:00:37	70.5	18.3796
18/10/2011	12:01:07	71.0	18.3774
18/10/2011	12:01:37	71.5	18.3763
18/10/2011	12:02:07	72.0	18.3736
18/10/2011	12:02:37	72.5	18.3741
18/10/2011	12:03:07	73.0	18.3707
18/10/2011	12:03:37	73.5	18.3718
18/10/2011	12:04:07	74.0	18.3694
18/10/2011	12:04:37	74.5	18.3688
18/10/2011	12:05:07	75.0	18.3673
18/10/2011	12:05:37	75.5	18.3665
18/10/2011	12:06:07	76.0	18.3661
18/10/2011	12:06:37	76.5	18.3657
18/10/2011	12:07:07	77.0	18.3635
18/10/2011	12:07:37	77.5	18.3627
18/10/2011	12:08:07	78.0	18.3600
18/10/2011	12:08:37	78.5	18.3608
18/10/2011	12:09:07	79.0	18.3580
18/10/2011	12:09:37	79.5	18.3597
18/10/2011	12:10:07	80.0	18.3549

Carrigbyrne Extended Pumping Data 18/10/2011

Date	Time	Time (mins)	Water Level (m below the casing)
18/10/2011	12:10:37	80.5	18.3560
18/10/2011	12:11:07	81.0	18.3558
18/10/2011	12:11:37	81.5	18.3533
18/10/2011	12:12:07	82.0	18.3521
18/10/2011	12:12:37	82.5	18.3512
18/10/2011	12:13:07	83.0	18.3505
18/10/2011	12:13:37	83.5	18.3481
18/10/2011	12:14:07	84.0	18.3484
18/10/2011	12:14:37	84.5	18.3469
18/10/2011	12:15:07	85.0	18.3464
18/10/2011	12:15:37	85.5	18.3452
18/10/2011	12:16:07	86.0	18.3437
18/10/2011	12:16:37	86.5	18.3437
18/10/2011	12:17:07	87.0	18.3407
18/10/2011	12:17:37	87.5	18.3404
18/10/2011	12:18:07	88.0	18.3385
18/10/2011	12:18:37	88.5	18.3373
18/10/2011	12:19:07	89.0	18.3384
18/10/2011	12:19:37	89.5	18.3362
18/10/2011	12:20:07	90.0	18.3352
18/10/2011	12:20:37	90.5	18.3338
18/10/2011	12:21:07	91.0	18.3334
18/10/2011	12:21:37	91.5	18.3320
18/10/2011	12:22:07	92.0	18.3309
18/10/2011	12:22:37	92.5	18.3303
18/10/2011	12:23:07	93.0	18.3287
18/10/2011	12:23:37	93.5	18.3280
18/10/2011	12:24:07	94.0	18.3259
18/10/2011	12:24:37	94.5	18.3258
18/10/2011	12:25:07	95.0	18.3253
18/10/2011	12:25:37	95.5	18.3235
18/10/2011	12:26:07	96.0	18.3226
18/10/2011	12:26:37	96.5	18.3215
18/10/2011	12:27:07	97.0	18.3178
18/10/2011	12:27:37	97.5	18.3197
18/10/2011	12:28:07	98.0	18.3181
18/10/2011	12:28:37	98.5	18.3168
18/10/2011	12:29:07	99.0	18.3154
18/10/2011	12:29:37	99.5	18.3148
18/10/2011	12:30:07	100.0	18.3134
18/10/2011	12:30:37	100.5	18.3127
18/10/2011	12:31:07	101.0	18.3120
18/10/2011	12:31:37	101.5	18.3117
18/10/2011	12:32:07	102.0	18.3116
18/10/2011	12:32:37	102.5	18.3086
18/10/2011	12:33:07	103.0	18.3073
18/10/2011	12:33:37	103.5	18.3070
18/10/2011	12:34:07	104.0	18.3061

Carrigbyrne Extended Pumping Data 18/10/2011

Date	Time	Time (mins)	Water Level (m below the casing)
18/10/2011	12:34:37	104.5	18.3050
18/10/2011	12:35:07	105.0	18.3034
18/10/2011	12:35:37	105.5	18.3020
18/10/2011	12:36:07	106.0	18.3024
18/10/2011	12:36:37	106.5	18.3028
18/10/2011	12:37:07	107.0	18.3011
18/10/2011	12:37:37	107.5	18.2999
18/10/2011	12:38:07	108.0	18.2982
18/10/2011	12:38:37	108.5	18.2964
18/10/2011	12:39:07	109.0	18.2970
18/10/2011	12:39:37	109.5	18.2960
18/10/2011	12:40:07	110.0	18.2946
18/10/2011	12:40:37	110.5	18.2928
18/10/2011	12:41:07	111.0	18.2932
18/10/2011	12:41:37	111.5	18.2923
18/10/2011	12:42:07	112.0	18.2905
18/10/2011	12:42:37	112.5	18.2902
18/10/2011	12:43:07	113.0	18.2916
18/10/2011	12:43:37	113.5	18.2900
18/10/2011	12:44:07	114.0	18.2883
18/10/2011	12:44:37	114.5	18.2856
18/10/2011	12:45:07	115.0	18.2854
18/10/2011	12:45:37	115.5	18.2853
18/10/2011	12:46:07	116.0	18.2838
18/10/2011	12:46:37	116.5	18.2839
18/10/2011	12:47:07	117.0	18.2846
18/10/2011	12:47:37	117.5	18.2810
18/10/2011	12:48:07	118.0	18.2800
18/10/2011	12:48:37	118.5	18.2806
18/10/2011	12:49:07	119.0	18.2803
18/10/2011	12:49:37	119.5	18.2784
18/10/2011	12:50:07	120.0	18.2775
18/10/2011	12:50:37	120.5	18.2761
18/10/2011	12:51:07	121.0	18.2753
18/10/2011	12:51:37	121.5	18.2756
18/10/2011	12:52:07	122.0	18.2738
18/10/2011	12:52:37	122.5	18.2733
18/10/2011	12:53:07	123.0	18.2718
18/10/2011	12:53:37	123.5	18.2703
18/10/2011	12:54:07	124.0	18.2697
18/10/2011	12:54:37	124.5	18.2689
18/10/2011	12:55:07	125.0	18.2659
18/10/2011	12:55:37	125.5	18.2659
18/10/2011	12:56:07	126.0	18.2657
18/10/2011	12:56:37	126.5	18.2663
18/10/2011	12:57:07	127.0	18.2643
18/10/2011	12:57:37	127.5	18.2480
18/10/2011	12:58:07	128.0	18.2478

Carrigbyrne Extended Pumping Data 18/10/2011

Date	Time	Time (mins)	Water Level (m below the casing)
18/10/2011	12:58:37	128.5	18.2328
18/10/2011	12:59:07	129.0	18.2299
18/10/2011	12:59:37	129.5	18.2294
18/10/2011	13:00:07	130.0	18.2304
18/10/2011	13:00:37	130.5	18.2286
18/10/2011	13:01:07	131.0	18.2287
18/10/2011	13:01:37	131.5	18.2280
18/10/2011	13:02:07	132.0	18.2254
18/10/2011	13:02:37	132.5	18.2257
18/10/2011	13:03:07	133.0	18.2253
18/10/2011	13:03:37	133.5	18.2237
18/10/2011	13:04:07	134.0	18.2224
18/10/2011	13:04:37	134.5	18.2212
18/10/2011	13:05:07	135.0	18.2203
18/10/2011	13:05:37	135.5	18.2207
18/10/2011	13:06:07	136.0	18.2182
18/10/2011	13:06:37	136.5	18.2179
18/10/2011	13:07:07	137.0	18.2184
18/10/2011	13:07:37	137.5	18.2173
18/10/2011	13:08:07	138.0	18.2162
18/10/2011	13:08:37	138.5	18.2148
18/10/2011	13:09:07	139.0	18.2158
18/10/2011	13:09:37	139.5	18.2135
18/10/2011	13:10:07	140.0	18.2145
18/10/2011	13:10:37	140.5	18.2127
18/10/2011	13:11:07	141.0	18.2117
18/10/2011	13:11:37	141.5	18.2114
18/10/2011	13:12:07	142.0	18.2100
18/10/2011	13:12:37	142.5	18.2097
18/10/2011	13:13:07	143.0	18.2096
18/10/2011	13:13:37	143.5	18.2083
18/10/2011	13:14:07	144.0	18.2083
18/10/2011	13:14:37	144.5	18.2057
18/10/2011	13:15:07	145.0	18.2060
18/10/2011	13:15:37	145.5	18.2061
18/10/2011	13:16:07	146.0	18.2062
18/10/2011	13:16:37	146.5	18.2038
18/10/2011	13:17:07	147.0	18.2029
18/10/2011	13:17:37	147.5	18.2014
18/10/2011	13:18:07	148.0	18.2020
18/10/2011	13:18:37	148.5	18.2003
18/10/2011	13:19:07	149.0	18.1988
18/10/2011	13:19:37	149.5	18.1999
18/10/2011	13:20:07	150.0	18.1978
18/10/2011	13:20:37	150.5	18.1971
18/10/2011	13:21:07	151.0	18.1967
18/10/2011	13:21:37	151.5	18.1946
18/10/2011	13:22:07	152.0	18.1940

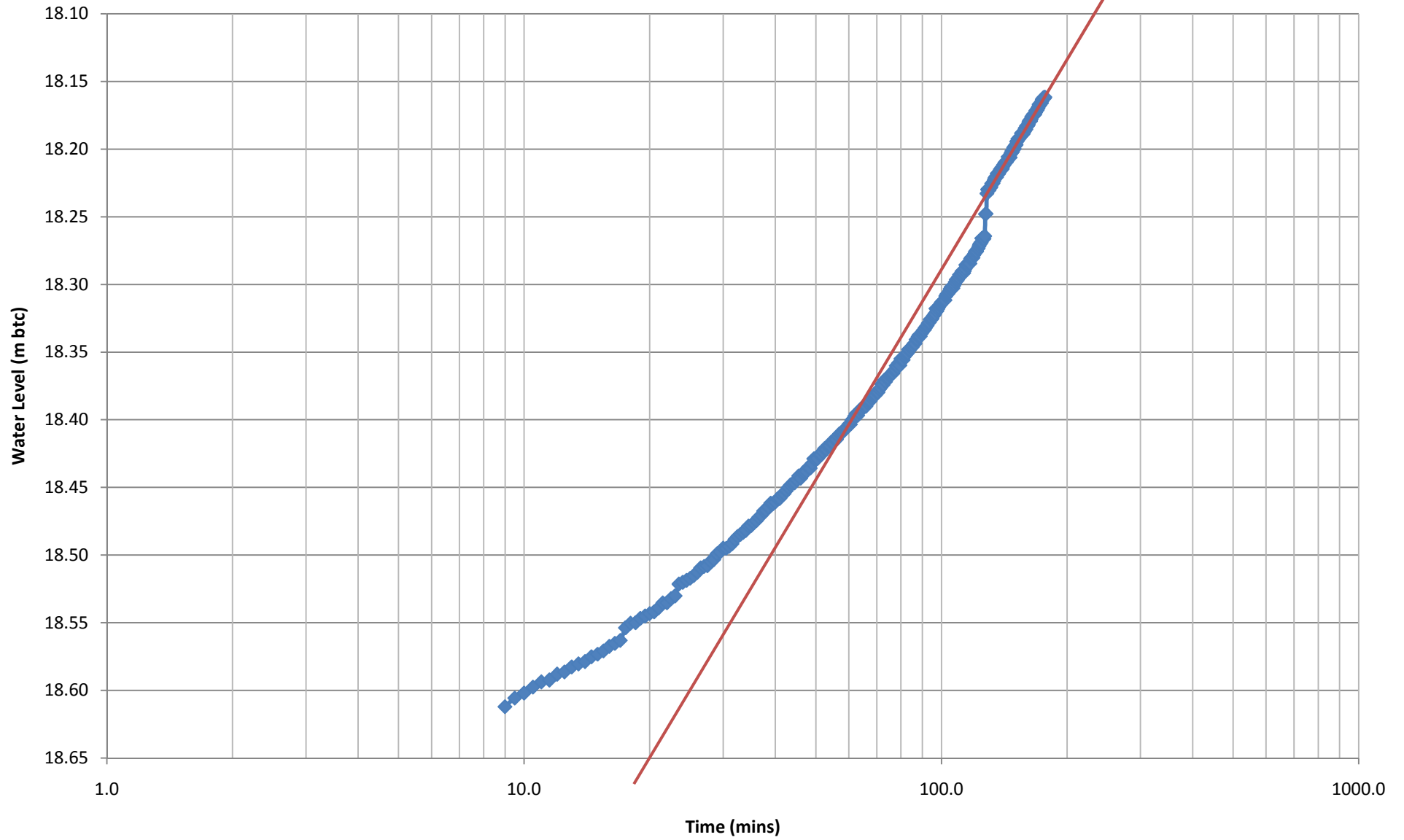
Carrigbyrne Extended Pumping Data 18/10/2011

Date	Time	Time (mins)	Water Level (m below the casing)
18/10/2011	13:22:37	152.5	18.1925
18/10/2011	13:23:07	153.0	18.1926
18/10/2011	13:23:37	153.5	18.1920
18/10/2011	13:24:07	154.0	18.1913
18/10/2011	13:24:37	154.5	18.1908
18/10/2011	13:25:07	155.0	18.1906
18/10/2011	13:25:37	155.5	18.1883
18/10/2011	13:26:07	156.0	18.1895
18/10/2011	13:26:37	156.5	18.1876
18/10/2011	13:27:07	157.0	18.1888
18/10/2011	13:27:37	157.5	18.1877
18/10/2011	13:28:07	158.0	18.1870
18/10/2011	13:28:37	158.5	18.1855
18/10/2011	13:29:07	159.0	18.1843
18/10/2011	13:29:37	159.5	18.1854
18/10/2011	13:30:07	160.0	18.1828
18/10/2011	13:30:37	160.5	18.1832
18/10/2011	13:31:07	161.0	18.1826
18/10/2011	13:31:37	161.5	18.1819
18/10/2011	13:32:07	162.0	18.1800
18/10/2011	13:32:37	162.5	18.1790
18/10/2011	13:33:07	163.0	18.1793
18/10/2011	13:33:37	163.5	18.1793
18/10/2011	13:34:07	164.0	18.1779
18/10/2011	13:34:37	164.5	18.1763
18/10/2011	13:35:07	165.0	18.1758
18/10/2011	13:35:37	165.5	18.1758
18/10/2011	13:36:07	166.0	18.1744
18/10/2011	13:36:37	166.5	18.1748
18/10/2011	13:37:07	167.0	18.1741
18/10/2011	13:37:37	167.5	18.1743
18/10/2011	13:38:07	168.0	18.1730
18/10/2011	13:38:37	168.5	18.1715
18/10/2011	13:39:07	169.0	18.1711
18/10/2011	13:39:37	169.5	18.1713
18/10/2011	13:40:07	170.0	18.1702
18/10/2011	13:40:37	170.5	18.1696
18/10/2011	13:41:07	171.0	18.1685
18/10/2011	13:41:37	171.5	18.1669
18/10/2011	13:42:07	172.0	18.1676
18/10/2011	13:42:37	172.5	18.1663
18/10/2011	13:43:07	173.0	18.1663
18/10/2011	13:43:37	173.5	18.1660
18/10/2011	13:44:07	174.0	18.1647
18/10/2011	13:44:37	174.5	18.1633
18/10/2011	13:45:07	175.0	18.1626
18/10/2011	13:45:37	175.5	18.1625
18/10/2011	13:46:07	176.0	18.1619

Carrigbyrne Extended Pumping Data 18/10/2011

Date	Time	Time (mins)	Water Level (m below the casing)
18/10/2011	13:46:37	176.5	18.1625
18/10/2011	13:47:07	177.0	18.1616

Recovery Data in BH-1 18/10/2011



Pumping Test on Bottled Water Borehole

by K.T. Cullen1981

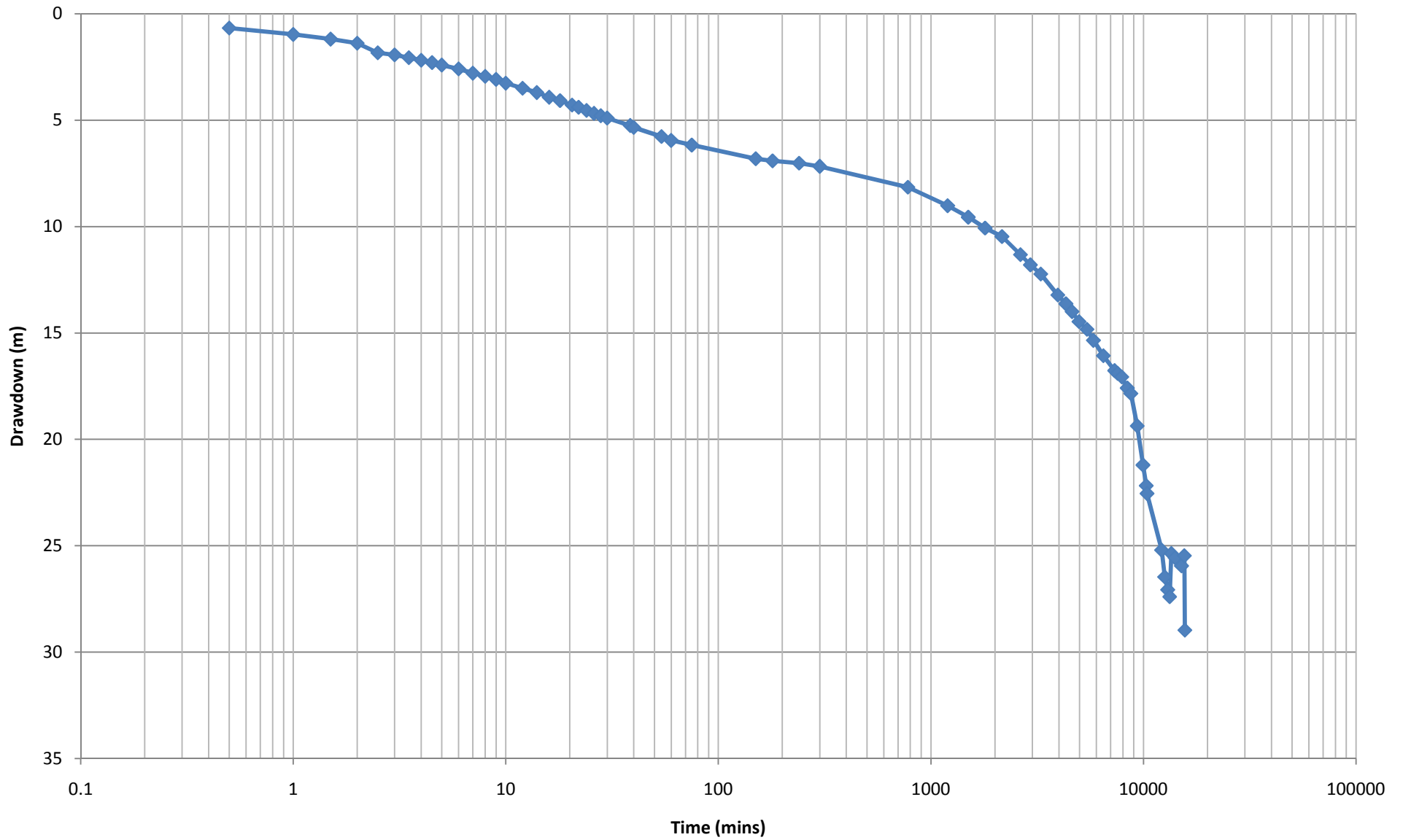
Bottled Water Pumping Data

Time (mins)	Water Level (m below the casing)	Drawdown
0.5	18.7	0.67
1	19	0.97
1.5	19.22	1.19
2	19.41	1.38
2.5	19.86	1.83
3	19.96	1.93
3.5	20.09	2.06
4	20.21	2.18
4.5	20.32	2.29
5	20.44	2.41
6	20.62	2.59
7	20.82	2.79
8	20.97	2.94
9	21.11	3.08
10	21.29	3.26
12	21.53	3.5
14	21.73	3.7
16	21.95	3.92
18	22.11	4.08
20.5	22.32	4.29
22	22.42	4.39
24	22.57	4.54
26	22.71	4.68
28	22.82	4.79
30	22.93	4.9
38.5	23.28	5.25
40	23.37	5.34
54	23.8	5.77
60	23.98	5.95
75	24.2	6.17
150	24.84	6.81
180	24.94	6.91
240	25.05	7.02
300	25.2	7.17
780	26.18	8.15
1200	27.05	9.02
1500	27.59	9.56
1800	28.1	10.07
2160	28.5	10.47
2640	29.35	11.32
2940	29.83	11.8
3290	30.26	12.23
3960	31.25	13.22
4320	31.66	13.63
4620	32.03	14
4800	32.5	14.47

Bottled Water Pumping Data

Time (mins)	Water Level (m below the casing)	Drawdown
5820	33.38	15.35
6480	34.1	16.07
7320	34.8	16.77
7560	34.93	16.9
7920	35.1	17.07
8400	35.62	17.59
8730	35.88	17.85
9360	37.4	19.37
9960	39.24	21.21
10320	40.21	22.18
10410	40.58	22.55
12190	43.24	25.21
12600	44.5	26.47
13020	45.1	27.07
13300	45.43	27.4
13547	43.4	25.37
14100	43.6	25.57
15120	43.98	25.95
15580	43.5	25.47
15670	47	28.97

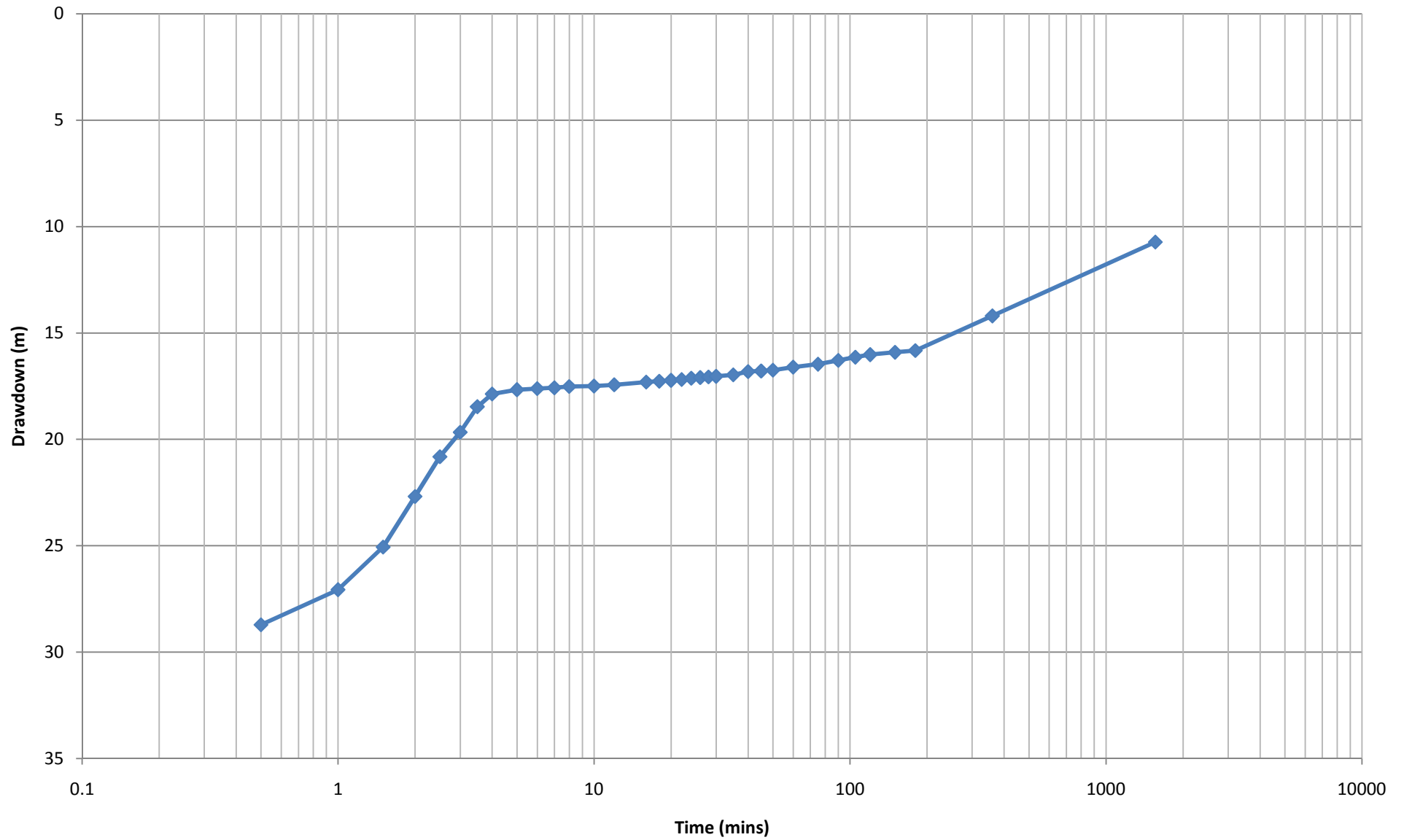
Bottled Water Borehole Pumping Test Data



Bottled Water Recovery Data

Time (mins)	Drawdown (m)
0.5	28.72
1	27.07
1.5	25.07
2	22.69
2.5	20.82
3	19.67
3.5	18.47
4	17.87
5	17.67
6	17.62
7	17.58
8	17.52
10	17.5
12	17.44
16	17.31
18	17.27
20	17.23
22	17.19
24	17.13
26	17.1
28	17.07
30	17.04
35	16.97
40	16.82
45	16.79
50	16.75
60	16.61
75	16.47
90	16.29
105	16.14
120	16.02
150	15.91
180	15.83
360	14.2
1560	10.73

Bottled Water Recovery Data



Pumping Tests for Camross Adamstown Public Water Supply

by KT Cullen (1987)

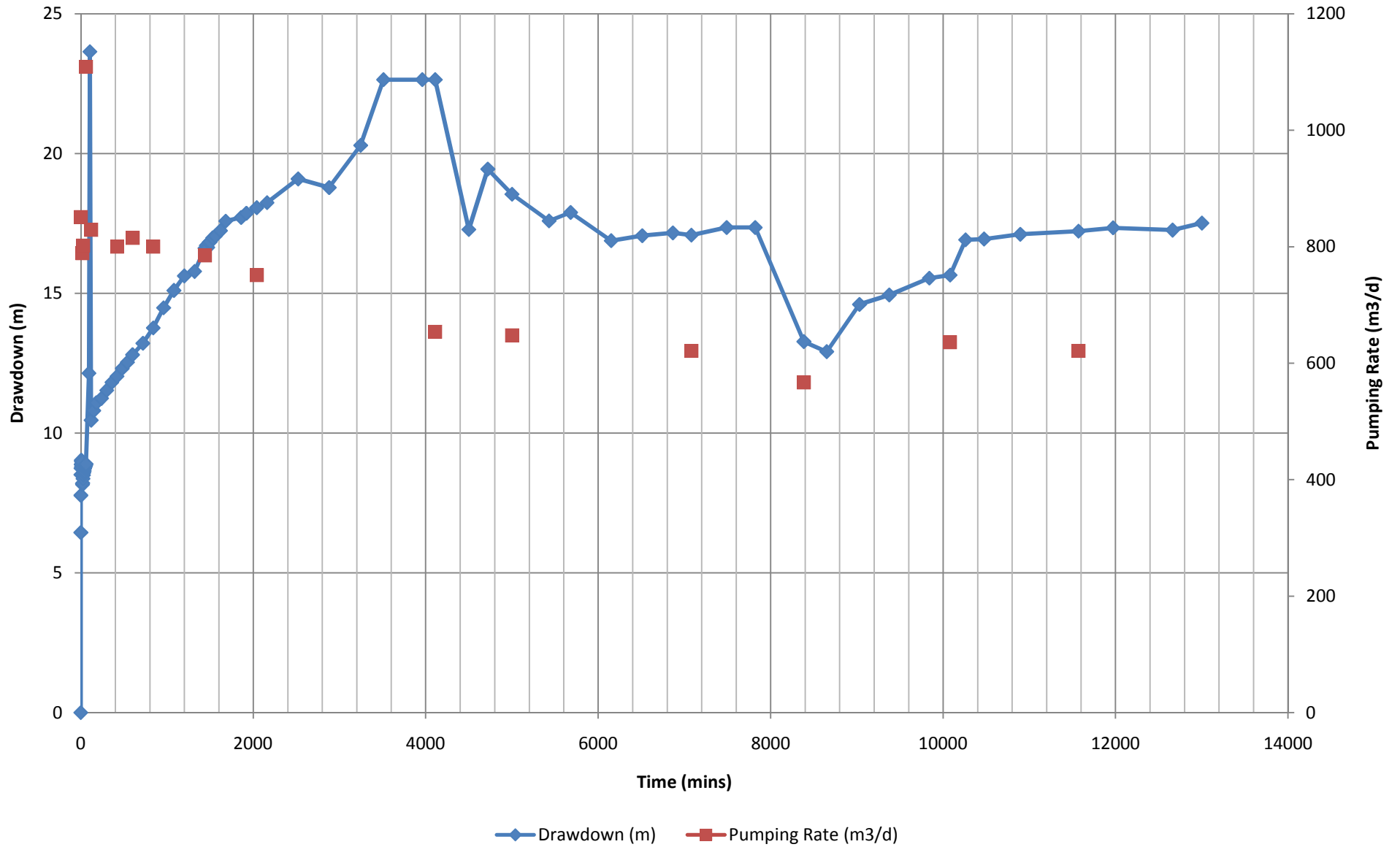
TW-31/10 Pumping Data

Time	Water Level (m btc)	Drawdown (m)	Pumping Rate (m3/d)
0	3.36	0	851
0.5	9.8	6.44	
1	11.13	7.77	
1.5	11.87	8.51	
2	12.1	8.74	
3	12.24	8.88	
5	12.35	8.99	
6	12.39	9.03	
8	12.16	8.8	
10	12.22	8.86	
12	12.23	8.87	
14	12.12	8.76	
16	12.32	8.96	
18	11.55	8.19	789
20	11.52	8.16	
22	11.57	8.21	
26	11.73	8.37	802
30	11.85	8.49	
35	11.94	8.58	
40	12	8.64	
45	12.09	8.73	
50	12.15	8.79	
55	12.2	8.84	
60	12.25	8.89	1109
95	15.5	12.14	
105	27	23.64	
120	13.82	10.46	829
150	14.16	10.8	
180	14.44	11.08	
240	14.6	11.24	
300	14.89	11.53	
360	15.17	11.81	
420	15.39	12.03	800
480	15.67	12.31	
540	15.89	12.53	
600	16.16	12.8	815
720	16.57	13.21	
840	17.12	13.76	800
960	17.84	14.48	
1080	18.46	15.1	
1200	18.98	15.62	
1320	19.14	15.78	
1440	19.97	16.61	785
1455	20.07	16.71	
1470	20	16.64	
1485	20.17	16.81	
1500	20.2	16.84	

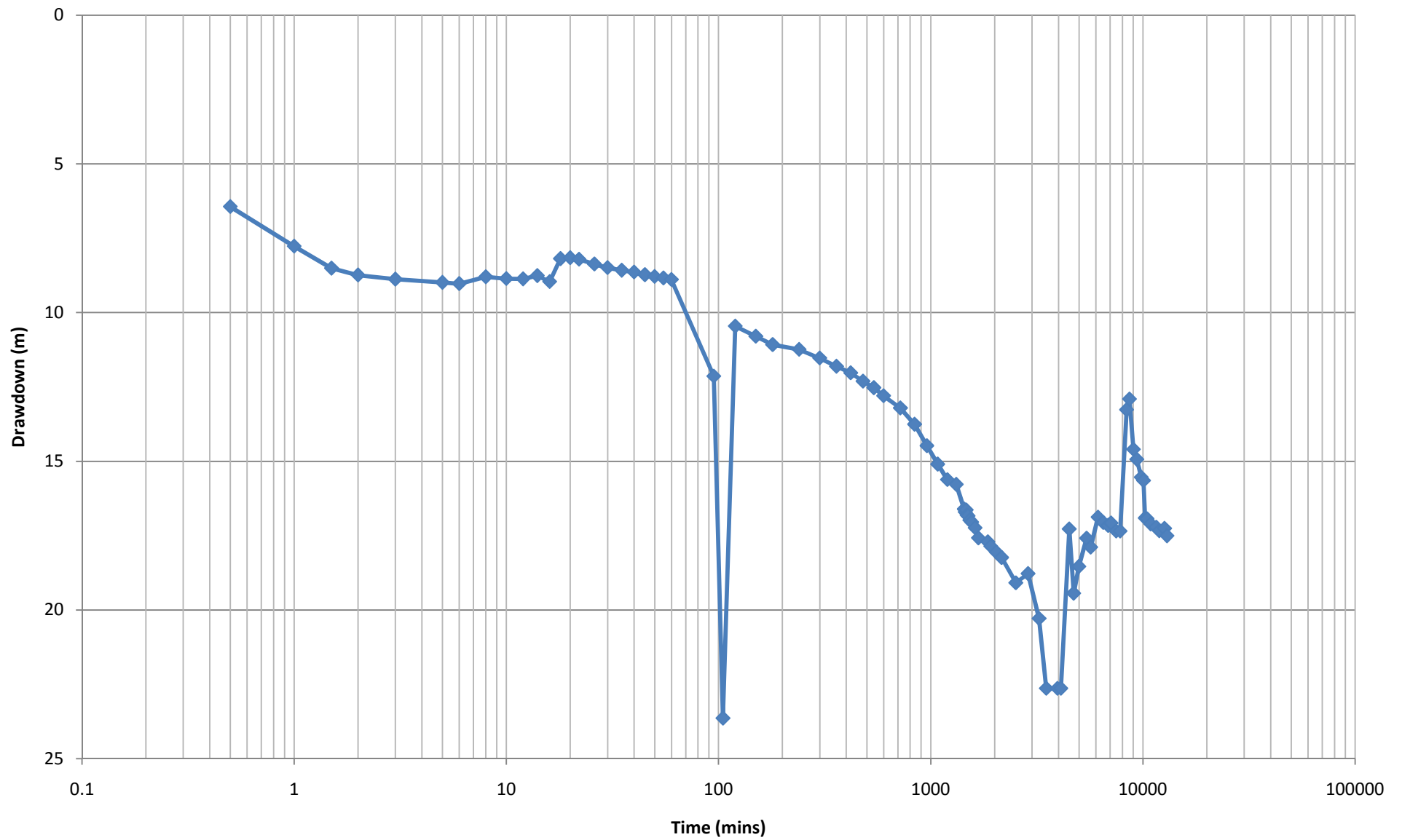
TW-31/10 Pumping Data

Time	Water Level (m btc)	Drawdown (m)	Pumping Rate (m3/d)
1560	20.41	17.05	
1620	20.6	17.24	
1680	20.94	17.58	
1860	21.07	17.71	
1920	21.22	17.86	
2040	21.42	18.06	751
2160	21.6	18.24	
2520	22.45	19.09	
2880	22.14	18.78	
3245	23.65	20.29	
3510	26	22.64	
3960	26	22.64	
4110	26	22.64	654
4500	20.64	17.28	
4720	22.8	19.44	
5000	21.9	18.54	648
5430	20.95	17.59	
5680	21.25	17.89	
6150	20.24	16.88	
6510	20.42	17.06	
6865	20.52	17.16	
7080	20.44	17.08	621
7490	20.71	17.35	
7820	20.71	17.35	
8385	16.63	13.27	567
8650	16.27	12.91	
9030	17.96	14.6	
9375	18.3	14.94	
9840	18.9	15.54	
10080	19.01	15.65	636
10260	20.27	16.91	
10475	20.3	16.94	

TW 35/1 Pumping Data and Pumping Rate



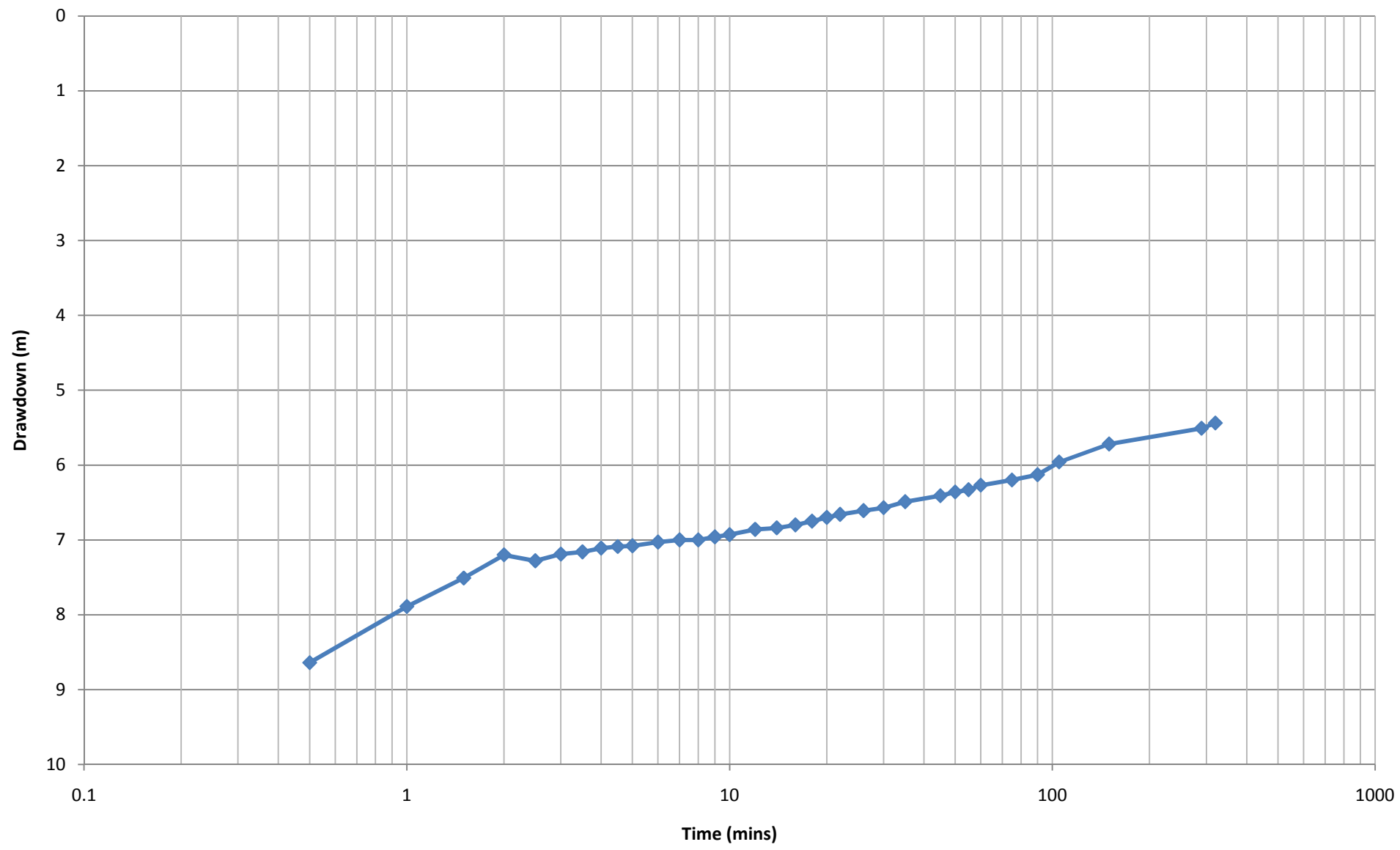
TW 31/1 Pumping Test Data



TW 31/1 Recovery Data

Time	Water Level (m btc)	Drawdown (m)
0	20.87	17.51
0.5	12	8.64
1	11.25	7.89
1.5	10.87	7.51
2	10.56	7.2
2.5	10.64	7.28
3	10.55	7.19
3.5	10.52	7.16
4	10.47	7.11
4.5	10.45	7.09
5	10.44	7.08
6	10.39	7.03
7	10.36	7
8	10.36	7
9	10.32	6.96
10	10.29	6.93
12	10.22	6.86
14	10.2	6.84
16	10.16	6.8
18	10.11	6.75
20	10.06	6.7
22	10.02	6.66
26	9.97	6.61
30	9.93	6.57
35	9.85	6.49
45	9.77	6.41
50	9.72	6.36
55	9.69	6.33
60	9.63	6.27
75	9.56	6.2
90	9.49	6.13
105	9.32	5.96
150	9.08	5.72
290	8.87	5.51
320	8.8	5.44

TW 31/1 Recovery Data



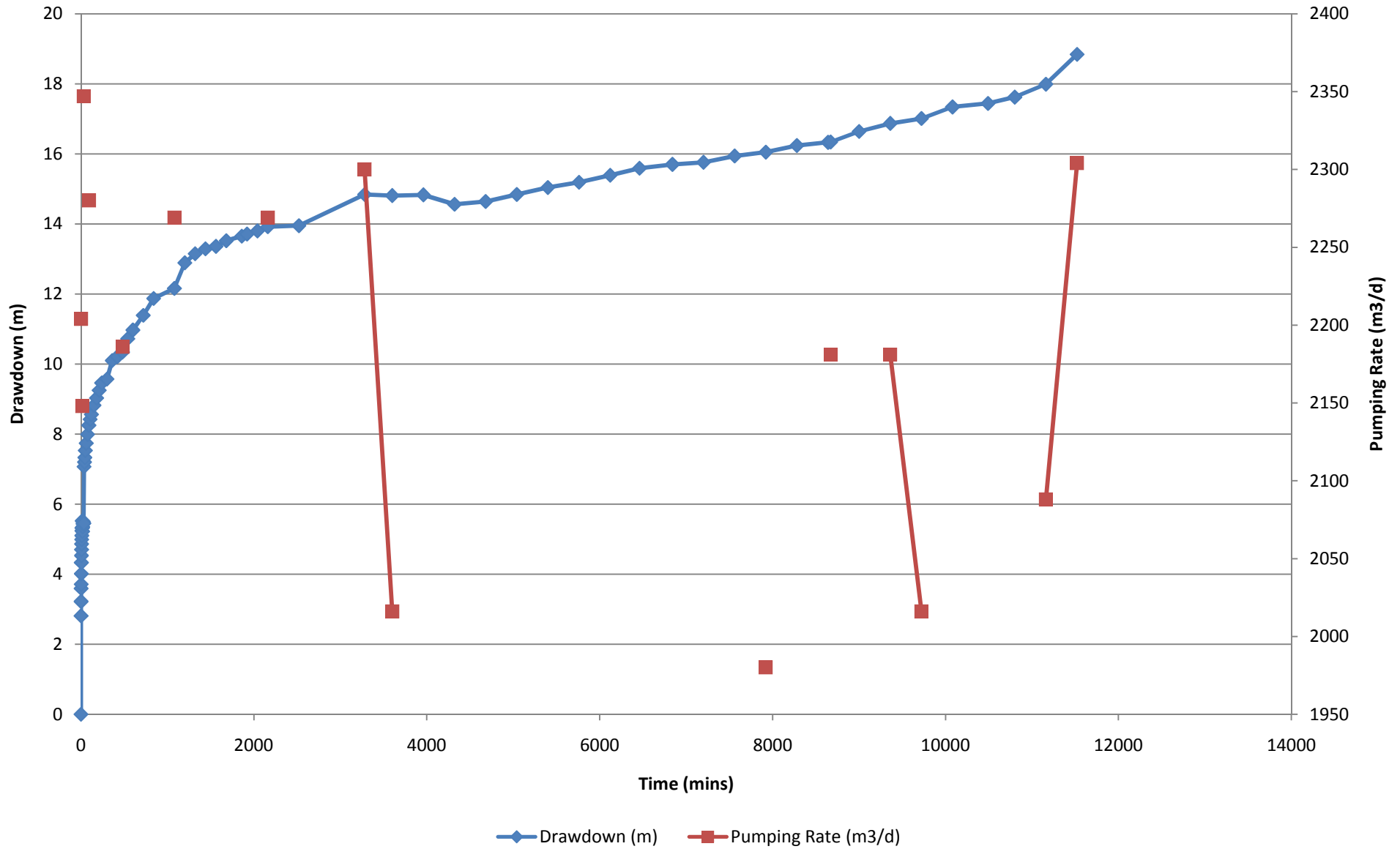
TW-31 Pumping Data

Time	Water Level (m btc)	Drawdown (m)	Pumping Rate (m3/d)
0	2.52	0	2204
0.5	5.33	2.81	
1	5.74	3.22	
1.5	6.11	3.59	
2	6.23	3.71	
3	6.53	4.01	
4	6.85	4.33	
5	7.05	4.53	
6	7.22	4.7	
7	7.38	4.86	
8	7.51	4.99	
9	7.62	5.1	
10	7.76	5.24	
12	7.84	5.32	
14	8.04	5.52	2148
16	7.84	5.32	
18	7.74	5.22	
20	7.87	5.35	
22	7.96	5.44	
24	8.03	5.51	
28	8	5.48	
30	7.97	5.45	2347
31	7.97	5.45	
35	9.59	7.07	
40	9.72	7.2	
45	9.85	7.33	
50	10.05	7.53	
60	10.26	7.74	
75	10.51	7.99	
90	10.77	8.25	2280
105	10.94	8.42	
120	11.08	8.56	
150	11.34	8.82	
180	11.55	9.03	
210	11.77	9.25	
240	11.98	9.46	
300	12.09	9.57	
360	12.62	10.1	
420	12.73	10.21	
480	12.86	10.34	2186
540	13.24	10.72	
600	13.49	10.97	
720	13.91	11.39	
840	14.39	11.87	
1080	14.68	12.16	2269
1200	15.41	12.89	
1320	15.67	13.15	

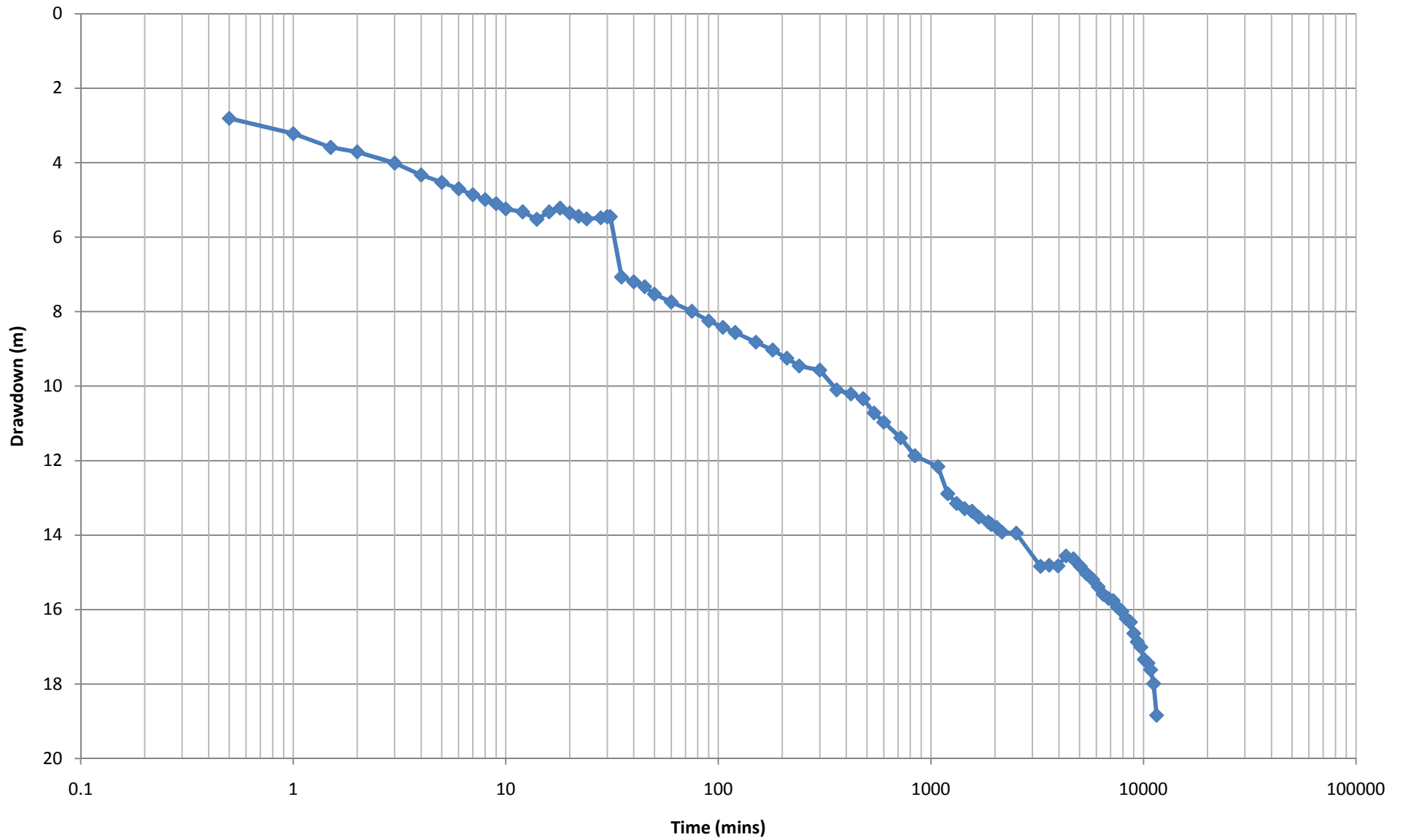
TW-31 Pumping Data

Time	Water Level (m btc)	Drawdown (m)	Pumping Rate (m3/d)
1440	15.81	13.29	
1560	15.88	13.36	
1680	16.04	13.52	
1860	16.17	13.65	
1920	16.23	13.71	
2040	16.32	13.8	
2160	16.44	13.92	2269
2520	16.47	13.95	
3280	17.36	14.84	2300
3600	17.33	14.81	2016
3960	17.35	14.83	
4320	17.08	14.56	
4680	17.16	14.64	
5040	17.36	14.84	
5400	17.56	15.04	
5760	17.71	15.19	
6120	17.91	15.39	
6460	18.11	15.59	
6840	18.22	15.7	
7200	18.28	15.76	
7560	18.46	15.94	
7920	18.57	16.05	1980
8280	18.76	16.24	
8640	18.85	16.33	
8670	18.86	16.34	2181
9000	19.16	16.64	
9360	19.39	16.87	2181
9720	19.53	17.01	2016
10080	19.86	17.34	
10490	19.96	17.44	
10800	20.14	17.62	
11160	20.51	17.99	2088
11520	21.36	18.84	2304

TW 31/10 Pumping Data and Pumping Rate



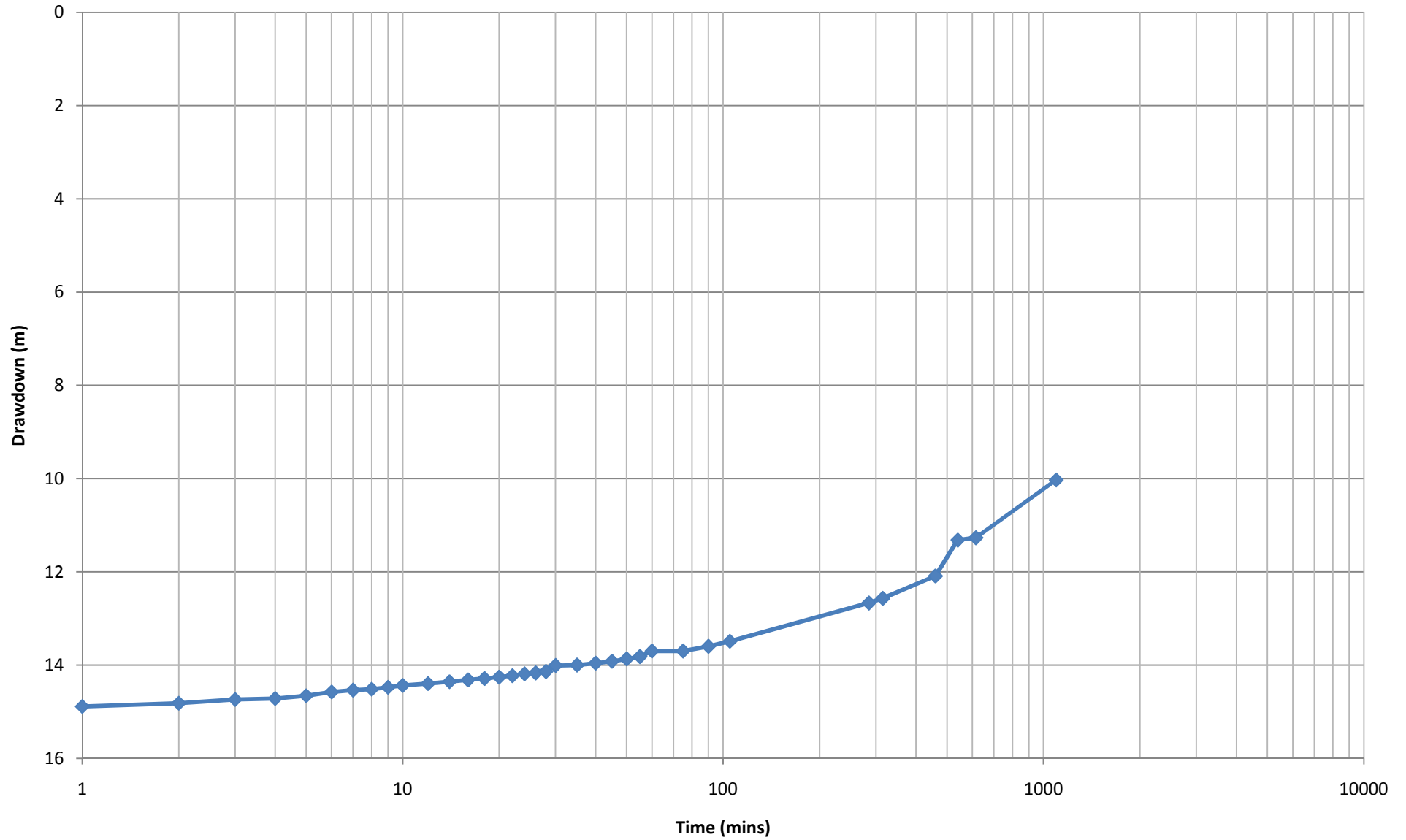
TW 31/10 Pumping Test Data



TW 31/10 Recovery Data

Time	Water Level (m btc)	Drawdown (m)
0	21.95	18.84
1	18	14.89
2	17.93	14.82
3	17.85	14.74
4	17.83	14.72
5	17.77	14.66
6	17.69	14.58
7	17.65	14.54
8	17.63	14.52
9	17.59	14.48
10	17.55	14.44
12	17.51	14.4
14	17.47	14.36
16	17.43	14.32
18	17.4	14.29
20	17.37	14.26
22	17.34	14.23
24	17.3	14.19
26	17.28	14.17
28	17.25	14.14
30	17.12	14.01
35	17.11	14
40	17.07	13.96
45	17.03	13.92
50	16.98	13.87
55	16.93	13.82
60	16.81	13.7
75	16.81	13.7
90	16.71	13.6
105	16.6	13.49
285	15.78	12.67
315	15.68	12.57
460	15.2	12.09
540	14.43	11.32
615	14.38	11.27
1095	13.14	10.03

TW 31/10 Recovery Data



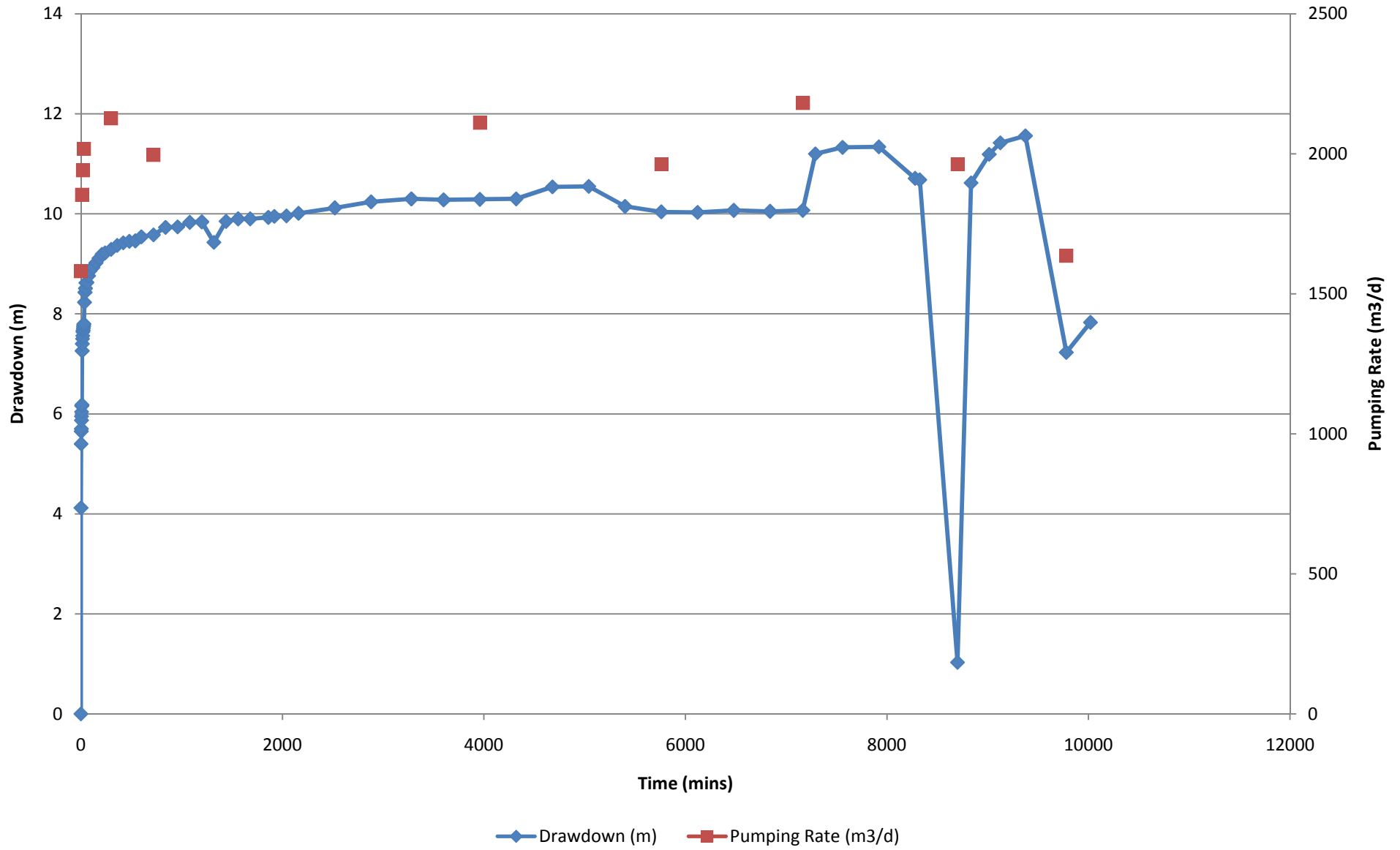
TW-35/7 Pumping Data

Time	Water Level (m btc)	Drawdown (m)	Pumping Rate (m3/d)
0	3.14	0	1581
1	7.26	4.12	
2	8.54	5.4	
3	8.79	5.65	
4	8.84	5.7	
5	9.01	5.87	
6	9.09	5.95	
7	9.18	6.04	
8	9.3	6.16	
9	9.3	6.16	
10	9.32	6.18	1854
12	10.4	7.26	
14	10.54	7.4	
16	10.64	7.5	
18	10.7	7.56	1941
20	10.78	7.64	
22	10.81	7.67	
24	10.85	7.71	
26	10.89	7.75	
28	10.92	7.78	
30	10.94	7.8	2018
35	11.37	8.23	
40	11.57	8.43	
45	11.65	8.51	
50	11.76	8.62	
55	11.76	8.62	
60	11.77	8.63	
75	11.9	8.76	
90	12	8.86	
105	12.05	8.91	
120	12.07	8.93	
150	12.16	9.02	
180	12.25	9.11	
210	12.33	9.19	
240	12.36	9.22	
300	12.43	9.29	2127
360	12.51	9.37	
420	12.56	9.42	
480	12.59	9.45	
540	12.6	9.46	
600	12.68	9.54	
720	12.72	9.58	1996
840	12.87	9.73	
960	12.88	9.74	
1080	12.97	9.83	
1200	12.98	9.84	
1320	12.57	9.43	
1440	12.99	9.85	

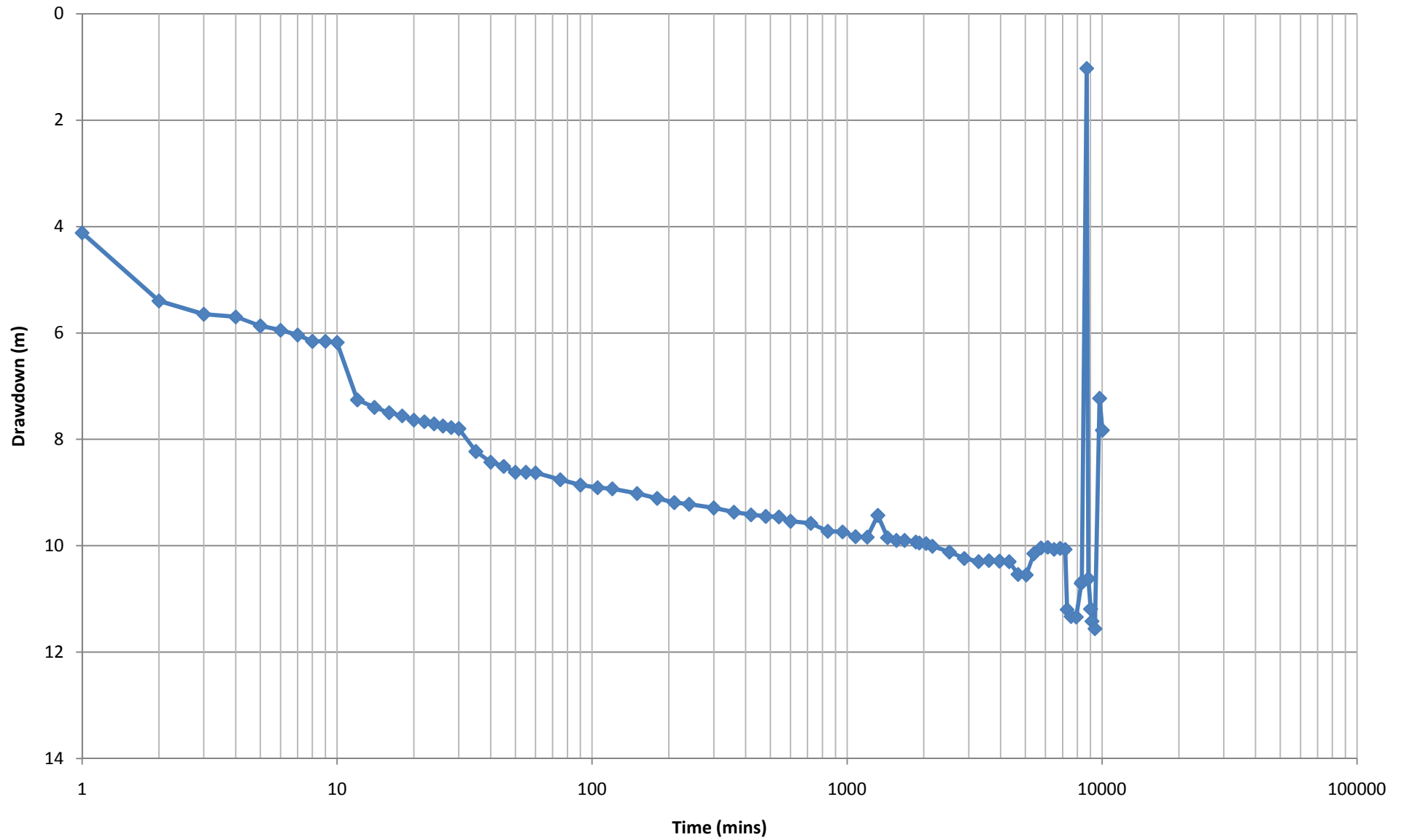
TW-35/7 Pumping Data

Time	Water Level (m btc)	Drawdown (m)	Pumping Rate (m3/d)
1560	13.04	9.9	
1680	13.04	9.9	
1860	13.07	9.93	
1920	13.09	9.95	
2040	13.1	9.96	
2160	13.15	10.01	
2520	13.26	10.12	
2880	13.38	10.24	
3280	13.44	10.3	
3600	13.42	10.28	
3960	13.43	10.29	2111
4320	13.44	10.3	
4680	13.68	10.54	
5040	13.69	10.55	
5400	13.29	10.15	
5760	13.18	10.04	1963
6120	13.17	10.03	
6480	13.21	10.07	
6840	13.19	10.05	
7165	13.21	10.07	2181
7290	14.34	11.2	
7560	14.47	11.33	
7920	14.48	11.34	
8280	13.85	10.71	
8325	13.82	10.68	
8700	4.17	1.03	1963
8835	13.76	10.62	
9015	14.33	11.19	
9125	14.56	11.42	
9375	14.7	11.56	
9780	10.37	7.23	1636
10020	10.97	7.83	

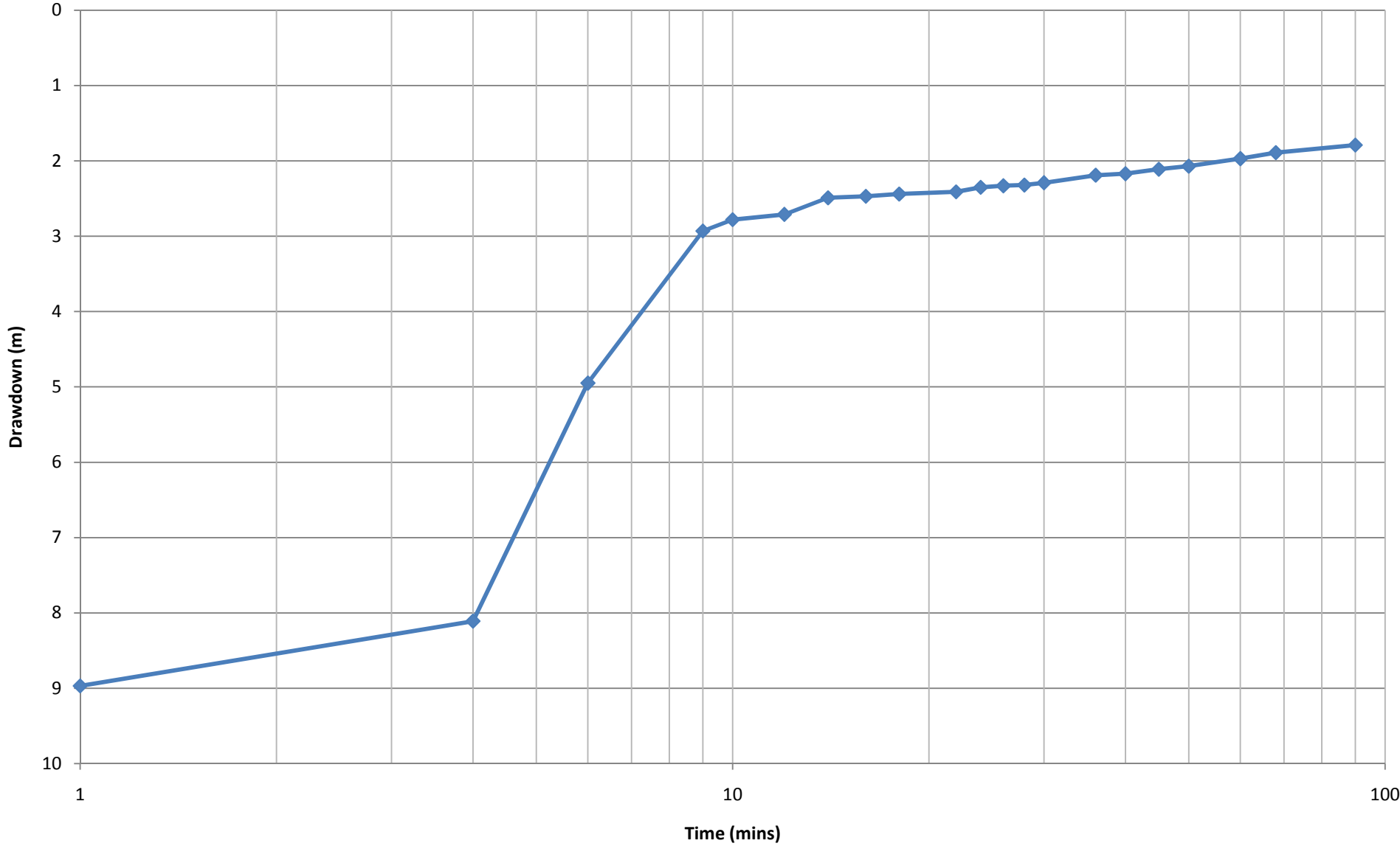
TW 35/7 Pumping Data and Pumping Rate



TW 35/7 Pumping Test Data



TW 35/7 Recovery Data



APPENDIX 3

**Report on the Drilling and Testing of Trial Well at Carrickbyrne, Co
Wexford (1982)**

720 820

3

REPORT ON THE DRILLING AND TESTING

OF A

TRIAL WELL AT CARRICKBYRNE, CO. WEXFORD.

by K.T. Cullen, M.Sc.,
Consulting Hydrogeologist.

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VI.	Conclusions and Recommendations	4.

APPENDIX I. Time-Drawdown data from
test pumping of trial
well.

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REPORT ON THE DRILLING AND TEST PUMPING

OF A

TRIAL WELL AT CARRICKBYRNE, CO. WEXFORD. 22nd September, 1981

I. INTRODUCTION.

This Report, dated 22nd September, 1981, describes the drilling and test pumping of a trial water well at Carrickbyrne, Co. Wexford, during the Summer of 1981. The Report lists the analyses of water samples from the trial well and compares them to (a) the chemistry of water from the nearby Local Authority production well and (b) the E.E.C. Standards for potable water.

The works and studies outlined in this Report were commissioned by Mr. P. Dubsy to determine if a well at Carrickbyrne could be developed as a source of mineral water.

II. LOCATION OF TRIAL WELL.

The trial well was located on land owned by Mr. P. Dubsy on the southern slopes of Carrickbyrne Hill. The well site is bounded immediately by evergreen forest to the north and west, and by agricultural land to the east and south.

Mr. Dubsy's property lies some 106-114m above ordnance datum and some 0.4 Km from the production well supplying the Carrickbyrne Group Scheme.

III. DRILLING.

O'Donohoe Brothers of Gorey, drilling contractors, were retained to drill the trial well. Drilling commenced on August 10th, 1981 and continued until August 13th. The drilling contractor used a rotary drilling rig with compressed air as the flushing medium.

A 200 m.m. hole was drilled to a depth of 9 m. through the overburden and for 4m into the underlying rock. Three lengths (9m) of 150 m.m. (I.D.) thermoplastic casing was installed in the 200 m.m. hole. Drilling was then continued and the hole deepened to the finished depth of 61m at a diameter of 150 m.m.

The overburden was 5m thick and consisted of loose gravel and weathered rock overlying bedrock of light coloured rhyolite. The rhyolite gave way to a dark coloured igneous rock (probably andesitic in composition) at a depth of 28m which continued to the bottom of the hole at 61m.

Significant inflows of water were recorded at 20, 27 and 50m below ground level. On completion of the drilling the well was developed with compressed air for 2 hours, the water becoming clear within a few minutes of development starting.

IV. TEST PUMPING.

Mr. S. Kelly of Courtnacuddy was retained to test pump the well. The testing began on August 20th, 1981 and continued without interruption for a period of 264.5 hours with recovery starting on September 1st. The well was pumped with a submersible pump powered by a diesel driven generator. The pumped water was carried off Mr. Dubsy's property and flowed into a surface water drain, a distance of 200m from the well head. The trial well was pumped at a constant rate of $109\text{m}^3/\text{day}$. Water levels were measured at regular intervals in the trial both during the pumping and recovery phases. Appendix I of this Report contains the water levels measured during the test pumping exercise.

An analysis of the time-drawdown data shows that the rate of fall of the water level is affected by the level of water in the well. This feature is characteristic of groundwater flow in fissured rocks and reflects the draining of various fissures as the water levels falls with pumping. The test pumping exercise has shown that the trial well is capable of a sustained yield of $109\text{m}^3/\text{day}$ with a drawdown of 28.5m. However, due to the variation of the rate of water level decline the specific capacity of the well can be given as $11.4\text{m}^3/\text{day/m}$ after 3 days of pumping or as $3.86\text{m}^3/\text{day/m}$ after 11 days of continuous pumping. This variation of specific capacity

with pumping duration means that a greater volume of water can be obtained from the well per meter of drawdown when the water level remains above 30m then when the pumping level falls below 30m.

Using the above figures a production demand of $300\text{m}^3/\text{day}$ (66,000 g.p.d.) for an 8-hour day would see a drawdown of 8.8m and a pumping level of 27.5m. The intervening 16-hours would allow the well to recover.

V. CHEMICAL ANALYSES.

Samples of the water pumped from the trial well were collected at the well head and delivered to the I.I.R.S. for chemical and bacteriological analysis. Two samples were collected after 72 hours of pumping, one for chemical and one for bacteriological analysis. One sample was taken from the trial well at the end of the pump test and together with a sample from the nearby Local Authority pumping well, were sent for chemical analysis. The results of these analyses and the results of a previous analysis of the water from the Group Scheme well are brought together in Table I below and compared with the E.E.C. standards for potable water.

It is clear from Table I that the chemistry of the water pumped from the trial well changed slightly during the duration of the test pumping as is evident from the variation in sulphate, nitrate, calcium and bicarbonate values.

The chemistry of the Group Scheme well water is similar to that of the trial well with small differences in the calcium, magnesium and sulphate concentrations. The variation of the well water chemistry with time is also seen in the Group Scheme well with nitrate levels changing from a high of 9.7 mg/l to 3.2 mg/l between the Summers of 1980 and 1981. Whether this variation in nitrate levels is seasonal or affected by outside influences can only be determined by regular monitoring of the groundwater chemistry.

The relatively high levels of sodium and chloride in these groundwaters (Highland Spring, Na= 12.5, Cl = 15.6) is attributed to the proximity of Carrickbyrne to the sea with the result that precipitation in this region carries an unusually high concentration of these salts. The average chlorine level in Irish groundwater is 28 mg/l but this overall average is from

Source	Co.Co. Well	Co.Co. Well.	P. Dubsky	P. Dubsky.	Standards.	
Date	14/7/1980	31/8/1981	24/8/1981	31/8/1981	15/7/1980*	
Parameter					Guide	Maximum
Calcium	8.4	12	9.6	13.6	100	-
Magnesium	2.9	1.5	6.3	4.4	30	50
Sodium	16.0	16.0	16.0	16.0	20	175
Potassium	2.2	1.1	0.9	1.1	10	12
Bicarbonate	22.0	22.0	31.7	36.6	30	-
Sulphate	2.0	3.0	12.5	2.9	25	250
Chloride	37.0	34.0	34.0	35.0	25	-
Nitrate	9.7	3.2	9.7	3.4	25	50
Nitrite	< 0.01(N)	< 0.01 (N)	< 0.01 (N)	< 0.01(N)	-	0.2
Ammonia	< 0.01(N)	< 0.01 (N)	< 0.01 (N)	< 0.01(N)	0.05	0.5
Iron	0.09	< 0.1	< 0.1	< 0.1	(NH ₄) 0.05	(NH ₄) 0.2
Manganese	ND	< 0.1	ND	< 0.1	0.02	0.05
Copper	< 0.02	< 0.02	< 0.02	< 0.02	0.1	-
Silica	ND	4.8	ND	5.2	-	-
T.D.S.**	110	110	108	123	-	1500
E.C.	120	150	200	160	400	-
Temperature	ND	10.4	10.4	10.4	12	25
pH (F)	ND	ND	ND	ND	-	-
pH (L)	5.8	6.1	6.2	6.4	6.5	8.5
Colour	< 5Hazen	< 5Hazen	< 5Hazen	< 5Hazen	Clear	Clear
Total Hardness***	33	36	50	52	150	-
Alkalinity***	18	18	26	30	25	-
Cell Count (22°C)	ND	ND	1,300	ND	20	100
(37°C)	ND	ND	53	ND	5	20
Coliforms	0	ND	0	ND	0	0
E-Coli	0	ND	0	ND	0	0

* E.E.C. Standards (80/778/EEC) for quality of potable water.

**By evaporation at 180°C

*** CaCO₃

ND = Not determined

< = less than

F = field

L = laboratory.

EC = Electrical Conductivity

means for each aquifer ranging from 14.7 mg/l in the Castlecomer sandstone to 40 mg/l in the limestone dolomite aquifer of south Wexford.

Table I shows the waters tested from the Carrickbyrne area conform to the chemical standards of the E.E.C. directive on potable water quality. However, although the bacteriological analyses show no coliform bacteria present in the samples tested the colony count carried out on the sample of August 24th, gave a result that falls outside the E.E.C. standards.

Colony counts are not essential for assessing the safety of domestic water supplies. They are useful for indicating the efficiency of certain processes in water treatment and the cleanliness of the distribution system. They are also useful for determining the suitability of a water supply for the large-scale preparation of food and drink where, in order to avoid the risk of spoilage, the water should ideally contain few organisms of any kind. The high cell count recorded from the Carrickbyrne well may have been caused by soil or dust gaining access to the well during development.

VI. CONCLUSIONS AND RECOMMENDATIONS.

The results of the present drilling and testing programme show that the trial well at Carrickbyrne Hill is capable of a sustained yield of 109m³/day for 11 days and that the pumped water is of an exceptionally low mineralised character.

The water pumped from the trial well satisfies all but one of the E.E.C. standards for potable water but this divergence in the colony count may be related to the well development and so not a permanent feature. Changes in groundwater chemistry with time and pumping were noted in both the trial and Group Scheme wells especially in the sulphate and nitrate levels.

It is recommended that pumped samples be collected and analysed from both the trial and Group Scheme wells during late January and February of 1982 when groundwater levels are the highest, and the aquifer replenished by Winter recharge. These samples will show whether the low nitrate levels recorded in the last pair of analyses are annual low values and

whether the marginally high colony count is a permanent feature of the Carrickbyrne trial well.

APPENDIX I.

Time-Drawdown Data from Test Pumping of Trial Well.

10410
10500
10600
10700
10810
10900
11000
11100
11200
11300
11400
11500
11600
11700
11800
11900
12000
12100
12200
12300
12400
12500
12600
12700
12800
12900
13000
13100
13200
13300
13400
13500
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13800
13900
14000
14100
14200
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14500
14600
14700
14800
14900
15000
15100
15200
15300
15400
15500
15600
15700
15800
15900
16000

40.52
41.0
41.45
42.0
42.5
43.04
43.53
44.0
44.5
45.0
45.45
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DATE/TIME: WED. 21/11 1981 TEST PERIOD FROM: 1300 AUGUST 20 1981

LOCATION: DAVENKYPHENE COUNTY WEXFORD TO : 1430 SEPT. 1 1981

WEATHER : DRY CONDUCTED BY : K.T.C.

CONSTANT YIELD AND RECOVERY TEST

PUMPING WELL RECOVERY DATA

PUMPING WELL RADIUS : 150MM

PUMPING RATE PRIOR TO RECOVERY PERIOD: 10Y MLD

ELAPSED TIME (MIN)	WATER LEVEL (METRES)	DRAWNDOWN (METRES)
5	42.75	20.72
10	42.1	21.07
15	41.1	22.07
20	41	22.57
25	38.85	20.82
30	37.7	19.67
35	36.5	18.47
40	35.9	17.87
45	35.7	17.67
50	35.65	17.62
55	35.6	17.58
60	35.55	17.54
65	35.53	17.5
70	35.47	17.44
75	35.34	17.31
80	35.1	17.07
85	35.26	17.21
90	35.22	17.19
95	35.18	17.15
100	35.14	17.1
105	35.1	17.07
110	35.07	17.04
115	35	16.97
120	34.7	16.87
125	34.82	16.78
130	34.78	16.75
135	34.54	16.51
140	34.5	16.47
145	34.3	16.27
150	34.17	16.14
155	31.05	13.02
160	30.83	12.8
165	33.85	15.83
170	32.25	14.22
1750	29.75	10.72

BOREHOLE: WE 635/3 TEST PERIOD FROM: 1200 AUGUST 20 1981
 LOCATION: HARRICKBYRNE COUNTY WEXFORD TO : 1430 SEPT. 1 1981
 WEATHER : DRY CONSULTED BY : K.T.C.
 CONSTANT YIELD AND RECOVERY TEST
 PUMPING WELL DRAWDOWN DATA
 PUMPING WELL RADIUS : 150MM

FLOWING PHASE 1 PUMPING RATE: 109 M3/D

ELAPSED TIME (MIN)	WATER LEVEL (METRES)	DRAWDOWN (METRES)
1.5	12.7	.67
1.5	12.7	.97
1.5	12.7	1.19
1.5	12.7	1.38
1.5	12.7	1.48
1.5	12.7	1.58
1.5	12.7	1.68
1.5	12.7	1.78
1.5	12.7	1.88
1.5	12.7	1.98
1.5	12.7	2.08
1.5	12.7	2.18
1.5	12.7	2.27
1.5	12.7	2.37
1.5	12.7	2.47
1.5	12.7	2.57
1.5	12.7	2.67
1.5	12.7	2.77
1.5	12.7	2.87
1.5	12.7	2.97
1.5	12.7	3.08
1.5	12.7	3.18
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1.5	12.7	38.68
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1.5	12.7	38.88
1.5	12.	

Adamstown GWB: Summary of Initial Characterisation.

Hydrometric Area Local Authority		Associated surface water bodies	Associated terrestrial ecosystems	Area (km ²)
13 –Coastal area Wexford Co Co		Corock, Owenduff, Tintern Abbey Stream and Barrow estuary.	Boley Fen, Barrow River Estuary	181
Topography		The drainage pattern in this aquifer reflects the reduction in elevation from north to south. The highest point within the groundwater body area is Carrickbyrne Hill at 234m OD. The lowest areas in the groundwater body are to the west at the mouth of the River Barrow around Campile, which is at sea level.		
Geology and Aquifers	Aquifer type(s)	<p><u>Mostly: Rf:</u> Regionally Important Fractured aquifer. <u>With Smaller areas of:</u> LI: Locally important aquifer which is moderately productive only in local zones PI: Poor aquifer which is generally unproductive except for local zones</p>		
	Main aquifer lithologies	<p><u>Mostly:</u> Ordovician Volcanics <u>With Smaller areas of:</u> Devonian Old Red Sandstones Granites & other Igneous Intrusive rocks Ordovician Metasediments This rock contains areas of felsic volcanic rock which are belived to be the main water bearing components.</p>		
	Key structures.	The bedrock is highly fractured and broken due to folding and faulting in the Caledonian Orogeny, which formed the Campile Syncline. Superimposed upon this are a series of minor folds giving rise to pronounced cleavage. The crystalline volcanic rocks will have ruptured under the mountain building forces that affected the whole area. The rock units are steeply dipping to the south.		
	Key properties	Wells tested at Adamstown and Carrickbyrne Hill have yields of 1400m ³ /d, specific capacities of 44.7m ³ /d/m and transmissivity values in the region of 150m ² /d		
	Thickness	The effective thickness of this aquifer could be quite large. Well logging data from Kilkenny shows large fractures open at depths of 50m.		
Overlying Strata	Lithologies	The Clogga Till is a stone clay sand based till containing large angular cobbles and boulders chiefly of shale and granite. There are also some significant silty alluvium deposits close to the Barrow River estuary. In places there appear to be sand and gravel layers of about 6.5m between the bedrock and the overlying silt.		
	Thickness	Thickness has been shown to be mostly less than 10m but may increase closer to the Barrow, as alluvial deposits become thicker.		
	% area aquifer near surface	<i>[Information will be added at a later date]</i>		
	Vulnerability	<i>[Information will be added at a later date]</i>		
Recharge	Main recharge mechanisms	Rainfall recharges largely in the north where overlying strata may be thinner in the uplands. Also in locations like Carrickbyrne Hill which appear to coincide with areas where felsic volcanics outcrop.		
	Est. recharge rates	<i>[Information will be added at a later date]</i>		
Discharge	Springs and large known abstractions (m ³ /d)	Adamstown (1400), Carrigbyrne (204).		
	Main discharge mechanisms	The most likely areas for this groundwater body to discharge will be to the associated surface water bodies. This may occur mostly at the geological contact between this groundwater body and the body to the south. It is possible that water could be forced to the surface and into surface water bodies here.		
	Hydrochemical Signature	Low mineralized nature is noteworthy. Waters monitored are shown to be moderately soft to slightly hard. Average electrical conductivity values are Carrickbyrne 418, Tellerought 283 and Ballinamona 384 (µs/cm), low values which confirm low mineralised water. There is evidence of saltwater intrusion at Great Island, Wexford. The bedrock strata of this groundwater body are Siliceous .		
Groundwater Flow Paths		Groundwater flow may be in long flowpaths from north to south. There may be a small/local groundwater divide where some flow will be to the west towards Campile and the Barrow River estuary and the rest will flow south. In areas like Carrickbyrne there will probably be elevated groundwater levels which would radiate from the peak but probably taper towards the south with the regional flow system. Groundwater flow has been estimated at 8m/yr in the extreme west area of the body at Great Island Power Station.		
Groundwater and surface water interactions		There is likely to be an important groundwater connection to Boley Fen, which lies on a geological contact between two groundwater bodies of differing aquifer classification. The relevance of this requires further investigation.		

Conceptual model	<p>This groundwater body is defined to the northwest and southeast by the extent of the Campile Formation. The Barrow River defines the western boundary and the boundary of Hydrometric area 13 defines the northern boundary.</p> <p>Groundwater is mostly recharged in the north and at various hills in the area. Regional flow is mostly north to south. There is probably a local groundwater divide in the area east of Campile. West of this divide, groundwater discharges to the Barrow Estuary and northeast of this, probably discharges to the associated surface water bodies, especially at the geological contact at the southern boundary of the body.</p>
Attachments	
Instrumentation	<p>Stream gauge: 14066</p> <p>Borehole Hydrograph: none</p> <p>EPA Representative Monitoring boreholes: Carrickbyrne WS (#9 - S831245), Tellerought GWS (#49 - S756214), Ballinamona (#37 - S710178).</p>
Information Sources	<p>Pow, S.J., & Brems, D.L. (2001) An Environmental Impact Assessment of Great Island Generating Station upon the Local Soil and Groundwater Quality. ESB International.</p> <p>Cullen, K.T. (1980) Groundwater Development for Urban and Rural Water Supply Schemes. IAH (Irish Group).</p>
Disclaimer	Note that all calculation and interpretations presented in this report represent estimations based on the information sources described above and established hydrogeological formulae

Formation Name	Code	Description	Rock Unit Group	Aquifer Category
Ballylane Formation	BY	Green & grey slate with thin siltstone	Ordovician Metasediments	PI
Campile Formation	CA	Rhyolitic volcanics, grey & brown slates	Ordovician Volcanics	Rf
Dolerite	D		Granites & other Igneous Intrusive rocks	Rf
Granite (undifferentiated)	Gr		Granites & other Igneous Intrusive rocks	Rf
Harrylock Formation	HL	Red conglomerate, sandstone & siltstone	Devonian Old Red Sandstones	LI
Maulin Formation	MN	Dark blue-grey slate, phyllite & schist	Ordovician Metasediments	LI
Oaklands Formation	OA	Green, red-purple, buff slate, siltstone	Ordovician Metasediments	LI

Carrigbyrne Extended Pumping Data 18/10/2011

Date	Time	Time (mins)	Water Level (m below the casing)
18/10/2011	13:47:07	0	18.16162
18/10/2011	13:47:37	0.5	18.62002
18/10/2011	13:48:07	1	19.234389
18/10/2011	13:48:37	1.5	19.32113
18/10/2011	13:49:07	2	19.2618
18/10/2011	13:49:37	2.5	19.24938
18/10/2011	13:50:07	3	19.24225
18/10/2011	13:50:37	3.5	19.251549
18/10/2011	13:51:07	4	19.26362
18/10/2011	13:51:37	4.5	19.27139
18/10/2011	13:52:07	5	19.28268
18/10/2011	13:52:37	5.5	19.291159
18/10/2011	13:53:07	6	19.29924
18/10/2011	13:53:37	6.5	19.30244
18/10/2011	13:54:07	7	19.314439
18/10/2011	13:54:37	7.5	19.32049
18/10/2011	13:55:07	8	19.32135
18/10/2011	13:55:37	8.5	19.33088
18/10/2011	13:56:07	9	19.338869
18/10/2011	13:56:37	9.5	19.341549
18/10/2011	13:57:07	10	19.34872
18/10/2011	13:57:37	10.5	19.355379
18/10/2011	13:58:07	11	19.35804
18/10/2011	13:58:37	11.5	19.36566
18/10/2011	13:59:07	12	19.36742
18/10/2011	13:59:37	12.5	19.37682
18/10/2011	14:00:07	13	19.38081
18/10/2011	14:00:37	13.5	19.3838
18/10/2011	14:01:07	14	19.3856
18/10/2011	14:01:37	14.5	19.395899
18/10/2011	14:02:07	15	19.401289
18/10/2011	14:02:37	15.5	19.402749
18/10/2011	14:03:07	16	19.40769
18/10/2011	14:03:37	16.5	19.41396
18/10/2011	14:04:07	17	19.41357
18/10/2011	14:04:37	17.5	19.42164
18/10/2011	14:05:07	18	19.42162
18/10/2011	14:05:37	18.5	19.42713
18/10/2011	14:06:07	19	19.432589
18/10/2011	14:06:37	19.5	19.43626
18/10/2011	14:07:07	20	19.43731
18/10/2011	14:07:37	20.5	19.44604
18/10/2011	14:08:07	21	19.44635
18/10/2011	14:08:37	21.5	19.45165
18/10/2011	14:09:07	22	19.44997
18/10/2011	14:09:37	22.5	19.457459
18/10/2011	14:10:07	23	19.46013
18/10/2011	14:10:37	23.5	19.46032

Carrigbyrne Extended Pumping Data 18/10/2011

Date	Time	Time (mins)	Water Level (m below the casing)
18/10/2011	14:11:07	24	19.47204
18/10/2011	14:11:37	24.5	19.464079
18/10/2011	14:12:07	25	19.47779
18/10/2011	14:12:37	25.5	19.47339
18/10/2011	14:13:07	26	19.48026
18/10/2011	14:13:37	26.5	19.48107
18/10/2011	14:14:07	27	19.486629
18/10/2011	14:14:37	27.5	19.488479
18/10/2011	14:15:07	28	19.49258
18/10/2011	14:15:37	28.5	19.48687
18/10/2011	14:16:07	29	19.495089
18/10/2011	14:16:37	29.5	19.507409
18/10/2011	14:17:07	30	19.50735
18/10/2011	14:17:37	30.5	19.50464
18/10/2011	14:18:07	31	19.51166
18/10/2011	14:18:37	31.5	19.5175
18/10/2011	14:19:07	32	19.51402
18/10/2011	14:19:37	32.5	19.52381
18/10/2011	14:20:07	33	19.52578
18/10/2011	14:20:37	33.5	19.52276
18/10/2011	14:21:07	34	19.525119
18/10/2011	14:21:37	34.5	19.52997
18/10/2011	14:22:07	35	19.5287
18/10/2011	14:22:37	35.5	19.53278
18/10/2011	14:23:07	36	19.53284
18/10/2011	14:23:37	36.5	19.537929
18/10/2011	14:24:07	37	19.54182
18/10/2011	14:24:37	37.5	19.54737
18/10/2011	14:25:07	38	19.55141
18/10/2011	14:25:37	38.5	19.550849
18/10/2011	14:26:07	39	19.55323
18/10/2011	14:26:37	39.5	19.55523
18/10/2011	14:27:07	40	19.55605
18/10/2011	14:27:37	40.5	19.560119
18/10/2011	14:28:07	41	19.56628
18/10/2011	14:28:37	41.5	19.56487
18/10/2011	14:29:07	42	19.56594
18/10/2011	14:29:37	42.5	19.57315
18/10/2011	14:30:07	43	19.57244
18/10/2011	14:30:37	43.5	19.57693
18/10/2011	14:31:07	44	19.579309
18/10/2011	14:31:37	44.5	19.57882
18/10/2011	14:32:07	45	19.58182
18/10/2011	14:32:37	45.5	19.58157
18/10/2011	14:33:07	46	19.58547
18/10/2011	14:33:37	46.5	19.585819
18/10/2011	14:34:07	47	19.594099
18/10/2011	14:34:37	47.5	19.58839

Carrigbyrne Extended Pumping Data 18/10/2011

Date	Time	Time (mins)	Water Level (m below the casing)
18/10/2011	14:35:07	48	19.591629
18/10/2011	14:35:37	48.5	19.59968
18/10/2011	14:36:07	49	19.59739
18/10/2011	14:36:37	49.5	19.60243
18/10/2011	14:37:07	50	19.59964
18/10/2011	14:37:37	50.5	19.602669
18/10/2011	14:38:07	51	19.60196
18/10/2011	14:38:37	51.5	19.60449
18/10/2011	14:39:07	52	19.60632
18/10/2011	14:39:37	52.5	19.60812
18/10/2011	14:40:07	53	19.6102
18/10/2011	14:40:37	53.5	19.616209
18/10/2011	14:41:07	54	19.62153
18/10/2011	14:41:37	54.5	19.61675
18/10/2011	14:42:07	55	19.62141
18/10/2011	14:42:37	55.5	19.62471
18/10/2011	14:43:07	56	19.624129
18/10/2011	14:43:37	56.5	19.62381
18/10/2011	14:44:07	57	19.625219
18/10/2011	14:44:37	57.5	19.63083
18/10/2011	14:45:07	58	19.63289
18/10/2011	14:45:37	58.5	19.63563
18/10/2011	14:46:07	59	19.634779
18/10/2011	14:46:37	59.5	19.63381
18/10/2011	14:47:07	60	19.64068
18/10/2011	14:47:37	60.5	19.64398
18/10/2011	14:48:07	61	19.639259
18/10/2011	14:48:37	61.5	19.64886
18/10/2011	14:49:07	62	19.64596
18/10/2011	14:49:37	62.5	19.645249
18/10/2011	14:50:07	63	19.650509
18/10/2011	14:50:37	63.5	19.64774
18/10/2011	14:51:07	64	19.65776
18/10/2011	14:51:37	64.5	19.65364
18/10/2011	14:52:07	65	19.65995
18/10/2011	14:52:37	65.5	19.65575
18/10/2011	14:53:07	66	19.65954
18/10/2011	14:53:37	66.5	19.66369
18/10/2011	14:54:07	67	19.66311
18/10/2011	14:54:37	67.5	19.66777
18/10/2011	14:55:07	68	19.66594
18/10/2011	14:55:37	68.5	19.66852
18/10/2011	14:56:07	69	19.67287
18/10/2011	14:56:37	69.5	19.674179
18/10/2011	14:57:07	70	19.676499
18/10/2011	14:57:37	70.5	19.67725
18/10/2011	14:58:07	71	19.67594
18/10/2011	14:58:37	71.5	19.67699

Carrigbyrne Extended Pumping Data 18/10/2011

Date	Time	Time (mins)	Water Level (m below the casing)
18/10/2011	14:59:07	72	19.67852
18/10/2011	14:59:37	72.5	19.68799
18/10/2011	15:00:07	73	19.68238
18/10/2011	15:00:37	73.5	19.6814
18/10/2011	15:01:07	74	19.682
18/10/2011	15:01:37	74.5	19.6873
18/10/2011	15:02:07	75	19.68925
18/10/2011	15:02:37	75.5	19.69062
18/10/2011	15:03:07	76	19.69406
18/10/2011	15:03:37	76.5	19.68925
18/10/2011	15:04:07	77	19.695559
18/10/2011	15:04:37	77.5	19.69672
18/10/2011	15:05:07	78	19.70106
18/10/2011	15:05:37	78.5	19.70363
18/10/2011	15:06:07	79	19.70193
18/10/2011	15:06:37	79.5	19.70206
18/10/2011	15:07:07	80	19.70698
18/10/2011	15:07:37	80.5	19.7055
18/10/2011	15:08:07	81	19.70475
18/10/2011	15:08:37	81.5	19.70994
18/10/2011	15:09:07	82	19.71196
18/10/2011	15:09:37	82.5	19.71677
18/10/2011	15:10:07	83	19.713739
18/10/2011	15:10:37	83.5	19.719129
18/10/2011	15:11:07	84	19.713869
18/10/2011	15:11:37	84.5	19.7205
18/10/2011	15:12:07	85	19.72211
18/10/2011	15:12:37	85.5	19.72114
18/10/2011	15:13:07	86	19.72398
18/10/2011	15:13:37	86.5	19.72151
18/10/2011	15:14:07	87	19.72846
18/10/2011	15:14:37	87.5	19.72316
18/10/2011	15:15:07	88	19.72877
18/10/2011	15:15:37	88.5	19.72503
18/10/2011	15:16:07	89	19.733659
18/10/2011	15:16:37	89.5	19.729469
18/10/2011	15:17:07	90	19.72739
18/10/2011	15:17:37	90.5	19.732459
18/10/2011	15:18:07	91	19.738059
18/10/2011	15:18:37	91.5	19.73411
18/10/2011	15:19:07	92	19.74023
18/10/2011	15:19:37	92.5	19.739859
18/10/2011	15:20:07	93	19.73619
18/10/2011	15:20:37	93.5	19.73963
18/10/2011	15:21:07	94	19.742539
18/10/2011	15:21:37	94.5	19.7442
18/10/2011	15:22:07	95	19.75055
18/10/2011	15:22:37	95.5	19.74881

Carrigbyrne Extended Pumping Data 18/10/2011

Date	Time	Time (mins)	Water Level (m below the casing)
18/10/2011	15:23:07	96	19.74995
18/10/2011	15:23:37	96.5	19.75454
18/10/2011	15:24:07	97	19.75212
18/10/2011	15:24:37	97.5	19.75081
18/10/2011	15:25:07	98	19.75469
18/10/2011	15:25:37	98.5	19.75532
18/10/2011	15:26:07	99	19.75516
18/10/2011	15:26:37	99.5	19.75869
18/10/2011	15:27:07	100	19.75946
18/10/2011	15:27:37	100.5	19.762459
18/10/2011	15:28:07	101	19.75693
18/10/2011	15:28:37	101.5	19.76555
18/10/2011	15:29:07	102	19.7583
18/10/2011	15:29:37	102.5	19.76882
18/10/2011	15:30:07	103	19.76667
18/10/2011	15:30:37	103.5	19.76873
18/10/2011	15:31:07	104	19.76622
18/10/2011	15:31:37	104.5	19.775379
18/10/2011	15:32:07	105	19.76907
18/10/2011	15:32:37	105.5	19.77255
18/10/2011	15:33:07	106	19.76974
18/10/2011	15:33:37	106.5	19.776239
18/10/2011	15:34:07	107	19.77815
18/10/2011	15:34:37	107.5	19.775429
18/10/2011	15:35:07	108	19.77654
18/10/2011	15:35:37	108.5	19.78281
18/10/2011	15:36:07	109	19.77873
18/10/2011	15:36:37	109.5	19.780689
18/10/2011	15:37:07	110	19.78114
18/10/2011	15:37:37	110.5	19.7836
18/10/2011	15:38:07	111	19.785769
18/10/2011	15:38:37	111.5	19.78779
18/10/2011	15:39:07	112	19.790689
18/10/2011	15:39:37	112.5	19.784829
18/10/2011	15:40:07	113	19.79341
18/10/2011	15:40:37	113.5	19.790949
18/10/2011	15:41:07	114	19.791289
18/10/2011	15:41:37	114.5	19.79341
18/10/2011	15:42:07	115	19.79614
18/10/2011	15:42:37	115.5	19.79455
18/10/2011	15:43:07	116	19.79225
18/10/2011	15:43:37	116.5	19.79779
18/10/2011	15:44:07	117	19.79592
18/10/2011	15:44:37	117.5	19.80148
18/10/2011	15:45:07	118	19.800819
18/10/2011	15:45:37	118.5	19.80294
18/10/2011	15:46:07	119	19.800299
18/10/2011	15:46:37	119.5	19.80451

Carrigbyrne Extended Pumping Data 18/10/2011

Date	Time	Time (mins)	Water Level (m below the casing)
18/10/2011	15:47:07	120	19.80683
18/10/2011	15:47:37	120.5	19.805819
18/10/2011	15:48:07	121	19.80829
18/10/2011	15:48:37	121.5	19.80698
18/10/2011	15:49:07	122	19.80981
18/10/2011	15:49:37	122.5	19.81157
18/10/2011	15:50:07	123	19.80904
18/10/2011	15:50:37	123.5	19.807539
18/10/2011	15:51:07	124	19.818219
18/10/2011	15:51:37	124.5	19.816209
18/10/2011	15:52:07	125	19.815089
18/10/2011	15:52:37	125.5	19.81453
18/10/2011	15:53:07	126	19.82464
18/10/2011	15:53:37	126.5	19.82308
18/10/2011	15:54:07	127	19.82192
18/10/2011	15:54:37	127.5	19.82136
18/10/2011	15:55:07	128	19.82645
18/10/2011	15:55:37	128.5	19.82102
18/10/2011	15:56:07	129	19.8267
18/10/2011	15:56:37	129.5	19.82087
18/10/2011	15:57:07	130	19.82771
18/10/2011	15:57:37	130.5	19.826469
18/10/2011	15:58:07	131	19.825949
18/10/2011	15:58:37	131.5	19.8311
18/10/2011	15:59:07	132	19.82675
18/10/2011	15:59:37	132.5	19.836939
18/10/2011	16:00:07	133	19.82943
18/10/2011	16:00:37	133.5	19.83372
18/10/2011	16:01:07	134	19.83559
18/10/2011	16:01:37	134.5	19.83321
18/10/2011	16:02:07	135	19.836
18/10/2011	16:02:37	135.5	19.84008
18/10/2011	16:03:07	136	19.83872
18/10/2011	16:03:37	136.5	19.84224
18/10/2011	16:04:07	137	19.84739
18/10/2011	16:04:37	137.5	19.83812
18/10/2011	16:05:07	138	19.84563
18/10/2011	16:05:37	138.5	19.84557
18/10/2011	16:06:07	139	19.84739
18/10/2011	16:06:37	139.5	19.84587
18/10/2011	16:07:07	140	19.84617
18/10/2011	16:07:37	140.5	19.84583
18/10/2011	16:08:07	141	19.84482
18/10/2011	16:08:37	141.5	19.85164
18/10/2011	16:09:07	142	19.85001
18/10/2011	16:09:37	142.5	19.85214
18/10/2011	16:10:07	143	19.8533
18/10/2011	16:10:37	143.5	19.84744

Carrigbyrne Extended Pumping Data 18/10/2011

Date	Time	Time (mins)	Water Level (m below the casing)
18/10/2011	16:11:07	144	19.8545
18/10/2011	16:11:37	144.5	19.854259
18/10/2011	16:12:07	145	19.85823
18/10/2011	16:12:37	145.5	19.85783
18/10/2011	16:13:07	146	19.85855
18/10/2011	16:13:37	146.5	19.8583
18/10/2011	16:14:07	147	19.860249
18/10/2011	16:14:37	147.5	19.86073
18/10/2011	16:15:07	148	19.86283
18/10/2011	16:15:37	148.5	19.861469
18/10/2011	16:16:07	149	19.86208
18/10/2011	16:16:37	149.5	19.866
18/10/2011	16:17:07	150	19.86682
18/10/2011	16:17:37	150.5	19.86933
18/10/2011	16:18:07	151	19.86976
18/10/2011	16:18:37	151.5	19.87075
18/10/2011	16:19:07	152	19.869049
18/10/2011	16:19:37	152.5	19.86974
18/10/2011	16:20:07	153	19.873219
18/10/2011	16:20:37	153.5	19.87403
18/10/2011	16:21:07	154	19.87601
18/10/2011	16:21:37	154.5	19.87283
18/10/2011	16:22:07	155	19.87867
18/10/2011	16:22:37	155.5	19.87646
18/10/2011	16:23:07	156	19.87238
18/10/2011	16:23:37	156.5	19.87873
18/10/2011	16:24:07	157	19.87337
18/10/2011	16:24:37	157.5	19.88474
18/10/2011	16:25:07	158	19.87869
18/10/2011	16:25:37	158.5	19.88195
18/10/2011	16:26:07	159	19.88079
18/10/2011	16:26:37	159.5	19.879779
18/10/2011	16:27:07	160	19.88068
18/10/2011	16:27:37	160.5	19.887099
18/10/2011	16:28:07	161	19.88156
18/10/2011	16:28:37	161.5	19.89159
18/10/2011	16:29:07	162	19.88184
18/10/2011	16:29:37	162.5	19.88534
18/10/2011	16:30:07	163	19.88972
18/10/2011	16:30:37	163.5	19.89034
18/10/2011	16:31:07	164	19.89191
18/10/2011	16:31:37	164.5	19.89084
18/10/2011	16:32:07	165	19.890169
18/10/2011	16:32:37	165.5	19.89054
18/10/2011	16:33:07	166	19.891499
18/10/2011	16:33:37	166.5	19.89856
18/10/2011	16:34:07	167	19.88717
18/10/2011	16:34:37	167.5	19.89539

Carrigbyrne Extended Pumping Data 18/10/2011

Date	Time	Time (mins)	Water Level (m below the casing)
18/10/2011	16:35:07	168	19.8912
18/10/2011	16:35:37	168.5	19.890769
18/10/2011	16:36:07	169	19.89766
18/10/2011	16:36:37	169.5	19.89599
18/10/2011	16:37:07	170	19.89745
18/10/2011	16:37:37	170.5	19.89912
18/10/2011	16:38:07	171	19.89872
18/10/2011	16:38:37	171.5	19.90067
18/10/2011	16:39:07	172	19.905559
18/10/2011	16:39:37	172.5	19.90193
18/10/2011	16:40:07	173	19.89906
18/10/2011	16:40:37	173.5	19.90719
18/10/2011	16:41:07	174	19.90316
18/10/2011	16:41:37	174.5	19.90532
18/10/2011	16:42:07	175	19.90586
18/10/2011	16:42:37	175.5	19.90649
18/10/2011	16:43:07	176	19.90402
18/10/2011	16:43:37	176.5	19.90769
18/10/2011	16:44:07	177	19.90917
18/10/2011	16:44:37	177.5	19.90597
18/10/2011	16:45:07	178	19.90693
18/10/2011	16:45:37	178.5	19.911339
18/10/2011	16:46:07	179	19.91149
18/10/2011	16:46:37	179.5	19.910819
18/10/2011	16:47:07	180	19.91724
18/10/2011	16:47:37	180.5	19.91445
18/10/2011	16:48:07	181	19.9132
18/10/2011	16:48:37	181.5	19.91623
18/10/2011	16:49:07	182	19.911889
18/10/2011	16:49:37	182.5	19.91565
18/10/2011	16:50:07	183	19.917069
18/10/2011	16:50:37	183.5	19.91477
18/10/2011	16:51:07	184	19.91679
18/10/2011	16:51:37	184.5	19.9211
18/10/2011	16:52:07	185	19.92005
18/10/2011	16:52:37	185.5	19.91881
18/10/2011	16:53:07	186	19.91934
18/10/2011	16:53:37	186.5	19.9211
18/10/2011	16:54:07	187	19.92213
18/10/2011	16:54:37	187.5	19.9214
18/10/2011	16:55:07	188	19.92368
18/10/2011	16:55:37	188.5	19.92666
18/10/2011	16:56:07	189	19.927
18/10/2011	16:56:37	189.5	19.92554
18/10/2011	16:57:07	190	19.93046
18/10/2011	16:57:37	190.5	19.927669
18/10/2011	16:58:07	191	19.92842
18/10/2011	16:58:37	191.5	19.927409

Carrigbyrne Extended Pumping Data 18/10/2011

Date	Time	Time (mins)	Water Level (m below the casing)
18/10/2011	16:59:07	192	19.92988
18/10/2011	16:59:37	192.5	19.92844
18/10/2011	17:00:07	193	19.93591
18/10/2011	17:00:37	193.5	19.93615
18/10/2011	17:01:07	194	19.93125
18/10/2011	17:01:37	194.5	19.93192
18/10/2011	17:02:07	195	19.93544
18/10/2011	17:02:37	195.5	19.936599
18/10/2011	17:03:07	196	19.9367
18/10/2011	17:03:37	196.5	19.93808
18/10/2011	17:04:07	197	19.9401
18/10/2011	17:04:37	197.5	19.941109
18/10/2011	17:05:07	198	19.94411
18/10/2011	17:05:37	198.5	19.93462
18/10/2011	17:06:07	199	19.93619
18/10/2011	17:06:37	199.5	19.939729
18/10/2011	17:07:07	200	19.94342
18/10/2011	17:07:37	200.5	19.94469
18/10/2011	17:08:07	201	19.94297
18/10/2011	17:08:37	201.5	19.94381
18/10/2011	17:09:07	202	19.94645
18/10/2011	17:09:37	202.5	19.94407
18/10/2011	17:10:07	203	19.94529
18/10/2011	17:10:37	203.5	19.943269
18/10/2011	17:11:07	204	19.950379
18/10/2011	17:11:37	204.5	19.9463
18/10/2011	17:12:07	205	19.94675
18/10/2011	17:12:37	205.5	19.95169
18/10/2011	17:13:07	206	19.94709
18/10/2011	17:13:37	206.5	19.94684
18/10/2011	17:14:07	207	19.95034
18/10/2011	17:14:37	207.5	19.95386
18/10/2011	17:15:07	208	19.94885
18/10/2011	17:15:37	208.5	19.948919
18/10/2011	17:16:07	209	19.94988
18/10/2011	17:16:37	209.5	19.95448
18/10/2011	17:17:07	210	19.95639
18/10/2011	17:17:37	210.5	19.958789
18/10/2011	17:18:07	211	19.95568
18/10/2011	17:18:37	211.5	19.953999
18/10/2011	17:19:07	212	19.95527
18/10/2011	17:19:37	212.5	19.95542
18/10/2011	17:20:07	213	19.96244
18/10/2011	17:20:37	213.5	19.959859
18/10/2011	17:21:07	214	19.95935
18/10/2011	17:21:37	214.5	19.96042
18/10/2011	17:22:07	215	19.958059
18/10/2011	17:22:37	215.5	19.958789

Carrigbyrne Extended Pumping Data 18/10/2011

Date	Time	Time (mins)	Water Level (m below the casing)
18/10/2011	17:23:07	216	19.96139
18/10/2011	17:23:37	216.5	19.958189
18/10/2011	17:24:07	217	19.96596
18/10/2011	17:24:37	217.5	19.961369
18/10/2011	17:25:07	218	19.963399
18/10/2011	17:25:37	218.5	19.96199
18/10/2011	17:26:07	219	19.96102
18/10/2011	17:26:37	219.5	19.96394
18/10/2011	17:27:07	220	19.96461
18/10/2011	17:27:37	220.5	19.96555
18/10/2011	17:28:07	221	19.96718
18/10/2011	17:28:37	221.5	19.9651
18/10/2011	17:29:07	222	19.966369
18/10/2011	17:29:37	222.5	19.96684
18/10/2011	17:30:07	223	19.9695
18/10/2011	17:30:37	223.5	19.97032
18/10/2011	17:31:07	224	19.97519
18/10/2011	17:31:37	224.5	19.971109
18/10/2011	17:32:07	225	19.97399
18/10/2011	17:32:37	225.5	19.973449
18/10/2011	17:33:07	226	19.97817
18/10/2011	17:33:37	226.5	19.973839
18/10/2011	17:34:07	227	19.97476
18/10/2011	17:34:37	227.5	19.978579
18/10/2011	17:35:07	228	19.978579
18/10/2011	17:35:37	228.5	19.97813
18/10/2011	17:36:07	229	19.97899
18/10/2011	17:36:37	229.5	19.9844
18/10/2011	17:37:07	230	19.98041
18/10/2011	17:37:37	230.5	19.98186
18/10/2011	17:38:07	231	19.98081
18/10/2011	17:38:37	231.5	19.9801
18/10/2011	17:39:07	232	19.98367
18/10/2011	17:39:37	232.5	19.98515
18/10/2011	17:40:07	233	19.98511
18/10/2011	17:40:37	233.5	19.98313
18/10/2011	17:41:07	234	19.98367
18/10/2011	17:41:37	234.5	19.983319
18/10/2011	17:42:07	235	19.98807
18/10/2011	17:42:37	235.5	19.98783
18/10/2011	17:43:07	236	19.98309
18/10/2011	17:43:37	236.5	19.98519
18/10/2011	17:44:07	237	19.98882
18/10/2011	17:44:37	237.5	19.991759
18/10/2011	17:45:07	238	19.98873
18/10/2011	17:45:37	238.5	19.99433
18/10/2011	17:46:07	239	19.98555
18/10/2011	17:46:37	239.5	19.987619

Carrigbyrne Extended Pumping Data 18/10/2011

Date	Time	Time (mins)	Water Level (m below the casing)
18/10/2011	17:47:07	240	19.99146
18/10/2011	17:47:37	240.5	19.99251
18/10/2011	17:48:07	241	19.995899
18/10/2011	17:48:37	241.5	19.99244
18/10/2011	17:49:07	242	19.989439
18/10/2011	17:49:37	242.5	19.99302
18/10/2011	17:50:07	243	19.99386
18/10/2011	17:50:37	243.5	19.99251
18/10/2011	17:51:07	244	19.99315
18/10/2011	17:51:37	244.5	19.994569
18/10/2011	17:52:07	245	19.99287
18/10/2011	17:52:37	245.5	19.99942
18/10/2011	17:53:07	246	20.00365
18/10/2011	17:53:37	246.5	19.99882
18/10/2011	17:54:07	247	19.99378
18/10/2011	17:54:37	247.5	19.99695
18/10/2011	17:55:07	248	19.998449
18/10/2011	17:55:37	248.5	20.00195
18/10/2011	17:56:07	249	19.99584
18/10/2011	17:56:37	249.5	20.00047
18/10/2011	17:57:07	250	20.00099
18/10/2011	17:57:37	250.5	20.01172
18/10/2011	17:58:07	251	20.00335
18/10/2011	17:58:37	251.5	20.0029
18/10/2011	17:59:07	252	20.00305
18/10/2011	17:59:37	252.5	20.00745
18/10/2011	18:00:07	253	20.00356
18/10/2011	18:00:37	253.5	20.00925
18/10/2011	18:01:07	254	20.007
18/10/2011	18:01:37	254.5	20.006889
18/10/2011	18:02:07	255	20.00824
18/10/2011	18:02:37	255.5	20.00734
18/10/2011	18:03:07	256	20.00977
18/10/2011	18:03:37	256.5	20.01058
18/10/2011	18:04:07	257	20.00386
18/10/2011	18:04:37	257.5	20.01567
18/10/2011	18:05:07	258	20.00824
18/10/2011	18:05:37	258.5	20.01093
18/10/2011	18:06:07	259	20.012539
18/10/2011	18:06:37	259.5	20.01324
18/10/2011	18:07:07	260	20.01481
18/10/2011	18:07:37	260.5	20.0129
18/10/2011	18:08:07	261	20.00966
18/10/2011	18:08:37	261.5	20.01713
18/10/2011	18:09:07	262	20.01541
18/10/2011	18:09:37	262.5	20.01601
18/10/2011	18:10:07	263	20.0143
18/10/2011	18:10:37	263.5	20.017749

Carrigbyrne Extended Pumping Data 18/10/2011

Date	Time	Time (mins)	Water Level (m below the casing)
18/10/2011	18:11:07	264	20.02131
18/10/2011	18:11:37	264.5	20.01739
18/10/2011	18:12:07	265	20.01558
18/10/2011	18:12:37	265.5	20.01503
18/10/2011	18:13:07	266	20.01919
18/10/2011	18:13:37	266.5	20.02192
18/10/2011	18:14:07	267	20.02198
18/10/2011	18:14:37	267.5	20.0146
18/10/2011	18:15:07	268	20.02106
18/10/2011	18:15:37	268.5	20.0243
18/10/2011	18:16:07	269	20.02138
18/10/2011	18:16:37	269.5	20.02292
18/10/2011	18:17:07	270	20.021419
18/10/2011	18:17:37	270.5	20.02146
18/10/2011	18:18:07	271	20.023999
18/10/2011	18:18:37	271.5	20.02541
18/10/2011	18:19:07	272	20.0238
18/10/2011	18:19:37	272.5	20.0258
18/10/2011	18:20:07	273	20.02355
18/10/2011	18:20:37	273.5	20.02591
18/10/2011	18:21:07	274	20.02632
18/10/2011	18:21:37	274.5	20.02537
18/10/2011	18:22:07	275	20.02638
18/10/2011	18:22:37	275.5	20.03213
18/10/2011	18:23:07	276	20.02451
18/10/2011	18:23:37	276.5	20.02606
18/10/2011	18:24:07	277	20.03086
18/10/2011	18:24:37	277.5	20.03615
18/10/2011	18:25:07	278	20.03157
18/10/2011	18:25:37	278.5	20.02868
18/10/2011	18:26:07	279	20.03263
18/10/2011	18:26:37	279.5	20.03243
18/10/2011	18:27:07	280	20.03269
18/10/2011	18:27:37	280.5	20.03157
18/10/2011	18:28:07	281	20.035689
18/10/2011	18:28:37	281.5	20.03247
18/10/2011	18:29:07	282	20.035089
18/10/2011	18:29:37	282.5	20.03458
18/10/2011	18:30:07	283	20.03378
18/10/2011	18:30:37	283.5	20.032879
18/10/2011	18:31:07	284	20.038269
18/10/2011	18:31:37	284.5	20.03773
18/10/2011	18:32:07	285	20.03125
18/10/2011	18:32:37	285.5	20.04089
18/10/2011	18:33:07	286	20.0413
18/10/2011	18:33:37	286.5	20.042749
18/10/2011	18:34:07	287	20.03323
18/10/2011	18:34:37	287.5	20.03988

Carrigbyrne Extended Pumping Data 18/10/2011

Date	Time	Time (mins)	Water Level (m below the casing)
18/10/2011	18:35:07	288	20.0401
18/10/2011	18:35:37	288.5	20.03524
18/10/2011	18:36:07	289	20.03782
18/10/2011	18:36:37	289.5	20.039389
18/10/2011	18:37:07	290	20.03778
18/10/2011	18:37:37	290.5	20.03902
18/10/2011	18:38:07	291	20.040949
18/10/2011	18:38:37	291.5	20.04235
18/10/2011	18:39:07	292	20.039989
18/10/2011	18:39:37	292.5	20.04196
18/10/2011	18:40:07	293	20.04838
18/10/2011	18:40:37	293.5	20.0414
18/10/2011	18:41:07	294	20.04514
18/10/2011	18:41:37	294.5	20.043059
18/10/2011	18:42:07	295	20.04323
18/10/2011	18:42:37	295.5	20.056599
18/10/2011	18:43:07	296	20.0475
18/10/2011	18:43:37	296.5	20.04958
18/10/2011	18:44:07	297	20.04786
18/10/2011	18:44:37	297.5	20.048269
18/10/2011	18:45:07	298	20.050219
18/10/2011	18:45:37	298.5	20.05014
18/10/2011	18:46:07	299	20.046809
18/10/2011	18:46:37	299.5	20.04984
18/10/2011	18:47:07	300	20.05325
18/10/2011	18:47:37	300.5	20.04967
18/10/2011	18:48:07	301	20.050219
18/10/2011	18:48:37	301.5	20.04709
18/10/2011	18:49:07	302	20.046809
18/10/2011	18:49:37	302.5	20.04896
18/10/2011	18:50:07	303	20.054129
18/10/2011	18:50:37	303.5	20.05211
18/10/2011	18:51:07	304	20.05119
18/10/2011	18:51:37	304.5	20.05113
18/10/2011	18:52:07	305	20.06169
18/10/2011	18:52:37	305.5	20.053059
18/10/2011	18:53:07	306	20.050979
18/10/2011	18:53:37	306.5	20.05776
18/10/2011	18:54:07	307	20.05851
18/10/2011	18:54:37	307.5	20.054859
18/10/2011	18:55:07	308	20.05583
18/10/2011	18:55:37	308.5	20.05205
18/10/2011	18:56:07	309	20.05579
18/10/2011	18:56:37	309.5	20.05593
18/10/2011	18:57:07	310	20.058399
18/10/2011	18:57:37	310.5	20.062799
18/10/2011	18:58:07	311	20.06669
18/10/2011	18:58:37	311.5	20.060979

Carrigbyrne Extended Pumping Data 18/10/2011

Date	Time	Time (mins)	Water Level (m below the casing)
18/10/2011	18:59:07	312	20.05941
18/10/2011	18:59:37	312.5	20.06205
18/10/2011	19:00:07	313	20.06289
18/10/2011	19:00:37	313.5	20.06471
18/10/2011	19:01:07	314	20.06441
18/10/2011	19:01:37	314.5	20.06179
18/10/2011	19:02:07	315	20.06583
18/10/2011	19:02:37	315.5	20.06546
18/10/2011	19:03:07	316	20.06396
18/10/2011	19:03:37	316.5	20.06982
18/10/2011	19:04:07	317	20.065639
18/10/2011	19:04:37	317.5	20.06961
18/10/2011	19:05:07	318	20.06851
18/10/2011	19:05:37	318.5	20.06643
18/10/2011	19:06:07	319	20.06875
18/10/2011	19:06:37	319.5	20.07102
18/10/2011	19:07:07	320	20.071369
18/10/2011	19:07:37	320.5	20.068189
18/10/2011	19:08:07	321	20.07424
18/10/2011	19:08:37	321.5	20.07046
18/10/2011	19:09:07	322	20.0736
18/10/2011	19:09:37	322.5	20.075509
18/10/2011	19:10:07	323	20.07456
18/10/2011	19:10:37	323.5	20.06583
18/10/2011	19:11:07	324	20.07555
18/10/2011	19:11:37	324.5	20.07701
18/10/2011	19:12:07	325	20.07349
18/10/2011	19:12:37	325.5	20.074049
18/10/2011	19:13:07	326	20.07592
18/10/2011	19:13:37	326.5	20.07778
18/10/2011	19:14:07	327	20.076
18/10/2011	19:14:37	327.5	20.07671
18/10/2011	19:15:07	328	20.07592
18/10/2011	19:15:37	328.5	20.07809
18/10/2011	19:16:07	329	20.07909
18/10/2011	19:16:37	329.5	20.07484
18/10/2011	19:17:07	330	20.08122
18/10/2011	19:17:37	330.5	20.0792
18/10/2011	19:18:07	331	20.079049
18/10/2011	19:18:37	331.5	20.08062
18/10/2011	19:19:07	332	20.07727
18/10/2011	19:19:37	332.5	20.08175
18/10/2011	19:20:07	333	20.07778
18/10/2011	19:20:37	333.5	20.07989
18/10/2011	19:21:07	334	20.08283
18/10/2011	19:21:37	334.5	20.07961
18/10/2011	19:22:07	335	20.08691
18/10/2011	19:22:37	335.5	20.080509

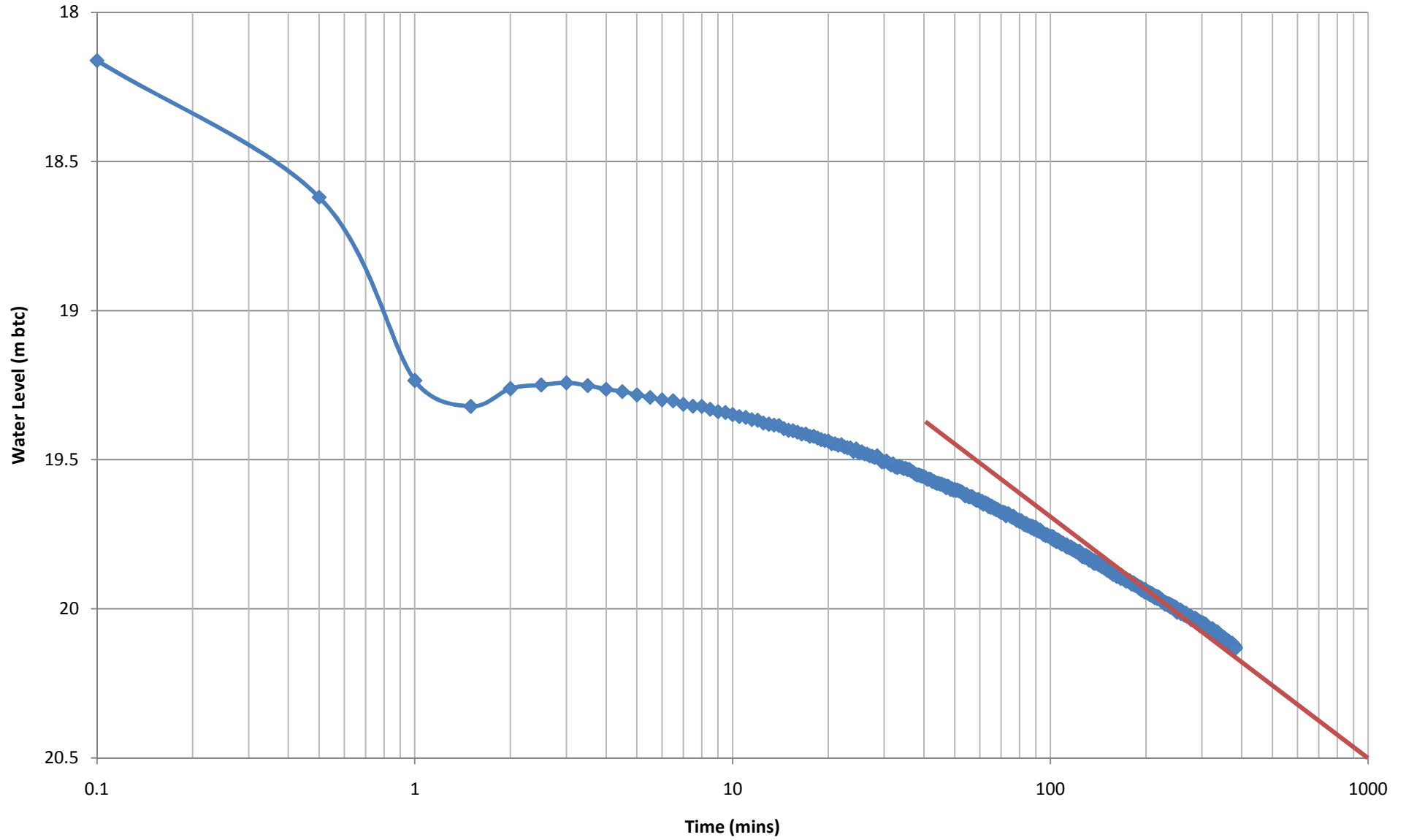
Carrigbyrne Extended Pumping Data 18/10/2011

Date	Time	Time (mins)	Water Level (m below the casing)
18/10/2011	19:23:07	336	20.07729
18/10/2011	19:23:37	336.5	20.08459
18/10/2011	19:24:07	337	20.08821
18/10/2011	19:24:37	337.5	20.08794
18/10/2011	19:25:07	338	20.09081
18/10/2011	19:25:37	338.5	20.08566
18/10/2011	19:26:07	339	20.096239
18/10/2011	19:26:37	339.5	20.0918
18/10/2011	19:27:07	340	20.09347
18/10/2011	19:27:37	340.5	20.09251
18/10/2011	19:28:07	341	20.08914
18/10/2011	19:28:37	341.5	20.08862
18/10/2011	19:29:07	342	20.08753
18/10/2011	19:29:37	342.5	20.08895
18/10/2011	19:30:07	343	20.09197
18/10/2011	19:30:37	343.5	20.09066
18/10/2011	19:31:07	344	20.08974
18/10/2011	19:31:37	344.5	20.09575
18/10/2011	19:32:07	345	20.09146
18/10/2011	19:32:37	345.5	20.09691
18/10/2011	19:33:07	346	20.09343
18/10/2011	19:33:37	346.5	20.09165
18/10/2011	19:34:07	347	20.09601
18/10/2011	19:34:37	347.5	20.09598
18/10/2011	19:35:07	348	20.09817
18/10/2011	19:35:37	348.5	20.09695
18/10/2011	19:36:07	349	20.100089
18/10/2011	19:36:37	349.5	20.09923
18/10/2011	19:37:07	350	20.098709
18/10/2011	19:37:37	350.5	20.102849
18/10/2011	19:38:07	351	20.09787
18/10/2011	19:38:37	351.5	20.09989
18/10/2011	19:39:07	352	20.09609
18/10/2011	19:39:37	352.5	20.09933
18/10/2011	19:40:07	353	20.10144
18/10/2011	19:40:37	353.5	20.10165
18/10/2011	19:41:07	354	20.099829
18/10/2011	19:41:37	354.5	20.10378
18/10/2011	19:42:07	355	20.10326
18/10/2011	19:42:37	355.5	20.10146
18/10/2011	19:43:07	356	20.107749
18/10/2011	19:43:37	356.5	20.10498
18/10/2011	19:44:07	357	20.103
18/10/2011	19:44:37	357.5	20.105169
18/10/2011	19:45:07	358	20.10513
18/10/2011	19:45:37	358.5	20.10831
18/10/2011	19:46:07	359	20.10867
18/10/2011	19:46:37	359.5	20.10685

Carrigbyrne Extended Pumping Data 18/10/2011

Date	Time	Time (mins)	Water Level (m below the casing)
18/10/2011	19:47:07	360	20.1123
18/10/2011	19:47:37	360.5	20.111289
18/10/2011	19:48:07	361	20.107359
18/10/2011	19:48:37	361.5	20.110949
18/10/2011	19:49:07	362	20.10912
18/10/2011	19:49:37	362.5	20.10837
18/10/2011	19:50:07	363	20.11002
18/10/2011	19:50:37	363.5	20.1111
18/10/2011	19:51:07	364	20.10822
18/10/2011	19:51:37	364.5	20.11264
18/10/2011	19:52:07	365	20.116289
18/10/2011	19:52:37	365.5	20.11271
18/10/2011	19:53:07	366	20.124699
18/10/2011	19:53:37	366.5	20.11462
18/10/2011	19:54:07	367	20.1173
18/10/2011	19:54:37	367.5	20.11653
18/10/2011	19:55:07	368	20.11798
18/10/2011	19:55:37	368.5	20.11648
18/10/2011	19:56:07	369	20.11839
18/10/2011	19:56:37	369.5	20.11713
18/10/2011	19:57:07	370	20.122879
18/10/2011	19:57:37	370.5	20.11723
18/10/2011	19:58:07	371	20.12238
18/10/2011	19:58:37	371.5	20.11966
18/10/2011	19:59:07	372	20.12507
18/10/2011	19:59:37	372.5	20.122489
18/10/2011	20:00:07	373	20.118839
18/10/2011	20:00:37	373.5	20.11537
18/10/2011	20:01:07	374	20.12
18/10/2011	20:01:37	374.5	20.12399
18/10/2011	20:02:07	375	20.12093
18/10/2011	20:02:37	375.5	20.12597
18/10/2011	20:03:07	376	20.12002
18/10/2011	20:03:37	376.5	20.12649
18/10/2011	20:04:07	377	20.12505
18/10/2011	20:04:37	377.5	20.127879
18/10/2011	20:05:07	378	20.12732
18/10/2011	20:05:37	378.5	20.12865
18/10/2011	20:06:07	379	20.122539
18/10/2011	20:06:37	379.5	20.12936
18/10/2011	20:07:07	380	20.12809
18/10/2011	20:07:37	380.5	20.12633
18/10/2011	20:08:07	381	20.13232
18/10/2011	20:08:37	381.5	20.13368
18/10/2011	20:09:07	382	20.12839
18/10/2011	20:09:37	382.5	20.131209

Pumping Data BH-1 18/10/2011



Carrigbyrne Recovery Data BH-1**18/10/2011**

Date	Time	Time (mins)	Water Level (m below the casing)
18/10/2011	10:50:00	0.0	
18/10/2011	10:59:07	9.0	18.6120
18/10/2011	10:59:37	9.5	18.6056
18/10/2011	11:00:07	10.0	18.6019
18/10/2011	11:00:37	10.5	18.5975
18/10/2011	11:01:07	11.0	18.5936
18/10/2011	11:01:37	11.5	18.5923
18/10/2011	11:02:07	12.0	18.5880
18/10/2011	11:02:37	12.5	18.5863
18/10/2011	11:03:07	13.0	18.5826
18/10/2011	11:03:37	13.5	18.5803
18/10/2011	11:04:07	14.0	18.5786
18/10/2011	11:04:37	14.5	18.5751
18/10/2011	11:05:07	15.0	18.5732
18/10/2011	11:05:37	15.5	18.5708
18/10/2011	11:06:07	16.0	18.5674
18/10/2011	11:06:37	16.5	18.5652
18/10/2011	11:07:07	17.0	18.5630
18/10/2011	11:07:37	17.5	18.5537
18/10/2011	11:08:07	18.0	18.5503
18/10/2011	11:08:37	18.5	18.5499
18/10/2011	11:09:07	19.0	18.5467
18/10/2011	11:09:37	19.5	18.5450
18/10/2011	11:10:07	20.0	18.5432
18/10/2011	11:10:37	20.5	18.5418
18/10/2011	11:11:07	21.0	18.5389
18/10/2011	11:11:37	21.5	18.5353
18/10/2011	11:12:07	22.0	18.5352
18/10/2011	11:12:37	22.5	18.5321
18/10/2011	11:13:07	23.0	18.5301
18/10/2011	11:13:37	23.5	18.5214
18/10/2011	11:14:07	24.0	18.5201
18/10/2011	11:14:37	24.5	18.5186
18/10/2011	11:15:07	25.0	18.5171
18/10/2011	11:15:37	25.5	18.5151
18/10/2011	11:16:07	26.0	18.5127
18/10/2011	11:16:37	26.5	18.5095
18/10/2011	11:17:07	27.0	18.5083
18/10/2011	11:17:37	27.5	18.5078
18/10/2011	11:18:07	28.0	18.5045
18/10/2011	11:18:37	28.5	18.5032
18/10/2011	11:19:07	29.0	18.4991
18/10/2011	11:19:37	29.5	18.4976
18/10/2011	11:20:07	30.0	18.4948
18/10/2011	11:20:37	30.5	18.4949
18/10/2011	11:21:07	31.0	18.4935
18/10/2011	11:21:37	31.5	18.4916
18/10/2011	11:22:07	32.0	18.4883
18/10/2011	11:22:37	32.5	18.4861
18/10/2011	11:23:07	33.0	18.4846

Carrigbyrne Recovery Data BH-1

18/10/2011

Date	Time	Time (mins)	Water Level (m below the casing)
18/10/2011	11:23:37	33.5	18.4831
18/10/2011	11:24:07	34.0	18.4817
18/10/2011	11:24:37	34.5	18.4785
18/10/2011	11:25:07	35.0	18.4782
18/10/2011	11:25:37	35.5	18.4761
18/10/2011	11:26:07	36.0	18.4746
18/10/2011	11:26:37	36.5	18.4719
18/10/2011	11:27:07	37.0	18.4706
18/10/2011	11:27:37	37.5	18.4674
18/10/2011	11:28:07	38.0	18.4669
18/10/2011	11:28:37	38.5	18.4645
18/10/2011	11:29:07	39.0	18.4616
18/10/2011	11:29:37	39.5	18.4619
18/10/2011	11:30:07	40.0	18.4607
18/10/2011	11:30:37	40.5	18.4584
18/10/2011	11:31:07	41.0	18.4581
18/10/2011	11:31:37	41.5	18.4553
18/10/2011	11:32:07	42.0	18.4546
18/10/2011	11:32:37	42.5	18.4523
18/10/2011	11:33:07	43.0	18.4499
18/10/2011	11:33:37	43.5	18.4481
18/10/2011	11:34:07	44.0	18.4471
18/10/2011	11:34:37	44.5	18.4465
18/10/2011	11:35:07	45.0	18.4444
18/10/2011	11:35:37	45.5	18.4415
18/10/2011	11:36:07	46.0	18.4432
18/10/2011	11:36:37	46.5	18.4395
18/10/2011	11:37:07	47.0	18.4389
18/10/2011	11:37:37	47.5	18.4382
18/10/2011	11:38:07	48.0	18.4351
18/10/2011	11:38:37	48.5	18.4358
18/10/2011	11:39:07	49.0	18.4323
18/10/2011	11:39:37	49.5	18.4288
18/10/2011	11:40:07	50.0	18.4291
18/10/2011	11:40:37	50.5	18.4287
18/10/2011	11:41:07	51.0	18.4256
18/10/2011	11:41:37	51.5	18.4258
18/10/2011	11:42:07	52.0	18.4237
18/10/2011	11:42:37	52.5	18.4213
18/10/2011	11:43:07	53.0	18.4217
18/10/2011	11:43:37	53.5	18.4195
18/10/2011	11:44:07	54.0	18.4191
18/10/2011	11:44:37	54.5	18.4164
18/10/2011	11:45:07	55.0	18.4169
18/10/2011	11:45:37	55.5	18.4143
18/10/2011	11:46:07	56.0	18.4146
18/10/2011	11:46:37	56.5	18.4118
18/10/2011	11:47:07	57.0	18.4104
18/10/2011	11:47:37	57.5	18.4097
18/10/2011	11:48:07	58.0	18.4089

Carrigbyrne Recovery Data BH-1**18/10/2011**

Date	Time	Time (mins)	Water Level (m below the casing)
18/10/2011	11:48:37	58.5	18.4073
18/10/2011	11:49:07	59.0	18.4061
18/10/2011	11:49:37	59.5	18.4052
18/10/2011	11:50:07	60.0	18.4034
18/10/2011	11:50:37	60.5	18.4033
18/10/2011	11:51:07	61.0	18.4003
18/10/2011	11:51:37	61.5	18.3992
18/10/2011	11:52:07	62.0	18.3974
18/10/2011	11:52:37	62.5	18.3954
18/10/2011	11:53:07	63.0	18.3968
18/10/2011	11:53:37	63.5	18.3944
18/10/2011	11:54:07	64.0	18.3923
18/10/2011	11:54:37	64.5	18.3918
18/10/2011	11:55:07	65.0	18.3902
18/10/2011	11:55:37	65.5	18.3893
18/10/2011	11:56:07	66.0	18.3899
18/10/2011	11:56:37	66.5	18.3872
18/10/2011	11:57:07	67.0	18.3863
18/10/2011	11:57:37	67.5	18.3861
18/10/2011	11:58:07	68.0	18.3839
18/10/2011	11:58:37	68.5	18.3825
18/10/2011	11:59:07	69.0	18.3819
18/10/2011	11:59:37	69.5	18.3818
18/10/2011	12:00:07	70.0	18.3795
18/10/2011	12:00:37	70.5	18.3796
18/10/2011	12:01:07	71.0	18.3774
18/10/2011	12:01:37	71.5	18.3763
18/10/2011	12:02:07	72.0	18.3736
18/10/2011	12:02:37	72.5	18.3741
18/10/2011	12:03:07	73.0	18.3707
18/10/2011	12:03:37	73.5	18.3718
18/10/2011	12:04:07	74.0	18.3694
18/10/2011	12:04:37	74.5	18.3688
18/10/2011	12:05:07	75.0	18.3673
18/10/2011	12:05:37	75.5	18.3665
18/10/2011	12:06:07	76.0	18.3661
18/10/2011	12:06:37	76.5	18.3657
18/10/2011	12:07:07	77.0	18.3635
18/10/2011	12:07:37	77.5	18.3627
18/10/2011	12:08:07	78.0	18.3600
18/10/2011	12:08:37	78.5	18.3608
18/10/2011	12:09:07	79.0	18.3580
18/10/2011	12:09:37	79.5	18.3597
18/10/2011	12:10:07	80.0	18.3549
18/10/2011	12:10:37	80.5	18.3560
18/10/2011	12:11:07	81.0	18.3558
18/10/2011	12:11:37	81.5	18.3533
18/10/2011	12:12:07	82.0	18.3521
18/10/2011	12:12:37	82.5	18.3512
18/10/2011	12:13:07	83.0	18.3505

Carrigbyrne Recovery Data BH-1**18/10/2011**

Date	Time	Time (mins)	Water Level (m below the casing)
18/10/2011	12:13:37	83.5	18.3481
18/10/2011	12:14:07	84.0	18.3484
18/10/2011	12:14:37	84.5	18.3469
18/10/2011	12:15:07	85.0	18.3464
18/10/2011	12:15:37	85.5	18.3452
18/10/2011	12:16:07	86.0	18.3437
18/10/2011	12:16:37	86.5	18.3437
18/10/2011	12:17:07	87.0	18.3407
18/10/2011	12:17:37	87.5	18.3404
18/10/2011	12:18:07	88.0	18.3385
18/10/2011	12:18:37	88.5	18.3373
18/10/2011	12:19:07	89.0	18.3384
18/10/2011	12:19:37	89.5	18.3362
18/10/2011	12:20:07	90.0	18.3352
18/10/2011	12:20:37	90.5	18.3338
18/10/2011	12:21:07	91.0	18.3334
18/10/2011	12:21:37	91.5	18.3320
18/10/2011	12:22:07	92.0	18.3309
18/10/2011	12:22:37	92.5	18.3303
18/10/2011	12:23:07	93.0	18.3287
18/10/2011	12:23:37	93.5	18.3280
18/10/2011	12:24:07	94.0	18.3259
18/10/2011	12:24:37	94.5	18.3258
18/10/2011	12:25:07	95.0	18.3253
18/10/2011	12:25:37	95.5	18.3235
18/10/2011	12:26:07	96.0	18.3226
18/10/2011	12:26:37	96.5	18.3215
18/10/2011	12:27:07	97.0	18.3178
18/10/2011	12:27:37	97.5	18.3197
18/10/2011	12:28:07	98.0	18.3181
18/10/2011	12:28:37	98.5	18.3168
18/10/2011	12:29:07	99.0	18.3154
18/10/2011	12:29:37	99.5	18.3148
18/10/2011	12:30:07	100.0	18.3134
18/10/2011	12:30:37	100.5	18.3127
18/10/2011	12:31:07	101.0	18.3120
18/10/2011	12:31:37	101.5	18.3117
18/10/2011	12:32:07	102.0	18.3116
18/10/2011	12:32:37	102.5	18.3086
18/10/2011	12:33:07	103.0	18.3073
18/10/2011	12:33:37	103.5	18.3070
18/10/2011	12:34:07	104.0	18.3061
18/10/2011	12:34:37	104.5	18.3050
18/10/2011	12:35:07	105.0	18.3034
18/10/2011	12:35:37	105.5	18.3020
18/10/2011	12:36:07	106.0	18.3024
18/10/2011	12:36:37	106.5	18.3028
18/10/2011	12:37:07	107.0	18.3011
18/10/2011	12:37:37	107.5	18.2999
18/10/2011	12:38:07	108.0	18.2982

Carrigbyrne Recovery Data BH-1**18/10/2011**

Date	Time	Time (mins)	Water Level (m below the casing)
18/10/2011	12:38:37	108.5	18.2964
18/10/2011	12:39:07	109.0	18.2970
18/10/2011	12:39:37	109.5	18.2960
18/10/2011	12:40:07	110.0	18.2946
18/10/2011	12:40:37	110.5	18.2928
18/10/2011	12:41:07	111.0	18.2932
18/10/2011	12:41:37	111.5	18.2923
18/10/2011	12:42:07	112.0	18.2905
18/10/2011	12:42:37	112.5	18.2902
18/10/2011	12:43:07	113.0	18.2916
18/10/2011	12:43:37	113.5	18.2900
18/10/2011	12:44:07	114.0	18.2883
18/10/2011	12:44:37	114.5	18.2856
18/10/2011	12:45:07	115.0	18.2854
18/10/2011	12:45:37	115.5	18.2853
18/10/2011	12:46:07	116.0	18.2838
18/10/2011	12:46:37	116.5	18.2839
18/10/2011	12:47:07	117.0	18.2846
18/10/2011	12:47:37	117.5	18.2810
18/10/2011	12:48:07	118.0	18.2800
18/10/2011	12:48:37	118.5	18.2806
18/10/2011	12:49:07	119.0	18.2803
18/10/2011	12:49:37	119.5	18.2784
18/10/2011	12:50:07	120.0	18.2775
18/10/2011	12:50:37	120.5	18.2761
18/10/2011	12:51:07	121.0	18.2753
18/10/2011	12:51:37	121.5	18.2756
18/10/2011	12:52:07	122.0	18.2738
18/10/2011	12:52:37	122.5	18.2733
18/10/2011	12:53:07	123.0	18.2718
18/10/2011	12:53:37	123.5	18.2703
18/10/2011	12:54:07	124.0	18.2697
18/10/2011	12:54:37	124.5	18.2689
18/10/2011	12:55:07	125.0	18.2659
18/10/2011	12:55:37	125.5	18.2659
18/10/2011	12:56:07	126.0	18.2657
18/10/2011	12:56:37	126.5	18.2663
18/10/2011	12:57:07	127.0	18.2643
18/10/2011	12:57:37	127.5	18.2480
18/10/2011	12:58:07	128.0	18.2478
18/10/2011	12:58:37	128.5	18.2328
18/10/2011	12:59:07	129.0	18.2299
18/10/2011	12:59:37	129.5	18.2294
18/10/2011	13:00:07	130.0	18.2304
18/10/2011	13:00:37	130.5	18.2286
18/10/2011	13:01:07	131.0	18.2287
18/10/2011	13:01:37	131.5	18.2280
18/10/2011	13:02:07	132.0	18.2254
18/10/2011	13:02:37	132.5	18.2257
18/10/2011	13:03:07	133.0	18.2253

Carrigbyrne Recovery Data BH-1

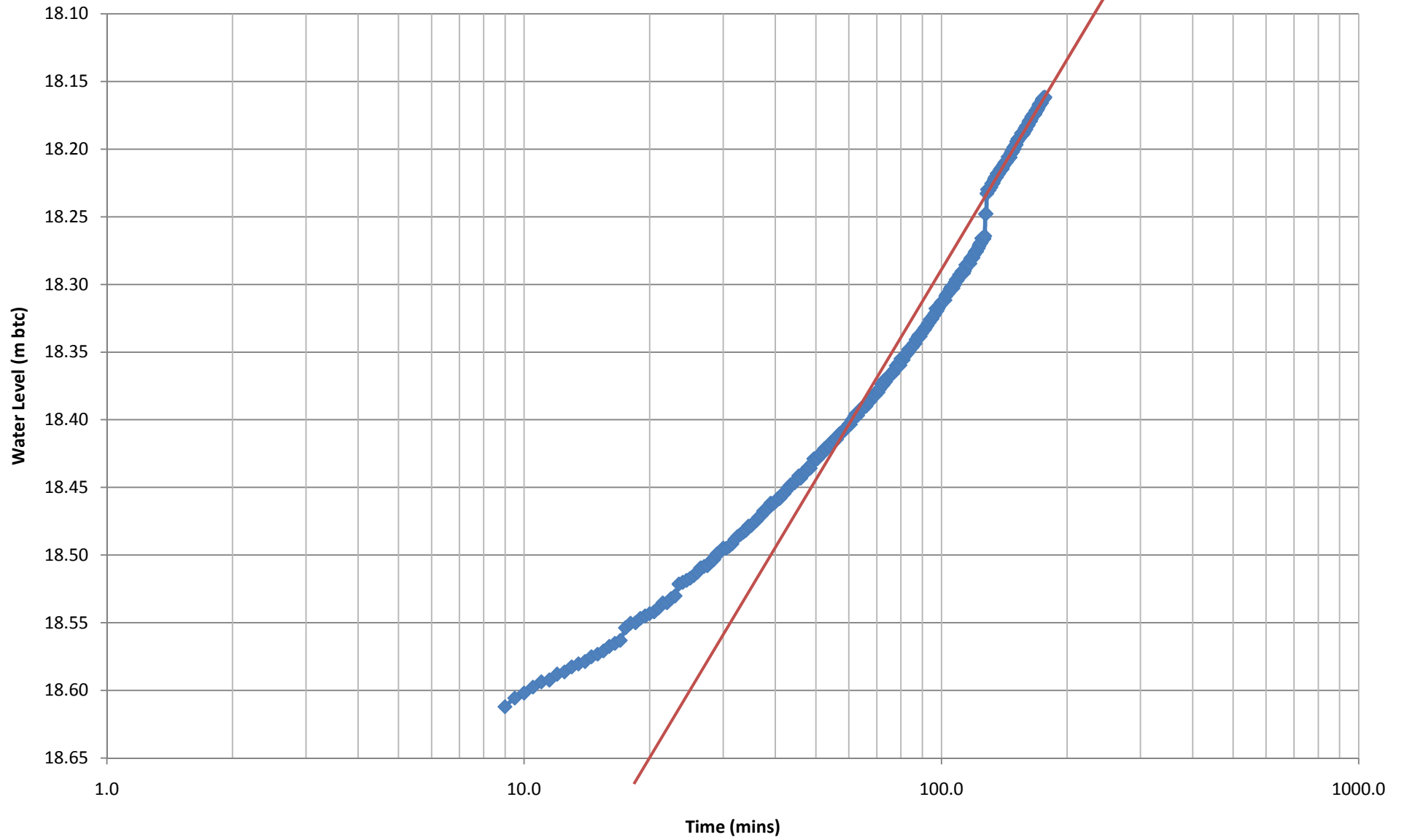
18/10/2011

Date	Time	Time (mins)	Water Level (m below the casing)
18/10/2011	13:03:37	133.5	18.2237
18/10/2011	13:04:07	134.0	18.2224
18/10/2011	13:04:37	134.5	18.2212
18/10/2011	13:05:07	135.0	18.2203
18/10/2011	13:05:37	135.5	18.2207
18/10/2011	13:06:07	136.0	18.2182
18/10/2011	13:06:37	136.5	18.2179
18/10/2011	13:07:07	137.0	18.2184
18/10/2011	13:07:37	137.5	18.2173
18/10/2011	13:08:07	138.0	18.2162
18/10/2011	13:08:37	138.5	18.2148
18/10/2011	13:09:07	139.0	18.2158
18/10/2011	13:09:37	139.5	18.2135
18/10/2011	13:10:07	140.0	18.2145
18/10/2011	13:10:37	140.5	18.2127
18/10/2011	13:11:07	141.0	18.2117
18/10/2011	13:11:37	141.5	18.2114
18/10/2011	13:12:07	142.0	18.2100
18/10/2011	13:12:37	142.5	18.2097
18/10/2011	13:13:07	143.0	18.2096
18/10/2011	13:13:37	143.5	18.2083
18/10/2011	13:14:07	144.0	18.2083
18/10/2011	13:14:37	144.5	18.2057
18/10/2011	13:15:07	145.0	18.2060
18/10/2011	13:15:37	145.5	18.2061
18/10/2011	13:16:07	146.0	18.2062
18/10/2011	13:16:37	146.5	18.2038
18/10/2011	13:17:07	147.0	18.2029
18/10/2011	13:17:37	147.5	18.2014
18/10/2011	13:18:07	148.0	18.2020
18/10/2011	13:18:37	148.5	18.2003
18/10/2011	13:19:07	149.0	18.1988
18/10/2011	13:19:37	149.5	18.1999
18/10/2011	13:20:07	150.0	18.1978
18/10/2011	13:20:37	150.5	18.1971
18/10/2011	13:21:07	151.0	18.1967
18/10/2011	13:21:37	151.5	18.1946
18/10/2011	13:22:07	152.0	18.1940

Carrigbyrne Recovery Data BH-1**18/10/2011**

Date	Time	Time (mins)	Water Level (m below the casing)
18/10/2011	13:22:37	152.5	18.1925
18/10/2011	13:23:07	153.0	18.1926
18/10/2011	13:23:37	153.5	18.1920
18/10/2011	13:24:07	154.0	18.1913
18/10/2011	13:24:37	154.5	18.1908
18/10/2011	13:25:07	155.0	18.1906
18/10/2011	13:25:37	155.5	18.1883
18/10/2011	13:26:07	156.0	18.1895
18/10/2011	13:26:37	156.5	18.1876
18/10/2011	13:27:07	157.0	18.1888
18/10/2011	13:27:37	157.5	18.1877
18/10/2011	13:28:07	158.0	18.1870
18/10/2011	13:28:37	158.5	18.1855
18/10/2011	13:29:07	159.0	18.1843
18/10/2011	13:29:37	159.5	18.1854
18/10/2011	13:30:07	160.0	18.1828
18/10/2011	13:30:37	160.5	18.1832
18/10/2011	13:31:07	161.0	18.1826
18/10/2011	13:31:37	161.5	18.1819
18/10/2011	13:32:07	162.0	18.1800
18/10/2011	13:32:37	162.5	18.1790
18/10/2011	13:33:07	163.0	18.1793
18/10/2011	13:33:37	163.5	18.1793
18/10/2011	13:34:07	164.0	18.1779
18/10/2011	13:34:37	164.5	18.1763
18/10/2011	13:35:07	165.0	18.1758
18/10/2011	13:35:37	165.5	18.1758
18/10/2011	13:36:07	166.0	18.1744
18/10/2011	13:36:37	166.5	18.1748
18/10/2011	13:37:07	167.0	18.1741
18/10/2011	13:37:37	167.5	18.1743
18/10/2011	13:38:07	168.0	18.1730
18/10/2011	13:38:37	168.5	18.1715
18/10/2011	13:39:07	169.0	18.1711
18/10/2011	13:39:37	169.5	18.1713
18/10/2011	13:40:07	170.0	18.1702
18/10/2011	13:40:37	170.5	18.1696
18/10/2011	13:41:07	171.0	18.1685
18/10/2011	13:41:37	171.5	18.1669
18/10/2011	13:42:07	172.0	18.1676
18/10/2011	13:42:37	172.5	18.1663
18/10/2011	13:43:07	173.0	18.1663
18/10/2011	13:43:37	173.5	18.1660
18/10/2011	13:44:07	174.0	18.1647
18/10/2011	13:44:37	174.5	18.1633
18/10/2011	13:45:07	175.0	18.1626
18/10/2011	13:45:37	175.5	18.1625
18/10/2011	13:46:07	176.0	18.1619
18/10/2011	13:46:37	176.5	18.1625
18/10/2011	13:47:07	177.0	18.1616

Recovery Data in BH-1 18/10/2011



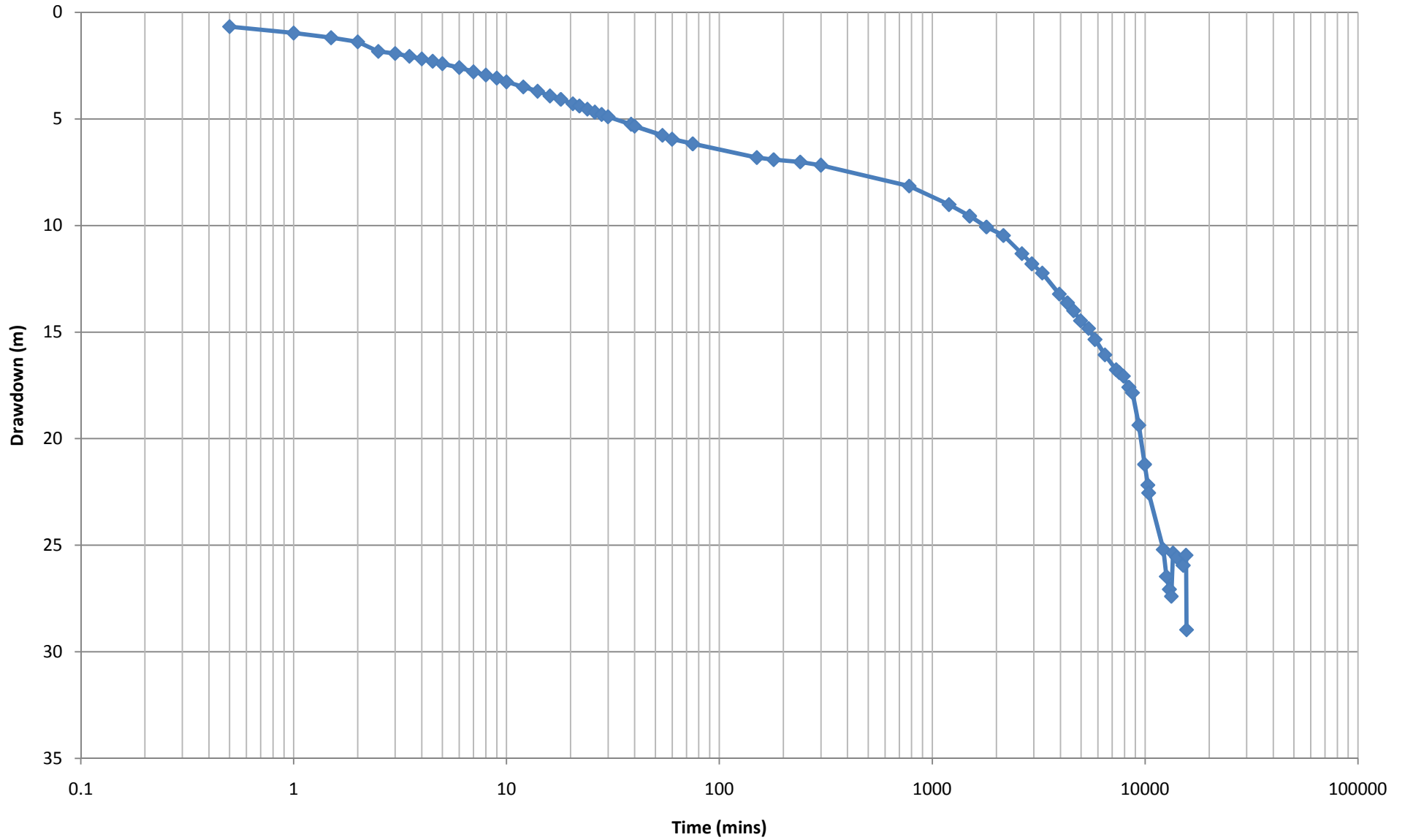
Bottled Water Pumping Data

Time (mins)	Water Level (m below the casing)	Drawdown
0.5	18.7	0.67
1	19	0.97
1.5	19.22	1.19
2	19.41	1.38
2.5	19.86	1.83
3	19.96	1.93
3.5	20.09	2.06
4	20.21	2.18
4.5	20.32	2.29
5	20.44	2.41
6	20.62	2.59
7	20.82	2.79
8	20.97	2.94
9	21.11	3.08
10	21.29	3.26
12	21.53	3.5
14	21.73	3.7
16	21.95	3.92
18	22.11	4.08
20.5	22.32	4.29
22	22.42	4.39
24	22.57	4.54
26	22.71	4.68
28	22.82	4.79
30	22.93	4.9
38.5	23.28	5.25
40	23.37	5.34
54	23.8	5.77
60	23.98	5.95
75	24.2	6.17
150	24.84	6.81
180	24.94	6.91
240	25.05	7.02
300	25.2	7.17
780	26.18	8.15
1200	27.05	9.02
1500	27.59	9.56
1800	28.1	10.07
2160	28.5	10.47
2640	29.35	11.32
2940	29.83	11.8
3290	30.26	12.23
3960	31.25	13.22
4320	31.66	13.63
4620	32.03	14
4800	32.5	14.47

Bottled Water Pumping Data

Time (mins)	Water Level (m below the casing)	Drawdown
5820	33.38	15.35
6480	34.1	16.07
7320	34.8	16.77
7560	34.93	16.9
7920	35.1	17.07
8400	35.62	17.59
8730	35.88	17.85
9360	37.4	19.37
9960	39.24	21.21
10320	40.21	22.18
10410	40.58	22.55
12190	43.24	25.21
12600	44.5	26.47
13020	45.1	27.07
13300	45.43	27.4
13547	43.4	25.37
14100	43.6	25.57
15120	43.98	25.95
15580	43.5	25.47
15670	47	28.97

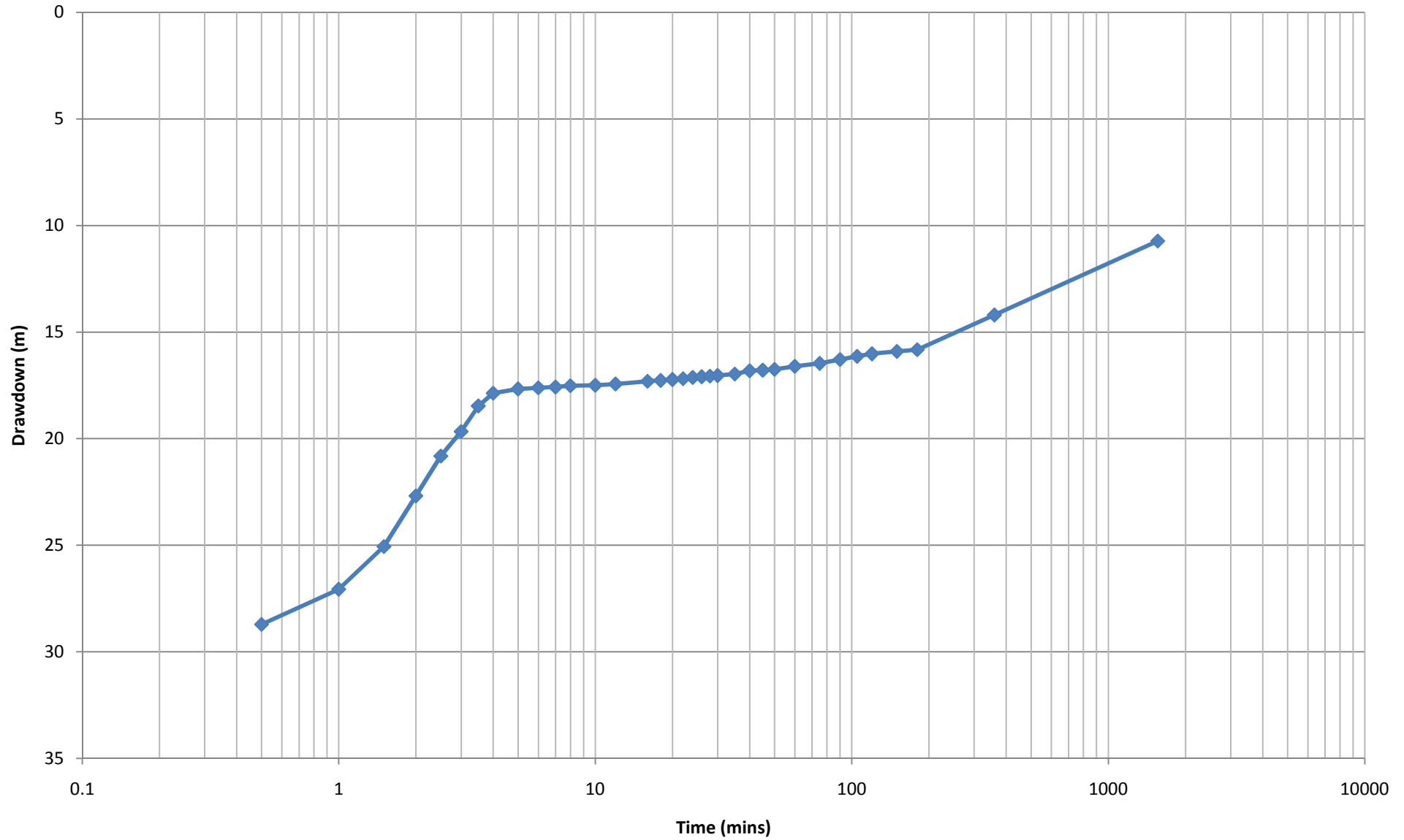
Bottled Water Borehole Pumping Test Data



Bottled Water Recovery Data

Time (mins)	Drawdown (m)
0.5	28.72
1	27.07
1.5	25.07
2	22.69
2.5	20.82
3	19.67
3.5	18.47
4	17.87
5	17.67
6	17.62
7	17.58
8	17.52
10	17.5
12	17.44
16	17.31
18	17.27
20	17.23
22	17.19
24	17.13
26	17.1
28	17.07
30	17.04
35	16.97
40	16.82
45	16.79
50	16.75
60	16.61
75	16.47
90	16.29
105	16.14
120	16.02
150	15.91
180	15.83
360	14.2
1560	10.73

Bottled Water Recovery Data



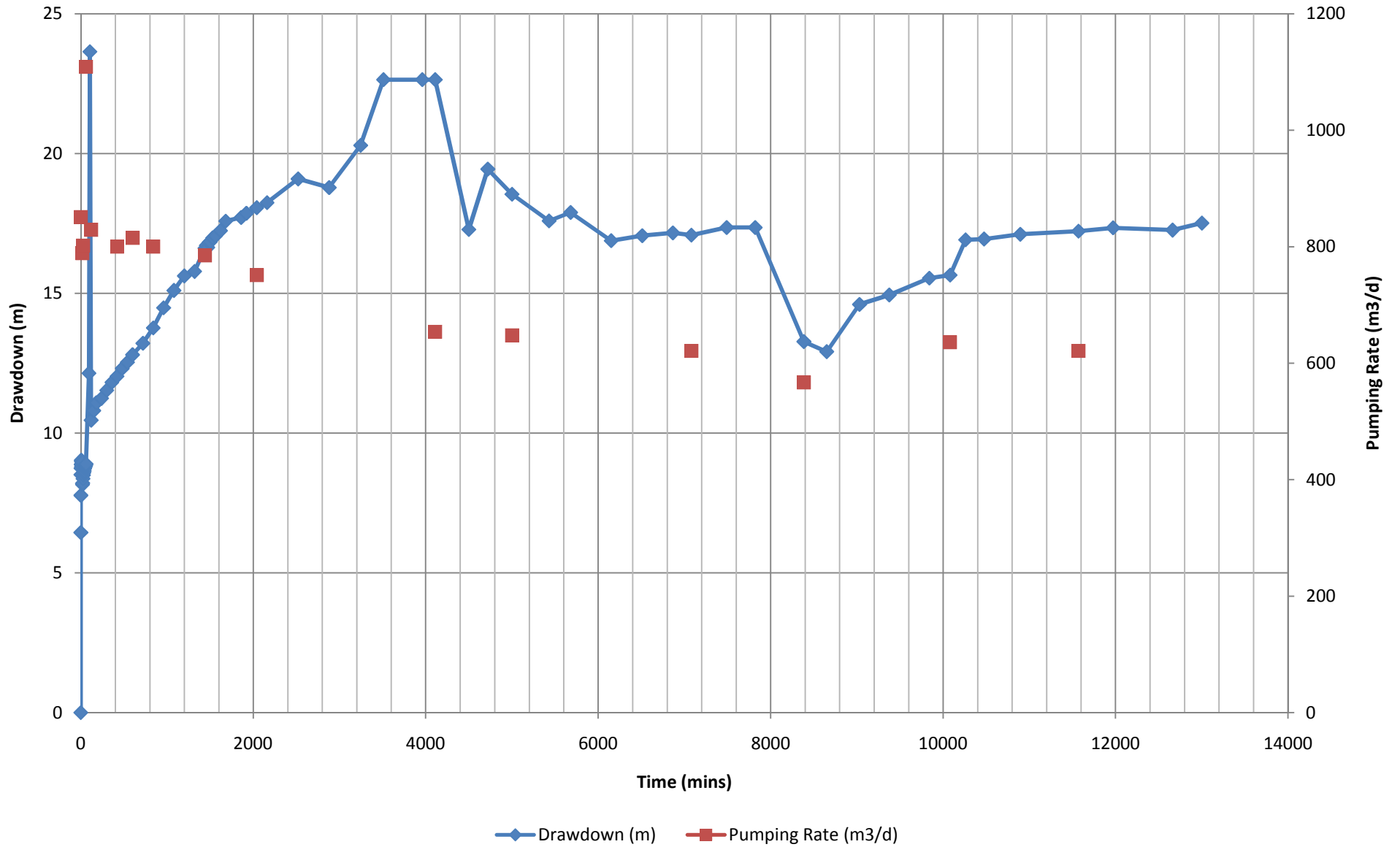
TW-31/10 Pumping Data

Time	Water Level (m btc)	Drawdown (m)	Pumping Rate (m3/d)
0	3.36	0	851
0.5	9.8	6.44	
1	11.13	7.77	
1.5	11.87	8.51	
2	12.1	8.74	
3	12.24	8.88	
5	12.35	8.99	
6	12.39	9.03	
8	12.16	8.8	
10	12.22	8.86	
12	12.23	8.87	
14	12.12	8.76	
16	12.32	8.96	
18	11.55	8.19	789
20	11.52	8.16	
22	11.57	8.21	
26	11.73	8.37	802
30	11.85	8.49	
35	11.94	8.58	
40	12	8.64	
45	12.09	8.73	
50	12.15	8.79	
55	12.2	8.84	
60	12.25	8.89	1109
95	15.5	12.14	
105	27	23.64	
120	13.82	10.46	829
150	14.16	10.8	
180	14.44	11.08	
240	14.6	11.24	
300	14.89	11.53	
360	15.17	11.81	
420	15.39	12.03	800
480	15.67	12.31	
540	15.89	12.53	
600	16.16	12.8	815
720	16.57	13.21	
840	17.12	13.76	800
960	17.84	14.48	
1080	18.46	15.1	
1200	18.98	15.62	
1320	19.14	15.78	
1440	19.97	16.61	785
1455	20.07	16.71	
1470	20	16.64	
1485	20.17	16.81	
1500	20.2	16.84	

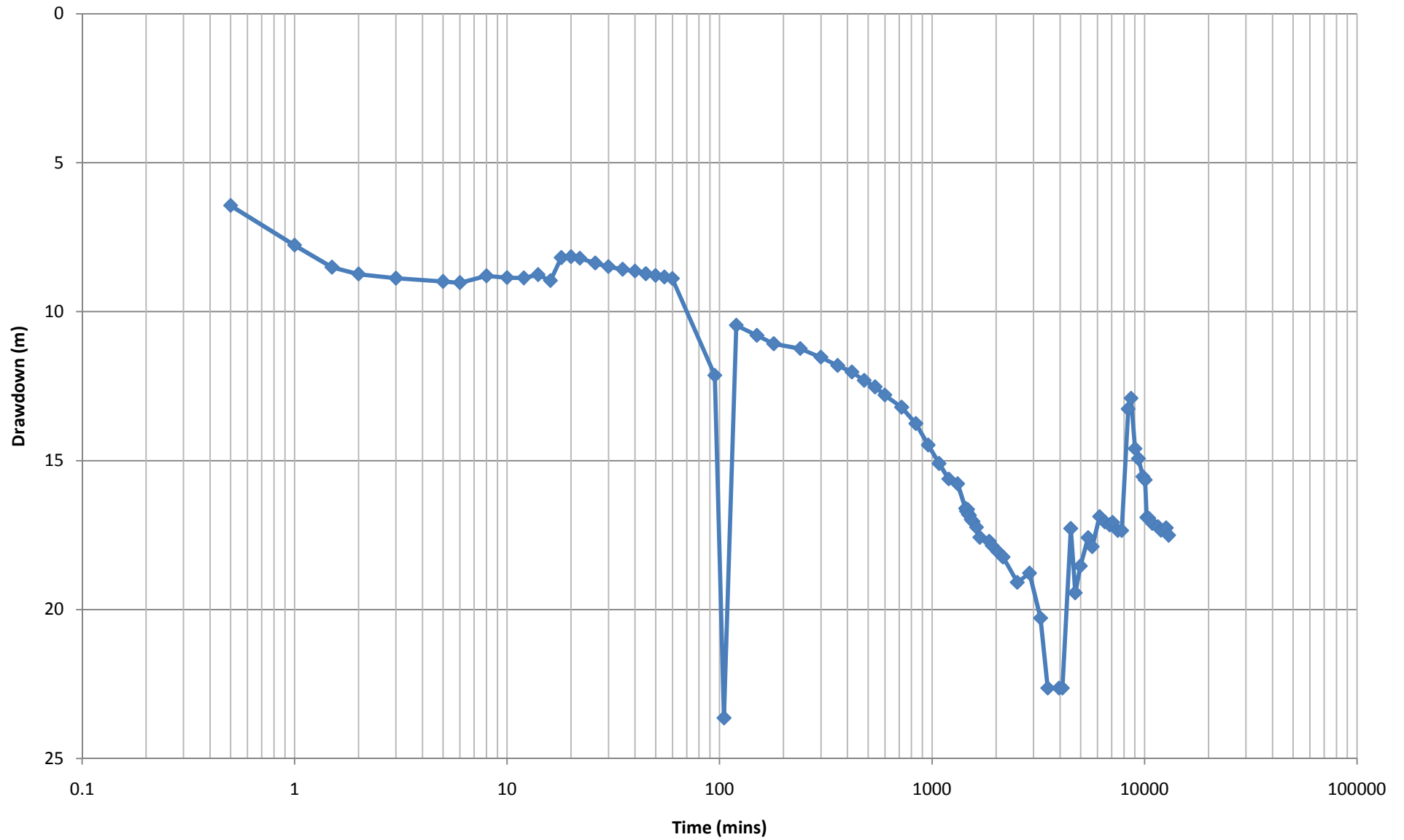
TW-31/10 Pumping Data

Time	Water Level (m btc)	Drawdown (m)	Pumping Rate (m3/d)
1560	20.41	17.05	
1620	20.6	17.24	
1680	20.94	17.58	
1860	21.07	17.71	
1920	21.22	17.86	
2040	21.42	18.06	751
2160	21.6	18.24	
2520	22.45	19.09	
2880	22.14	18.78	
3245	23.65	20.29	
3510	26	22.64	
3960	26	22.64	
4110	26	22.64	654
4500	20.64	17.28	
4720	22.8	19.44	
5000	21.9	18.54	648
5430	20.95	17.59	
5680	21.25	17.89	
6150	20.24	16.88	
6510	20.42	17.06	
6865	20.52	17.16	
7080	20.44	17.08	621
7490	20.71	17.35	
7820	20.71	17.35	
8385	16.63	13.27	567
8650	16.27	12.91	
9030	17.96	14.6	
9375	18.3	14.94	
9840	18.9	15.54	
10080	19.01	15.65	636
10260	20.27	16.91	
10475	20.3	16.94	

TW 35/1 Pumping Data and Pumping Rate



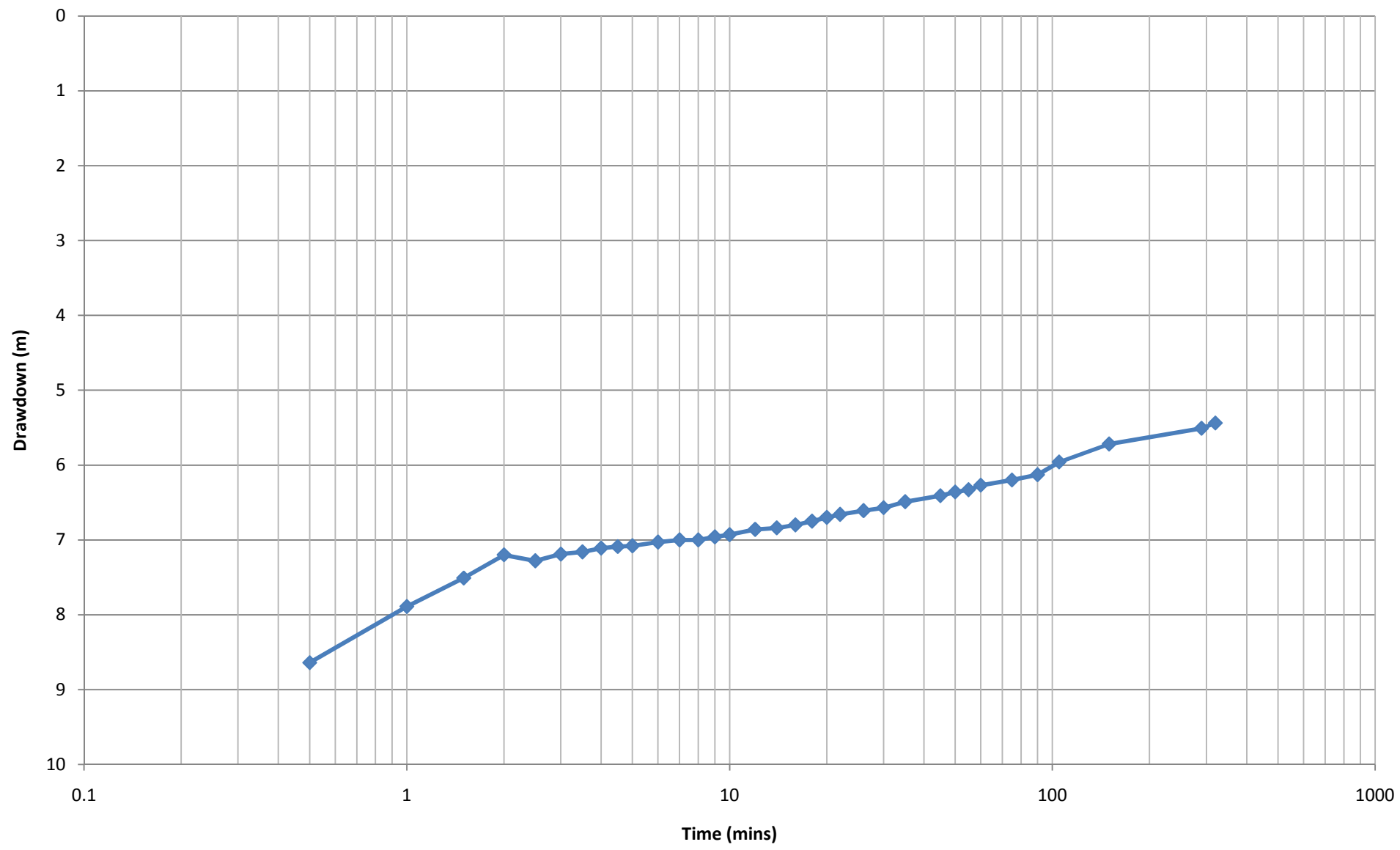
TW 31/1 Pumping Test Data



TW 31/1 Recovery Data

Time	Water Level (m btc)	Drawdown (m)
0	20.87	17.51
0.5	12	8.64
1	11.25	7.89
1.5	10.87	7.51
2	10.56	7.2
2.5	10.64	7.28
3	10.55	7.19
3.5	10.52	7.16
4	10.47	7.11
4.5	10.45	7.09
5	10.44	7.08
6	10.39	7.03
7	10.36	7
8	10.36	7
9	10.32	6.96
10	10.29	6.93
12	10.22	6.86
14	10.2	6.84
16	10.16	6.8
18	10.11	6.75
20	10.06	6.7
22	10.02	6.66
26	9.97	6.61
30	9.93	6.57
35	9.85	6.49
45	9.77	6.41
50	9.72	6.36
55	9.69	6.33
60	9.63	6.27
75	9.56	6.2
90	9.49	6.13
105	9.32	5.96
150	9.08	5.72
290	8.87	5.51
320	8.8	5.44

TW 31/1 Recovery Data



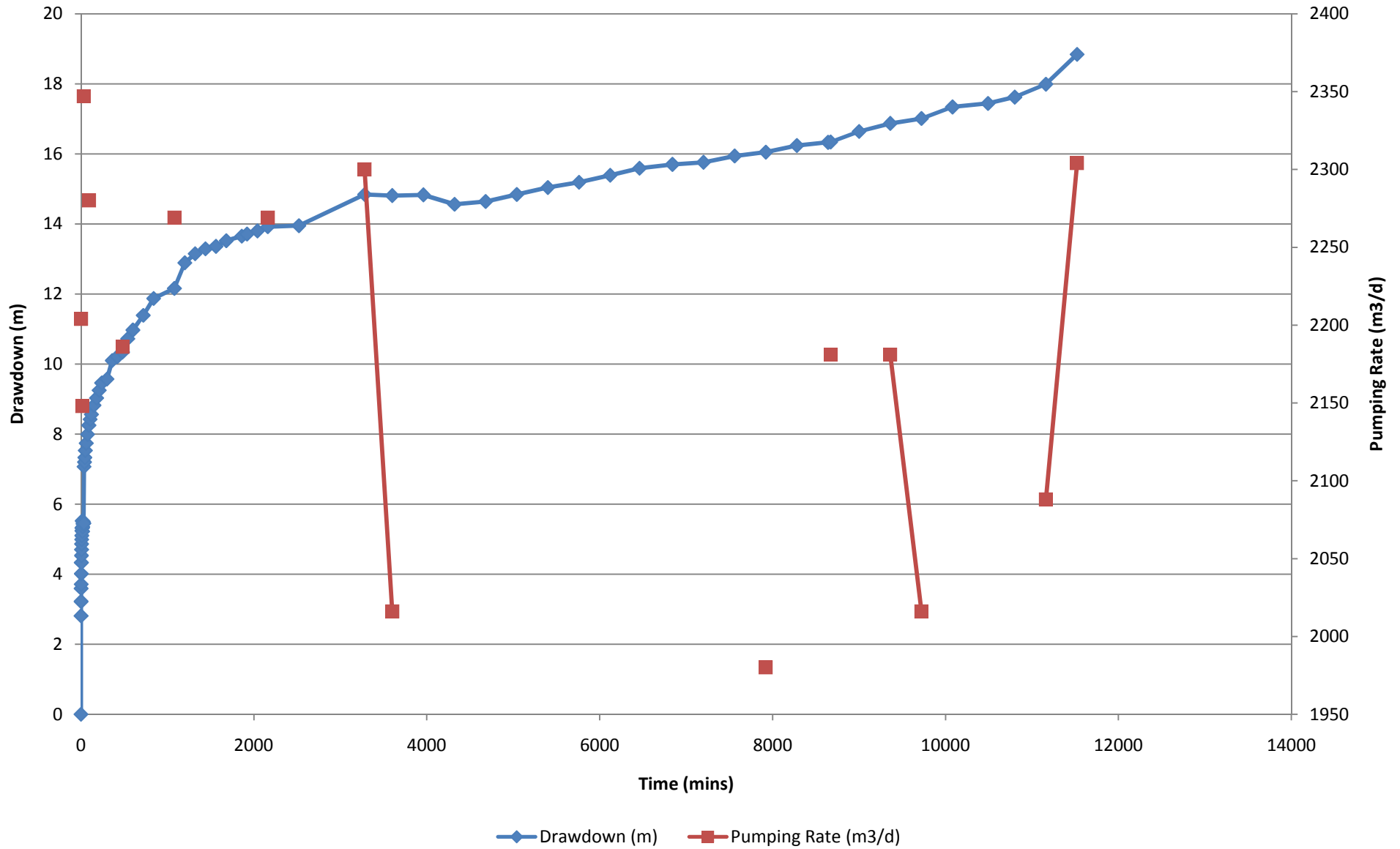
TW-31 Pumping Data

Time	Water Level (m btc)	Drawdown (m)	Pumping Rate (m3/d)
0	2.52	0	2204
0.5	5.33	2.81	
1	5.74	3.22	
1.5	6.11	3.59	
2	6.23	3.71	
3	6.53	4.01	
4	6.85	4.33	
5	7.05	4.53	
6	7.22	4.7	
7	7.38	4.86	
8	7.51	4.99	
9	7.62	5.1	
10	7.76	5.24	
12	7.84	5.32	
14	8.04	5.52	2148
16	7.84	5.32	
18	7.74	5.22	
20	7.87	5.35	
22	7.96	5.44	
24	8.03	5.51	
28	8	5.48	
30	7.97	5.45	2347
31	7.97	5.45	
35	9.59	7.07	
40	9.72	7.2	
45	9.85	7.33	
50	10.05	7.53	
60	10.26	7.74	
75	10.51	7.99	
90	10.77	8.25	2280
105	10.94	8.42	
120	11.08	8.56	
150	11.34	8.82	
180	11.55	9.03	
210	11.77	9.25	
240	11.98	9.46	
300	12.09	9.57	
360	12.62	10.1	
420	12.73	10.21	
480	12.86	10.34	2186
540	13.24	10.72	
600	13.49	10.97	
720	13.91	11.39	
840	14.39	11.87	
1080	14.68	12.16	2269
1200	15.41	12.89	
1320	15.67	13.15	

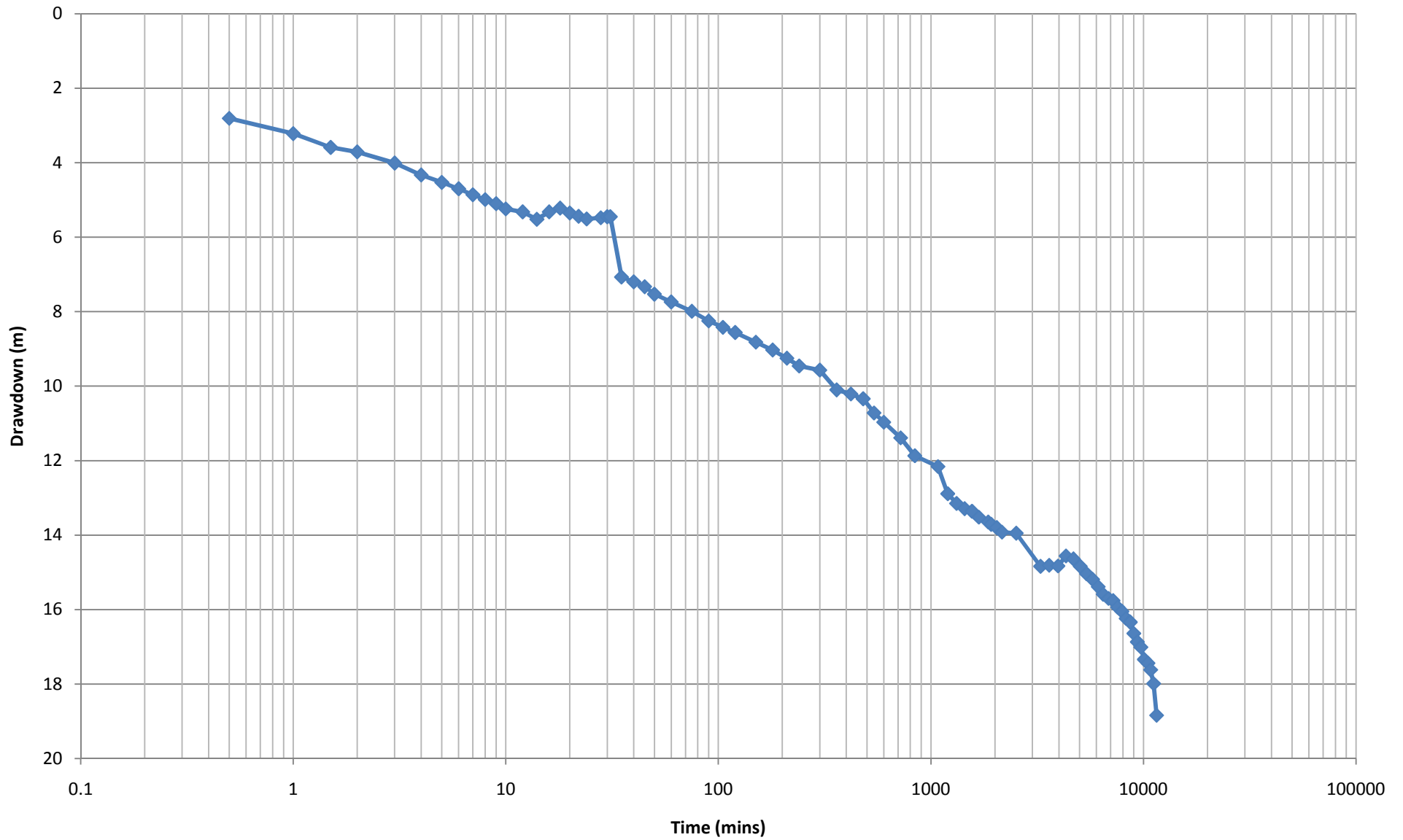
TW-31 Pumping Data

Time	Water Level (m btc)	Drawdown (m)	Pumping Rate (m³/d)
1440	15.81	13.29	
1560	15.88	13.36	
1680	16.04	13.52	
1860	16.17	13.65	
1920	16.23	13.71	
2040	16.32	13.8	
2160	16.44	13.92	2269
2520	16.47	13.95	
3280	17.36	14.84	2300
3600	17.33	14.81	2016
3960	17.35	14.83	
4320	17.08	14.56	
4680	17.16	14.64	
5040	17.36	14.84	
5400	17.56	15.04	
5760	17.71	15.19	
6120	17.91	15.39	
6460	18.11	15.59	
6840	18.22	15.7	
7200	18.28	15.76	
7560	18.46	15.94	
7920	18.57	16.05	1980
8280	18.76	16.24	
8640	18.85	16.33	
8670	18.86	16.34	2181
9000	19.16	16.64	
9360	19.39	16.87	2181
9720	19.53	17.01	2016
10080	19.86	17.34	
10490	19.96	17.44	
10800	20.14	17.62	
11160	20.51	17.99	2088
11520	21.36	18.84	2304

TW 31/10 Pumping Data and Pumping Rate



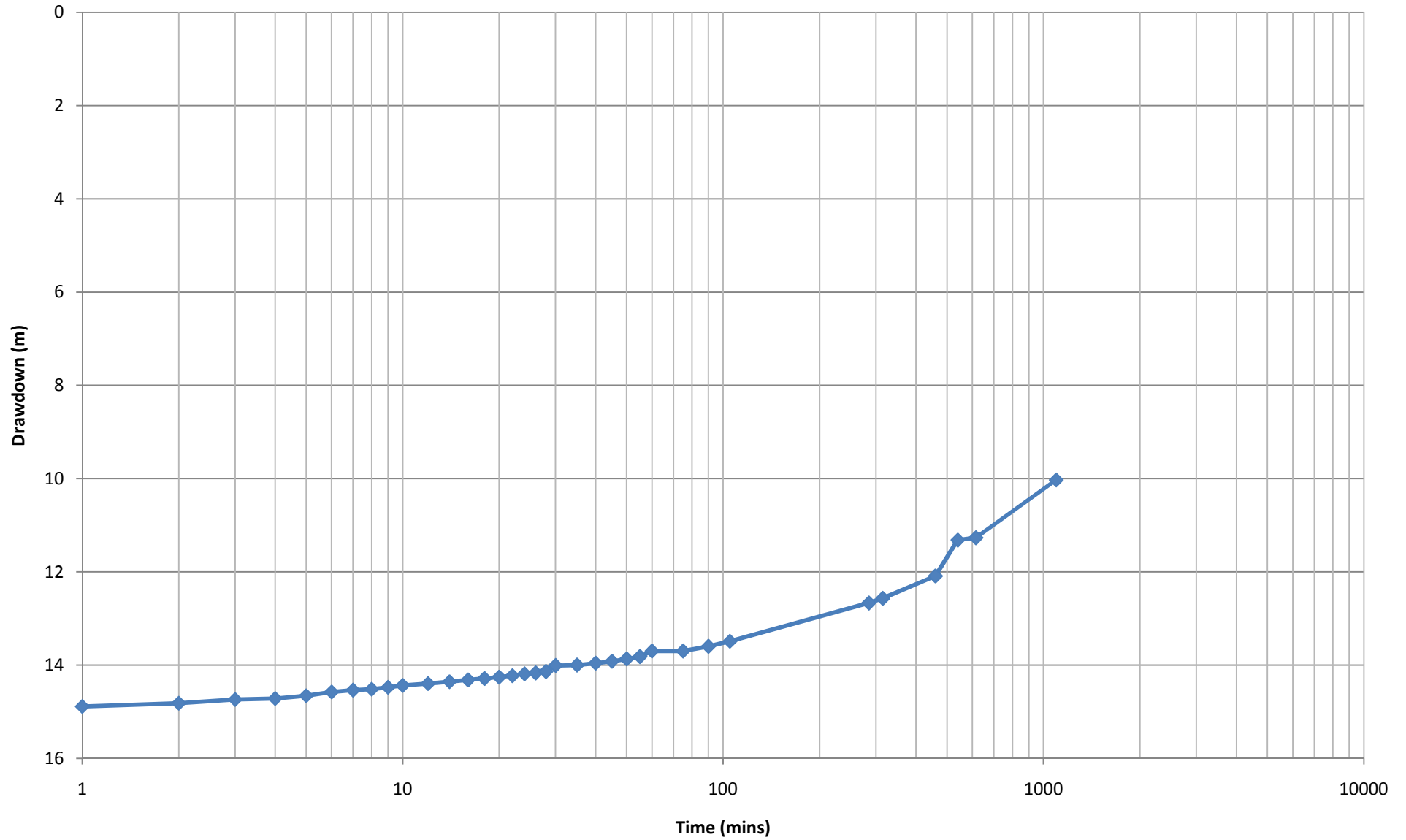
TW 31/10 Pumping Test Data



TW 31/10 Recovery Data

Time	Water Level (m btc)	Drawdown (m)
0	21.95	18.84
1	18	14.89
2	17.93	14.82
3	17.85	14.74
4	17.83	14.72
5	17.77	14.66
6	17.69	14.58
7	17.65	14.54
8	17.63	14.52
9	17.59	14.48
10	17.55	14.44
12	17.51	14.4
14	17.47	14.36
16	17.43	14.32
18	17.4	14.29
20	17.37	14.26
22	17.34	14.23
24	17.3	14.19
26	17.28	14.17
28	17.25	14.14
30	17.12	14.01
35	17.11	14
40	17.07	13.96
45	17.03	13.92
50	16.98	13.87
55	16.93	13.82
60	16.81	13.7
75	16.81	13.7
90	16.71	13.6
105	16.6	13.49
285	15.78	12.67
315	15.68	12.57
460	15.2	12.09
540	14.43	11.32
615	14.38	11.27
1095	13.14	10.03

TW 31/10 Recovery Data



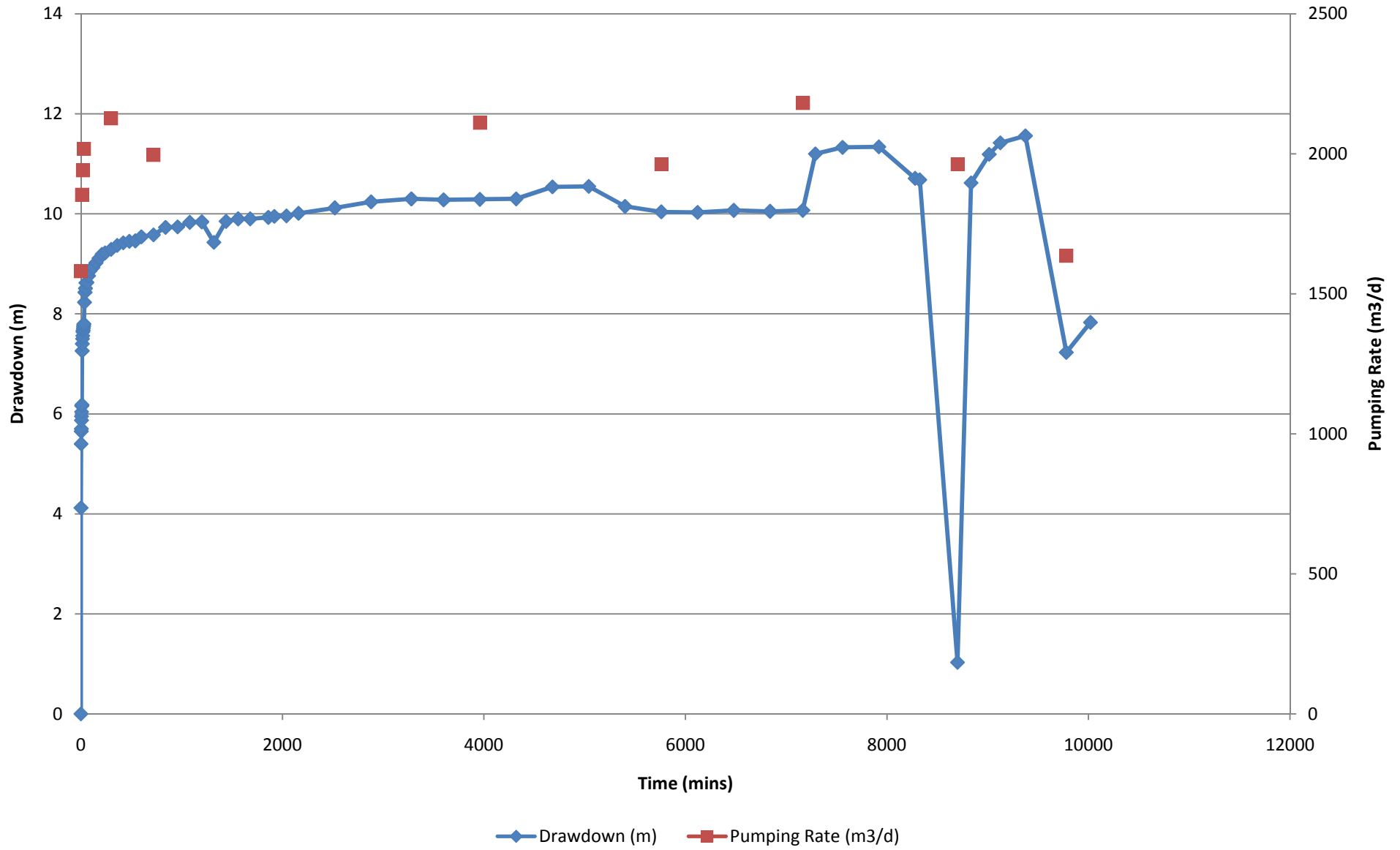
TW-35/7 Pumping Data

Time	Water Level (m btc)	Drawdown (m)	Pumping Rate (m3/d)
0	3.14	0	1581
1	7.26	4.12	
2	8.54	5.4	
3	8.79	5.65	
4	8.84	5.7	
5	9.01	5.87	
6	9.09	5.95	
7	9.18	6.04	
8	9.3	6.16	
9	9.3	6.16	
10	9.32	6.18	1854
12	10.4	7.26	
14	10.54	7.4	
16	10.64	7.5	
18	10.7	7.56	1941
20	10.78	7.64	
22	10.81	7.67	
24	10.85	7.71	
26	10.89	7.75	
28	10.92	7.78	
30	10.94	7.8	2018
35	11.37	8.23	
40	11.57	8.43	
45	11.65	8.51	
50	11.76	8.62	
55	11.76	8.62	
60	11.77	8.63	
75	11.9	8.76	
90	12	8.86	
105	12.05	8.91	
120	12.07	8.93	
150	12.16	9.02	
180	12.25	9.11	
210	12.33	9.19	
240	12.36	9.22	
300	12.43	9.29	2127
360	12.51	9.37	
420	12.56	9.42	
480	12.59	9.45	
540	12.6	9.46	
600	12.68	9.54	
720	12.72	9.58	1996
840	12.87	9.73	
960	12.88	9.74	
1080	12.97	9.83	
1200	12.98	9.84	
1320	12.57	9.43	
1440	12.99	9.85	

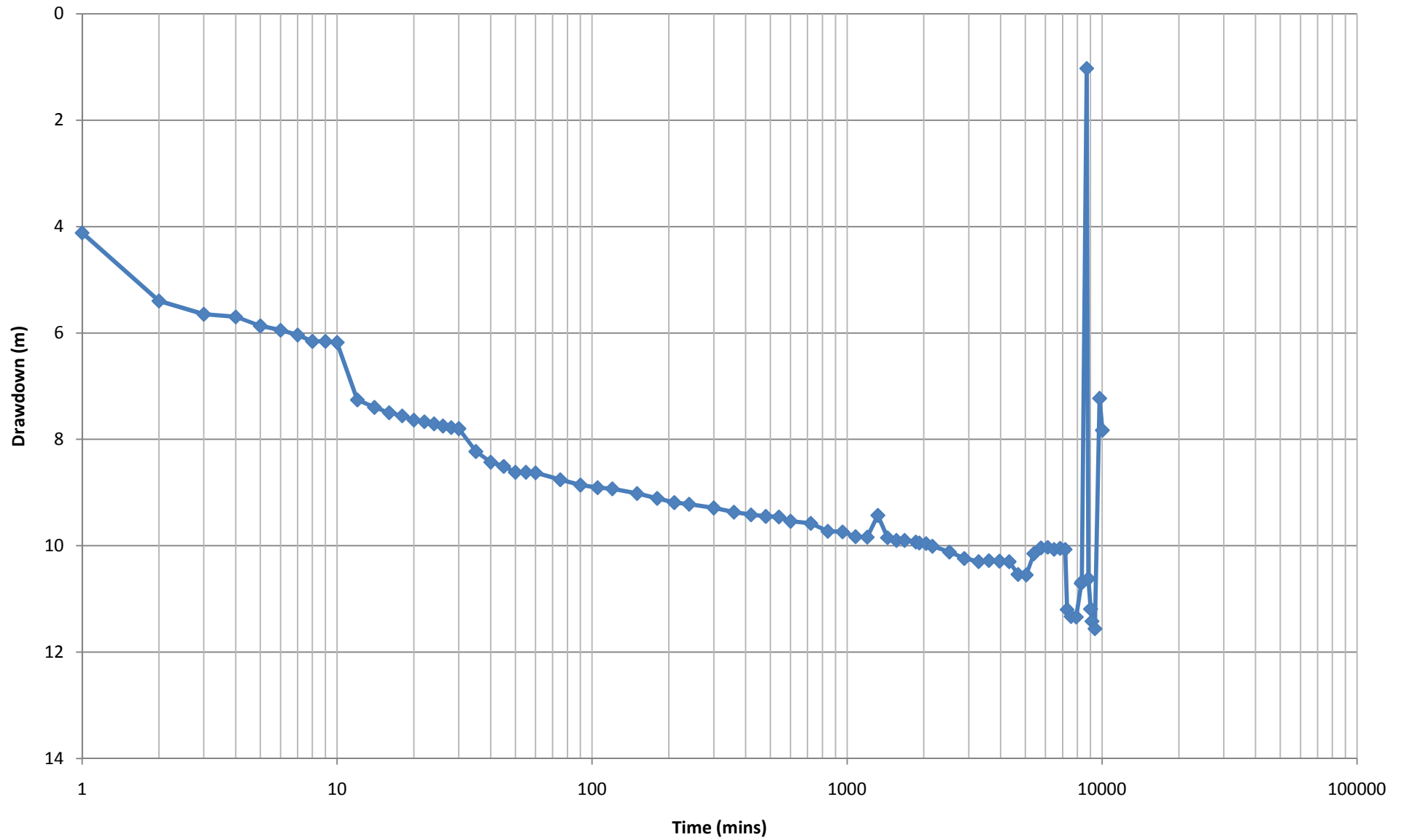
TW-35/7 Pumping Data

Time	Water Level (m btc)	Drawdown (m)	Pumping Rate (m3/d)
1560	13.04	9.9	
1680	13.04	9.9	
1860	13.07	9.93	
1920	13.09	9.95	
2040	13.1	9.96	
2160	13.15	10.01	
2520	13.26	10.12	
2880	13.38	10.24	
3280	13.44	10.3	
3600	13.42	10.28	
3960	13.43	10.29	2111
4320	13.44	10.3	
4680	13.68	10.54	
5040	13.69	10.55	
5400	13.29	10.15	
5760	13.18	10.04	1963
6120	13.17	10.03	
6480	13.21	10.07	
6840	13.19	10.05	
7165	13.21	10.07	2181
7290	14.34	11.2	
7560	14.47	11.33	
7920	14.48	11.34	
8280	13.85	10.71	
8325	13.82	10.68	
8700	4.17	1.03	1963
8835	13.76	10.62	
9015	14.33	11.19	
9125	14.56	11.42	
9375	14.7	11.56	
9780	10.37	7.23	1636
10020	10.97	7.83	

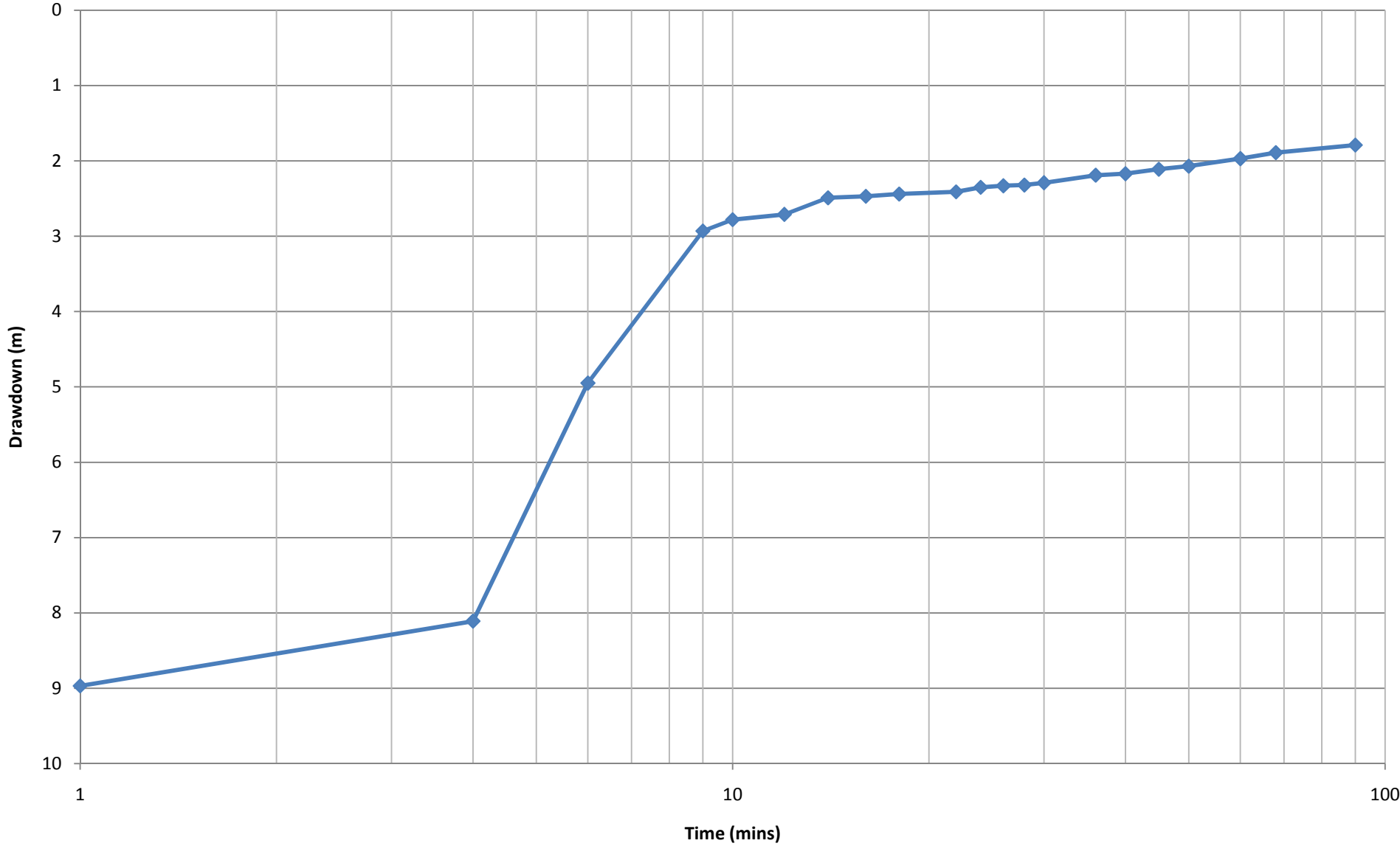
TW 35/7 Pumping Data and Pumping Rate



TW 35/7 Pumping Test Data



TW 35/7 Recovery Data



720 820

3

REPORT ON THE DRILLING AND TESTING

OF A

TRIAL WELL AT CARRICKBYRNE, CO. WEXFORD.

by K.T. Cullen, M.Sc.,
Consulting Hydrogeologist.

TABLE OF CONTENTS.

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VI.	Conclusions and Recommendations	4.

APPENDIX I. Time-Drawdown data from
test pumping of trial
well.

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REPORT ON THE DRILLING AND TEST PUMPING

OF A

TRIAL WELL AT CARRICKBYRNE, CO. WEXFORD. 22nd September, 1981

I. INTRODUCTION.

This Report, dated 22nd September, 1981, describes the drilling and test pumping of a trial water well at Carrickbyrne, Co. Wexford, during the Summer of 1981. The Report lists the analyses of water samples from the trial well and compares them to (a) the chemistry of water from the nearby Local Authority production well and (b) the E.E.C. Standards for potable water.

The works and studies outlined in this Report were commissioned by Mr. P. Dubsy to determine if a well at Carrickbyrne could be developed as a source of mineral water.

II. LOCATION OF TRIAL WELL.

The trial well was located on land owned by Mr. P. Dubsy on the southern slopes of Carrickbyrne Hill. The well site is bounded immediately by evergreen forest to the north and west, and by agricultural land to the east and south.

Mr. Dubsy's property lies some 106-114m above ordnance datum and some 0.4 Km from the production well supplying the Carrickbyrne Group Scheme.

III. DRILLING.

O'Donohoe Brothers of Gorey, drilling contractors, were retained to drill the trial well. Drilling commenced on August 10th, 1981 and continued until August 13th. The drilling contractor used a rotary drilling rig with compressed air as the flushing medium.

A 200 m.m. hole was drilled to a depth of 9 m. through the overburden and for 4m into the underlying rock. Three lengths (9m) of 150 m.m. (I.D.) thermoplastic casing was installed in the 200 m.m. hole. Drilling was then continued and the hole deepened to the finished depth of 61m at a diameter of 150 m.m.

The overburden was 5m thick and consisted of loose gravel and weathered rock overlying bedrock of light coloured rhyolite. The rhyolite gave way to a dark coloured igneous rock (probably andesitic in composition) at a depth of 28m which continued to the bottom of the hole at 61m.

Significant inflows of water were recorded at 20, 27 and 50m below ground level. On completion of the drilling the well was developed with compressed air for 2 hours, the water becoming clear within a few minutes of development starting.

IV. TEST PUMPING.

Mr. S. Kelly of Courtnacuddy was retained to test pump the well. The testing began on August 20th, 1981 and continued without interruption for a period of 264.5 hours with recovery starting on September 1st. The well was pumped with a submersible pump powered by a diesel driven generator. The pumped water was carried off Mr. Dubsy's property and flowed into a surface water drain, a distance of 200m from the well head. The trial well was pumped at a constant rate of $109\text{m}^3/\text{day}$. Water levels were measured at regular intervals in the trial both during the pumping and recovery phases. Appendix I of this Report contains the water levels measured during the test pumping exercise.

An analysis of the time-drawdown data shows that the rate of fall of the water level is affected by the level of water in the well. This feature is characteristic of groundwater flow in fissured rocks and reflects the draining of various fissures as the water levels falls with pumping. The test pumping exercise has shown that the trial well is capable of a sustained yield of $109\text{m}^3/\text{day}$ with a drawdown of 28.5m. However, due to the variation of the rate of water level decline the specific capacity of the well can be given as $11.4\text{m}^3/\text{day/m}$ after 3 days of pumping or as $3.86\text{m}^3/\text{day/m}$ after 11 days of continuous pumping. This variation of specific capacity

with pumping duration means that a greater volume of water can be obtained from the well per meter of drawdown when the water level remains above 30m then when the pumping level falls below 30m.

Using the above figures a production demand of $300\text{m}^3/\text{day}$ (66,000 g.p.d.) for an 8-hour day would see a drawdown of 8.8m and a pumping level of 27.5m. The intervening 16-hours would allow the well to recover.

V. CHEMICAL ANALYSES.

Samples of the water pumped from the trial well were collected at the well head and delivered to the I.I.R.S. for chemical and bacteriological analysis. Two samples were collected after 72 hours of pumping, one for chemical and one for bacteriological analysis. One sample was taken from the trial well at the end of the pump test and together with a sample from the nearby Local Authority pumping well, were sent for chemical analysis. The results of these analyses and the results of a previous analysis of the water from the Group Scheme well are brought together in Table I below and compared with the E.E.C. standards for potable water.

It is clear from Table I that the chemistry of the water pumped from the trial well changed slightly during the duration of the test pumping as is evident from the variation in sulphate, nitrate, calcium and bicarbonate values.

The chemistry of the Group Scheme well water is similar to that of the trial well with small differences in the calcium, magnesium and sulphate concentrations. The variation of the well water chemistry with time is also seen in the Group Scheme well with nitrate levels changing from a high of 9.7 mg/l to 3.2 mg/l between the Summers of 1980 and 1981. Whether this variation in nitrate levels is seasonal or affected by outside influences can only be determined by regular monitoring of the groundwater chemistry.

The relatively high levels of sodium and chloride in these groundwaters (Highland Spring, Na= 12.5, Cl = 15.6) is attributed to the proximity of Carrickbyrne to the sea with the result that precipitation in this region carries an unusually high concentration of these salts. The average chlorine level in Irish groundwater is 28 mg/l but this overall average is from

Source	Co.Co. Well	Co.Co. Well.	P. Dubsky	P. Dubsky.	Standards.	
Date	14/7/1980	31/8/1981	24/8/1981	31/8/1981	15/7/1980*	
Parameter					Guide	Maximum
Calcium	8.4	12	9.6	13.6	100	-
Magnesium	2.9	1.5	6.3	4.4	30	50
Sodium	16.0	16.0	16.0	16.0	20	175
Potassium	2.2	1.1	0.9	1.1	10	12
Bicarbonate	22.0	22.0	31.7	36.6	30	-
Sulphate	2.0	3.0	12.5	2.9	25	250
Chloride	37.0	34.0	34.0	35.0	25	-
Nitrate	9.7	3.2	9.7	3.4	25	50
Nitrite	< 0.01(N)	< 0.01 (N)	< 0.01 (N)	< 0.01(N)	-	0.2
Ammonia	< 0.01(N)	< 0.01 (N)	< 0.01 (N)	< 0.01(N)	0.05	0.5
Iron	0.09	< 0.1	< 0.1	< 0.1	(NH ₄) 0.05	(NH ₄) 0.2
Manganese	ND	< 0.1	ND	< 0.1	0.02	0.05
Copper	< 0.02	< 0.02	< 0.02	< 0.02	0.1	-
Silica	ND	4.8	ND	5.2	-	-
T.D.S.**	110	110	108	123	-	1500
E.C.	120	150	200	160	400	-
Temperature	ND	10.4	10.4	10.4	12	25
pH (F)	ND	ND	ND	ND	-	-
pH (L)	5.8	6.1	6.2	6.4	6.5	8.5
Colour	< 5Hazen	< 5Hazen	< 5Hazen	< 5Hazen	Clear	Clear
Total Hardness***	33	36	50	52	150	-
Alkalinity***	18	18	26	30	25	-
Cell Count (22°C)	ND	ND	1,300	ND	20	100
(37°C)	ND	ND	53	ND	5	20
Coliforms	0	ND	0	ND	0	0
E-Coli	0	ND	0	ND	0	0

* E.E.C. Standards (80/778/EEC) for quality of potable water.

**By evaporation at 180°C

*** CaCO₃

ND = Not determined

< = less than

F = field

L = laboratory.

EC = Electrical Conductivity

means for each aquifer ranging from 14.7 mg/l in the Castlecomer sandstone to 40 mg/l in the limestone dolomite aquifer of south Wexford.

Table I shows the waters tested from the Carrickbyrne area conform to the chemical standards of the E.E.C. directive on potable water quality. However, although the bacteriological analyses show no coliform bacteria present in the samples tested the colony count carried out on the sample of August 24th, gave a result that falls outside the E.E.C. standards.

Colony counts are not essential for assessing the safety of domestic water supplies. They are useful for indicating the efficiency of certain processes in water treatment and the cleanliness of the distribution system. They are also useful for determining the suitability of a water supply for the large-scale preparation of food and drink where, in order to avoid the risk of spoilage, the water should ideally contain few organisms of any kind. The high cell count recorded from the Carrickbyrne well may have been caused by soil or dust gaining access to the well during development.

VI. CONCLUSIONS AND RECOMMENDATIONS.

The results of the present drilling and testing programme show that the trial well at Carrickbyrne Hill is capable of a sustained yield of 109m³/day for 11 days and that the pumped water is of an exceptionally low mineralised character.

The water pumped from the trial well satisfies all but one of the E.E.C. standards for potable water but this divergence in the colony count may be related to the well development and so not a permanent feature. Changes in groundwater chemistry with time and pumping were noted in both the trial and Group Scheme wells especially in the sulphate and nitrate levels.

It is recommended that pumped samples be collected and analysed from both the trial and Group Scheme wells during late January and February of 1982 when groundwater levels are the highest, and the aquifer replenished by Winter recharge. These samples will show whether the low nitrate levels recorded in the last pair of analyses are annual low values and

whether the marginally high colony count is a permanent feature of the Carrickbyrne trial well.

APPENDIX I.

Time-Drawdown Data from Test Pumping of Trial Well.

10410
10500
10600
10700
10810
10900
11000
11100
11200
11300
11400
11500
11600
11700
11800
11900
12000
12100
12200
12300
12400
12500
12600
12700
12800
12900
13000
13100
13200
13300
13400
13500
13600
13700
13800
13900
14000
14100
14200
14300
14400
14500
14600
14700
14800
14900
15000
15100
15200
15300
15400
15500
15600
15700
15800
15900
16000

40.52
41.0
41.45
42.0
42.5
43.04
43.53
44.0
44.5
45.0
45.45
46.0
46.4
47.0
47.6
48.0
48.5
49.0
49.5
50.0
50.5
51.0
51.5
52.0
52.5
53.0
53.5
54.0
54.5
55.0
55.5
56.0
56.5
57.0
57.5
58.0
58.5
59.0
59.5
60.0

60.55
61.0
61.5
62.0
62.5
63.0
63.5
64.0
64.5
65.0
65.5
66.0
66.5
67.0
67.5
68.0
68.5
69.0
69.5
70.0
70.5
71.0
71.5
72.0
72.5
73.0
73.5
74.0
74.5
75.0
75.5
76.0
76.5
77.0
77.5
78.0
78.5
79.0
79.5
80.0

BENCHMARK: WEA. 01/17 TEST - BEGINS FROM: 1300 AUGUST 20 1981
 LOCATION: DANIELSHYNE COUNTY MEXFORD TO : 1430 SEPT. 1 1981
 WEATHER : DRY CONDUCTED BY : K.T.C.
 CONSTANT YIELD AND RECOVERY TEST
 PUMPING WELL RECOVERY DATA
 PUMPING WELL RADIUS : 150MM

PUMPING RATE PRIOR TO RECOVERY PERIOD: 10Y MLD

ELAPSED TIME (MIN)	WATER LEVEL (METRES)	DRAWNDOWN (METRES)
5	42.75	20.72
10	42.1	21.07
15	41.1	22.07
20	41	22.57
25	38.85	23.82
30	37.7	24.67
35	36.5	25.87
40	35.9	26.47
45	35.7	26.67
50	35.65	26.72
55	35.6	26.77
60	35.55	26.82
65	35.53	26.84
70	35.47	26.92
75	35.34	27.05
80	35.1	27.27
85	35.26	27.11
90	35.22	27.15
95	35.22	27.15
100	35.18	27.19
105	35.16	27.21
110	35.14	27.23
115	35.1	27.27
120	35.07	27.3
125	35	27.35
130	34.9	27.45
135	34.82	27.53
140	34.78	27.57
145	34.64	27.71
150	34.5	27.85
155	34.3	28.17
160	34.17	28.33
165	34.05	28.45
170	33.93	28.57
175	33.85	28.65
180	33.85	28.65
185	33.85	28.65
190	33.85	28.65
195	33.85	28.65
200	33.85	28.65
205	33.85	28.65
210	33.85	28.65
215	33.85	28.65
220	33.85	28.65
225	33.85	28.65
230	33.85	28.65
235	33.85	28.65
240	33.85	28.65
245	33.85	28.65
250	33.85	28.65
255	33.85	28.65
260	33.85	28.65
265	33.85	28.65
270	33.85	28.65
275	33.85	28.65
280	33.85	28.65
285	33.85	28.65
290	33.85	28.65
295	33.85	28.65
300	33.85	28.65
305	33.85	28.65
310	33.85	28.65
315	33.85	28.65
320	33.85	28.65
325	33.85	28.65
330	33.85	28.65
335	33.85	28.65
340	33.85	28.65
345	33.85	28.65
350	33.85	28.65
355	33.85	28.65
360	33.85	28.65
365	33.85	28.65
370	33.85	28.65
375	33.85	28.65
380	33.85	28.65
385	33.85	28.65
390	33.85	28.65
395	33.85	28.65
400	33.85	28.65
405	33.85	28.65
410	33.85	28.65
415	33.85	28.65
420	33.85	28.65
425	33.85	28.65
430	33.85	28.65
435	33.85	28.65
440	33.85	28.65
445	33.85	28.65
450	33.85	28.65
455	33.85	28.65
460	33.85	28.65
465	33.85	28.65
470	33.85	28.65
475	33.85	28.65
480	33.85	28.65
485	33.85	28.65
490	33.85	28.65
495	33.85	28.65
500	33.85	28.65
505	33.85	28.65
510	33.85	28.65
515	33.85	28.65
520	33.85	28.65
525	33.85	28.65
530	33.85	28.65
535	33.85	28.65
540	33.85	28.65
545	33.85	28.65
550	33.85	28.65
555	33.85	28.65
560	33.85	28.65
565	33.85	28.65
570	33.85	28.65
575	33.85	28.65
580	33.85	28.65
585	33.85	28.65
590	33.85	28.65
595	33.85	28.65
600	33.85	28.65
605	33.85	28.65
610	33.85	28.65
615	33.85	28.65
620	33.85	28.65
625	33.85	28.65
630	33.85	28.65
635	33.85	28.65
640	33.85	28.65
645	33.85	28.65
650	33.85	28.65
655	33.85	28.65
660	33.85	28.65
665	33.85	28.65
670	33.85	28.65
675	33.85	28.65
680	33.85	28.65
685	33.85	28.65
690	33.85	28.65
695	33.85	28.65
700	33.85	28.65
705	33.85	28.65
710	33.85	28.65
715	33.85	28.65
720	33.85	28.65
725	33.85	28.65
730	33.85	28.65
735	33.85	28.65
740	33.85	28.65
745	33.85	28.65
750	33.85	28.65
755	33.85	28.65
760	33.85	28.65
765	33.85	28.65
770	33.85	28.65
775	33.85	28.65
780	33.85	28.65
785	33.85	28.65
790	33.85	28.65
795	33.85	28.65
800	33.85	28.65
805	33.85	28.65
810	33.85	28.65
815	33.85	28.65
820	33.85	28.65
825	33.85	28.65
830	33.85	28.65
835	33.85	28.65
840	33.85	28.65
845	33.85	28.65
850	33.85	28.65
855	33.85	28.65
860	33.85	28.65
865	33.85	28.65
870	33.85	28.65
875	33.85	28.65
880	33.85	28.65
885	33.85	28.65
890	33.85	28.65
895	33.85	28.65
900	33.85	28.65
905	33.85	28.65
910	33.85	28.65
915	33.85	28.65
920	33.85	28.65
925	33.85	28.65
930	33.85	28.65
935	33.85	28.65
940	33.85	28.65
945	33.85	28.65
950	33.85	28.65
955	33.85	28.65
960	33.85	28.65
965	33.85	28.65
970	33.85	28.65
975	33.85	28.65
980	33.85	28.65
985	33.85	28.65
990	33.85	28.65
995	33.85	28.65
1000	33.85	28.65

BOREHOLE: WE 635/3 TEST PERIOD FROM: 1200 AUGUST 20 1981
 LOCATION: HARRICKBYRNE COUNTY WEXFORD TO : 1430 SEPT. 1 1981
 WEATHER : DRY CONSULTED BY : K.T.C.
 CONSTANT YIELD AND RECOVERY TEST
 PUMPING WELL DRAWDOWN DATA
 PUMPING WELL RADIUS : 150MM

FLOWING PHASE 1 PUMPING RATE: 109 M3/D

ELAPSED TIME (MIN)	WATER LEVEL (METRES)	DRAWDOWN (METRES)
1.5	12.7	.67
1.5	12.7	.97
1.5	12.7	1.19
1.5	12.7	1.38
1.5	12.7	1.48
1.5	12.7	1.58
1.5	12.7	1.68
1.5	12.7	1.78
1.5	12.7	1.88
1.5	12.7	1.98
1.5	12.7	2.08
1.5	12.7	2.18
1.5	12.7	2.27
1.5	12.7	2.37
1.5	12.7	2.47
1.5	12.7	2.57
1.5	12.7	2.67
1.5	12.7	2.77
1.5	12.7	2.87
1.5	12.7	2.97
1.5	12.7	3.08
1.5	12.7	3.18
1.5	12.7	3.28
1.5	12.7	3.38
1.5	12.7	3.48
1.5	12.7	3.58
1.5	12.7	3.68
1.5	12.7	3.78
1.5	12.7	3.88
1.5	12.7	3.98
1.5	12.7	4.08
1.5	12.7	4.18
1.5	12.7	4.28
1.5	12.7	4.38
1.5	12.7	4.48
1.5	12.7	4.58
1.5	12.7	4.68
1.5	12.7	4.78
1.5	12.7	4.88
1.5	12.7	4.98
1.5	12.7	5.08
1.5	12.7	5.18
1.5	12.7	5.28
1.5	12.7	5.38
1.5	12.7	5.48
1.5	12.7	5.58
1.5	12.7	5.68
1.5	12.7	5.78
1.5	12.7	5.88
1.5	12.7	5.98
1.5	12.7	6.08
1.5	12.7	6.18
1.5	12.7	6.28
1.5	12.7	6.38
1.5	12.7	6.48
1.5	12.7	6.58
1.5	12.7	6.68
1.5	12.7	6.78
1.5	12.7	6.88
1.5	12.7	6.98
1.5	12.7	7.08
1.5	12.7	7.18
1.5	12.7	7.28
1.5	12.7	7.38
1.5	12.7	7.48
1.5	12.7	7.58
1.5	12.7	7.68
1.5	12.7	7.78
1.5	12.7	7.88
1.5	12.7	7.98
1.5	12.7	8.08
1.5	12.7	8.18
1.5	12.7	8.28
1.5	12.7	8.38
1.5	12.7	8.48
1.5	12.7	8.58
1.5	12.7	8.68
1.5	12.7	8.78
1.5	12.7	8.88
1.5	12.7	8.98
1.5	12.7	9.08
1.5	12.7	9.18
1.5	12.7	9.28
1.5	12.7	9.38
1.5	12.7	9.48
1.5	12.7	9.58
1.5	12.7	9.68
1.5	12.7	9.78
1.5	12.7	9.88
1.5	12.7	9.98
1.5	12.7	10.08
1.5	12.7	10.18
1.5	12.7	10.28
1.5	12.7	10.38
1.5	12.7	10.48
1.5	12.7	10.58
1.5	12.7	10.68
1.5	12.7	10.78
1.5	12.7	10.88
1.5	12.7	10.98
1.5	12.7	11.08
1.5	12.7	11.18
1.5	12.7	11.28
1.5	12.7	11.38
1.5	12.7	11.48
1.5	12.7	11.58
1.5	12.7	11.68
1.5	12.7	11.78
1.5	12.7	11.88
1.5	12.7	11.98
1.5	12.7	12.08
1.5	12.7	12.18
1.5	12.7	12.28
1.5	12.7	12.38
1.5	12.7	12.48
1.5	12.7	12.58
1.5	12.7	12.68
1.5	12.7	12.78
1.5	12.7	12.88
1.5	12.7	12.98
1.5	12.7	13.08
1.5	12.7	13.18
1.5	12.7	13.28
1.5	12.7	13.38
1.5	12.7	13.48
1.5	12.7	13.58
1.5	12.7	13.68
1.5	12.7	13.78
1.5	12.7	13.88
1.5	12.7	13.98
1.5	12.7	14.08
1.5	12.7	14.18
1.5	12.7	14.28
1.5	12.7	14.38
1.5	12.7	14.48
1.5	12.7	14.58
1.5	12.7	14.68
1.5	12.7	14.78
1.5	12.7	14.88
1.5	12.7	14.98
1.5	12.7	15.08
1.5	12.7	15.18
1.5	12.7	15.28
1.5	12.7	15.38
1.5	12.7	15.48
1.5	12.7	15.58
1.5	12.7	15.68
1.5	12.7	15.78
1.5	12.7	15.88
1.5	12.7	15.98
1.5	12.7	16.08
1.5	12.7	16.18
1.5	12.7	16.28
1.5	12.7	16.38
1.5	12.7	16.48
1.5	12.7	16.58
1.5	12.7	16.68
1.5	12.7	16.78
1.5	12.7	16.88
1.5	12.7	16.98
1.5	12.7	17.08
1.5	12.7	17.18
1.5	12.7	17.28
1.5	12.7	17.38
1.5	12.7	17.48
1.5	12.7	17.58
1.5	12.7	17.68
1.5	12.7	17.78
1.5	12.7	17.88
1.5	12.7	17.98
1.5	12.7	18.08
1.5	12.7	18.18
1.5	12.7	18.28
1.5	12.7	18.38
1.5	12.7	18.48
1.5	12.7	18.58
1.5	12.7	18.68
1.5	12.7	18.78
1.5	12.7	18.88
1.5	12.7	18.98
1.5	12.7	19.08
1.5	12.7	19.18
1.5	12.7	19.28
1.5	12.7	19.38
1.5	12.7	19.48
1.5	12.7	19.58
1.5	12.7	19.68
1.5	12.7	19.78
1.5	12.7	19.88
1.5	12.7	19.98
1.5	12.7	20.08
1.5	12.7	20.18
1.5	12.7	20.28
1.5	12.7	20.38
1.5	12.7	20.48
1.5	12.7	20.58
1.5	12.7	20.68
1.5	12.7	20.78
1.5	12.7	20.88
1.5	12.7	20.98
1.5	12.7	21.08
1.5	12.7	21.18
1.5	12.7	21.28
1.5	12.7	21.38
1.5	12.7	21.48
1.5	12.7	21.58
1.5	12.7	21.68
1.5	12.7	21.78
1.5	12.7	21.88
1.5	12.7	21.98
1.5	12.7	22.08
1.5	12.7	22.18
1.5	12.7	22.28
1.5	12.7	22.38
1.5	12.7	22.48
1.5	12.7	22.58
1.5	12.7	22.68
1.5	12.7	22.78
1.5	12.7	22.88
1.5	12.7	22.98
1.5	12.7	23.08
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