April 2011

MACRAES PHASE III PROJECT

Tipperary Creek Hydrological Monitoring

Submitted to:
Oceana Gold (New Zealand) Limited
22 Maclaggan Street
Dunedin 9016

REPORT

Report Number. 0978110-562 R003 vC

A world of capabilities delivered locally

Golder Associates

Table of Contents

TABLES

FIGURES

APPENDICES

1.0 INTRODUCTION

1.1 Background

Oceana Gold (New Zealand) Limited (OceanaGold) is currently expanding their gold mining operations at Macraes Flat in East Otago between Middlemarch and Palmerston. As part of this project, hydrological information is required for Tipperary Creek, a small upper catchment tributary of McCormicks Creek adjacent to the proposed site (Figure 1).

Golder Associates (NZ) Limited (Golder) is undertaking hydrogeological and hydrological assessments within the Tipperary Creek catchment with the objective of obtaining resource consents for Macraes Phase III including the construction and operation of the proposed Top Tipperary Tailings Storage Facility (TTTSF). Obtaining hydrological information is critical for developing a surface water model, in particular for calibration of the model.

Golder installed a continuous flow monitoring site in Tipperary Creek in May 2010 to characterise the flow regime (especially low flows) and to use for calibration and validation of site hydrological models. Six flow gaugings were used to construct the rating curve for the site.

1.2 Scope and Report Contents

This report[1] presents:

- The water level data collected to date
- The rating curve generated from gauging data
- The resulting continuous flow data
- The continuous flow data by removing unnatural upstream discharges to the stream
- Recommendations for future monitoring

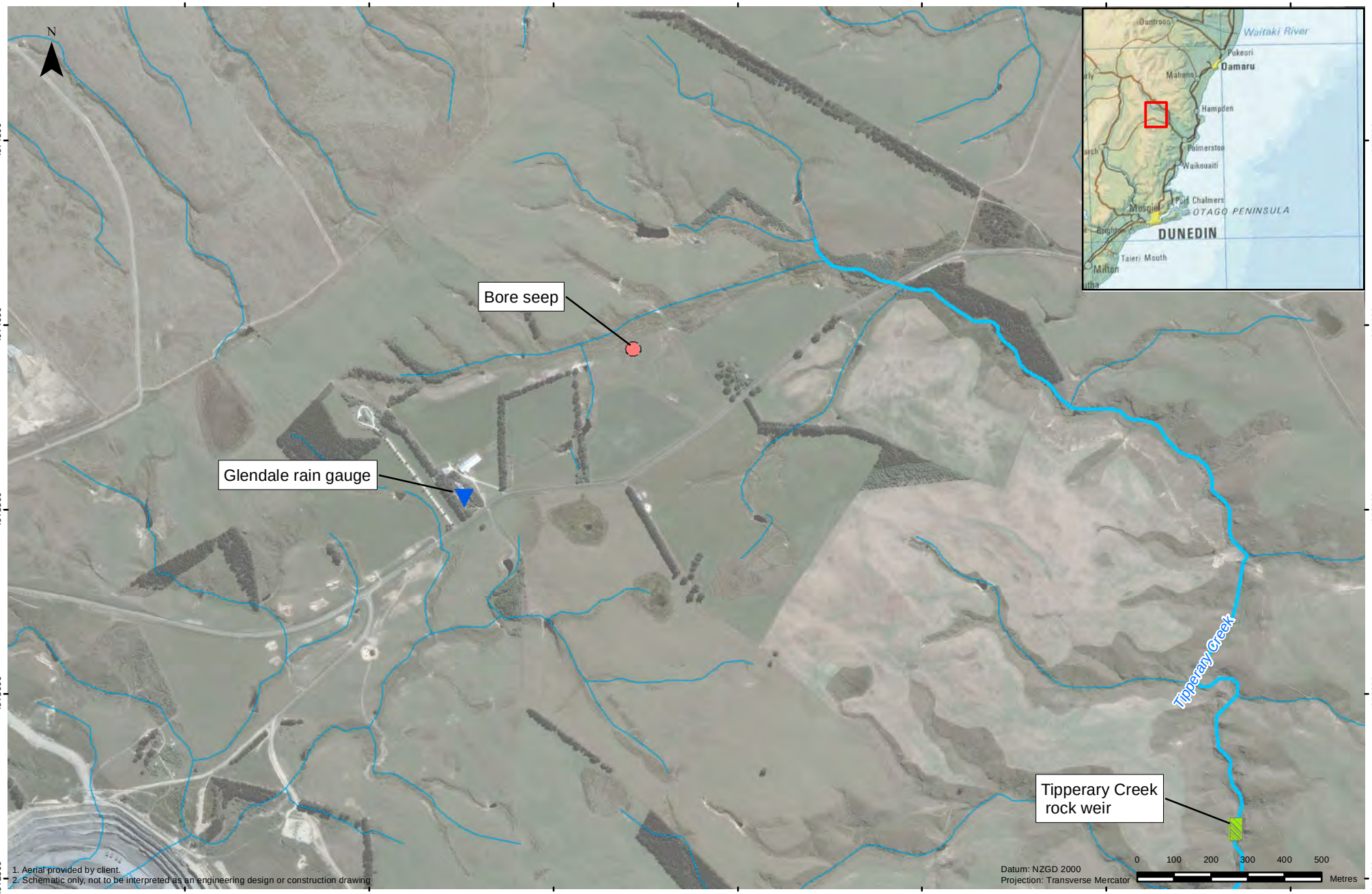
2.0 TIPPERARY CREEK HYDROLOGICAL MONITORING SITE

On 18 May 2010 water level monitoring equipment was installed on the Tipperary Creek upstream of an existing natural rocky outcrop (Figure 2). The site, subsequently named “Tipperary Creek at rock weir“ has a catchment area of approximately 3.9 km^2 and sits at an elevation of approximately 427 m. The maximum elevation of the catchment is approximately 575 m.

The location of the monitoring site was selected because water was confined to a hard rock bed section. A length of angle iron was bolted and mortared in place to provide a weir like control. This was undertaken to ensure particularly low flows could be accurately monitored.

A water level measuring device (transducer) was bolted to the bed of the stream in the pool created above the angle iron weir. An external staff gauge (ESG) was not installed due to the difficulties in securing it at the site. Instead, a measurement from a dynabolt in the upstream pool is undertaken to provide check data for the recorded water level. This bolt is assumed to have an arbitrary relative level (RL) of 1,000 mm. The survey and site establishment documentation is attached in Appendix B.

[1] This report is subject to the limitations provided in Appendix A.



Golder Associates

TITLE | TIPPERARY CREEK HYDROLOGICAL MONITORING SITE

MARCH 2011

PROJECT | 0978110562

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Figure 2: Tipperary Creek at rock weir.

3.0 SITE VISITS AND FLOW GAUGINGS

Between 18 May 2010 and 17 February 2011 the Tipperary Creek at rock weir site was visited on seven occasions to undertake flow gaugings and to download water level data. On the initial site visit, the weir was installed and a volumetric flow gauging undertaken. The second visit on 25 May occurred during a flood event. A total of seven flow gaugings (Table 1) were collected in the vicinity of the gauge site

The gauging on 25 May 2010 occurred during a flood event. The full section could not be gauged safely and only around 75% of the section was measured. The water level was pegged for later survey of the missing portion of the cross section. Where the water was too swift to enter, a velocity estimate was made based on previous verticals and professional judgement. The cross section was surveyed on the following visit. For this reason, the gauging on 25 May should be treated with caution as it has a larger degree of error than the other gaugings. The estimated margin of error associated with the 25 May 2010 gauging is 20% – 30% or ±0.8 m^3/s – 1.2 m^3/s, due to the estimated velocities in part of the section and the uncertainty in undertaking high flow gaugings. Figure 3 and Figure 4 show the site during low and high flow.

Table 1: Gauging results for the Tipperary Creek at rock weir monitoring site.

Site	Date and Time [1]	Stage	Flow	Area	Average velocity
		mm	L/s	m²	m/s
Tipperary Creek at rock weir	18/05/2010 1:45 pm	1,105	2	0.03	0.07
	25/05/2010 4:00 pm	1,356	4,051	2.43	1.58
	29/07/2010 2:45 pm	1,186	32	0.14	0.22
	26/08/2010 9:30 am	1,192	32	0.18	0.18
	30/09/2010 11:30 am	1,142	10	0.07	0.15
	10/12/2010 10:15 am	1,089	1	-[2]	-[2]
	17/2/2011	-[3]	-[3]	-[2]	-[2]

Notes: (1) All times reported as New Zealand standard time.

(2) Volumetric gauging completed using a bucket and stopwatch therefore area and velocity not measured.

(3) The stage and flow during the visit on 17 February 2011 was recorded on field sheets which were in the process of being electronically scanned at the time of the 22 February 2011 Christchurch earthquake. At the time of updating this report it had not been possible to enter Golder's Christchurch office and retrieve the field sheets.

Figure 3: Tipperary Creek site on 18-05-2010, flow estimated at approximately 2 L/s.

Figure 4: Tipperary Creek site on 25-05-2010, flow estimated at approximately 4,000 L/s

4.0 WATER LEVEL DATA

Water levels in Tipperary Creek at the rock weir monitoring site have been recorded continuously by Golder since 18 May 2010. The water level record up to 17 February 2011 contains one gap associated with a large flood on 29 May 2010. During this flood the water level monitoring instrument was damaged and consequently stopped logging. The water level monitoring instrument was replaced during the next inspection on 29 July 2010 and logging recommenced. The recorded water level data are presented in Figure 5 as daily average water level. The data up to 30 September 2010 have been referenced to the external staff gauge (ESG). Due to the 22 February 2011 Christchurch earthquake it has not been possible to retrieve the field sheets from the site visits on 10 December 2010 and 17 February 2011. The water level data since 30 September 2010 has therefore not been referenced to the ESG and should be treated with caution. The water level immediately prior to the logger being damaged on 29 May 2010 should also be treated with some caution as there is some uncertainty over exactly when the logger was damaged.

Weed growth appeared to affect the water level data during a prolonged period of low flow between 26 August 2010 and 30 September 2010. Consequently, a data correction was undertaken to remove the effect of weed growth. A simple ramp correction was undertaken on the stage data after weed was removed on 30 September and the water level receded to its natural level. This ramp correction assumes weed growth rate was constant over this period.

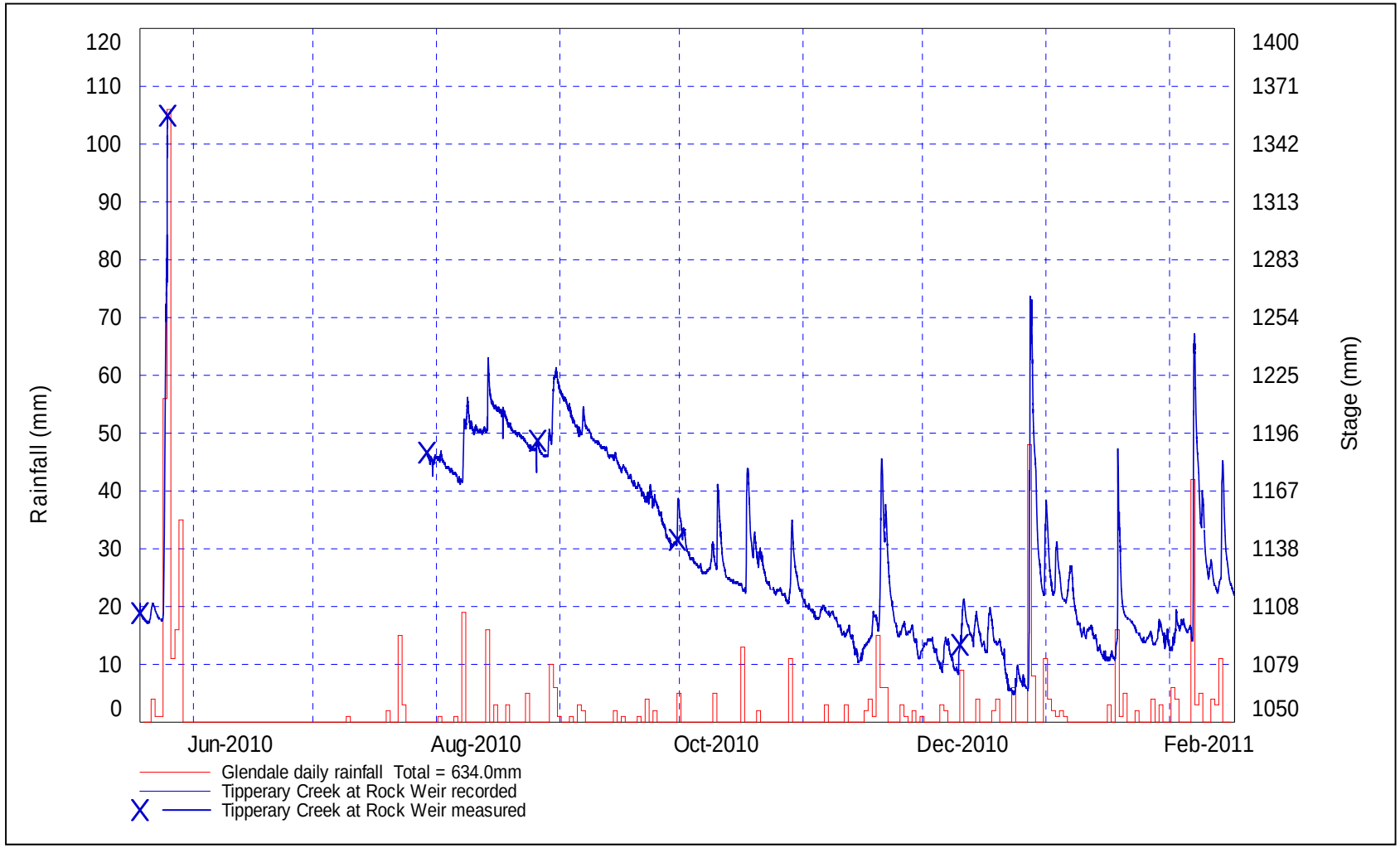

Figure 5: Tipperary Creek daily average water level data for the period 18 May 2010 to 17 February 2011 presented with rainfall data for the Glendale rainfall station.

Rainfall data from the Glendale rainfall monitoring station (I50341) until 17 February 2011 is also presented in Figure 5. The rainfall monitoring station is approximately 2.3 km northwest of the Tipperary Creek at rock weir flow monitoring site, at an elevation of 550 m. There is a strong correlation between water level in Tipperary Creek and local rainfall.

5.0 RATING CURVE

Of the seven instantaneous flow gaugings undertaken since installation of the water level monitoring equipment on 18 May 2010 (Table 1), six were used to derive a preliminary relationship between stage height and discharge (i.e. the rating curve). The gauging undertaken on 17 February 2011 was not included in generation of the rating curve as the 22 February 2011 Christchurch earthquake prevented retrieval of the necessary field sheets. The stage for zero flow, the level at which flow over the rock weir ceases, was estimated from survey data. Figure 6 presents the rating curve and Figure 7 illustrates the early portion of the curve.

No rating changes were observed over the monitoring period. The six gauged flows used to generate the rating cure ranged from 1 L/s to 4,051 L/s (Table 1 in Section 3.0). The gauging undertaken on 25 May 2010 (4,051 L/s) is considered high in the context of the data collected to date. All gauging points fit well (within 8%) on the preliminary rating curve that has been developed (Table 2) with the exception of the gauging on 26 August 2010. This gauging plotted around 14% off the rating and is possibly due to water level or gauging error.

The current rating relationship is considered reasonably strong for flows up to approximately 100 L/s. Additional gauging of flows greater than approximately 50 L/s is required to further develop and verify the preliminary rating curve.

The high end of the rating curve (flows > 4,051 L/s) has been calculated using extrapolated stage area and stage velocity curves, measured cross sectional area and an estimate of catchment flood flows. This high flow estimate of the rating should be treated with caution as no gauging data is available to qualify the estimate and it is likely that a reasonable degree of error will be associated with flows above 4,000 L/s. Flood gaugings should be targeted in the future.

Table 2: Tipperary Creek at rock weir stage-discharge relationship.

Water Level (mm)	Flow (L/s)	Water Level (mm)	Flow (L/s)
1,050	0	1,189	32
1,097	1	1,218	124
1,105	2	1,259	867
1,128	6	1,356	4,051
1,142	10	1,800	30,870
1,168	20	-	-

6.0 TIPPERARY CREEK HYDROLOGY

6.1 Flow Data

Water level data for the period 18 May 2010 to 17 February 2011 together with the rating relationship (Table 3) were used to calculate a 15-minute interval flow record for the Tipperary Creek at rock weir monitoring site (Figure 8 and Figure 9). The short record indicates that the Tipperary Creek experiences long periods of relatively low flow but can experience very large flood events. Between 18 May 2010 and 17 February 2011 the mean flow in the stream was 23 L/s while the median flow was 5 L/s. The minimum flow recorded was less than 1 L/s which occurred on 23 December 2010. A large flood event in the record peaked at approximately 4 m^3/s on 25 May 2010.

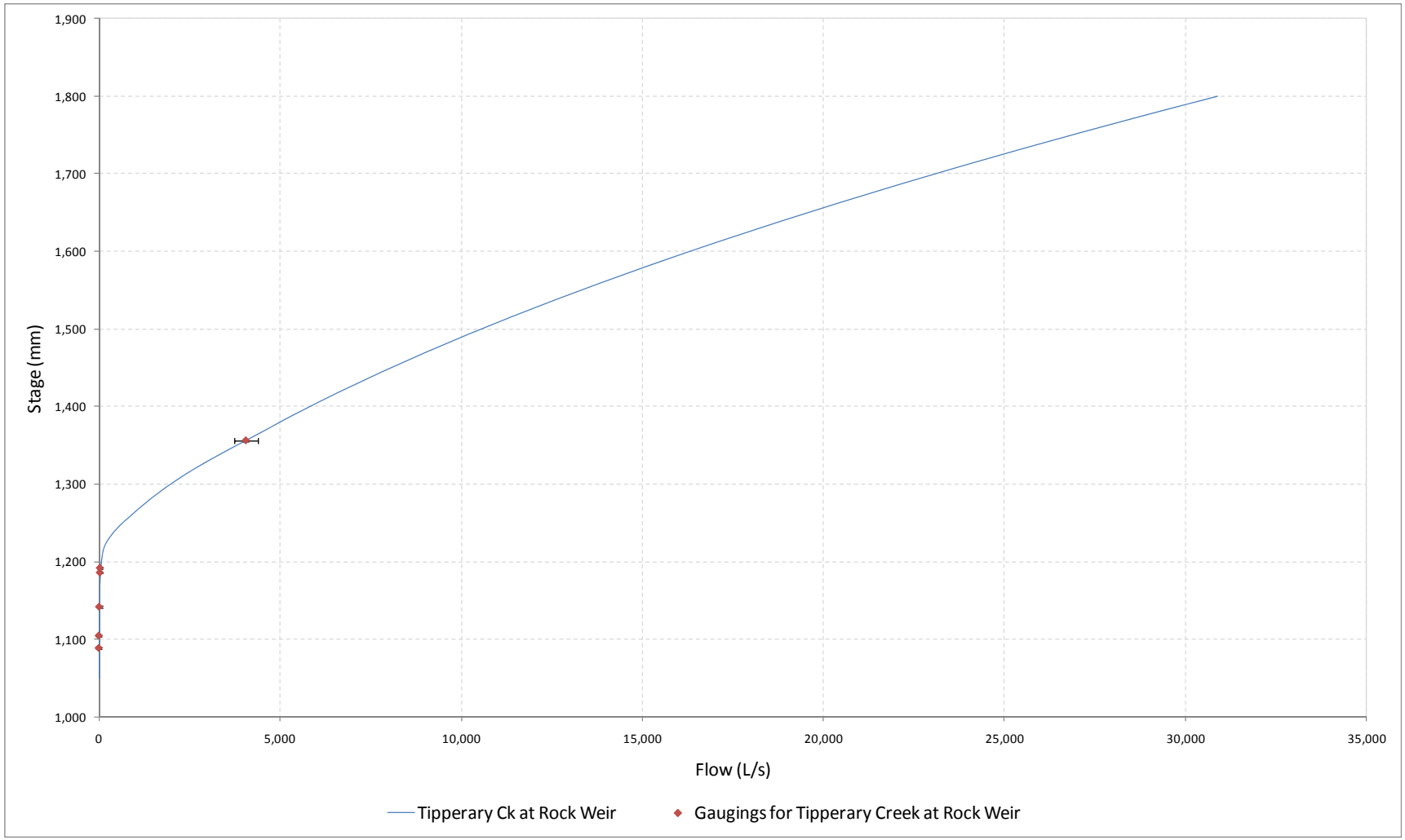

Figure 6: Tipperary Creek rating relationship (rating curve).

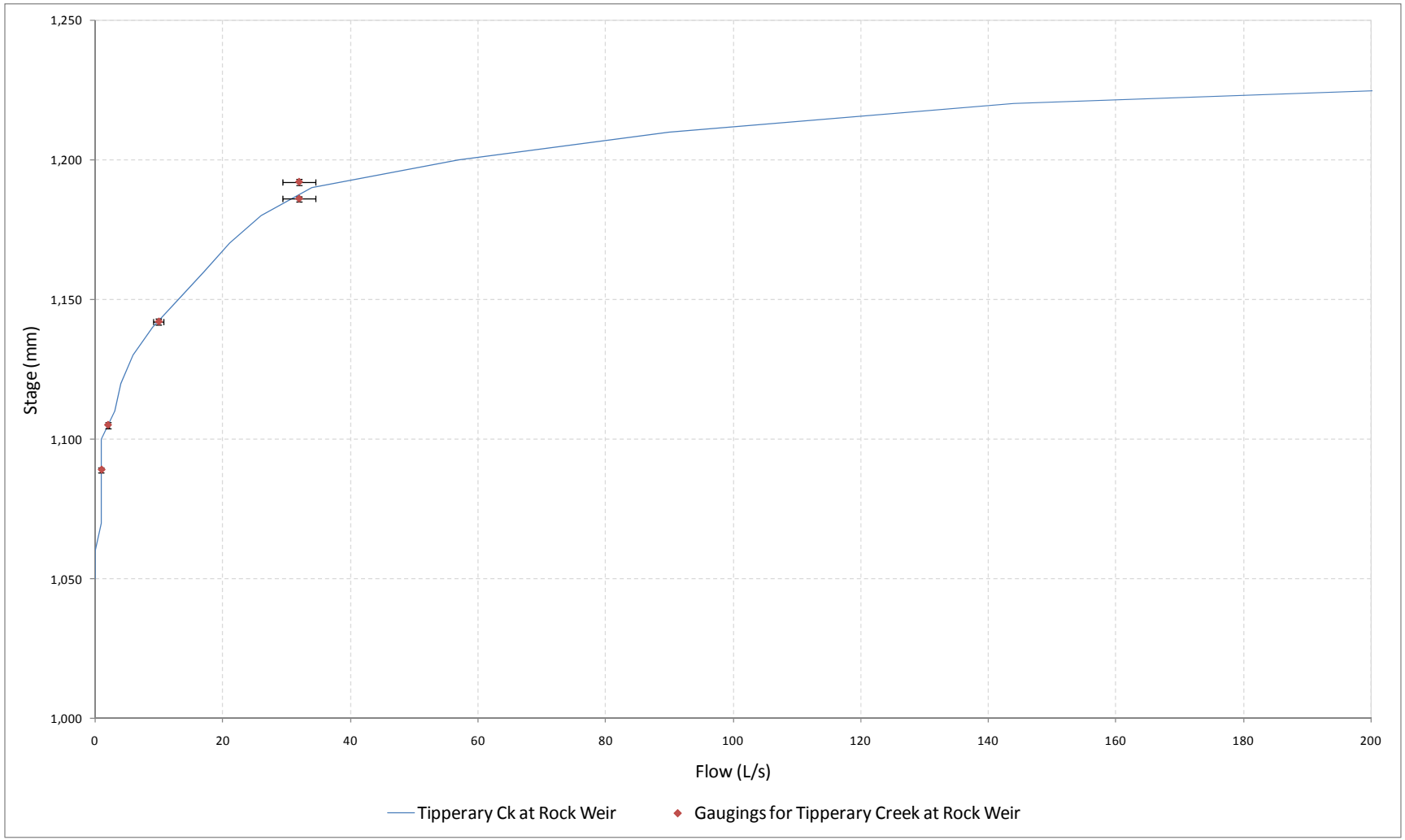

Figure 7: Tipperary Creek at rock weir rating relationship (rating curve) expanded.

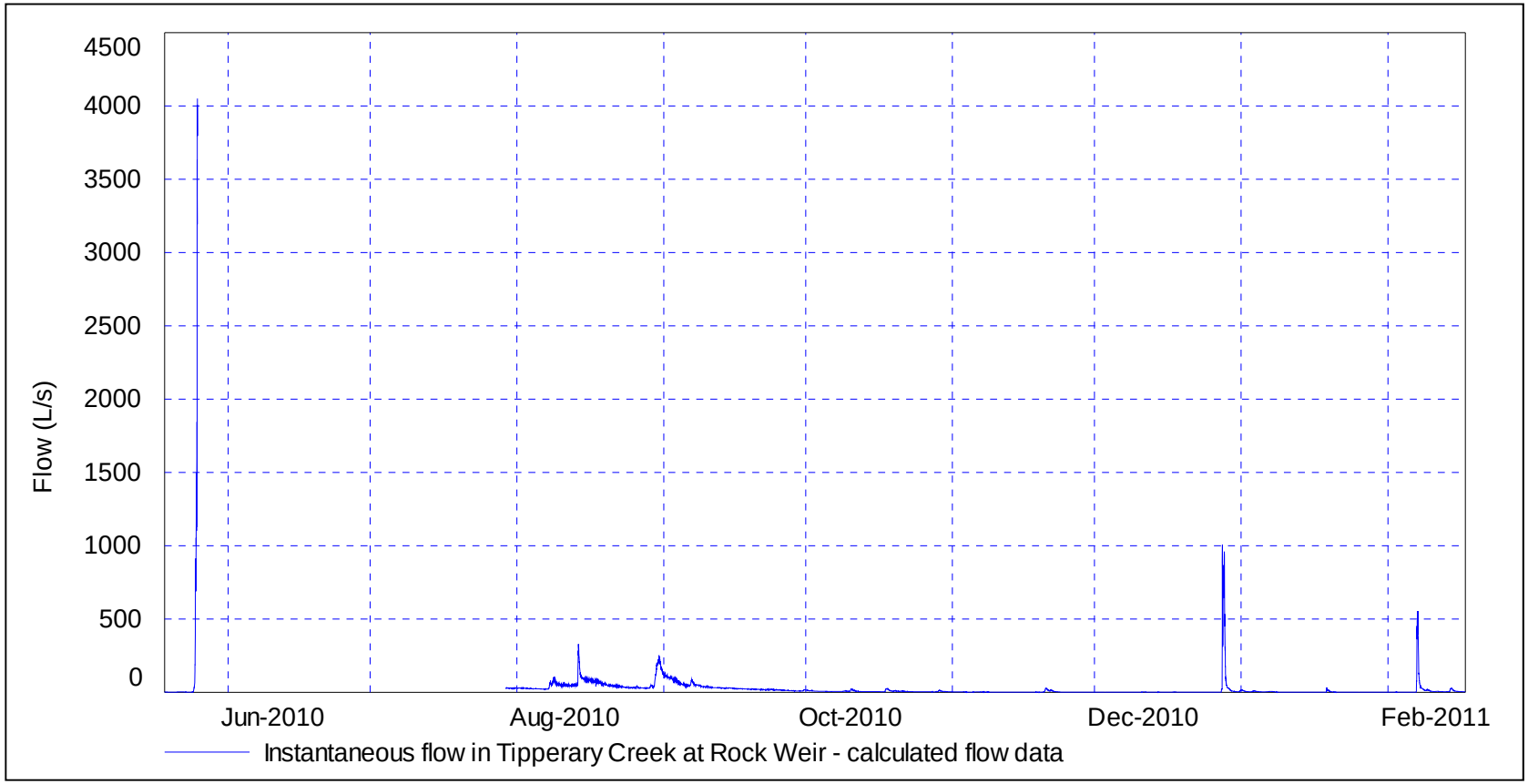

Figure 8: Tipperary Creek at rock weir calculated 15 minute flow data for the period 18 May 2010 to 17 February 2011

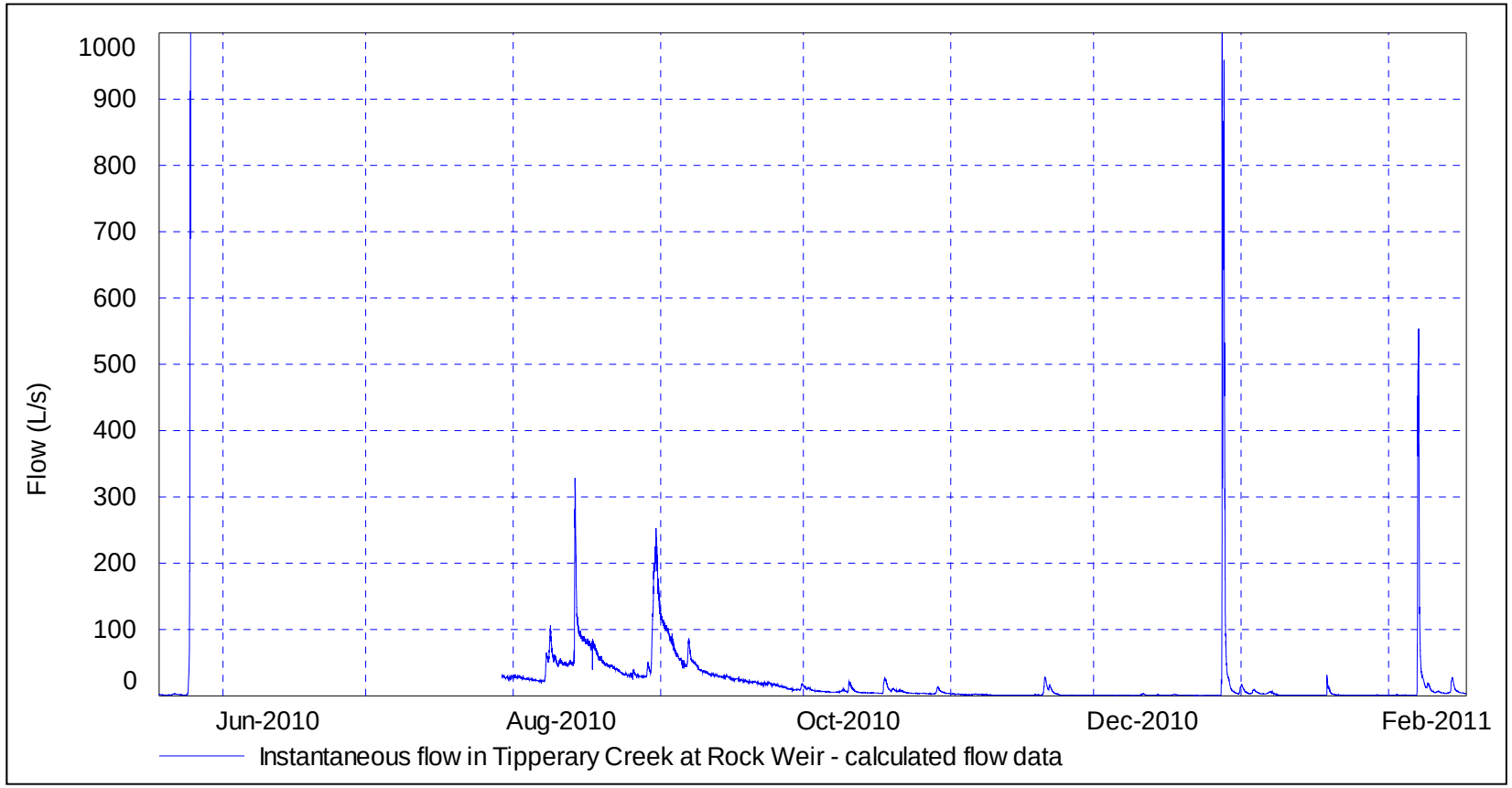

Figure 9: Tipperary Creek at rock weir calculated flow data for the period 18 May 2010 to 17 February 2011 (expanded 0 to 1,000 L/s).

Flow statistics for the period 18 May 2010 to 17 February 2011 are presented in Table 3 and Table 4.

Table 3: Tipperary Creek at rock weir 15 minute flow statistics[1].

Minimum* (L/s)	Maximum# (L/s)	Mean (L/s)	Standard deviation (L/s)	Lower quartile (L/s)	Median (L/s)	Upper quartile (L/s)
<1	4,051	23	97	1	5	24

Notes: [1]Statistics for the monitoring period from 18 May 2010 to 17 February 2011; * Minimum gauged flow used in rating was 1 L/s; # Maximum gauged flow used in rating was 4,051 L/s.

Table 4: Tipperary Creek at rock weir daily mean flow statistics[1].

Minimum (L/s)	Maximum (L/s)	Mean (L/s)	Standard deviation (L/s)	Lower quartile (L/s)	Median (L/s)	Upper quartile (L/s)
1	439*	19	42	1	5	22

Notes: [1]Statistics for the monitoring period from 18 May 2010 to 17 February 2011.*Maximum flow occurred on 28 December, because the peak flow event (4,051 L/s) was a partial day, this is not included.

The flow distribution curve for the record is shown in Figure 10 and expanded in Figure 11. These figures illustrate the exceedance percentiles for any given flow. Exceedance percentiles identify the period of time (identified as a percentage) that a particular flow is equalled or exceeded. For example (the flow at the Tipperary site equals or exceeds 18.0 L/s for 30% of the time over the monitoring period. Appendix C contains all the daily flow information derived from the water level information recorded at Tipperary Creek over the 18 May 2010 to 17 February 2011 monitoring period.

6.2 Naturalising the Flow Data

Upstream of the hydrological monitoring site on Tipperary Creek, a source of groundwater enters the creek. The groundwater is sourced from an exploration borehole which became artesian after it was drilled (Figure 12). Groundwater now flows out of this uncapped borehole and into the Tipperary Creek catchment approximately 3.1 km upstream of the monitoring site. This additional flow artificially alters the flow regime, and the flow in Tipperary Creek must therefore be naturalised.

The flow of groundwater out of the borehole has been measured on seven occasions from 6 June 2010 to 17 February 2011 using a volumetric method. The time taken to fill a container of known volume is recorded, and a discharge rate calculated. The results of the seven volumetric measurements are summarised in Table 5.

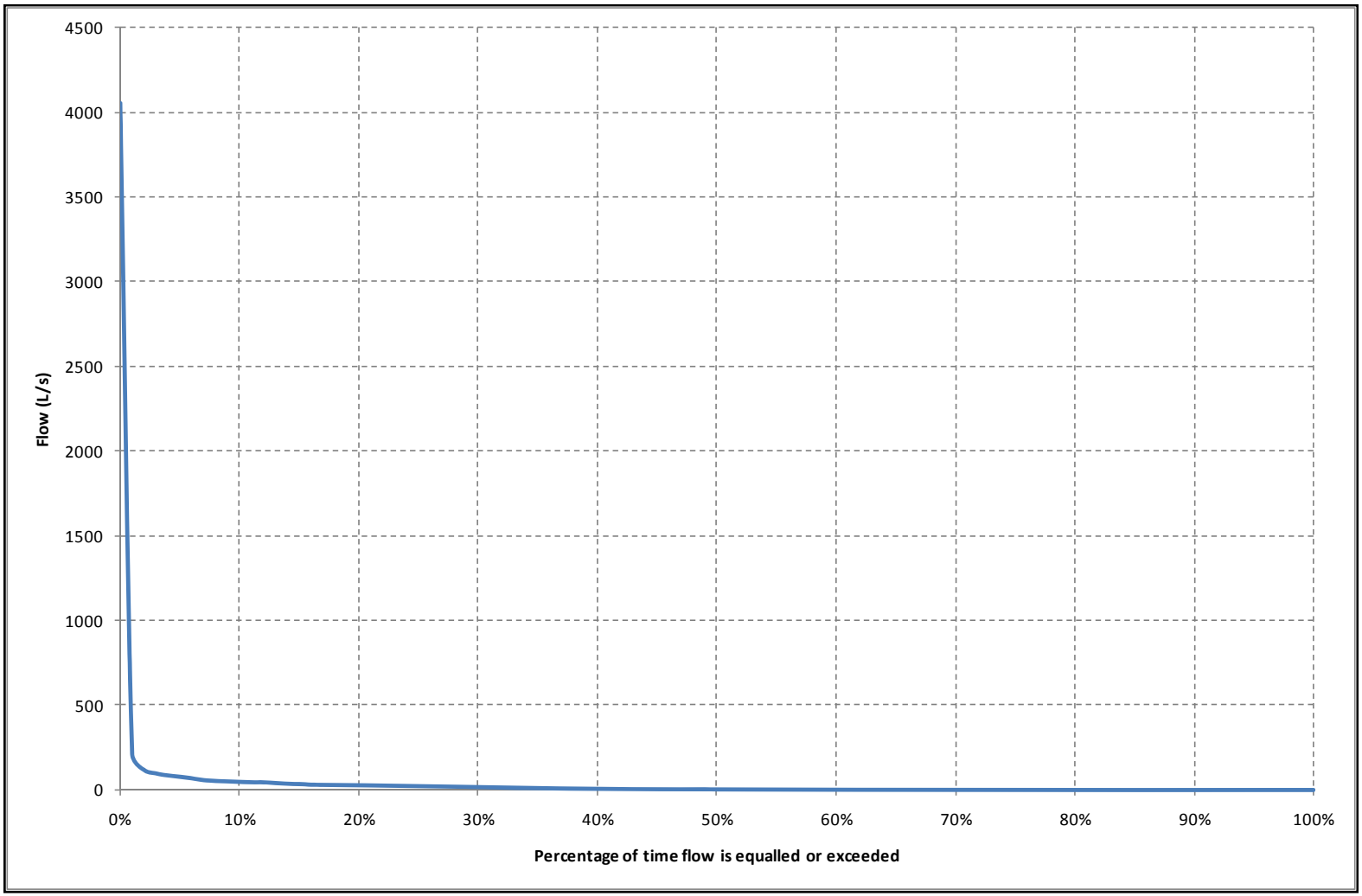

Figure 10: Flow distribution curve for the instantaneous flow record for Tipperary Creek at rock weir for the period 18 May 2010 to 17 February 2011.

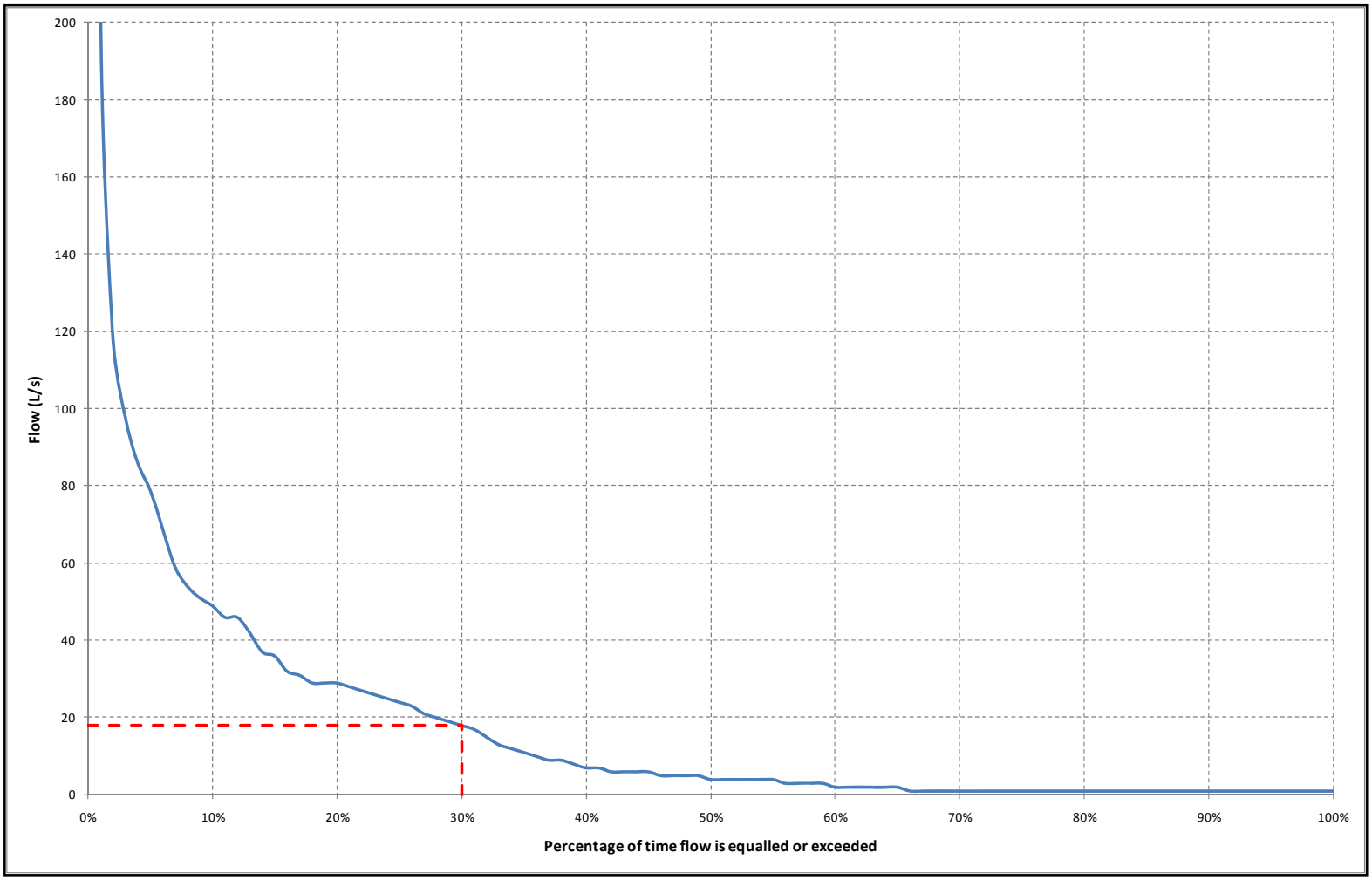

Figure 11: Flow distribution curve for the instantaneous flow record for Tipperary Creek at rock weir for the period 18 May 2010 to 17 February 2011.

Figure 12: Artesian borehole with flowing groundwater.

Table 5: Artesian borehole flow measurements.

Site	Date and time	Flow (L/s)	Recorded by
Artesian Borehole	03/06/2010 1:45 pm	0.9	OceanaGold
	16/06/2010 11:20 am	1.2	OceanaGold
	05/07/2010 12:15 pm	1.0	OceanaGold
	26/08/2010 10:30 am	1.2	Golder
	30/09/2010 11:30 am	1.0	Golder
	10/12/2010 11:00 am	0.9	Golder
	17/2/2011	-(1)	Golder
	Average	**1.0**	

Notes: (1) The flow during the visit on 17 February 2011 was recorded on field sheets which were in the process of being electronically scanned at the time of the 22 February 2011 Christchurch earthquake. At the time of updating this report it had not been possible to enter Golder's Christchurch office and retrieve the field sheets.

The average flow of around 1 L/s from the artesian borehole signifies the artificial flow added to Tipperary Creek. Subtracting this artificial flow from Tipperary Creek flows provides the naturalised flow. Naturalised flow statistics for the period 18 May 2010 to 17 February 2011 are presented in Table 6 and Table 7. The naturalised record indicates the stream was likely to have ceased flowing at the monitoring site during the dry summer period. Mean naturalised flow for the monitoring period was 22 L/s while the median naturalised flow was 3 L/s. The maximum flow is unaffected by the small addition and as such is still around 4 m^3/s. Appendix C includes all naturalised daily flow information calculated for Tipperary Creek over the 18 May 2010 to 17 February 2011 monitoring period.

Table 6: Tipperary Creek at rock weir naturalised 15 minute flow statistics.

Minimum* (L/s)	Maximum (L/s)	Mean (L/s)	Standard deviation (L/s)	Lower quartile (L/s)	Median (L/s)	Upper quartile (L/s)
0	4,050	22	97	0	3	23

Notes: Statistics are for the period from 18 May 2010 to 17 February 2011. * Under naturalised conditions Tipperary Creek at Rock Weir is expected to be ephemeral.

Table 7: Tipperary Creek at rock weir naturalised daily mean flow statistics.

Minimum* (L/s)	Maximum (L/s)	Mean (L/s)	Standard deviation (L/s)	Lower quartile (L/s)	Median (L/s)	Upper quartile (L/s)
0	438	18	42	0	4.0	21

Notes: Statistics are for the period from 18 May 2010 to 17 February 2011. * Under naturalised conditions Tipperary Creek at Rock Weir is expected to be ephemeral.

7.0 SUMMARY AND RECOMMENDATIONS

Summary

Golder installed and operated a flow monitoring site on Tipperary Creek at rock weir, downstream of the proposed Top Tipperary Tailings Storage Facility. The site was established to help in the calibration of a surface water model and to characterise the low flows in the Tipperary Creek and to quantify likely dilution water available. Since its establishment on 18 May 2010, the hydrological monitoring site on Tipperary Creek has operated well, however, a gap of around 60 days exists where the transducer was damaged in a large flood event. Water levels were recorded in the stream at 15 minute intervals and were used to derive flow data using a rating curve established over the monitoring period. The rating curve was constructed using six measured/gauged flows with corresponding water levels. The daily average flow in Tipperary Creek at rock weir, over the 2010-2011 monitoring period ranged from less than 1 L/s to around 438 L/s.

The data collected for Tipperary Creek at rock weir represents the flow in the creek with the addition of groundwater flowing from an uncapped upstream artesian bore. The bore spills on average around 1 L/s into the stream. Under naturalised conditions Tipperary Creek at Rock Weir is expected to be ephemeral.

The high flow gauging undertaken on 25 May 2010 has a higher degree of error than the lower gaugings due to the error associated with flood gaugings and because the full gauging could not be completed due to the high flood waters. For this reason the high flow end of the rating curve should be treated with some caution.

The hydraulic control at the monitoring site has the potential to be influenced by weed growth (periphyton), especially during periods of low stable flows. However, this can be controlled through periodic weed removal. To date the hydraulic control at the monitoring site has been reliable and no rating changes have been required.

Recommendations

It is recommended that further gaugings be carried out, particularly at flow rates above 50 L/s. This would provide a better range of data points from which to construct the rating curve, and therefore a more accurate representation of how the creek water level alters with changing flow rates. Additionally, frequent site visits and gaugings are required to ensure a robust dataset, especially during the summer months where weed growth may affect the water level readings.

APPENDIX A

Report Limitations

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APPENDIX B

Site Survey Results

SITE ESTABLISHMENT SHEET

SITE:	Rock Weir
WATERCOURSE:	Tipperary Creek
DESCRIPTION:	Water Level Recorder
CLIENT:	Oceana Gold
OPERATIONAL LIFE:	<1 Years

REGION:	Otago	**CATCHMENT AREA (KM^2):**	3.9
MAP REFERENCE (NZMG):	-45.37256, 170.50138		

BACKGROUND INFORMATION:

Flow monitoring site to characterise flow in Tiperarry Creek
No Data is available for the Creek

INSTALLER:	Matt Hamilton/Scott Mossman	**DATE:**	18-May-10

INSTRUMENTATION:

INSTRUMENT:	**SERIAL NUMBER:**	**PROGRAM:**
3m PT2X	#2720006	15 min log

REASON FOR INSTRUMENTS:

Cheap and reliable with no telemetry specifications needed
A permanent site is planned

POWER SOURCE: 2 x AA Batteries

PROBLEMS ENCOUNTERED:

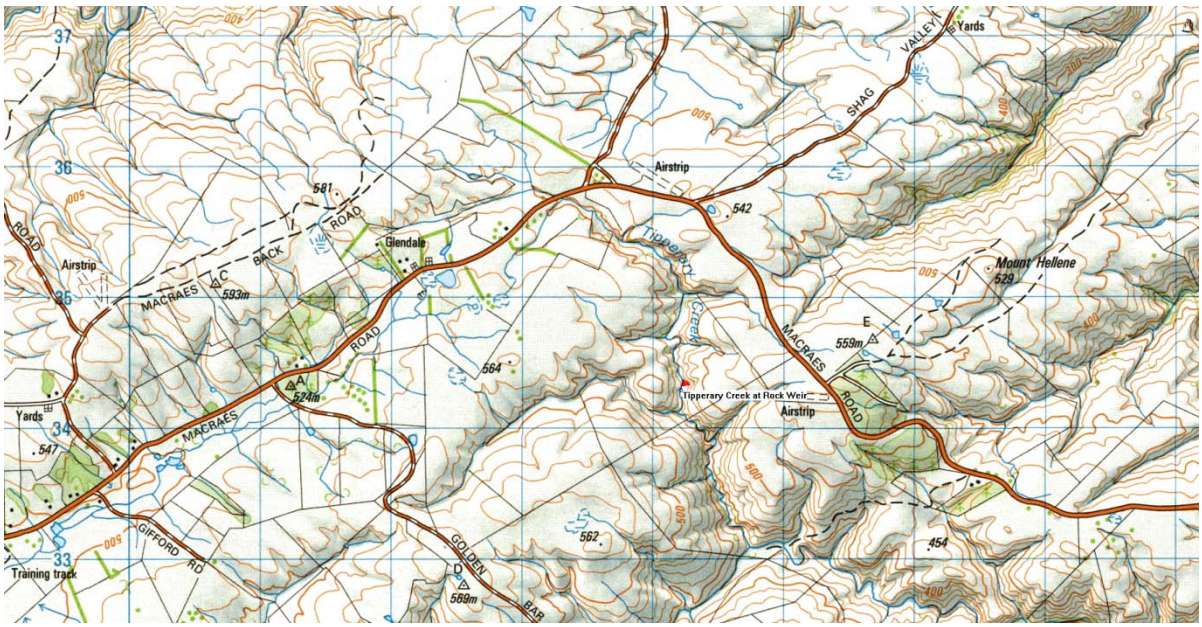
Hydrological control was good, a rock weir.

Flows are very low and low flows should be measured volumetrically
Clay and a small culvert can be utilised to direct flow to a fish bin.
a volumetric vessel > than 50L should be used.

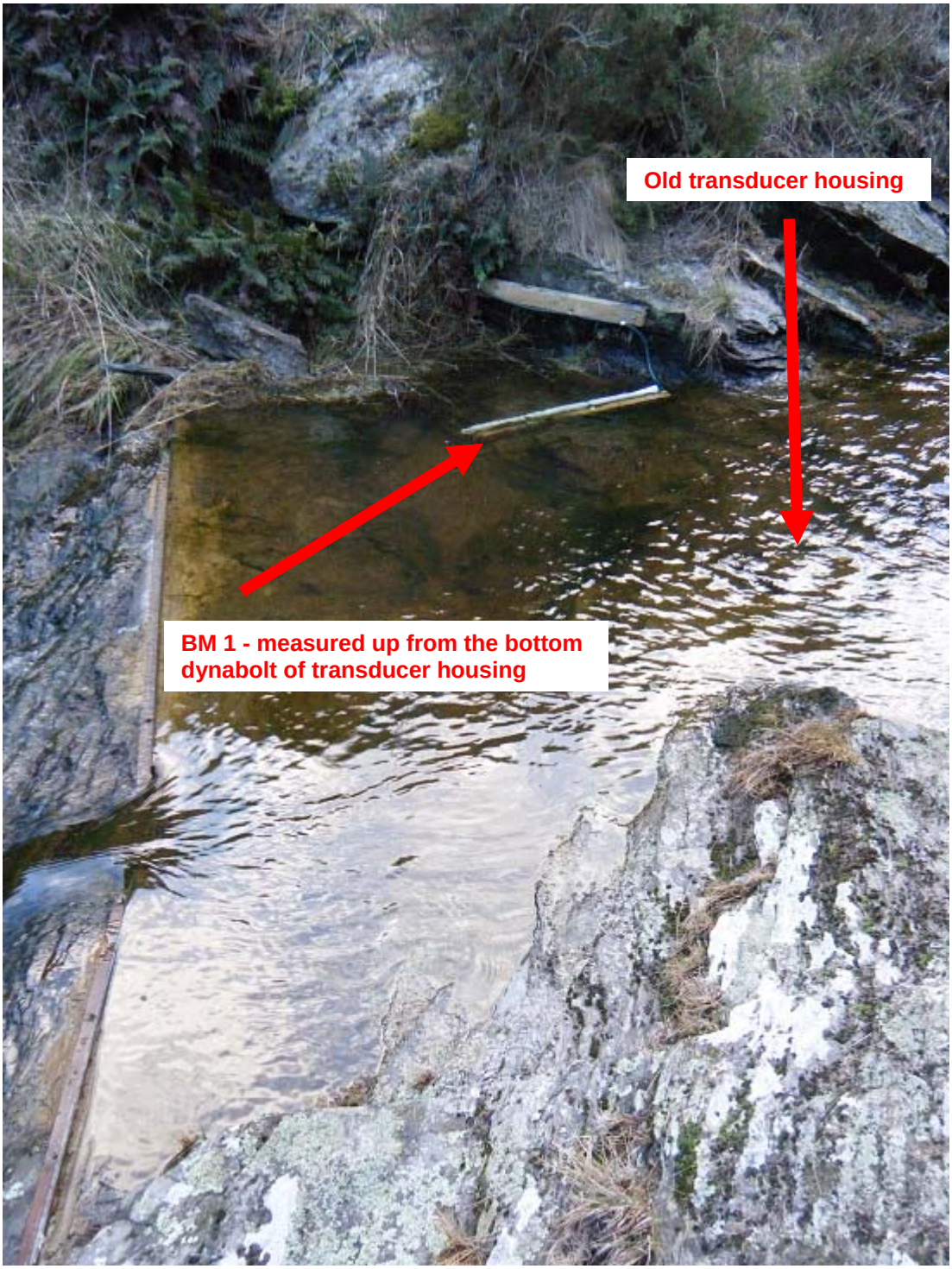
A drill hole higher in the catchment is leaking artesian groundwater into the catchment. If this drillhole is to be capped this should be done so immediately so to not influence results.

SITE PLAN:

TOPO MAP:



ADDITIONAL INFORMATION:



SITE SURVEY:		
SURVEY EQUIPMENT:	Nikon	
SERIAL NUMBER:	641013	
WEATHER:	Fine	
	RL (RELATIVE LEVEL)	
BENCHMARKS		
BM1 (Dynabolt at bottom of transducer housing)	1000.00	**mm**
STAFF GAUGE ZERO	0	mm
ORIFICE (approx)	1000	mm
Zero Flow	1050	mm
Bottom Dynabolt Old Housing	1029	mm
FLOOD MARKS	None Noted	

APPENDIX C

Daily Flow Results

~~~ PDAY ~~~

Source is H:\Company\Projects-Numbered\09781x\10xxx\0978110_562_OceanaGold_MacraesFlatExpansion\Data\Field Data-Site Visits\Tipperary Flow (m3/sec) at Tipperary Ck at Rock Weir (Post report)

From 18-May-2010 13:30:00 to 17-Feb-2011

24 hour periods beginning at midnight each day.

Daily means Years 2010-2011 Flow(m3/sec) at Tipperary Ck at Rock Weir (Post report)

Day	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	
1	?	?	?	?	0.028	0.111	0.012	0.003	0.001	0.011	0.001	?	
2	?	?	?	?	0.028	0.098	0.01	0.002	0.001	0.004	0.001	?	
3	?	?	?	?	0.026	0.08	0.008	0.002	0.001	0.007	0.001	?	
4	?	?	?	?	0.025	0.061	0.007	0.002	0.001	0.005	0.001	?	
5	?	?	?	?	0.024	0.051	0.006	0.002	0.001	0.003	0.001	?	
6	?	?	?	?	0.022	0.056	0.006	0.002	0.001	0.004	0.001	?	
7	?	?	?	?	0.029	0.058	0.005	0.002	0.001	0.005	0.205	?	
8	?	?	?	?	0.071	0.047	0.006	0.002	0.001	0.002	0.02	?	
9	?	?	?	?	0.061	0.039	0.008	0.001	0.001	0.001	0.014	?	
10	?	?	?	?	0.05	0.036	0.013	0.001	0.001	0.001	0.006	?	
11	?	?	?	?	0.049	0.032	0.01	0.001	0.002	0.001	0.006	?	
12	?	?	?	?	0.048	0.031	0.006	0.001	0.001	0.001	0.004	?	
13	?	?	?	?	0.073	0.029	0.005	0.001	0.001	0.001	0.004	?	
14	?	?	?	?	0.146	0.029	0.005	0.001	0.001	0.001	0.019	?	
15	?	?	?	?	0.089	0.027	0.005	0.001	0.001	0.001	0.007	?	
16	?	?	?	?	0.081	0.025	0.004	0.001	0.001	0.001	0.004	?	
17	?	?	?	?	0.076	0.025	0.007	0.001	0.001	0.001	?	?	
18	?	?	?	?	0.067	0.023	0.018	0.001	0.001	0.001	?	?	
19	?	0.001	?	?	0.055	0.021	0.009	0.001	0.001	0.011	?	?	
20	?	0.001	?	?	0.047	0.021	0.008	0.013	0.001	0.002	?	?	
21	?	0.002	?	?	0.045	0.019	0.007	0.014	0.001	0.001	?	?	
22	?	0.002	?	?	0.041	0.018	0.005	0.007	0.001	0.001	?	?	
23	?	0.001	?	?	0.036	0.019	0.004	0.002	0.001	0.001	?	?	
24	?	0.017	?	?	0.032	0.017	0.004	0.001	0.001	0.001	?	?	
25	?	?	?	?	0.031	0.016	0.004	0.001	0.001	0.001	?	?	
26	?	?	?	?	0.033	0.014	0.004	0.001	0.001	0.001	?	?	
27	?	?	?	?	0.03	0.011	0.003	0.001	0.011	0.001	?	?	
28	?	?	?	?	0.029	0.01	0.003	0.001	0.439	0.001	?	?	
29	?	?	?	?	0.04	0.009	0.01	0.001	0.022	0.001		?	
30	?	?	?	0.028	0.151	0.013	0.005	0.001	0.006	0.001		?	
31		?		0.027	0.171		0.004		0.006	0.001		?	
Min	?	0.001	?	0.027	0.022	0.009	0.003	0.001	0.001	0.001	0.001	?	0.001
Mean	?	0.004	?	0.028	0.056	0.035	0.007	0.002	0.016	0.002	0.018	?	0.019
Max	?	0.017	?	0.028	0.171	0.111	0.018	0.014	0.439	0.011	0.205	?	0.439
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~~~ PDAY ~~~

Source is H:\Company\Projects-Numbered\09781x\10xxx\0978110_562_OceanaGold_MacraesFlatExpansion\Data\Field Data-Site Visits\Tipperary Flow site\Tipperary site process\Copy of Tipperary Creek at Rock Weir_updated 25032011.hts

Flow (m3/sec) at Tipperary Ck at Rock Weir Naturalised (Post report)
From 18-May-2010 13:30:00 to 17-Feb-2011
08:00:00

24 hour periods beginning at midnight each day.
Daily means Years 2010-2011 Naturalised Flow(m3/sec) at Tipperary Ck at Rock Weir (Post report)

Day	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	
1	?	?	?	?	0.027	0.110	0.011	0.002	0.000	0.010	0.000	?	
2	?	?	?	?	0.027	0.097	0.009	0.001	0.000	0.003	0.000	?	
3	?	?	?	?	0.025	0.079	0.007	0.001	0.000	0.006	0.000	?	
4	?	?	?	?	0.024	0.060	0.006	0.001	0.000	0.004	0.000	?	
5	?	?	?	?	0.023	0.050	0.005	0.001	0.000	0.002	0.000	?	
6	?	?	?	?	0.021	0.055	0.005	0.001	0.000	0.003	0.000	?	
7	?	?	?	?	0.028	0.057	0.004	0.001	0.000	0.004	0.204	?	
8	?	?	?	?	0.070	0.046	0.005	0.001	0.000	0.001	0.019	?	
9	?	?	?	?	0.060	0.038	0.007	0.000	0.000	0.000	0.013	?	
10	?	?	?	?	0.049	0.035	0.012	0.000	0.000	0.000	0.005	?	
11	?	?	?	?	0.048	0.031	0.009	0.000	0.001	0.000	0.005	?	
12	?	?	?	?	0.047	0.030	0.005	0.000	0.000	0.000	0.003	?	
13	?	?	?	?	0.072	0.028	0.004	0.000	0.000	0.000	0.003	?	
14	?	?	?	?	0.145	0.028	0.004	0.000	0.000	0.000	0.018	?	
15	?	?	?	?	0.088	0.026	0.004	0.000	0.000	0.000	0.006	?	
16	?	?	?	?	0.080	0.024	0.003	0.000	0.000	0.000	0.003	?	
17	?	?	?	?	0.075	0.024	0.006	0.000	0.000	0.000	?	?	
18	?	?	?	?	0.066	0.022	0.017	0.000	0.000	0.000	?	?	
19	?	0.000	?	?	0.054	0.020	0.008	0.000	0.000	0.010	?	?	
20	?	0.000	?	?	0.046	0.020	0.007	0.012	0.000	0.001	?	?	
21	?	0.001	?	?	0.044	0.018	0.006	0.013	0.000	0.000	?	?	
22	?	0.001	?	?	0.040	0.017	0.004	0.006	0.000	0.000	?	?	
23	?	0.000	?	?	0.035	0.018	0.003	0.001	0.000	0.000	?	?	
24	?	0.016	?	?	0.031	0.016	0.003	0.000	0.000	0.000	?	?	
25	?	?	?	?	0.030	0.015	0.003	0.000	0.000	0.000	?	?	
26	?	?	?	?	0.032	0.013	0.003	0.000	0.000	0.000	?	?	
27	?	?	?	?	0.029	0.010	0.002	0.000	0.010	0.000	?	?	
28	?	?	?	?	0.028	0.009	0.002	0.000	0.438	0.000	?	?	
29	?	?	?	?	0.039	0.008	0.009	0.000	0.021	0.000		?	
30	?	?	?	0.027	0.150	0.012	0.004	0.000	0.005	0.000		?	
31		?		0.026	0.170		0.003		0.005	0.000		?	
Min	?	0.001	?	0.027	0.022	0.009	0.003	0.001	0.001	0.001	0.001	?	0.001
Mean	?	0.004	?	0.028	0.056	0.035	0.007	0.002	0.016	0.002	0.018	?	0.019
Max	?	0.017	?	0.028	0.171	0.111	0.018	0.014	0.439	0.011	0.205	?	0.439
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