ASHTON LONGWALL 102 – MID PANEL REPORT

1 INTRODUCTION

This report has been prepared by Ashton Coal Operations Pty Ltd (ACOL) and RPS Aquaterra.

The report has been prepared to satisfy the requirements of the "*Ashton Coal Project Upper Liddell Seam Extraction Plan, Longwalls 1 to 8", specifically* section 13.1.1.1 of the Ashton Water Management Plan:

> '**13.1.1.1** ***Mid-Panel Data Review***
>
> *ACOL will also prepare a succinct summary review of observed data for LWs 1, 2, and 3 in the ULD Seam, within two weeks of passing XL5 (nominally located above 10ct). A copy of this review will be provided to DRE and NOW for reference.*
>
> *This review will focus on the subsidence survey monitoring and groundwater monitoring data collected to that point. The review will comment on the adequacy of the mine plan, provide a brief comparison of the observed data to the predicted subsidence and ground water effects, and whether it is considered that there have been any impacts to Glennies Creek or the Hunter River.'*

The main body of the report focuses on the subsidence survey monitoring data collected for the Upper Liddell (ULD) seam LW102 to 18ct, and provides a brief comparison of the observed data to the predicted subsidence effects. The report also addresses the groundwater impacts observed during the extraction of approximately the first half of LW102.

2 BACKGROUND

Longwall 102 began extraction on the 10th of November 2013. Longwall 102 is 2240m long, 205m wide. Mining to date has occurred with no unexpected impacts to the environment or infrastructure above it.

The effects of subsidence were monitored in accordance with the document "*Ashton Coal Project Upper Liddell Seam Extraction Plan, Longwalls 1 to 8"*; this included both regular survey monitoring and visual inspection of both environmental, land and infrastructure features.

3 MINE SUBSIDENCE

The Upper Liddell Seam section is being mined along the length of Longwalls 102 at Ashton Underground Mine. Mining height is nominally in the 2.3m to 2.6m range. The seam dips to the southwest at a grade of up to 1 in 10. Overburden ranges in thickness from 165m near the start of the longwall panel to 105m at the take off end. The final extraction void is nominally 216m wide. This includes the 5.5m width of development drivage either side of the longwall block. Maingate chain pillars are nominally at a centre to centre width and length of 30m and 150m respectively. Tailgate chain pillars are nominally at a centre to centre width and length of 30m and 150m respectively.

Ashton's longwall mining operation commenced in February 2007. Since then 11 panels have been completed. The progress of longwall extraction in the ULD seam is shown in **Figure 1**.

Ashton Coal has monitored the subsidence movement on the surface during the extraction of Longwall's 1-8 using longitudinal subsidence lines. These are located over the start and finish lines of each panel, a main cross line extending over all seven southern panels and a dedicated cross line extending over Longwall 7B and 8. All panels have monitoring data for each start and end lines and various cross lines relevant to the panel, surface features or strata features.

The Upper Liddell Seam (ULD) Longwall 102 utilises panel centre lines (CL1 and CL2), the Pikes Gully LW2 panel centre lines and the cross block survey monitoring lines that were used for the Pikes Gully Seam (PG) longwalls. The subsidence monitoring lines relevant to LW102 to date are LW102-CL1, LW2-CL1 and XL5 as shown in **Figure 2.**

The following table (**Table 1)** outlines the maximum subsidence parameters predicted and recorded during regular survey of subsidence lines as the longwall passed each location.

Subsidence monitoring over Longwall 102 to date consists of regular survey of centreline 1 (LW102 CL1) and cross line 5 (XL5). The frequency and results of the monitoring has been maintained per monitoring document "*Ashton Mine Subsidence Monitoring Programme Longwall 101 to 104".* This information is being supplied to the Principal Subsidence Engineer. A graph of the vertical subsidence of cross line 5 is shown in **Figure 3**.

Visual and survey monitoring of existing 132kV power transmission structures over Longwall 102 was undertaken regularly. The 132kV poles have been referenced as SET24 – A, B & C, and SET25. The 132kV transmission line was surveyed prior to, during and post undermining. Survey data from the 132kV power lines was recorded and supplied to the Principal Subsidence Engineer as per the "*Ashton Mine Subsidence Monitoring Programme Longwall 102".* The effects of subsidence on the 132kV structures can be seen in **Figure 4**. Maximum subsidence measured on power poles (SET24 – A, B & C, and SET25) during Longwall 102 mining was: 1.21, 1.19m , 1.17m and 0.06 respectively.

Table 1: Cumulative subsidence of Longwall Panel 102 to 6/02/14 - Predicted vs. Actual

	Maximum Predicted SMP	**Maximum Measured as at 06/02/2014**		
Longwall 102		**LW102 CL1**	**LW2 CL1**	**XL5**
Subsidence (mm)	4000	2015	2897	2962
Tilt (mm/m)	189	23.9	38.9	51
Tensile Strain (mm/m)	76	11	15.4	21.4

3.1 SUBSIDENCE IMPACTS

Surface subsidence cracks have developed along each gate edge of the Longwall panel. These generally run parallel to the gate road within the longwall block. Cracks are evident on the up-hill side of the panel. Some cracks and compression lines have occurred parallel to the retreating face. Where this has occurred the features have usually started from a parallel pillar edge crack and continued around to align with the face.

The maximum subsidence movements detected over Longwall 102 are less than those predicted in the SMP. This occurred for all centreline (CL) survey monitoring lines and cross lines. Horizontal movement has occurred in the coal seam up dip direction (East North -East) above each of the Longwall panels. This movement has predominantly occurred within the longwall panels with limited displacement detected outside the panel edge.

Rehabilitation of the surface cracks has been occurring as extraction continues. Effected surface roads have only required a grader to smooth compression humps and minor cracks.

4 GROUNDWATER MONITORING

Ashton has an extensive monitoring network of piezometers, ground water inflow monitoring and laboratory analysis of water quality for monitoring groundwater pressure and levels and quality. Groundwater monitoring around LW102 has been intensified for the period of extraction to identify any potential sudden changes that may occur.

Groundwater monitoring shows that the impact of LW102 is less than that predicted in the EIS and the LW102 extraction plan. The monitoring data (Appendix 1) is categorised by aquifer, with monitored aquifers being: Glennies Creek Alluvium, Hunter River Alluvium, shallow Lemington coal seams, deep Lemington coal seams, the Pikes Gully seam and the Upper Liddell seam. The results of the monitoring are summarised below:

- Glennies Creek Alluvium: Monitoring shows no response in the Alluvium to the extraction of LW102. There was a significant recharge rainfall event in November that caused a response. The monitoring shows the saturation of the alluvium is being influenced by the rainfall events with a rise in levels during higher average rainfall and a decline in dry periods;
- Hunter River Alluvium: There is no response to the mining of LW102. The monitoring shows the saturation of the alluvium is being influenced by the rainfall events with a rise in levels during higher average rainfall and a decline in dry periods;
- Shallow Lemington seams: The monitoring shows no response to mining of LW102;
- Deep Lemington seams (Lem 15): The monitoring shows no response to the mining of LW102;
- Pikes Gully seam: The monitoring shows no change in the saturation of the Pikes Gully seam from LW102 extraction. This is as predicted as it is assumed to be slowly draining due to the previous extraction of the seam within the approved mine area. WML183 shows behaviour that is not consistent with adjacent monitoring bores and does not coincide with any mining activity or rain events. The monitoring bore is being investigated.
- Upper Liddell seam: The monitoring shows both a consistent level of saturation (WML261 & WMLC144) and a gradual decline of saturation (WML262 & WMLC248). This is consistent with the predicted impacts where the Upper Liddell seam is predicted to be slowly dewatering due to the extraction of the seam in the approved mining area.

Impacts to aquifers due to the extraction of LW102 to date are within predicted impacts for the Glennies Creek alluvium and Hunter River alluvium.

5 ADEQUACY OF THE MINE PLAN

The subsidence data and the groundwater monitoring data both show that the effects of multi seam extraction of LW102 is within the predictions of the EIS and the SMP. The offset layout of the multi seam panels is resulting in impacts that are less than those effects that were predicted. The results also show consistency across different monitoring sites indicating that the multi seam response is predictable.

Visual observation on the surface indicates that deformation from the subsidence is as expected with surface cracks occurring in similar locations as the single seam extraction with respect to the extraction panel edges. Underground observations show minimal effects from the overlying extraction in the Pikes Gully seam. These results are less than anticipated, indicating that the approach to mine design, operation and management of the multi seam extraction has been conservative.

Figures

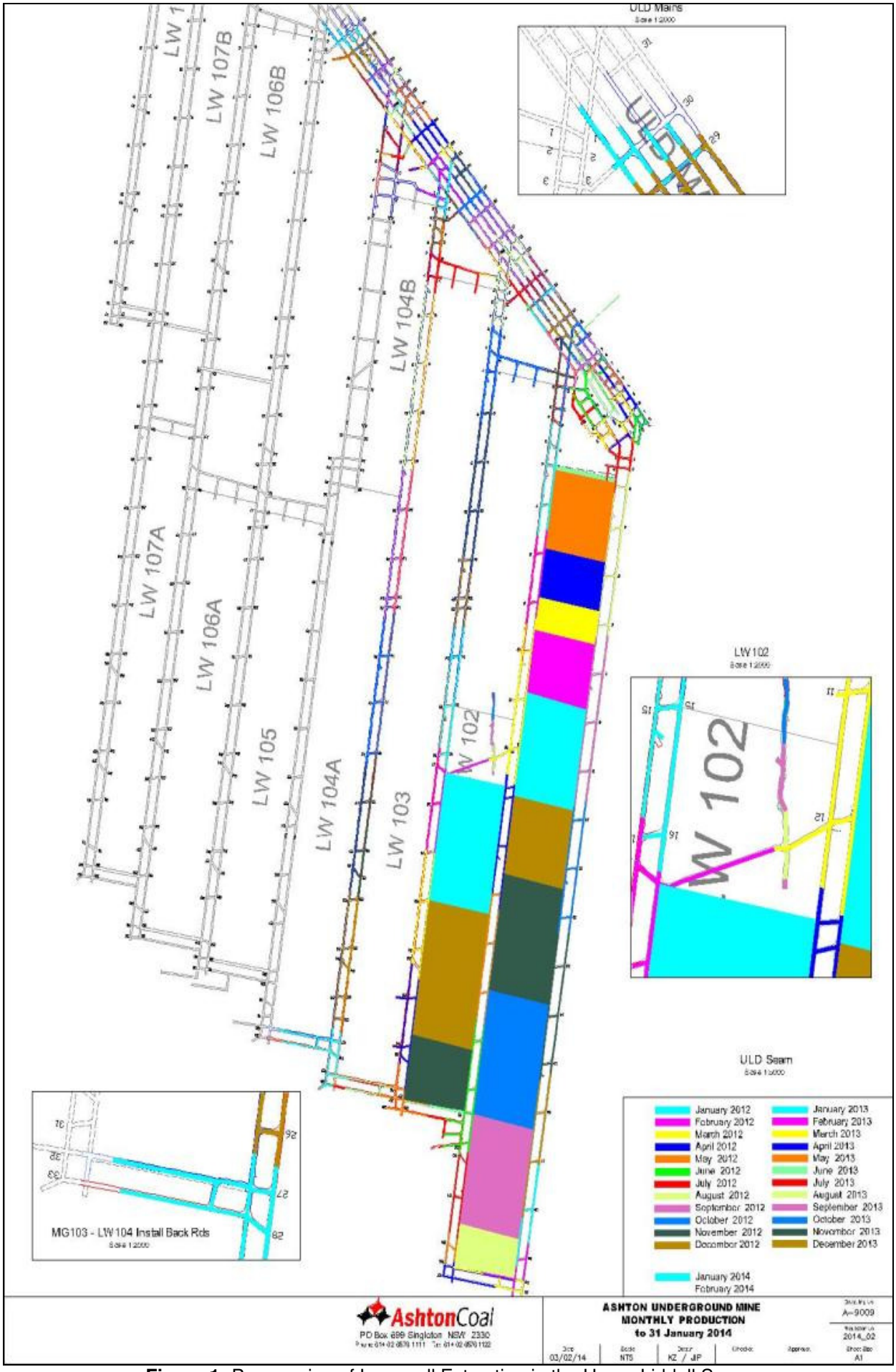


Figure 1: Progression of Longwall Extraction in the Upper Liddell Seam

Figure 2: Plan location of Monitoring Cross Lines. Also shown is the 132kV transmission lines.

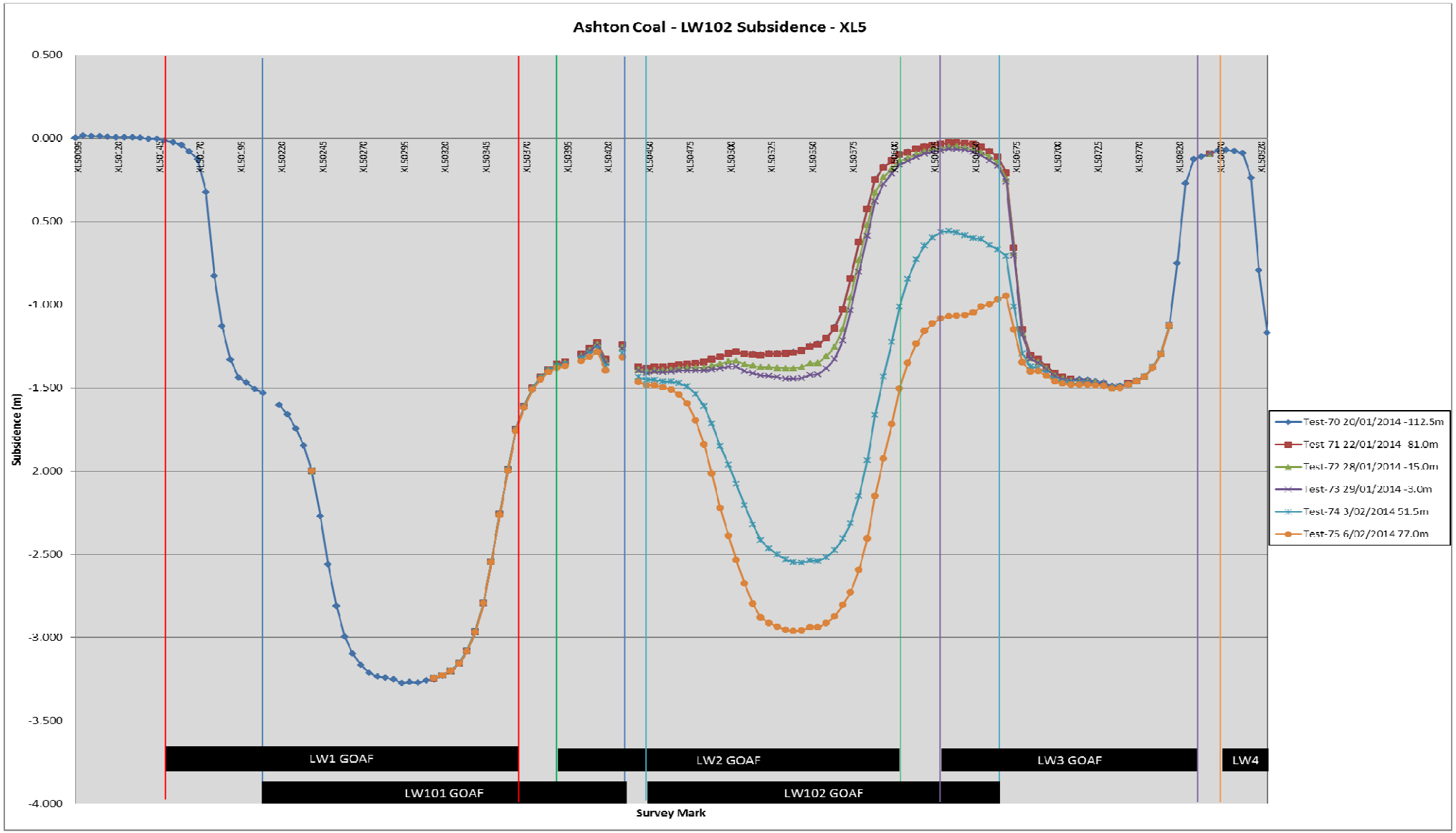


Figure 3: Vertical subsidence of XL5 – Pre and Post LW102

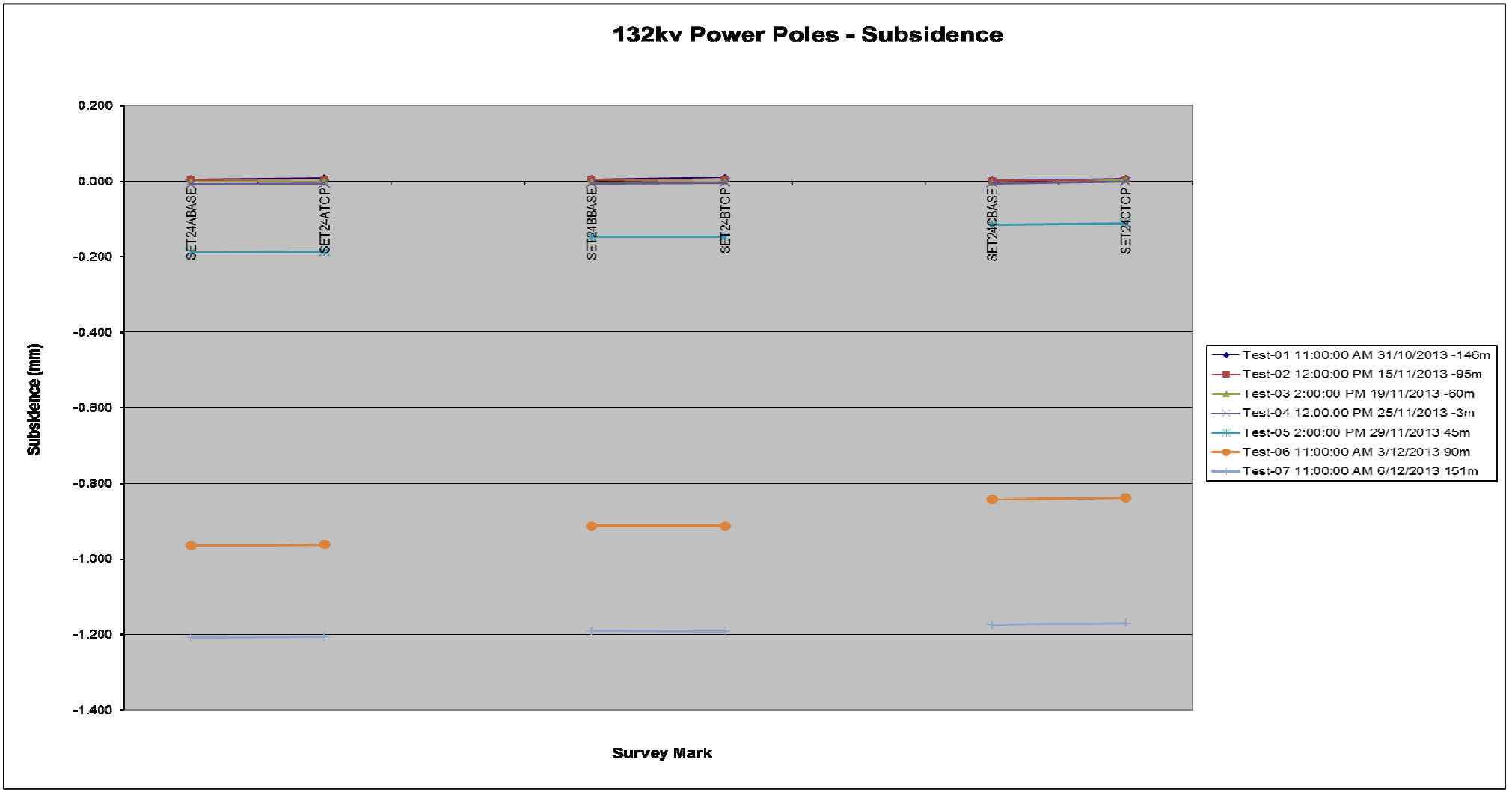
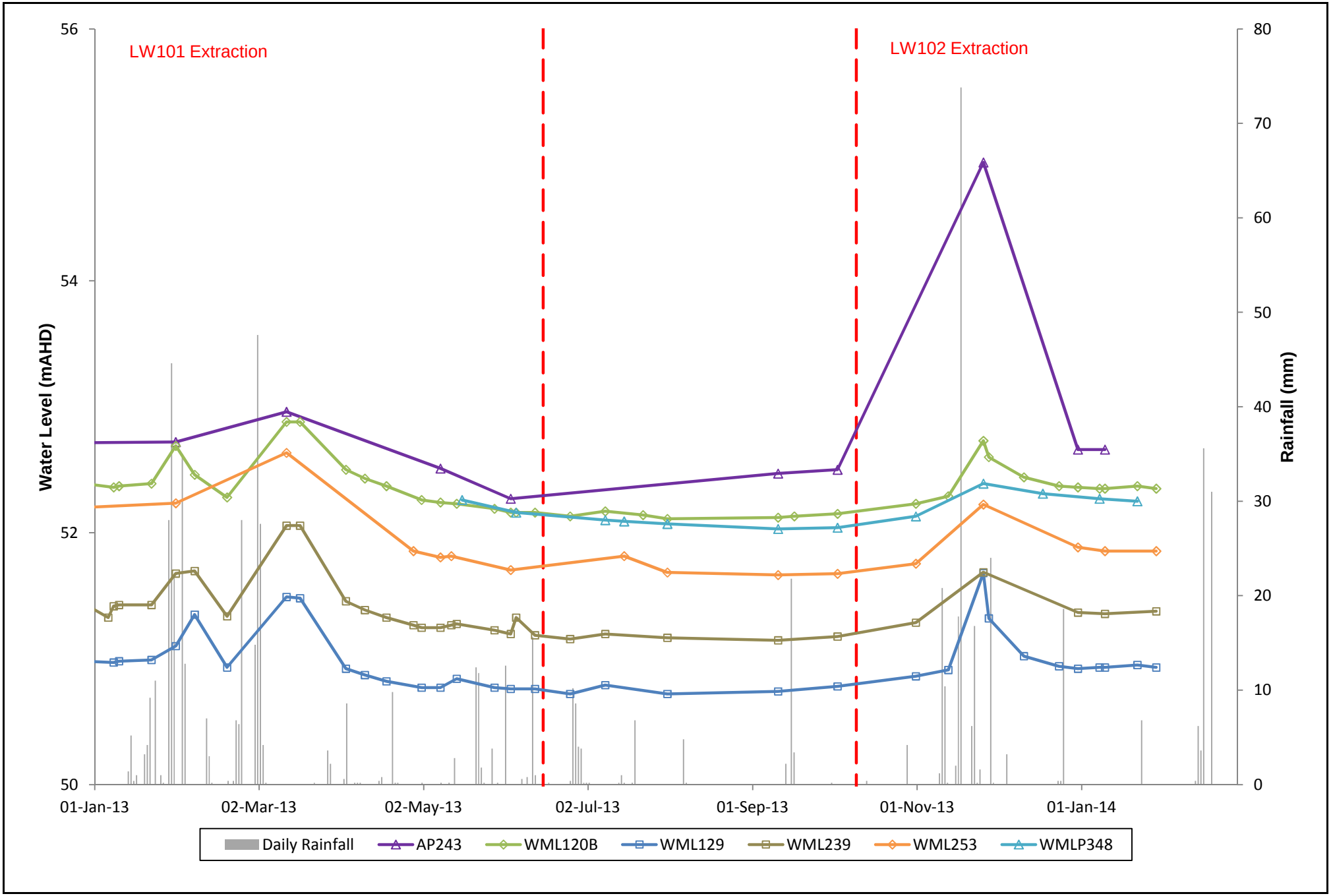


Figure 4: Subsidence Monitoring Data 132kv Power Poles – Set24 A, B and C

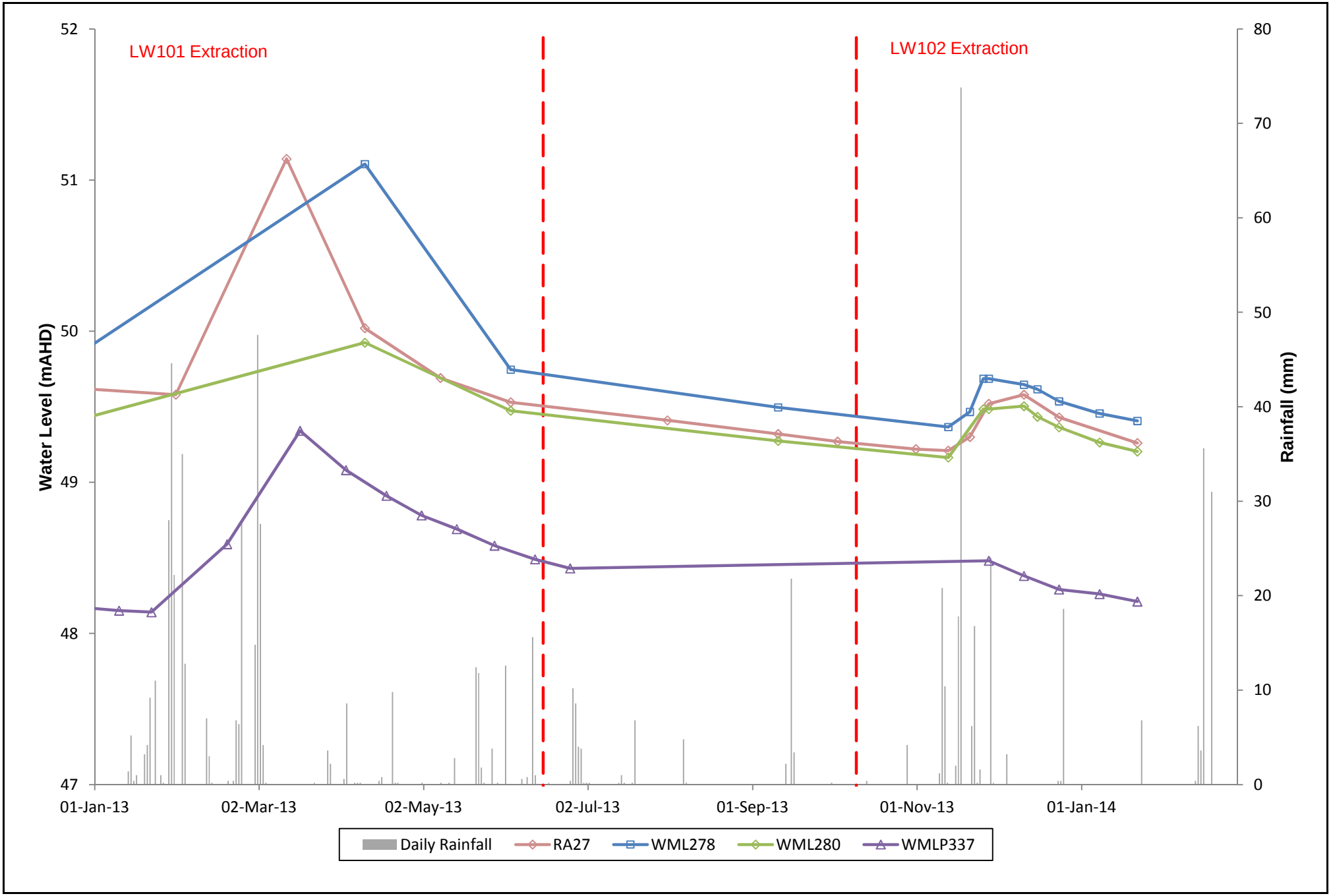
Appendix 1 – Piezometer monitoring hydrographs



RPS

HYDROGRAPH: GLENNIES CREEK ALLUVIUM FIGURE 1

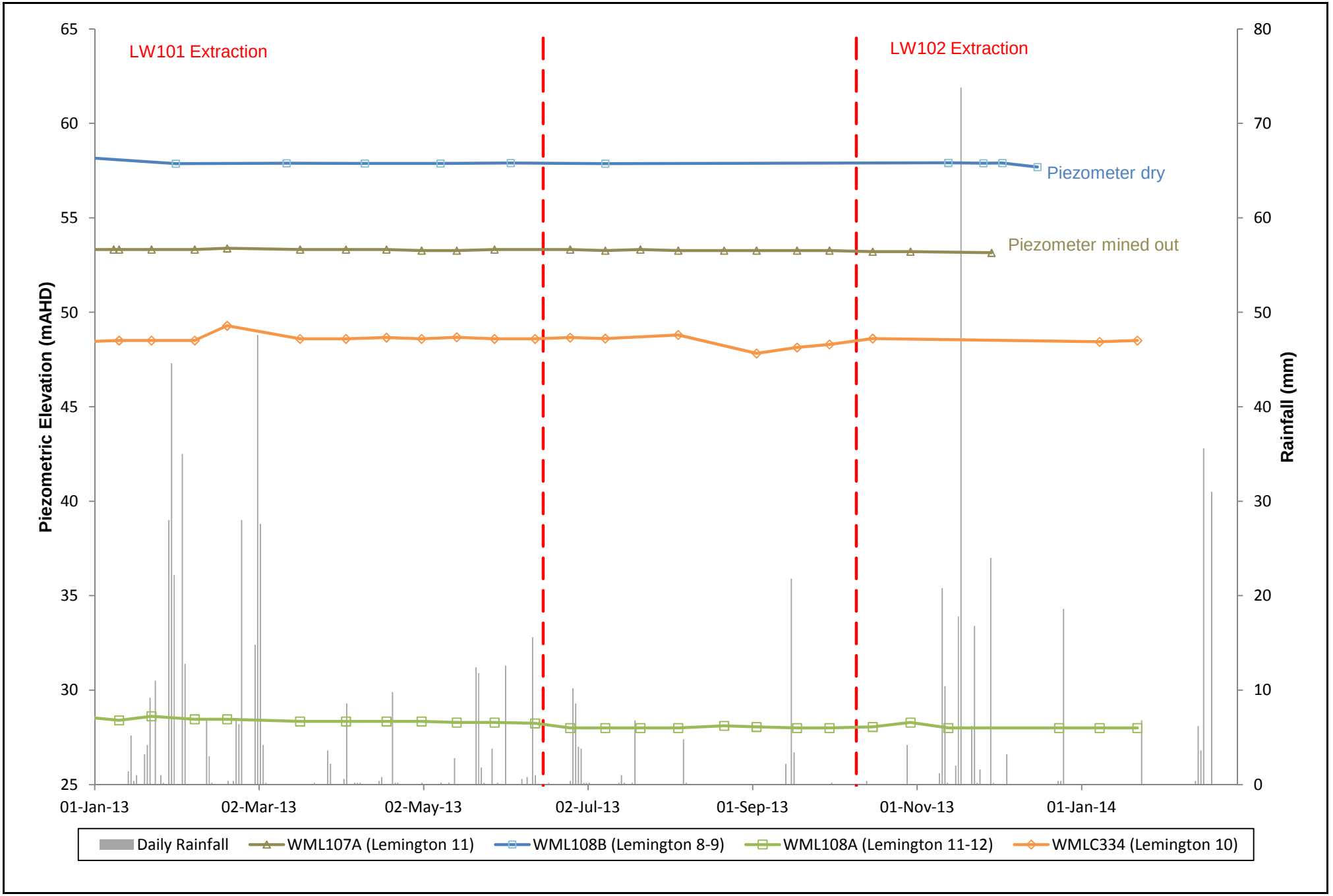
F:\Jobs\S55K\300\Hydrographs\[028a.xls]Figure 1



RPS

HYDROGRAPH: HUNTER RIVER ALLUVIUM FIGURE 2

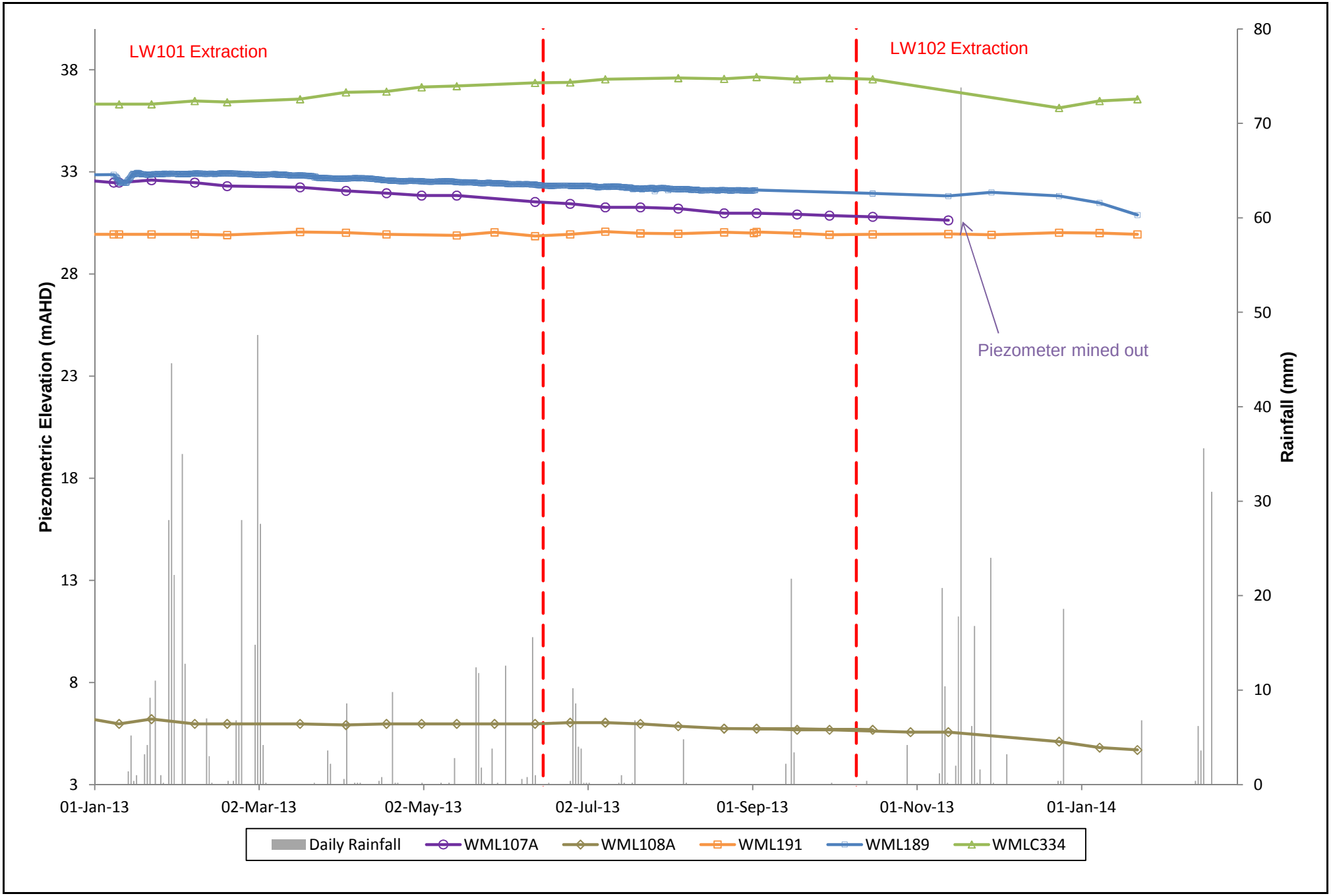
F:\Jobs\S55K\300\Hydrographs\[028a.xls]Figure 2



RPS

HYDROGRAPH: SHALLOW LEMINGTON SEAMS FIGURE 3

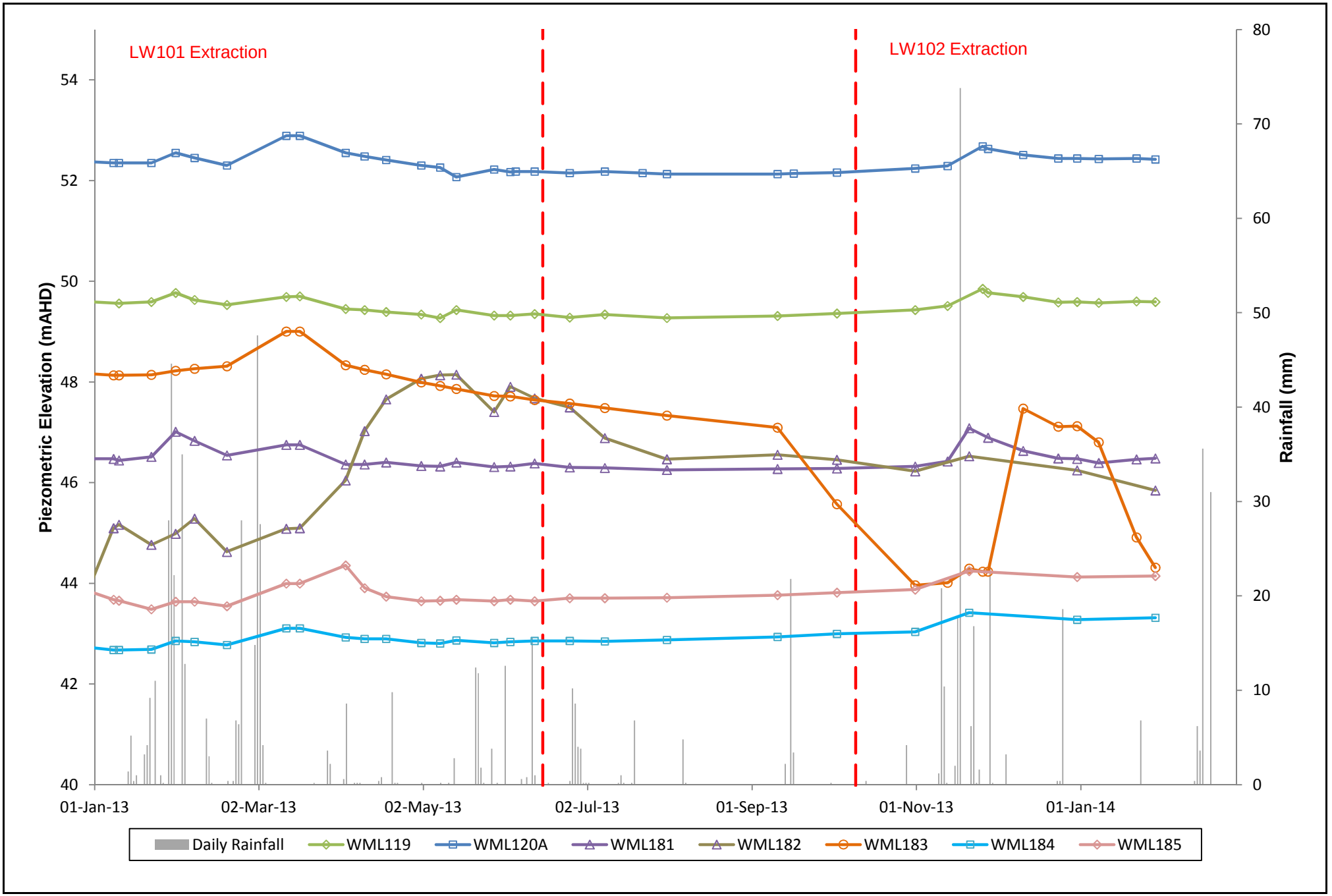
F:\Jobs\S55K\300\Hydrographs\[028a.xls]Figure 3



RPS

HYDROGRAPH: LEMINGTON 15 SEAM FIGURE 4

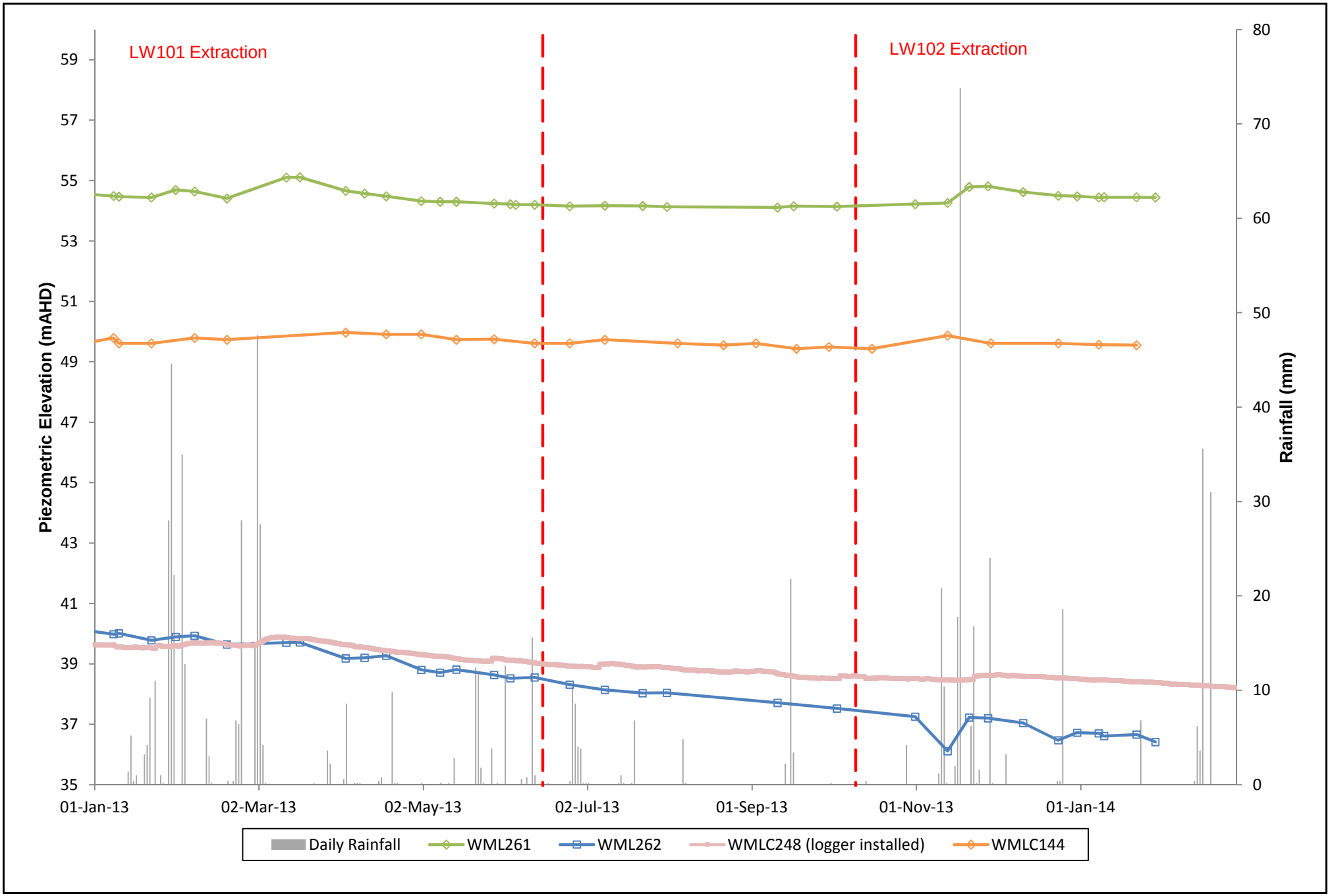
F:\Jobs\S55K\300\Hydrographs\[028a.xls]Figure 4



RPS

HYDROGRAPH: PIKES GULLY SEAM FIGURE 5

F:\Jobs\S55K\300\Hydrographs\[028a.xls]Figure 5



RPS

HYDROGRAPH: UPPER LIDDELL SEAM FIGURE 6

F:\Jobs\S55K\300\Hydrographs\[028a.xls]Figure 6