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*15/03/2013* *VE23742 / Murray View Estates, Tailem Bend / Rev1*

Dear Kate

**RIVERBANK COLLAPSE HAZARD, LOWER REACHES RIVER MURRAY STABILITY RISK MANAGEMENT, MURRAY VIEW ESTATES, TAILEM BEND, MONITORING REVIEW – FEBRUARY 2012 TO JANUARY 2013**

We have incorporated the opinion of Coffey Geotechnics, letter dated 21 February 2013, within our assessment and recommendation as presented in the following.

## Introduction

Sinclair Knight Merz (SKM) are pleased to provide the Department of Environment, Water and Natural Resources (DEWNR) with a review of ground survey monitoring data collected over a twelve month period from the foreshore at Murray View Estates, Tailem Bend in the lower reaches of the River Murray, South Australia.

Survey monitoring was carried out by Alexander & Symonds Pty Ltd (Alexander & Symonds) on behalf of DEWNR. Monitoring data collected consists of twelve data sets (including the initial survey) between 2 February 2012 and 4 January 2013. The data from 2 February 2012 is taken as the baseline survey. The aim of the monitoring was to measure vertical and lateral surface movements of fixed survey points installed adjacent to the riverbank in order to monitor surface deformations along the foreshore at Murray View Estates over time.

The site plan indicating the location of the riverbank monitoring points is included as Figure 1.

## Brief Background

Unprecedented low water level occurred in the Lower River Murray from 2008 to 2010 as a result of drought (Reference 1). Falling water levels have been a major contributing factor to a large number of riverbank cracking and collapse incidents along the River during this time. A number of incidents were investigated in detail by DEWNR (previously the Department of Water, Land and Biodiversity Conservation (DWLBC)) to analyse the severity and public risk of potential riverbank instability.

On 12 February 2009, a 50 m section along the southern riverbank at Murray View Estates was recorded on DEWNR's incident register to have collapsed (Reference 3). Bank cracking had previously been reported approximately 200 m upstream of the collapsed section,. Subsequently pedestrian and vehicle access was restricted by partially fencing off the areas that had collapsed and where cracking had occurred.

Following recent post-drought recovery of river levels along the River Murray, the risk of riverbank collapse has reduced for most sites, yet some continue to show signs of instability during both high and low water levels. There has however been a decline in the number of new incidents of riverbank collapse since the post-drought recovery.

The river level at the Wellington Ferry monitoring station (station ID A4261159), near Wellington and approximately 10 km downstream of Murray View Estates, was reported at 0.613 m AHD on 10 January 2013 (Reference 2).

A number of ground monitoring programs have been implemented by DEWNR to enable reassessment of the safety of areas previously restricted from the public.

## Monitoring Programme

Ground survey monitoring of riverbank deformation at Murray View Estates was conducted by Alexander & Symonds between 2 February 2012 and 4 January 2013. Monthly monitoring data is presented in Appendix A.

The monitoring involved establishing three dimensional (Easting (E), Northing (N), Elevation(y)) co-ordinates using total station survey methods at a total of 49 reference points. Reference points consisted of 'Y' section steel pins driven into the ground to a depth of 0.5 m. Survey accuracy is reported to be within ±3 mm horizontally (E and N) and ±2 mm vertically (y).

The first survey was carried out on 2 February 2012 and has been used as the baseline survey from which relative movement for subsequent surveys was determined. Survey differences (movement) have been reported in millimetres (mm).

## Review and Analysis of Monitoring Data

Twelve sets of monthly data collected between 2 February 2012 and 4 January 2013 have been reviewed. As indicated on Figure 1, the site was split into three sections (Section 1 to Section 3) for ease of analysis of the riverbank stability.

As indicated on Figure 1, the entire near-shore site area is currently fenced off to the public due to previous riverbank collapse along an approximately 50 m long section of the bank. However it is believed that the fence is not secure and that foot and vehicle access is possible. This factor is considered as part of this review.

The review and analysis of lateral and vertical movement at each monitoring point was conducted according to a set pattern, referred to hereafter as the *Preliminary Filter*. The Preliminary Filter consisted of the following tasks:

1. Establish the cumulative difference between the first and last surveys (positive or negative) for each of the three components (E, N, y) at each survey pin, for each month of survey.

2. Highlight all points with a cumulative deformation of 5 mm or greater in any direction over the full monitoring period for further analysis.

3. Check that greater movement on a single axis on any individual survey did not exceed the value represented by the cumulative value. If cumulative movement was exceeded, consider this point for further analysis.

Seven of the monitoring points (E2, F1, F2, J2, M1, N1 and S1) experienced vertical deformation greater than or equal to 5 mm. Four points (D2, F1, M1 and N1) showed lateral movement greater than 5 mm. These points have been further analysed.

To gain a visual appreciation of the lateral and vertical deformation occurring across the site the monitoring data for 4 January 2013 (most recent monitoring survey) has been graphically presented as Figure 2. Contours of vertical movement have been incorporated to identify local vertical deformation (heave and settlement) and vectors demonstrate the magnitude and direction of lateral movements. Movement is relative to the baseline survey.

A commentary for the three sections of riverbank is presented as follows:

**Section 1**

This section of the riverbank showed both lateral and vertical deformation exceeding the 5 mm threshold in the area surrounding the previously collapsed riverbank area (shown on Figure 2).

Monitoring data for E2, F1, F2 and J2 have shown cumulative changes in vertical elevation exceeding 5 mm. Contour mapping of the cumulative changes (Figure 2) indicate two small depressions, centred on E2 and J2. To investigate the development of the depressions in this area over time a plot of elevation against time is presented in Appendix B.

Vertical movement between consecutive surveys for all four points across the twelve month survey period have been within the survey accuracy of 2 mm, with the exception of 3 mm downward changes at F1 between the March 2012 and April 2012 surveys and at E2 between the November 2012 and January 2013 surveys. These changes may indicate localised events caused by interference with the monitoring targets.

The graph included in Appendix B demonstrates a consistent trend in vertical movement with time for all four survey points analysed (particularly for points E2 and F2, whose movements have only diverged significantly in the last monitoring period). The overall average change

since the baseline survey for the four points is approximately -5 mm. This consistent trend in movement for the survey points may indicate that seasonal or tidal variations along the section of riverbank have some influence over the survey results, although the general downwards trend may suggest that some very slow (<0.4 mm per month) subsidence is occurring in the area.

Lateral movement indicated by the vectors on Figure 2 indicates slight movement of most survey points offshore; however cumulative lateral movement exceeding the 5 mm threshold was only observed at survey points D2 and F1 over the monitoring period. Cumulative offshore movements of 6 mm (E and N resultant) and 5 mm (N) were recorded at D2 and F1 respectively. Graphs of lateral movement with time are included in Appendix C for both points.

Lateral movement between consecutive surveys was within the survey accuracy of 3 mm throughout the twelve month survey period for both points. The survey data does not indicate a lateral directional trend for more than two consecutive survey months at any point during the survey period. The last two surveys have shown uni-directional movement for D2, which may indicate a cumulative lateral movement to the northeast (i.e. towards the river). This trend needs to be confirmed at subsequent monitoring intervals.

**Section 2**

Cumulative lateral and vertical movement exceeding 5 mm was observed at survey points M1 and N1 in Section 2.

Analysis of the change in vertical elevation and lateral position with time for both points is included graphically in Appendix B and Appendix C, respectively.

Consecutive vertical elevation survey data has been within the 2 mm survey accuracy for all monitoring periods for both points with the exception of N1 which showed a -3 mm change in the most recent survey. The trend of vertical movement for the two points has been relatively consistent over the monitoring period, with a downward trend of 5 to 6 mm observed (approximately 0.3 mm per month). The contour plan included as Figure 2 shows this slight downward slope towards the river's edge in the vicinity of points M1 and N1.

Lateral movement has been within the 3 mm survey accuracy throughout the survey period for both points. The time series analysis indicates no directional trend lasting more than 2 surveys, however the riverwards movement has been consistent for the last 2 survey rounds for both points and should continue to be monitored. The vector diagrams (Figure 2) show slight movement offshore for all points in Section 2, although within the 5 mm cumulative threshold for all other monitoring points.

**Section 3**

One survey point (S1) in Section 3 showed only cumulative vertical deformation exceeding the 5 mm threshold. Analysis of the vertical position of S1 with time (Appendix B) indicates

movement within survey accuracy for all consecutive surveys excepting the most recent survey (-3 mm change). The overall average trend in movement is less than 0.5 mm downwards per month, with the cumulative change in vertical deformation since the initial survey totalling -6 mm at the last survey.

## Discussion and Conclusions

A combined time-series analysis of all points noted as exceeding the vertical deformation threshold is included as Figure 4. The graph shows notable consistency in the vertical movement between consecutive surveys for all points analysed. While up and downwards fluctuations have been recorded across the twelve month period, an overall downward trend of 5 mm on average presides. A trend of increased settlement in the period September 2012 to January 2013 could indicate shrinkage due to desiccation of clay soil and may be recoverable.

To gain an appreciation of the influence of water levels (seasonal or tidal) on the survey marker elevation data, available water level data collected at the Wellington Ferry station (Reference 2) on the survey dates was superimposed on a secondary axis on Figure 4. The graph does not show a strong relationship between fluctuations in water levels and changes in vertical elevation. This result suggests that a downward trend is occurring along the riverbank at the site independently from the river level changes over the monitoring period analysed, although the river level fluctuations are small. Straight line interpolation of the time-series data suggests that this equates to less than 0.5 mm subsidence per month.

Alexander & Symonds noted vehicle tracks near survey point F2 (Section 1) during the April 2012 survey round indicating possible disturbance of survey points in this vicinity. The single event exceeding the 2 mm survey accuracy at F2 between the March 2012 and April 2012 surveys may be attributed to disturbance of the survey marker.

All other movement exceeding survey accuracy and with cumulative elevation changes exceeding the 5 mm threshold were recorded during the most recent survey round (January 2013). Alexander & Symonds noted in their e-mail to DEWNR (dated 9 January 2013) that the site showed evidence of a reasonable degree of pedestrian and vehicle activity, most likely due to the preceding holiday period. Disturbance of survey markers may have interfered with monitoring results.

Overall the analysis and interpretation of the twelve sets of monitoring data for the site does not conclusively identify any significant indicators of imminent riverbank collapse. While some slow downward trends may be occurring along the bank, the monthly changes recorded have been either within the survey accuracy of 2 mm, and in some cases potentially subject to human disturbance, and are therefore not conclusive. Lateral deformation is similarly inconclusive due to monthly movements being relatively random in direction and within the survey accuracy of 3 mm in magnitude at each monitoring period.

Despite results being relatively inconclusive, due to the general, albeit slow, downwards and riverwards trends that appear to be developing it is suggested that the site access restrictions,

albeit in as much as they are effective, at the site remain in place, but that periodic monitoring at the site continues at less frequent intervals.

## Recommendations

Based on the review and analysis of twelve sets of ground survey monitoring data collected at the Murray View Estates site since 2 February 2012, the following recommendations are made for the future monitoring and management of the site:

1. Continuous monthly monitoring at the site cannot be justified based on the ground deformation trends observed during the past twelve months of monitoring. It is recommended that monitoring be reduced to quarterly intervals, with the next round of monitoring occurring in early April 2013. A review and reassessment is recommended following one year of quarterly data collection (January 2014), at which time it may be appropriate to reduce monitoring to bi-annual or annual surveys provided the river levels remain within their normal range of approximately 0.5 m AHD to 1.25 m AHD as measured at the Wellington Ferry monitoring station near Tailem Bend (Reference 2).

2. At points N1, M1, S1 and to a lesser extent E2, F1, F2 and J2 there is a trend that suggests a very slowly subsiding riverbank. If this trend continues over the next 12 months then it may be reasonable to conclude that near bank subsidence is occurring at normal water level ranges. Recent bathymetric surveys (Figure 5) indicate little sign of major sudden bank failure. The rate of subsidence is very slow, however, accelerated movement could occur in the future at which time monthly measurements should be resumed.

3. Access restrictions are still considered necessary at the site, and all fencing currently in place should remain. If the trend of continued subsidence is not maintained over the next 12 months, removal of access restrictions can be justified. This position should be reviewed annually and appropriate action can be taken (e.g. re-impose restriction) should subsidence trends re-occur.

4. It is further recommended that during all future monitoring rounds the water level at Wellington Ferry monitoring station be recorded in conjunction with the ground survey monitoring data to allow for the investigation of additional trends concerning the relationship between ground movement and water levels.

## Limitations

This review is based on the data provided by DEWNR from Alexander & Symonds. It is assumed that the data provided is a true indication of ground movement that has occurred at Murray View Estates, Tailem Bend since 2 February 2012.

## References


- Reference 1: SKM Report, February 2012, 'Study into River Bank Collapsing – Lower River Murray, Inspection Report'
- Reference 2: DEWNR, 'River Murray Water Data', https://www.waterconnect.sa.gov.au/RMWD/Pages/default.aspx, accessed 11/01/2013
- Reference 3: DEWNR, 'Riverbank Collapse' https://www.waterconnect.sa.gov.au/RCHIW/Pages/map.aspx, accessed 11/01/2013


## Attachments

Figure 1 Site Plan

Figure 2 Lateral and Vertical Deformation Modelling, 4 January 2013

Figure 3 Wellington Ferry Historical Water Levels

Figure 4 Cumulative Vertical Movement for all Survey Points of Interest with Time

Figure 5 Bathymetric Survey

Appendix A Monthly Monitoring Data

Appendix B Analysis of Cumulative Vertical Movement

Appendix C Analysis of Cumulative Lateral Movement

Yours sincerely

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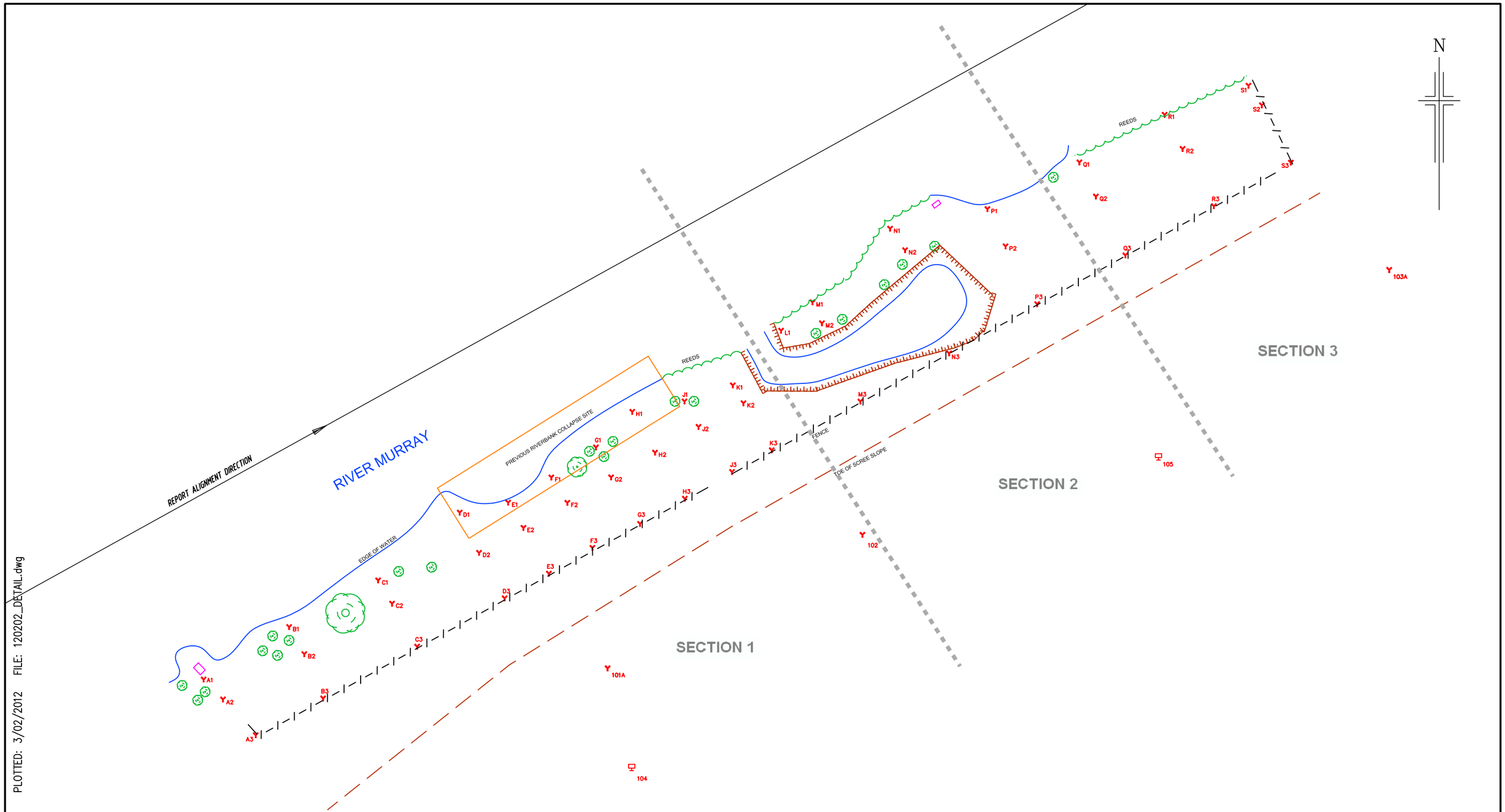
## Figure 1 Site Plan




PLOTTED: 3/02/2012 FILE: 120202_DETAIL.dwg

0 7.5 15 30 45 60 75 m

1:750

 ORIGINAL SHEET SIZE A3

| | | | |
|---|---|---|---|
| COORDINATES: IOCAL | | SURVEY: NRG | 2/2/2012 |
| HEIGHT DATUM: IOCAL | | DRAWN: NRG | 3/2/20112 |
| DATA FILE: | | | |
| FLD/LVL BOOK: | | CHECKED: | |

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+ Construction + Mining +
+ Spatial Information Management +

Alexander Symonds Surveying Consultants

# Murray View Estate
# TAILEM BEND
# River Bank Monitoring points

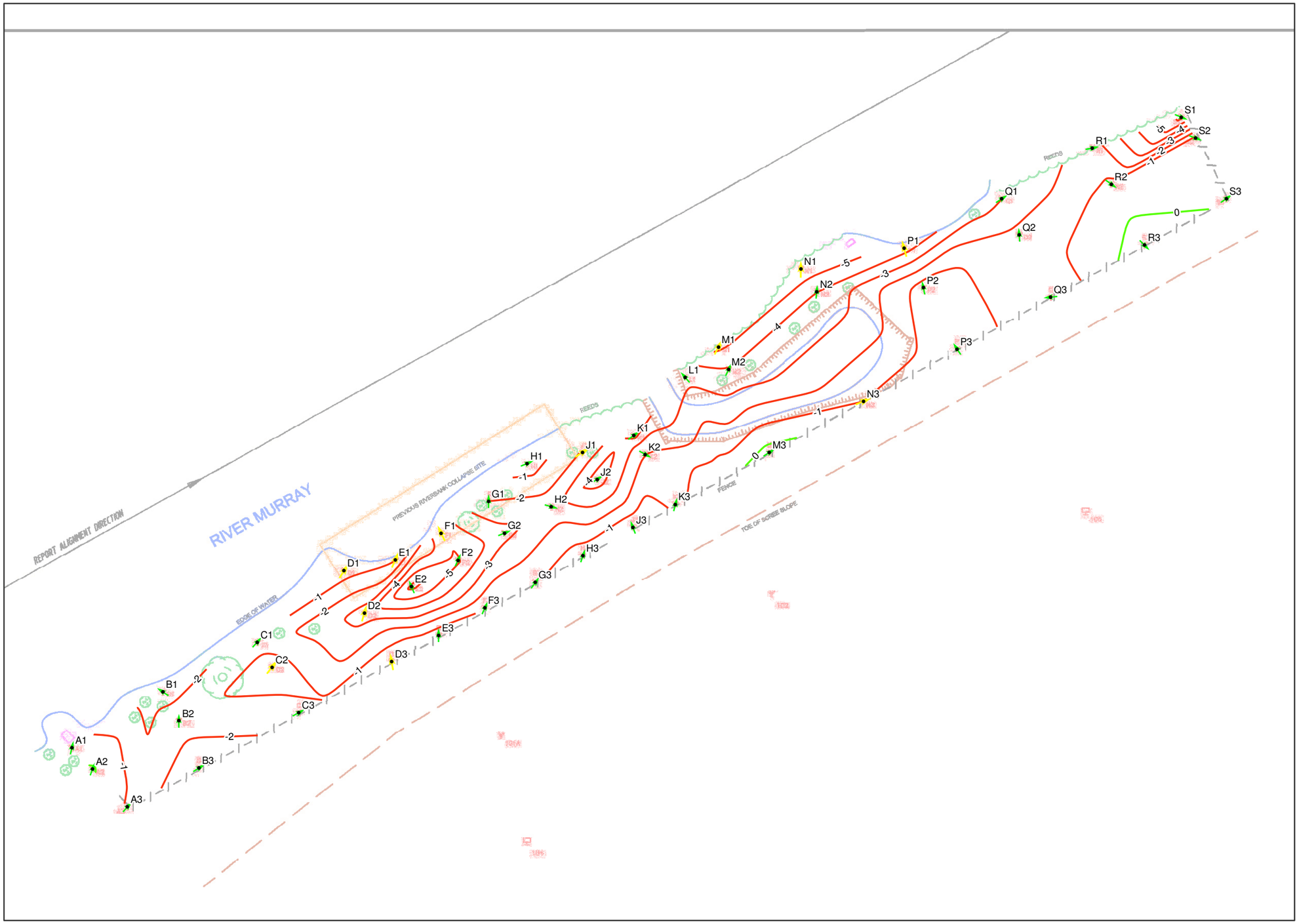
DRAWING No. A078911_MVE_DETAIL

SHEET 1 OF 1

REVISION

## Figure 2 Lateral and Vertical Deformation Modelling, 4 January 2013

# Murrayview Estate - River Bank Movement Monitoring - 02 February 2012 to 16 January 2013




- Monitoring point

Distance
- 0 - 3 mm
- 3 - 6
- 6 - 9

Contour
- Settlement (1mm increment)
- 0
- Heave (1mm increments)



GDA 1994 | Transverse Mercator
A4 1:750

0 5 10 20
Metres


VE23742

SKM

16/01/2013 1:57:43 PM cjohnson I:\VESA\Projects\VE23742\Technical\Spatial_Data\ArcGIS\Murrayview Estate River Bank Movement Monitoring - 02 February 2012 to 04 January 2013.mxd

Prepared by : CJ
Checked by : HB

## Figure 3 Wellington Ferry Historical Water Levels

DEWNR, 'River Murray Water Data',
https://www.waterconnect.sa.gov.au/RMWD/Pages/default.aspx, accessed 11/01/2013

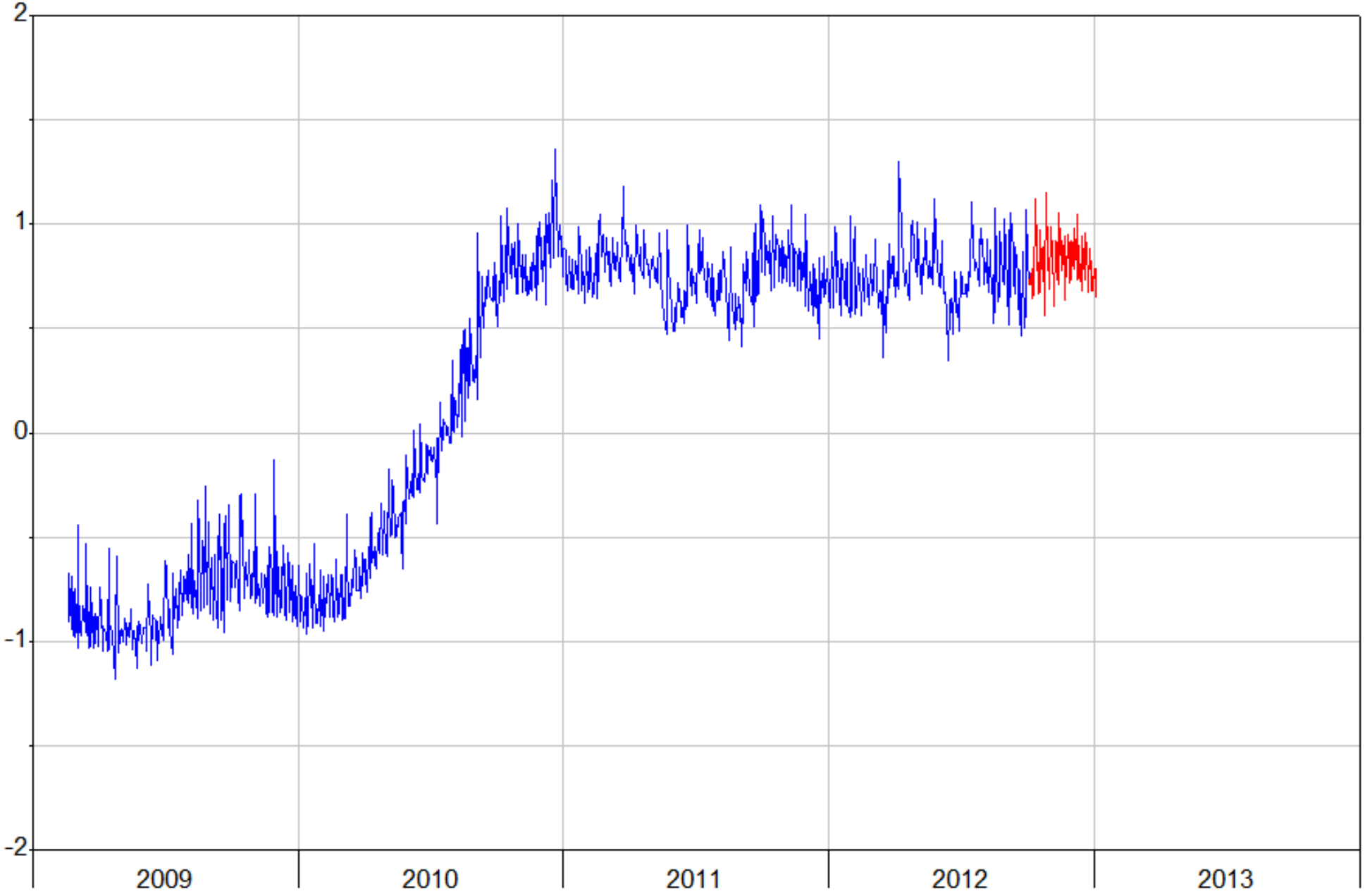
# Department for Water Surface Water Archive

HYPLOT V133 Output 06/01/2013

Period 5 Year Plot Start 00:00_01/01/2009 2009-14

Interval 3 Day Plot End 00:00_01/01/2014

A4261159 2k ds WellingtonFry 100.00 Max & Min Level (m) Continuous AT



## Figure 4 Cumulative Vertical Movement for all Survey Points of Interest with Time

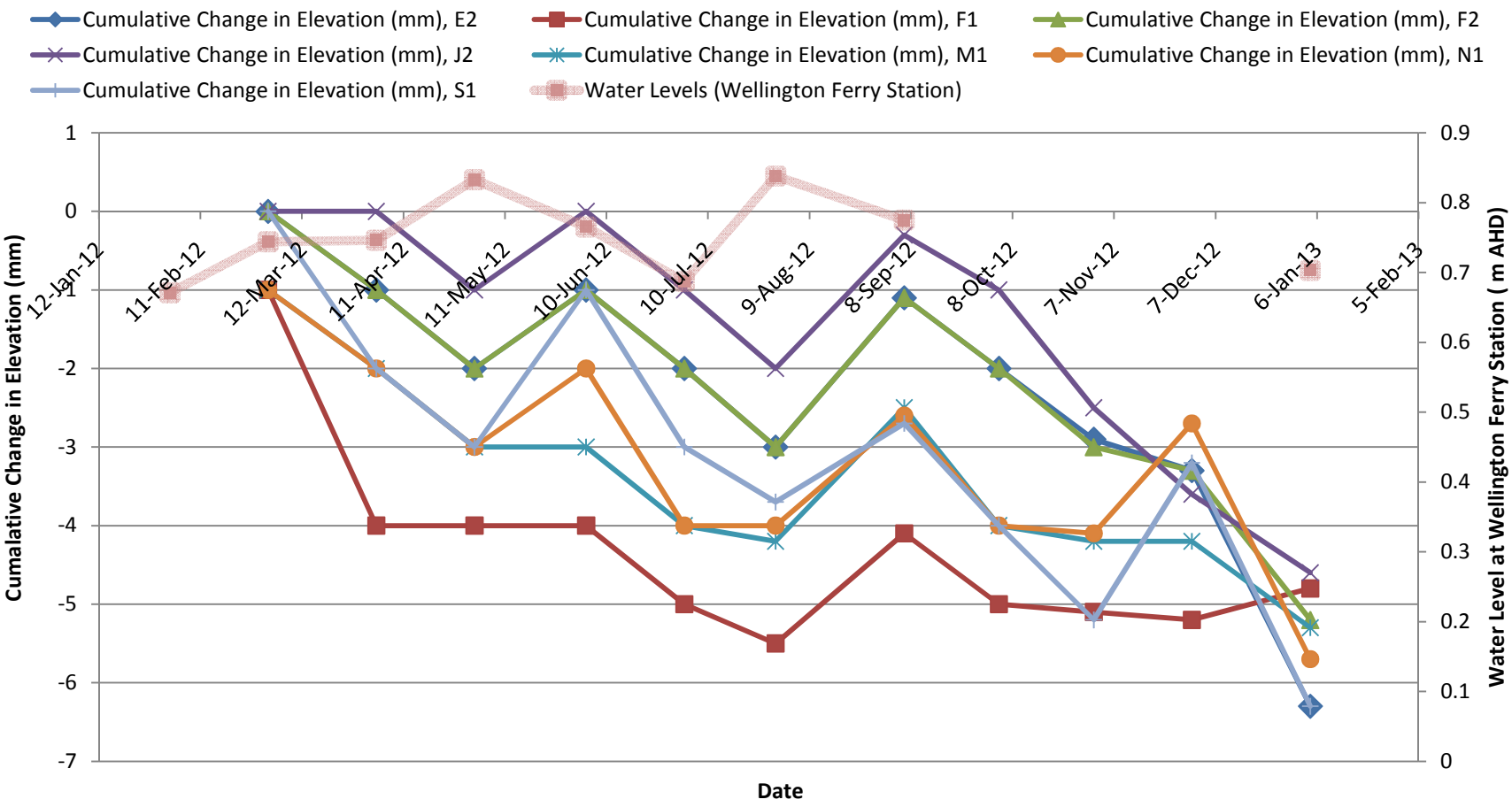
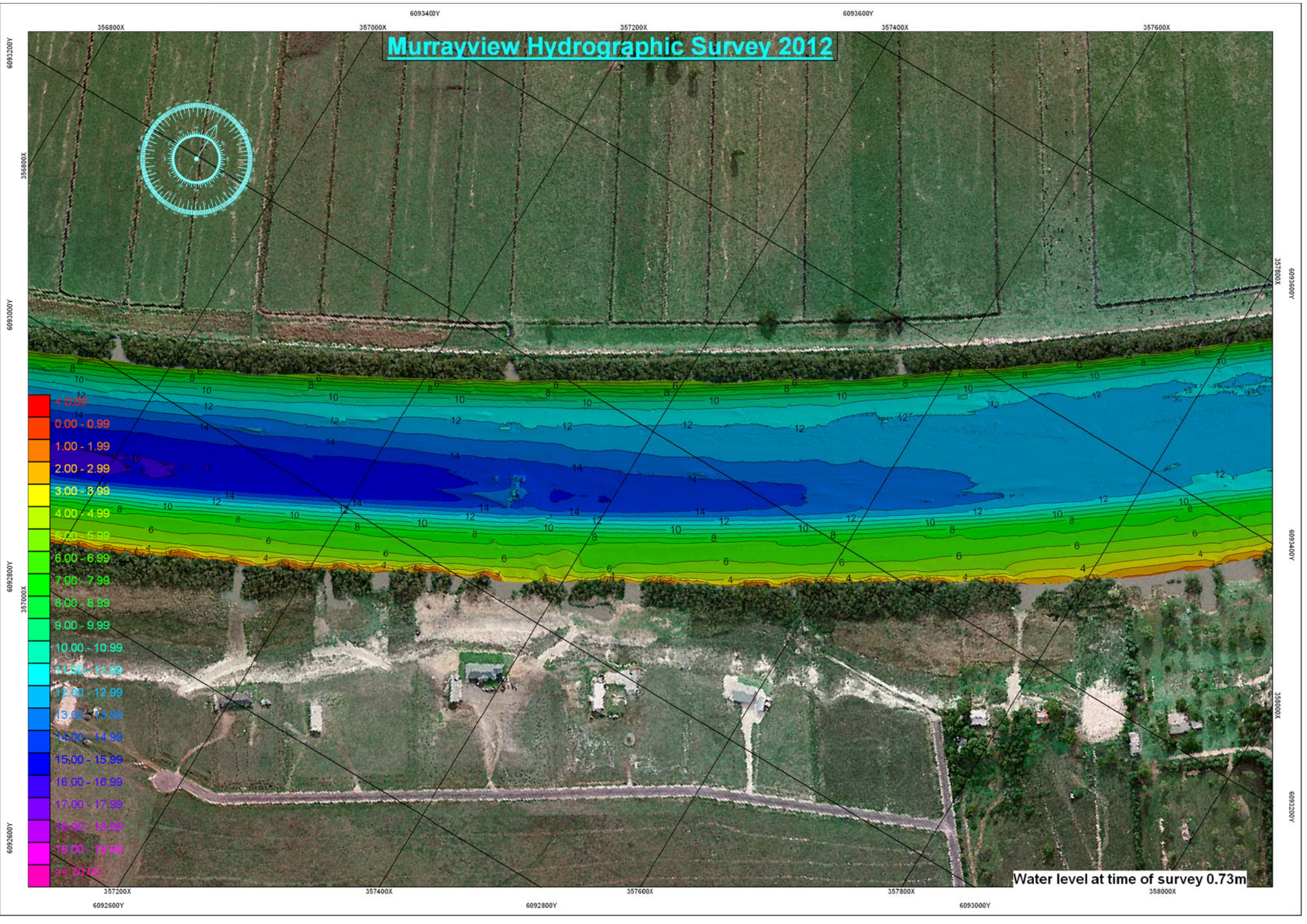



**FIGURE 4 - CUMULATIVE CHANGES IN SURVEY POINT ELEVATIONS AND RIVER MURRAY WATER LEVEL WITH TIME**

## Figure 5 Bathymetric Survey


Murrayview Hydrographic Survey 2012
< 0.00
0.00 - 0.99
1.00 - 1.99
2.00 - 2.99
3.00 - 3.99
4.00 - 4.99
5.00 - 5.99
6.00 - 6.99
7.00 - 7.99
8.00 - 8.99
9.00 - 9.99
10.00 - 10.99
11.00 - 11.99
12.00 - 12.99
13.00 - 13.99
14.00 - 14.99
15.00 - 15.99
16.00 - 16.99
17.00 - 17.99
18.00 - 18.99
19.00 - 19.99
>= 20.00
Water level at time of survey 0.73m

# Appendix A Monthly Monitoring Data

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# Murray River Estate - Tailem Bend

RIVER BANK MOVEMENT MONITORING

02-February-2012

| | |
|---|---|
| Date of survey | 2-Feb-12 |
| Equipment | Set 59 |
| Surveyed by: | NRG |

**References:**
Murray View Estate
A&S: A078911.0004

| | First Survey 2 February 2012 | | | | | Current Survey | | | | | Current Survey Comparisons: difference from first survey | | | Current Survey Comparisons: difference from last survey | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Point | Easting | Northing | Elevation | Chainage | Offset | Easting | Northing | Elevation | Chainage | Offset | Upstream (mm) | Cross (mm) | Up (mm) | Upstream (mm) | Cross (mm) | Up (mm) | Point Description |
| A1 | 3419.966 | 5397.788 | 1.028 | 44.130 | 32.245 | 3419.966 | 5397.788 | 1.028 | 44.130 | 32.245 | 0 | 0 | 0 | 0 | 0 | 0 | DROPPER |
| A2 | 3423.809 | 5393.843 | 1.222 | 45.583 | 37.557 | 3423.809 | 5393.843 | 1.222 | 45.583 | 37.557 | 0 | 0 | 0 | 0 | 0 | 0 | DROPPER |
| A3 | 3430.291 | 5386.757 | 1.678 | 47.822 | 46.896 | 3430.291 | 5386.757 | 1.678 | 47.822 | 46.896 | 0 | 0 | 0 | 0 | 0 | 0 | DROPPER |
| B1 | 3436.911 | 5408.174 | 1.003 | 63.985 | 31.364 | 3436.911 | 5408.174 | 1.003 | 63.985 | 31.364 | 0 | 0 | 0 | 0 | 0 | 0 | DROPPER |
| B2 | 3439.908 | 5402.809 | 1.270 | 64.010 | 37.509 | 3439.908 | 5402.809 | 1.270 | 64.010 | 37.509 | 0 | 0 | 0 | 0 | 0 | 0 | DROPPER |
| B3 | 3443.642 | 5394.044 | 1.845 | 63.032 | 46.987 | 3443.642 | 5394.044 | 1.845 | 63.032 | 46.987 | 0 | 0 | 0 | 0 | 0 | 0 | DROPPER |
| C1 | 3454.535 | 5417.408 | 1.199 | 83.877 | 31.820 | 3454.535 | 5417.408 | 1.199 | 83.877 | 31.820 | 0 | 0 | 0 | 0 | 0 | 0 | DROPPER |
| C2 | 3457.290 | 5412.807 | 1.489 | 84.059 | 37.180 | 3457.290 | 5412.807 | 1.489 | 84.059 | 37.180 | 0 | 0 | 0 | 0 | 0 | 0 | DROPPER |
| C3 | 3462.266 | 5404.294 | 2.339 | 84.290 | 47.037 | 3462.266 | 5404.294 | 2.339 | 84.290 | 47.037 | 0 | 0 | 0 | 0 | 0 | 0 | DROPPER |
| D1 | 3470.691 | 5430.835 | 1.051 | 104.515 | 27.897 | 3470.691 | 5430.835 | 1.051 | 104.515 | 27.897 | 0 | 0 | 0 | 0 | 0 | 0 | DROPPER |
| D2 | 3474.532 | 5422.866 | 1.620 | 104.016 | 36.729 | 3474.532 | 5422.866 | 1.620 | 104.016 | 36.729 | 0 | 0 | 0 | 0 | 0 | 0 | DROPPER |
| D3 | 3479.599 | 5413.862 | 2.441 | 104.089 | 47.061 | 3479.599 | 5413.862 | 2.441 | 104.089 | 47.061 | 0 | 0 | 0 | 0 | 0 | 0 | DROPPER |
| E1 | 3480.296 | 5432.819 | 1.046 | 113.879 | 30.812 | 3480.296 | 5432.819 | 1.046 | 113.879 | 30.812 | 0 | 0 | 0 | 0 | 0 | 0 | DROPPER |
| E2 | 3483.326 | 5427.807 | 1.642 | 114.103 | 36.665 | 3483.326 | 5427.807 | 1.642 | 114.103 | 36.665 | 0 | 0 | 0 | 0 | 0 | 0 | DROPPER |
| E3 | 3488.361 | 5418.747 | 2.466 | 114.120 | 47.030 | 3488.361 | 5418.747 | 2.466 | 114.120 | 47.030 | 0 | 0 | 0 | 0 | 0 | 0 | DROPPER |
| F1 | 3488.840 | 5437.796 | 1.056 | 123.764 | 30.596 | 3488.840 | 5437.796 | 1.056 | 123.764 | 30.596 | 0 | 0 | 0 | 0 | 0 | 0 | DROPPER |
| F2 | 3492.019 | 5432.772 | 1.662 | 124.113 | 36.531 | 3492.019 | 5432.772 | 1.662 | 124.113 | 36.531 | 0 | 0 | 0 | 0 | 0 | 0 | DROPPER |
| F3 | 3496.981 | 5423.846 | 2.492 | 124.131 | 46.744 | 3496.981 | 5423.846 | 2.492 | 124.131 | 46.744 | 0 | 0 | 0 | 0 | 0 | 0 | DROPPER |
| G1 | 3497.682 | 5443.746 | 1.070 | 134.382 | 29.672 | 3497.682 | 5443.746 | 1.070 | 134.382 | 29.672 | 0 | 0 | 0 | 0 | 0 | 0 | DROPPER |
| G2 | 3500.689 | 5437.819 | 1.624 | 134.142 | 36.315 | 3500.689 | 5437.819 | 1.624 | 134.142 | 36.315 | 0 | 0 | 0 | 0 | 0 | 0 | DROPPER |
| G3 | 3506.408 | 5428.601 | 2.579 | 134.682 | 47.149 | 3506.408 | 5428.601 | 2.579 | 134.682 | 47.149 | 0 | 0 | 0 | 0 | 0 | 0 | DROPPER |
| H1 | 3504.878 | 5450.787 | 1.024 | 144.088 | 26.997 | 3504.878 | 5450.787 | 1.024 | 144.088 | 26.997 | 0 | 0 | 0 | 0 | 0 | 0 | DROPPER |
| H2 | 3509.389 | 5442.710 | 1.690 | 144.122 | 36.248 | 3509.389 | 5442.710 | 1.690 | 144.122 | 36.248 | 0 | 0 | 0 | 0 | 0 | 0 | DROPPER |
| H3 | 3515.296 | 5433.593 | 2.588 | 144.876 | 47.086 | 3515.296 | 5433.593 | 2.588 | 144.876 | 47.086 | 0 | 0 | 0 | 0 | 0 | 0 | DROPPER |
| J1 | 3515.227 | 5452.854 | 1.136 | 154.143 | 30.200 | 3515.227 | 5452.854 | 1.136 | 154.143 | 30.200 | 0 | 0 | 0 | 0 | 0 | 0 | DROPPER |
| J2 | 3518.001 | 5447.804 | 1.577 | 154.125 | 35.962 | 3518.001 | 5447.804 | 1.577 | 154.125 | 35.962 | 0 | 0 | 0 | 0 | 0 | 0 | DROPPER |
| J3 | 3524.634 | 5438.883 | 2.580 | 155.608 | 46.979 | 3524.634 | 5438.883 | 2.580 | 155.608 | 46.979 | 0 | 0 | 0 | 0 | 0 | 0 | DROPPER |
| K1 | 3524.792 | 5456.028 | 1.428 | 164.049 | 32.055 | 3524.792 | 5456.028 | 1.428 | 164.049 | 32.055 | 0 | 0 | 0 | 0 | 0 | 0 | DROPPER |
| K2 | 3526.909 | 5452.487 | 1.767 | 164.186 | 36.179 | 3526.909 | 5452.487 | 1.767 | 164.186 | 36.179 | 0 | 0 | 0 | 0 | 0 | 0 | DROPPER |
| K3 | 3532.515 | 5443.180 | 2.605 | 164.584 | 47.037 | 3532.515 | 5443.180 | 2.605 | 164.584 | 47.037 | 0 | 0 | 0 | 0 | 0 | 0 | DROPPER |
| L1 | 3534.358 | 5466.862 | 1.051 | 177.665 | 27.210 | 3534.358 | 5466.862 | 1.051 | 177.665 | 27.210 | 0 | 0 | 0 | 0 | 0 | 0 | DROPPER |
| M1 | 3540.589 | 5472.468 | 1.106 | 185.832 | 25.322 | 3540.589 | 5472.468 | 1.106 | 185.832 | 25.322 | 0 | 0 | 0 | 0 | 0 | 0 | DROPPER |
| M2 | 3542.454 | 5468.314 | 1.324 | 185.452 | 29.860 | 3542.454 | 5468.314 | 1.324 | 185.452 | 29.860 | 0 | 0 | 0 | 0 | 0 | 0 | DROPPER |
| M3 | 3550.067 | 5452.828 | 2.624 | 184.613 | 47.096 | 3550.067 | 5452.828 | 2.624 | 184.613 | 47.096 | 0 | 0 | 0 | 0 | 0 | 0 | DROPPER |
| N1 | 3555.953 | 5487.047 | 1.257 | 206.334 | 20.007 | 3555.953 | 5487.047 | 1.257 | 206.334 | 20.007 | 0 | 0 | 0 | 0 | 0 | 0 | DROPPER |
| N2 | 3558.923 | 5482.788 | 1.438 | 206.869 | 25.172 | 3558.923 | 5482.788 | 1.438 | 206.869 | 25.172 | 0 | 0 | 0 | 0 | 0 | 0 | DROPPER |
| N3 | 3567.640 | 5462.354 | 2.315 | 204.600 | 47.271 | 3567.640 | 5462.354 | 2.315 | 204.600 | 47.271 | 0 | 0 | 0 | 0 | 0 | 0 | DROPPER |
| P1 | 3575.235 | 5490.935 | 1.051 | 225.087 | 25.944 | 3575.235 | 5490.935 | 1.051 | 225.087 | 25.944 | 0 | 0 | 0 | 0 | 0 | 0 | DROPPER |
| P2 | 3578.827 | 5483.557 | 1.759 | 224.656 | 34.138 | 3578.827 | 5483.557 | 1.759 | 224.656 | 34.138 | 0 | 0 | 0 | 0 | 0 | 0 | DROPPER |
| P3 | 3585.083 | 5472.121 | 2.586 | 224.591 | 47.173 | 3585.083 | 5472.121 | 2.586 | 224.591 | 47.173 | 0 | 0 | 0 | 0 | 0 | 0 | DROPPER |
| Q1 | 3593.448 | 5500.182 | 1.116 | 245.500 | 26.673 | 3593.448 | 5500.182 | 1.116 | 245.500 | 26.673 | 0 | 0 | 0 | 0 | 0 | 0 | DROPPER |
| Q2 | 3596.718 | 5493.412 | 1.754 | 245.082 | 34.180 | 3596.718 | 5493.412 | 1.754 | 245.082 | 34.180 | 0 | 0 | 0 | 0 | 0 | 0 | DROPPER |
| Q3 | 3602.552 | 5481.773 | 2.454 | 244.550 | 47.189 | 3602.552 | 5481.773 | 2.454 | 244.550 | 47.189 | 0 | 0 | 0 | 0 | 0 | 0 | DROPPER |
| R1 | 3610.337 | 5509.611 | 1.325 | 264.843 | 26.603 | 3610.337 | 5509.611 | 1.325 | 264.843 | 26.603 | 0 | 0 | 0 | 0 | 0 | 0 | DROPPER |
| R2 | 3613.887 | 5502.837 | 1.954 | 264.668 | 34.249 | 3613.887 | 5502.837 | 1.954 | 264.668 | 34.249 | 0 | 0 | 0 | 0 | 0 | 0 | DROPPER |

| | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **R3** | 3620.082 | 5491.510 | 2.364 | 264.603 | 47.160 | 3620.082 | 5491.510 | 2.364 | 264.603 | 47.160 | 0 | 0 | 0 | 0 | 0 | 0 | DROPPER |
| **S1** | 3626.946 | 5515.369 | 1.514 | 282.162 | 29.609 | 3626.946 | 5515.369 | 1.514 | 282.162 | 29.609 | 0 | 0 | 0 | 0 | 0 | 0 | DROPPER |
| **S2** | 3629.599 | 5511.492 | 1.861 | 282.606 | 34.286 | 3629.599 | 5511.492 | 1.861 | 282.606 | 34.286 | 0 | 0 | 0 | 0 | 0 | 0 | DROPPER |
| **S3** | 3635.344 | 5500.128 | 2.196 | 282.129 | 47.010 | 3635.344 | 5500.128 | 2.196 | 282.129 | 47.010 | 0 | 0 | 0 | 0 | 0 | 0 | DROPPER |
| | | | | | | | | | | **Max** | **0** | **0** | **0** | **0** | **0** | **0** | |
| | | | | | | | | | | **Min** | **0** | **0** | **0** | **0** | **0** | **0** | |
| | | | | | | | | | | **Average** | **0** | **0** | **0** | **0** | **0** | **0** | |

**Notes:**

Max, Min & Average values are for monitoring droppers only
Coordinates are calculated from least squares adjustment.
Chainage & offset is relative to line approximately parrellel to river bank
Origin of Chainage & Offset Alignment: E 3 365.74 , N 5 404.627
End of Chainage & Offset Alignment: E 3 628.213, N 5 549.913
Cross movement is positive away from the river bank in a south easterly direction
Upstream movement is positive in an upstream (North westerly) direction
Movement shown is relative to first survey 2 February 2012
Design co-ordinate accuracy is +,- 3mm
Design elevation accuracy is +,- 2mm

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# Murray River Estate - Tailem Bend

RIVER BANK MOVEMENT MONITORING

02-March-2012

| | |
|---|---|
| Date of survey | 2-Mar-12 |
| Equipment | Set 59 |
| Surveyed by: | NRG |

**References:**
Murray View Estate
A&S: A078911.0004

| Point | First Survey 2 February 2012 | | | | | Current Survey | | | | | Current Survey Comparisons: difference from first survey | | | Current Survey Comparisons: difference from last survey | | | Point Description |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Easting | Northing | Elevation | Chainage | Offset | Easting | Northing | Elevation | Chainage | Offset | Upstream (mm) | Cross (mm) | Up (mm) | Upstream (mm) | Cross (mm) | Up (mm) | |
| A1 | 3419.966 | 5397.788 | 1.028 | 44.130 | 32.245 | 3419.964 | 5397.787 | 1.029 | 44.129 | 32.244 | -1 | -1 | 1 | -1 | -1 | 1 | DROPPER |
| A2 | 3423.809 | 5393.843 | 1.222 | 45.583 | 37.557 | 3423.808 | 5393.843 | 1.223 | 45.582 | 37.557 | -1 | 0 | 1 | -1 | 0 | 1 | DROPPER |
| A3 | 3430.291 | 5386.757 | 1.678 | 47.822 | 46.896 | 3430.291 | 5386.757 | 1.678 | 47.822 | 46.896 | 0 | 0 | 0 | 0 | 0 | 0 | DROPPER |
| B1 | 3436.911 | 5408.174 | 1.003 | 63.985 | 31.364 | 3436.911 | 5408.173 | 1.002 | 63.985 | 31.365 | 0 | 1 | -1 | 0 | 1 | -1 | DROPPER |
| B2 | 3439.908 | 5402.809 | 1.270 | 64.010 | 37.509 | 3439.907 | 5402.809 | 1.271 | 64.009 | 37.509 | -1 | 0 | 1 | -1 | 0 | 1 | DROPPER |
| B3 | 3443.642 | 5394.044 | 1.845 | 63.032 | 46.987 | 3443.642 | 5394.044 | 1.845 | 63.032 | 46.987 | 0 | 0 | 0 | 0 | 0 | 0 | DROPPER |
| C1 | 3454.535 | 5417.408 | 1.199 | 83.877 | 31.820 | 3454.535 | 5417.409 | 1.200 | 83.877 | 31.820 | 0 | 0 | 1 | 0 | 0 | 1 | DROPPER |
| C2 | 3457.290 | 5412.807 | 1.489 | 84.059 | 37.180 | 3457.290 | 5412.807 | 1.490 | 84.060 | 37.180 | 1 | 0 | 1 | 1 | 0 | 1 | DROPPER |
| C3 | 3462.266 | 5404.294 | 2.339 | 84.290 | 47.037 | 3462.267 | 5404.294 | 2.339 | 84.291 | 47.038 | 1 | 1 | 0 | 1 | 1 | 0 | DROPPER |
| D1 | 3470.691 | 5430.835 | 1.051 | 104.515 | 27.897 | 3470.690 | 5430.837 | 1.052 | 104.515 | 27.895 | 0 | -2 | 1 | 0 | -2 | 1 | DROPPER |
| D2 | 3474.532 | 5422.866 | 1.620 | 104.016 | 36.729 | 3474.531 | 5422.868 | 1.622 | 104.016 | 36.727 | 0 | -2 | 2 | 0 | -2 | 2 | DROPPER |
| D3 | 3479.599 | 5413.862 | 2.441 | 104.089 | 47.061 | 3479.596 | 5413.865 | 2.443 | 104.088 | 47.057 | -1 | -4 | 2 | -1 | -4 | 2 | DROPPER |
| E1 | 3480.296 | 5432.819 | 1.046 | 113.879 | 30.812 | 3480.296 | 5432.820 | 1.046 | 113.879 | 30.811 | 0 | -1 | 0 | 0 | -1 | 0 | DROPPER |
| E2 | 3483.326 | 5427.807 | 1.642 | 114.103 | 36.665 | 3483.325 | 5427.807 | 1.642 | 114.102 | 36.664 | -1 | -1 | 0 | -1 | -1 | 0 | DROPPER |
| E3 | 3488.361 | 5418.747 | 2.466 | 114.120 | 47.030 | 3488.360 | 5418.748 | 2.466 | 114.120 | 47.029 | 0 | -1 | 0 | 0 | -1 | 0 | DROPPER |
| F1 | 3488.840 | 5437.796 | 1.056 | 123.764 | 30.596 | 3488.839 | 5437.797 | 1.055 | 123.764 | 30.594 | 0 | -2 | -1 | 0 | -2 | -1 | DROPPER |
| F2 | 3492.019 | 5432.772 | 1.662 | 124.113 | 36.531 | 3492.019 | 5432.772 | 1.662 | 124.113 | 36.531 | 0 | 0 | 0 | 0 | 0 | 0 | DROPPER |
| F3 | 3496.981 | 5423.846 | 2.492 | 124.131 | 46.744 | 3496.980 | 5423.847 | 2.492 | 124.131 | 46.742 | 0 | -2 | 0 | 0 | -2 | 0 | DROPPER |
| G1 | 3497.682 | 5443.746 | 1.070 | 134.382 | 29.672 | 3497.682 | 5443.746 | 1.070 | 134.382 | 29.672 | 0 | 0 | 0 | 0 | 0 | 0 | DROPPER |
| G2 | 3500.689 | 5437.819 | 1.624 | 134.142 | 36.315 | 3500.689 | 5437.819 | 1.624 | 134.143 | 36.314 | 1 | -1 | 0 | 1 | -1 | 0 | DROPPER |
| G3 | 3506.408 | 5428.601 | 2.579 | 134.682 | 47.149 | 3506.408 | 5428.602 | 2.580 | 134.682 | 47.148 | 0 | -1 | 1 | 0 | -1 | 1 | DROPPER |
| H1 | 3504.878 | 5450.787 | 1.024 | 144.088 | 26.997 | 3504.878 | 5450.787 | 1.025 | 144.088 | 26.997 | 0 | 0 | 1 | 0 | 0 | 1 | DROPPER |
| H2 | 3509.389 | 5442.710 | 1.690 | 144.122 | 36.248 | 3509.389 | 5442.709 | 1.690 | 144.123 | 36.249 | 1 | 1 | 0 | 1 | 1 | 0 | DROPPER |
| H3 | 3515.296 | 5433.593 | 2.588 | 144.876 | 47.086 | 3515.295 | 5433.592 | 2.588 | 144.875 | 47.086 | -1 | 0 | 0 | -1 | 0 | 0 | DROPPER |
| J1 | 3515.227 | 5452.854 | 1.136 | 154.143 | 30.200 | 3515.227 | 5452.854 | 1.136 | 154.143 | 30.200 | 0 | 0 | 0 | 0 | 0 | 0 | DROPPER |
| J2 | 3518.001 | 5447.804 | 1.577 | 154.125 | 35.962 | 3518.000 | 5447.803 | 1.577 | 154.123 | 35.962 | -2 | 0 | 0 | -2 | 0 | 0 | DROPPER |
| J3 | 3524.634 | 5438.883 | 2.580 | 155.608 | 46.979 | 3524.635 | 5438.883 | 2.580 | 155.608 | 46.979 | 0 | 0 | 0 | 0 | 0 | 0 | DROPPER |
| K1 | 3524.792 | 5456.028 | 1.428 | 164.049 | 32.055 | 3524.791 | 5456.028 | 1.427 | 164.048 | 32.055 | -1 | 0 | -1 | -1 | 0 | -1 | DROPPER |
| K2 | 3526.909 | 5452.487 | 1.767 | 164.186 | 36.179 | 3526.910 | 5452.486 | 1.767 | 164.187 | 36.180 | 1 | 1 | 0 | 1 | 1 | 0 | DROPPER |
| K3 | 3532.515 | 5443.180 | 2.605 | 164.584 | 47.037 | 3532.516 | 5443.181 | 2.606 | 164.585 | 47.036 | 1 | -1 | 1 | 1 | -1 | 1 | DROPPER |
| L1 | 3534.358 | 5466.862 | 1.051 | 177.665 | 27.210 | 3534.357 | 5466.862 | 1.051 | 177.664 | 27.209 | -1 | -1 | 0 | -1 | -1 | 0 | DROPPER |
| M1 | 3540.589 | 5472.468 | 1.106 | 185.832 | 25.322 | 3540.589 | 5472.467 | 1.105 | 185.831 | 25.323 | -1 | 1 | -1 | -1 | 1 | -1 | DROPPER |
| M2 | 3542.454 | 5468.314 | 1.324 | 185.452 | 29.860 | 3542.456 | 5468.314 | 1.324 | 185.453 | 29.861 | 1 | 1 | 0 | 1 | 1 | 0 | DROPPER |
| M3 | 3550.067 | 5452.828 | 2.624 | 184.613 | 47.096 | 3550.067 | 5452.828 | 2.624 | 184.612 | 47.096 | -1 | 0 | 0 | -1 | 0 | 0 | DROPPER |
| N1 | 3555.953 | 5487.047 | 1.257 | 206.334 | 20.007 | 3555.953 | 5487.048 | 1.256 | 206.334 | 20.007 | 0 | 0 | -1 | 0 | 0 | -1 | DROPPER |
| N2 | 3558.923 | 5482.788 | 1.438 | 206.869 | 25.172 | 3558.923 | 5482.787 | 1.438 | 206.869 | 25.172 | 0 | 0 | 0 | 0 | 0 | 0 | DROPPER |
| N3 | 3567.640 | 5462.354 | 2.315 | 204.600 | 47.271 | 3567.640 | 5462.354 | 2.315 | 204.600 | 47.271 | 0 | 0 | 0 | 0 | 0 | 0 | DROPPER |
| P1 | 3575.235 | 5490.935 | 1.051 | 225.087 | 25.944 | 3575.233 | 5490.936 | 1.050 | 225.086 | 25.942 | -1 | -2 | -1 | -1 | -2 | -1 | DROPPER |
| P2 | 3578.827 | 5483.557 | 1.759 | 224.656 | 34.138 | 3578.827 | 5483.559 | 1.760 | 224.657 | 34.136 | 1 | -2 | 1 | 1 | -2 | 1 | DROPPER |
| P3 | 3585.083 | 5472.121 | 2.586 | 224.591 | 47.173 | 3585.081 | 5472.122 | 2.587 | 224.591 | 47.172 | 0 | -1 | 1 | 0 | -1 | 1 | DROPPER |
| Q1 | 3593.448 | 5500.182 | 1.116 | 245.500 | 26.673 | 3593.448 | 5500.183 | 1.117 | 245.500 | 26.673 | 0 | 0 | 1 | 0 | 0 | 1 | DROPPER |
| Q2 | 3596.718 | 5493.412 | 1.754 | 245.082 | 34.180 | 3596.717 | 5493.413 | 1.755 | 245.082 | 34.179 | 0 | -1 | 1 | 0 | -1 | 1 | DROPPER |
| Q3 | 3602.552 | 5481.773 | 2.454 | 244.550 | 47.189 | 3602.550 | 5481.774 | 2.455 | 244.548 | 47.187 | -2 | -2 | 1 | -2 | -2 | 1 | DROPPER |

| | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **R1** | 3610.337 | 5509.611 | 1.325 | 264.843 | 26.603 | 3610.337 | 5509.613 | 1.325 | 264.843 | 26.601 | 0 | -2 | 0 | 0 | -2 | 0 | DROPPER |
| **R2** | 3613.887 | 5502.837 | 1.954 | 264.668 | 34.249 | 3613.887 | 5502.838 | 1.954 | 264.668 | 34.248 | 0 | -1 | 0 | 0 | -1 | 0 | DROPPER |
| **R3** | 3620.082 | 5491.510 | 2.364 | 264.603 | 47.160 | 3620.083 | 5491.510 | 2.365 | 264.604 | 47.160 | 1 | 0 | 1 | 1 | 0 | 1 | DROPPER |
| **S1** | 3626.946 | 5515.369 | 1.514 | 282.162 | 29.609 | 3626.945 | 5515.370 | 1.514 | 282.162 | 29.607 | 0 | -2 | 0 | 0 | -2 | 0 | DROPPER |
| **S2** | 3629.599 | 5511.492 | 1.861 | 282.606 | 34.286 | 3629.599 | 5511.493 | 1.863 | 282.607 | 34.284 | 1 | -2 | 2 | 1 | -2 | 2 | DROPPER |
| **S3** | 3635.344 | 5500.128 | 2.196 | 282.129 | 47.010 | 3635.344 | 5500.130 | 2.197 | 282.130 | 47.009 | 1 | -1 | 1 | 1 | -1 | 1 | DROPPER |
| | | | | | | | | | | **Max** | **1** | **1** | **2** | **1** | **1** | **2** | |
| | | | | | | | | | | **Min** | **-2** | **-2** | **-1** | **-2** | **-2** | **-1** | |
| | | | | | | | | | | **Average** | **-0** | **-1** | **0** | **-0** | **-1** | **0** | |

**Notes:**

Max, Min & Average values are for monitoring droppers only
Coordinates are calculated from least squares adjustment.
Chainage & offset is relative to line approximately parrellel to river bank
Origin of Chainage & Offset Alignment: E 3 365.74 , N 5 404.627
End of Chainage & Offset Alignment: E 3 628.213, N 5 549.913
Cross movement is positive away from the river bank in a south easterly direction
Upstream movement is positive in an upstream (North westerly) direction
Movement shown is relative to first survey 2 February 2012
Design co-ordinate accuracy is +,- 3mm
Design elevation accuracy is +,- 2mm

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# Murray River Estate - Tailem Bend

RIVER BANK MOVEMENT MONITORING

03-April-2012

| | |
|---|---|
| Date of survey | 3-Apr-12 |
| Equipment | Set 59 |
| Surveyed by: | NRG |

**References:**
Murray View Estate
A&S: A078911.0004

| | First Survey 2 February 2012 | | | | | Current Survey | | | | | Current Survey Comparisons: difference from first survey | | | Current Survey Comparisons: difference from last survey | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Point | Easting | Northing | Elevation | Chainage | Offset | Easting | Northing | Elevation | Chainage | Offset | Upstream (mm) | Cross (mm) | Up (mm) | Upstream (mm) | Cross (mm) | Up (mm) | Point Description |
| A1 | 3419.966 | 5397.788 | 1.028 | 44.130 | 32.245 | 3419.965 | 5397.788 | 1.028 | 44.130 | 32.244 | 0 | -1 | 0 | 1 | 0 | -1 | DROPPER |
| A2 | 3423.809 | 5393.843 | 1.222 | 45.583 | 37.557 | 3423.810 | 5393.843 | 1.222 | 45.583 | 37.558 | 0 | 1 | 0 | 1 | 1 | -1 | DROPPER |
| A3 | 3430.291 | 5386.757 | 1.678 | 47.822 | 46.896 | 3430.293 | 5386.756 | 1.677 | 47.823 | 46.897 | 1 | 1 | -1 | 1 | 1 | -1 | DROPPER |
| B1 | 3436.911 | 5408.174 | 1.003 | 63.985 | 31.364 | 3436.912 | 5408.173 | 1.001 | 63.986 | 31.365 | 1 | 1 | -2 | 1 | 0 | -1 | DROPPER |
| B2 | 3439.908 | 5402.809 | 1.270 | 64.010 | 37.509 | 3439.908 | 5402.809 | 1.269 | 64.010 | 37.510 | 0 | 1 | -1 | 1 | 1 | -2 | DROPPER |
| B3 | 3443.642 | 5394.044 | 1.845 | 63.032 | 46.987 | 3443.645 | 5394.044 | 1.844 | 63.034 | 46.988 | 2 | 1 | -1 | 2 | 1 | -1 | DROPPER |
| C1 | 3454.535 | 5417.408 | 1.199 | 83.877 | 31.820 | 3454.537 | 5417.408 | 1.199 | 83.879 | 31.822 | 2 | 2 | 0 | 2 | 2 | -1 | DROPPER |
| C2 | 3457.290 | 5412.807 | 1.489 | 84.059 | 37.180 | 3457.293 | 5412.806 | 1.489 | 84.062 | 37.182 | 3 | 2 | 0 | 2 | 2 | -1 | DROPPER |
| C3 | 3462.266 | 5404.294 | 2.339 | 84.290 | 47.037 | 3462.269 | 5404.294 | 2.339 | 84.293 | 47.039 | 3 | 2 | 0 | 2 | 1 | 0 | DROPPER |
| D1 | 3470.691 | 5430.835 | 1.051 | 104.515 | 27.897 | 3470.692 | 5430.835 | 1.051 | 104.516 | 27.897 | 1 | 0 | 0 | 1 | 2 | -1 | DROPPER |
| D2 | 3474.532 | 5422.866 | 1.620 | 104.016 | 36.729 | 3474.533 | 5422.867 | 1.621 | 104.017 | 36.729 | 1 | 0 | 1 | 1 | 2 | -1 | DROPPER |
| D3 | 3479.599 | 5413.862 | 2.441 | 104.089 | 47.061 | 3479.598 | 5413.864 | 2.443 | 104.089 | 47.059 | 0 | -2 | 2 | 1 | 2 | 0 | DROPPER |
| E1 | 3480.296 | 5432.819 | 1.046 | 113.879 | 30.812 | 3480.297 | 5432.819 | 1.046 | 113.880 | 30.813 | 1 | 1 | 0 | 1 | 2 | 0 | DROPPER |
| E2 | 3483.326 | 5427.807 | 1.642 | 114.103 | 36.665 | 3483.326 | 5427.806 | 1.641 | 114.102 | 36.666 | -1 | 1 | -1 | 0 | 2 | -1 | DROPPER |
| E3 | 3488.361 | 5418.747 | 2.466 | 114.120 | 47.030 | 3488.361 | 5418.746 | 2.466 | 114.120 | 47.031 | 0 | 1 | 0 | 0 | 2 | 0 | DROPPER |
| F1 | 3488.840 | 5437.796 | 1.056 | 123.764 | 30.596 | 3488.840 | 5437.796 | 1.052 | 123.764 | 30.595 | 0 | -1 | -4 | 0 | 1 | -3 | DROPPER |
| F2 | 3492.019 | 5432.772 | 1.662 | 124.113 | 36.531 | 3492.019 | 5432.772 | 1.661 | 124.112 | 36.531 | -1 | 0 | -1 | -1 | 0 | -1 | DROPPER |
| F3 | 3496.981 | 5423.846 | 2.492 | 124.131 | 46.744 | 3496.981 | 5423.845 | 2.492 | 124.131 | 46.745 | 0 | 1 | 0 | 0 | 3 | 0 | DROPPER |
| G1 | 3497.682 | 5443.746 | 1.070 | 134.382 | 29.672 | 3497.682 | 5443.746 | 1.069 | 134.382 | 29.673 | 0 | 1 | -1 | 0 | 1 | -1 | DROPPER |
| G2 | 3500.689 | 5437.819 | 1.624 | 134.142 | 36.315 | 3500.690 | 5437.819 | 1.623 | 134.143 | 36.315 | 1 | 0 | -1 | 0 | 1 | -1 | DROPPER |
| G3 | 3506.408 | 5428.601 | 2.579 | 134.682 | 47.149 | 3506.408 | 5428.600 | 2.580 | 134.682 | 47.150 | 0 | 1 | 1 | 0 | 2 | 0 | DROPPER |
| H1 | 3504.878 | 5450.787 | 1.024 | 144.088 | 26.997 | 3504.879 | 5450.786 | 1.024 | 144.088 | 26.998 | 0 | 1 | 0 | 0 | 1 | -1 | DROPPER |
| H2 | 3509.389 | 5442.710 | 1.690 | 144.122 | 36.248 | 3509.389 | 5442.710 | 1.690 | 144.123 | 36.249 | 1 | 1 | 0 | 0 | 0 | 0 | DROPPER |
| H3 | 3515.296 | 5433.593 | 2.588 | 144.876 | 47.086 | 3515.297 | 5433.593 | 2.589 | 144.876 | 47.086 | 0 | 0 | 1 | 1 | 0 | 1 | DROPPER |
| J1 | 3515.227 | 5452.854 | 1.136 | 154.143 | 30.200 | 3515.227 | 5452.854 | 1.135 | 154.144 | 30.200 | 1 | 0 | -1 | 1 | 0 | -1 | DROPPER |
| J2 | 3518.001 | 5447.804 | 1.577 | 154.125 | 35.962 | 3518.000 | 5447.803 | 1.577 | 154.123 | 35.963 | -2 | 1 | 0 | 0 | 1 | 0 | DROPPER |
| J3 | 3524.634 | 5438.883 | 2.580 | 155.608 | 46.979 | 3524.635 | 5438.883 | 2.580 | 155.608 | 46.980 | 0 | 1 | 0 | 0 | 1 | 0 | DROPPER |
| K1 | 3524.792 | 5456.028 | 1.428 | 164.049 | 32.055 | 3524.791 | 5456.027 | 1.426 | 164.048 | 32.056 | -1 | 1 | -2 | 0 | 1 | -1 | DROPPER |
| K2 | 3526.909 | 5452.487 | 1.767 | 164.186 | 36.179 | 3526.910 | 5452.486 | 1.766 | 164.187 | 36.180 | 1 | 1 | -1 | 0 | 0 | -1 | DROPPER |
| K3 | 3532.515 | 5443.180 | 2.605 | 164.584 | 47.037 | 3532.516 | 5443.181 | 2.605 | 164.584 | 47.036 | 0 | -1 | 0 | -1 | 0 | -1 | DROPPER |
| L1 | 3534.358 | 5466.862 | 1.051 | 177.665 | 27.210 | 3534.357 | 5466.861 | 1.049 | 177.664 | 27.210 | -1 | 0 | -2 | 0 | 1 | -2 | DROPPER |
| M1 | 3540.589 | 5472.468 | 1.106 | 185.832 | 25.322 | 3540.589 | 5472.468 | 1.104 | 185.832 | 25.322 | 0 | 0 | -2 | 1 | -1 | -1 | DROPPER |
| M2 | 3542.454 | 5468.314 | 1.324 | 185.452 | 29.860 | 3542.456 | 5468.315 | 1.322 | 185.454 | 29.860 | 2 | 0 | -2 | 1 | -1 | -2 | DROPPER |
| M3 | 3550.067 | 5452.828 | 2.624 | 184.613 | 47.096 | 3550.067 | 5452.828 | 2.624 | 184.612 | 47.096 | -1 | 0 | 0 | 0 | 0 | 0 | DROPPER |
| N1 | 3555.953 | 5487.047 | 1.257 | 206.334 | 20.007 | 3555.953 | 5487.049 | 1.255 | 206.335 | 20.006 | 1 | -1 | -2 | 1 | -1 | -1 | DROPPER |
| N2 | 3558.923 | 5482.788 | 1.438 | 206.869 | 25.172 | 3558.923 | 5482.787 | 1.436 | 206.869 | 25.172 | 0 | 0 | -2 | 0 | 0 | -2 | DROPPER |
| N3 | 3567.640 | 5462.354 | 2.315 | 204.600 | 47.271 | 3567.640 | 5462.354 | 2.315 | 204.600 | 47.271 | 0 | 0 | 0 | 0 | 0 | 0 | DROPPER |
| P1 | 3575.235 | 5490.935 | 1.051 | 225.087 | 25.944 | 3575.235 | 5490.937 | 1.049 | 225.088 | 25.942 | 1 | -2 | -2 | 2 | 0 | -1 | DROPPER |
| P2 | 3578.827 | 5483.557 | 1.759 | 224.656 | 34.138 | 3578.827 | 5483.558 | 1.762 | 224.657 | 34.137 | 1 | -1 | 3 | 0 | 1 | 2 | DROPPER |
| P3 | 3585.083 | 5472.121 | 2.586 | 224.591 | 47.173 | 3585.083 | 5472.122 | 2.586 | 224.592 | 47.173 | 1 | 0 | 0 | 1 | 1 | -1 | DROPPER |
| Q1 | 3593.448 | 5500.182 | 1.116 | 245.500 | 26.673 | 3593.448 | 5500.182 | 1.115 | 245.499 | 26.674 | -1 | 1 | -1 | -1 | 1 | -2 | DROPPER |
| Q2 | 3596.718 | 5493.412 | 1.754 | 245.082 | 34.180 | 3596.718 | 5493.413 | 1.756 | 245.082 | 34.180 | 0 | 0 | 2 | 0 | 1 | 1 | DROPPER |
| Q3 | 3602.552 | 5481.773 | 2.454 | 244.550 | 47.189 | 3602.550 | 5481.774 | 2.455 | 244.548 | 47.187 | -2 | -2 | 1 | 0 | 0 | 0 | DROPPER |

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| | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **R1** | 3610.337 | 5509.611 | 1.325 | 264.843 | 26.603 | 3610.337 | 5509.611 | 1.323 | 264.842 | 26.603 | -1 | 0 | -2 | -1 | 2 | -2 | DROPPER |
| **R2** | 3613.887 | 5502.837 | 1.954 | 264.668 | 34.249 | 3613.886 | 5502.837 | 1.953 | 264.667 | 34.248 | -1 | -1 | -1 | -1 | 0 | -1 | DROPPER |
| **R3** | 3620.082 | 5491.510 | 2.364 | 264.603 | 47.160 | 3620.083 | 5491.510 | 2.365 | 264.603 | 47.159 | 0 | -1 | 1 | -1 | -1 | 0 | DROPPER |
| **S1** | 3626.946 | 5515.369 | 1.514 | 282.162 | 29.609 | 3626.944 | 5515.369 | 1.512 | 282.161 | 29.608 | -1 | -1 | -2 | -1 | 1 | -2 | DROPPER |
| **S2** | 3629.599 | 5511.492 | 1.861 | 282.606 | 34.286 | 3629.598 | 5511.493 | 1.861 | 282.605 | 34.284 | -1 | -2 | 0 | -2 | 0 | -2 | DROPPER |
| **S3** | 3635.344 | 5500.128 | 2.196 | 282.129 | 47.010 | 3635.343 | 5500.130 | 2.196 | 282.129 | 47.008 | 0 | -2 | 0 | -1 | -1 | -1 | DROPPER |
| | | | | | | | | | | **Max** | **2** | **1** | **3** | **2** | **3** | **2** | |
| | | | | | | | | | | **Min** | **-2** | **-2** | **-4** | **-2** | **-1** | **-3** | |
| | | | | | | | | | | **Average** | **-0** | **-0** | **-1** | **-0** | **0** | **-1** | |

**Notes:**

Max, Min & Average values are for monitoring droppers only
Coordinates are calculated from least squares adjustment.
Chainage & offset is relative to line approximately parrellel to river bank
Origin of Chainage & Offset Alignment: E 3 365.74 , N 5 404.627
End of Chainage & Offset Alignment: E 3 628.213, N 5 549.913
Cross movement is positive away from the river bank in a south easterly direction
Upstream movement is positive in an upstream (North westerly) direction
Movement shown is relative to first survey 2 February 2012
Design co-ordinate accuracy is +,- 3mm
Design elevation accuracy is +,- 2mm

**3/04/2012 Point F2 - Vehicle tracks indicate possible disturbancce**

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# Murray River Estate - Tailem Bend

RIVER BANK MOVEMENT MONITORING

02-May-2012

| | |
|---|---|
| **Date of survey** | **2-May-12** |
| **Equipment** | **Set 59** |
| **Surveyed by:** | **NRG** |

**References:**
Murray View Estate
A&S: A078911.0004

| | First Survey 2 February 2012 | | | | | Current Survey | | | | | Current Survey Comparisons: difference from first survey | | | Current Survey Comparisons: difference from last survey | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Point** | **Easting** | **Northing** | **Elevation** | **Chainage** | **Offset** | **Easting** | **Northing** | **Elevation** | **Chainage** | **Offset** | **Upstream (mm)** | **Cross (mm)** | **Up (mm)** | **Upstream (mm)** | **Cross (mm)** | **Up (mm)** | **Point Description** |
| A1 | 3419.966 | 5397.788 | 1.028 | 44.130 | 32.245 | 3419.965 | 5397.788 | 1.027 | 44.130 | 32.244 | 0 | -1 | -1 | 0 | 0 | -1 | DROPPER |
| A2 | 3423.809 | 5393.843 | 1.222 | 45.583 | 37.557 | 3423.809 | 5393.844 | 1.222 | 45.582 | 37.557 | -1 | 0 | 0 | -1 | -1 | 0 | DROPPER |
| A3 | 3430.291 | 5386.757 | 1.678 | 47.822 | 46.896 | 3430.292 | 5386.758 | 1.678 | 47.823 | 46.896 | 1 | 0 | 0 | 0 | -1 | 1 | DROPPER |
| B1 | 3436.911 | 5408.174 | 1.003 | 63.985 | 31.364 | 3436.910 | 5408.174 | 1.001 | 63.985 | 31.363 | 0 | -1 | -2 | -1 | -2 | 0 | DROPPER |
| B2 | 3439.908 | 5402.809 | 1.270 | 64.010 | 37.509 | 3439.907 | 5402.809 | 1.269 | 64.009 | 37.508 | -1 | -1 | -1 | -1 | -2 | 0 | DROPPER |
| B3 | 3443.642 | 5394.044 | 1.845 | 63.032 | 46.987 | 3443.644 | 5394.044 | 1.844 | 63.034 | 46.987 | 2 | 0 | -1 | 0 | -1 | 0 | DROPPER |
| C1 | 3454.535 | 5417.408 | 1.199 | 83.877 | 31.820 | 3454.537 | 5417.409 | 1.199 | 83.879 | 31.820 | 2 | 0 | 0 | 0 | -2 | 0 | DROPPER |
| C2 | 3457.290 | 5412.807 | 1.489 | 84.059 | 37.180 | 3457.292 | 5412.807 | 1.489 | 84.061 | 37.181 | 2 | 1 | 0 | -1 | -1 | 0 | DROPPER |
| C3 | 3462.266 | 5404.294 | 2.339 | 84.290 | 47.037 | 3462.268 | 5404.294 | 2.339 | 84.292 | 47.039 | 2 | 2 | 0 | -1 | 0 | 0 | DROPPER |
| D1 | 3470.691 | 5430.835 | 1.051 | 104.515 | 27.897 | 3470.691 | 5430.836 | 1.051 | 104.515 | 27.896 | 0 | -1 | 0 | -1 | -1 | 0 | DROPPER |
| D2 | 3474.532 | 5422.866 | 1.620 | 104.016 | 36.729 | 3474.532 | 5422.867 | 1.621 | 104.016 | 36.728 | 0 | -1 | 1 | -1 | -1 | 0 | DROPPER |
| D3 | 3479.599 | 5413.862 | 2.441 | 104.089 | 47.061 | 3479.597 | 5413.864 | 2.442 | 104.088 | 47.058 | -1 | -3 | 1 | -1 | -1 | -1 | DROPPER |
| E1 | 3480.296 | 5432.819 | 1.046 | 113.879 | 30.812 | 3480.297 | 5432.820 | 1.045 | 113.880 | 30.812 | 1 | 0 | -1 | 0 | -1 | -1 | DROPPER |
| E2 | 3483.326 | 5427.807 | 1.642 | 114.103 | 36.665 | 3483.325 | 5427.807 | 1.640 | 114.102 | 36.665 | -1 | 0 | -2 | 0 | -1 | -1 | DROPPER |
| E3 | 3488.361 | 5418.747 | 2.466 | 114.120 | 47.030 | 3488.360 | 5418.747 | 2.466 | 114.119 | 47.030 | -1 | 0 | 0 | -1 | -1 | 0 | DROPPER |
| F1 | 3488.840 | 5437.796 | 1.056 | 123.764 | 30.596 | 3488.838 | 5437.797 | 1.052 | 123.764 | 30.594 | 0 | -2 | -4 | 0 | -1 | 0 | DROPPER |
| F2 | 3492.019 | 5432.772 | 1.662 | 124.113 | 36.531 | 3492.018 | 5432.773 | 1.660 | 124.112 | 36.530 | -1 | -1 | -2 | 0 | -1 | -1 | DROPPER |
| F3 | 3496.981 | 5423.846 | 2.492 | 124.131 | 46.744 | 3496.980 | 5423.846 | 2.491 | 124.130 | 46.743 | -1 | -1 | -1 | -1 | -2 | -1 | DROPPER |
| G1 | 3497.682 | 5443.746 | 1.070 | 134.382 | 29.672 | 3497.682 | 5443.746 | 1.069 | 134.382 | 29.673 | 0 | 1 | -1 | 0 | 0 | 0 | DROPPER |
| G2 | 3500.689 | 5437.819 | 1.624 | 134.142 | 36.315 | 3500.689 | 5437.819 | 1.623 | 134.142 | 36.314 | 0 | -1 | -1 | -1 | -1 | 0 | DROPPER |
| G3 | 3506.408 | 5428.601 | 2.579 | 134.682 | 47.149 | 3506.408 | 5428.601 | 2.579 | 134.682 | 47.149 | 0 | 0 | 0 | 0 | -1 | -1 | DROPPER |
| H1 | 3504.878 | 5450.787 | 1.024 | 144.088 | 26.997 | 3504.878 | 5450.787 | 1.024 | 144.088 | 26.997 | 0 | 0 | 0 | 0 | -1 | 0 | DROPPER |
| H2 | 3509.389 | 5442.710 | 1.690 | 144.122 | 36.248 | 3509.389 | 5442.709 | 1.690 | 144.122 | 36.249 | 0 | 1 | 0 | -1 | 0 | 0 | DROPPER |
| H3 | 3515.296 | 5433.593 | 2.588 | 144.876 | 47.086 | 3515.296 | 5433.592 | 2.588 | 144.875 | 47.086 | -1 | 0 | 0 | -1 | 0 | -1 | DROPPER |
| J1 | 3515.227 | 5452.854 | 1.136 | 154.143 | 30.200 | 3515.227 | 5452.854 | 1.135 | 154.143 | 30.200 | 0 | 0 | -1 | -1 | 0 | 0 | DROPPER |
| J2 | 3518.001 | 5447.804 | 1.577 | 154.125 | 35.962 | 3518.000 | 5447.803 | 1.576 | 154.123 | 35.963 | -2 | 1 | -1 | 0 | 0 | -1 | DROPPER |
| J3 | 3524.634 | 5438.883 | 2.580 | 155.608 | 46.979 | 3524.634 | 5438.883 | 2.580 | 155.608 | 46.979 | 0 | 0 | 0 | 0 | -1 | 0 | DROPPER |
| K1 | 3524.792 | 5456.028 | 1.428 | 164.049 | 32.055 | 3524.791 | 5456.028 | 1.425 | 164.048 | 32.055 | -1 | 0 | -3 | 0 | -1 | -1 | DROPPER |
| K2 | 3526.909 | 5452.487 | 1.767 | 164.186 | 36.179 | 3526.910 | 5452.486 | 1.766 | 164.186 | 36.180 | 0 | 1 | -1 | -1 | 0 | 0 | DROPPER |
| K3 | 3532.515 | 5443.180 | 2.605 | 164.584 | 47.037 | 3532.514 | 5443.179 | 2.605 | 164.583 | 47.037 | -1 | 0 | 0 | -1 | 1 | 0 | DROPPER |
| L1 | 3534.358 | 5466.862 | 1.051 | 177.665 | 27.210 | 3534.357 | 5466.861 | 1.049 | 177.664 | 27.209 | -1 | -1 | -2 | 0 | -1 | 0 | DROPPER |
| M1 | 3540.589 | 5472.468 | 1.106 | 185.832 | 25.322 | 3540.590 | 5472.467 | 1.103 | 185.832 | 25.323 | 0 | 1 | -3 | 0 | 1 | -1 | DROPPER |
| M2 | 3542.454 | 5468.314 | 1.324 | 185.452 | 29.860 | 3542.456 | 5468.313 | 1.321 | 185.453 | 29.861 | 1 | 1 | -3 | -1 | 1 | -1 | DROPPER |
| M3 | 3550.067 | 5452.828 | 2.624 | 184.613 | 47.096 | 3550.067 | 5452.827 | 2.624 | 184.613 | 47.096 | 0 | 0 | 0 | 1 | 0 | 0 | DROPPER |
| N1 | 3555.953 | 5487.047 | 1.257 | 206.334 | 20.007 | 3555.953 | 5487.048 | 1.254 | 206.335 | 20.006 | 1 | -1 | -3 | 0 | 0 | -1 | DROPPER |
| N2 | 3558.923 | 5482.788 | 1.438 | 206.869 | 25.172 | 3558.923 | 5482.787 | 1.436 | 206.869 | 25.172 | 0 | 0 | -2 | 0 | 0 | 0 | DROPPER |
| N3 | 3567.640 | 5462.354 | 2.315 | 204.600 | 47.271 | 3567.640 | 5462.355 | 2.315 | 204.601 | 47.271 | 1 | 0 | 0 | 1 | 0 | 0 | DROPPER |
| P1 | 3575.235 | 5490.935 | 1.051 | 225.087 | 25.944 | 3575.234 | 5490.936 | 1.047 | 225.087 | 25.942 | 0 | -2 | -4 | -1 | 0 | -2 | DROPPER |
| P2 | 3578.827 | 5483.557 | 1.759 | 224.656 | 34.138 | 3578.826 | 5483.558 | 1.761 | 224.656 | 34.137 | 0 | -1 | 2 | -1 | 0 | -1 | DROPPER |
| P3 | 3585.083 | 5472.121 | 2.586 | 224.591 | 47.173 | 3585.082 | 5472.122 | 2.585 | 224.591 | 47.172 | 0 | -1 | -1 | -1 | -1 | -1 | DROPPER |
| Q1 | 3593.448 | 5500.182 | 1.116 | 245.500 | 26.673 | 3593.447 | 5500.182 | 1.113 | 245.499 | 26.673 | -1 | 0 | -3 | 0 | -1 | -2 | DROPPER |
| Q2 | 3596.718 | 5493.412 | 1.754 | 245.082 | 34.180 | 3596.718 | 5493.412 | 1.755 | 245.082 | 34.180 | 0 | 0 | 1 | 0 | 0 | -1 | DROPPER |
| Q3 | 3602.552 | 5481.773 | 2.454 | 244.550 | 47.189 | 3602.550 | 5481.773 | 2.453 | 244.548 | 47.187 | -2 | -2 | -1 | 0 | 0 | -2 | DROPPER |

| | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **R1** | 3610.337 | 5509.611 | 1.325 | 264.843 | 26.603 | 3610.337 | 5509.611 | 1.323 | 264.843 | 26.603 | 0 | 0 | -2 | 1 | 0 | 0 | DROPPER |
| **R2** | 3613.887 | 5502.837 | 1.954 | 264.668 | 34.249 | 3613.887 | 5502.837 | 1.953 | 264.668 | 34.249 | 0 | 0 | -1 | 1 | 1 | 0 | DROPPER |
| **R3** | 3620.082 | 5491.510 | 2.364 | 264.603 | 47.160 | 3620.083 | 5491.510 | 2.364 | 264.603 | 47.159 | 0 | -1 | 0 | 0 | 0 | -1 | DROPPER |
| **S1** | 3626.946 | 5515.369 | 1.514 | 282.162 | 29.609 | 3626.945 | 5515.370 | 1.511 | 282.162 | 29.607 | 0 | -2 | -3 | 1 | -1 | -1 | DROPPER |
| **S2** | 3629.599 | 5511.492 | 1.861 | 282.606 | 34.286 | 3629.598 | 5511.493 | 1.860 | 282.606 | 34.285 | 0 | -1 | -1 | 1 | 1 | -1 | DROPPER |
| **S3** | 3635.344 | 5500.128 | 2.196 | 282.129 | 47.010 | 3635.344 | 5500.130 | 2.195 | 282.130 | 47.008 | 1 | -2 | -1 | 1 | 0 | -1 | DROPPER |
| | | | | | | | | | | **Max** | **1** | **1** | **2** | **1** | **1** | **0** | |
| | | | | | | | | | | **Min** | **-2** | **-2** | **-4** | **-1** | **-2** | **-2** | |
| | | | | | | | | | | **Average** | **-0** | **-0** | **-1** | **-0** | **-0** | **-1** | |

**Notes:**

Max, Min & Average values are for monitoring droppers only
Coordinates are calculated from least squares adjustment.
Chainage & offset is relative to line approximately parrellel to river bank
Origin of Chainage & Offset Alignment: E 3 365.74 , N 5 404.627
End of Chainage & Offset Alignment: E 3 628.213, N 5 549.913
Cross movement is positive away from the river bank in a south easterly direction
Upstream movement is positive in an upstream (North westerly) direction
Movement shown is relative to first survey 2 February 2012
Design co-ordinate accuracy is +,- 3mm
Design elevation accuracy is +,- 2mm

**3/04/2012 Point F2 - Vehicle tracks indicate possible disturbancce**

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# Murray River Estate - Tailem Bend

RIVER BANK MOVEMENT MONITORING

04-June-2012

| | |
|---|---|
| Date of survey | 4-Jun-12 |
| Equipment | Set 89 |
| Surveyed by: | NRG |

**References:**
Murray View Estate
A&S: A078911.0004

| Point | First Survey 2 February 2012 Easting | Northing | Elevation | Chainage | Offset | Current Survey Easting | Northing | Elevation | Chainage | Offset | Current Survey Comparisons: difference from first survey Upstream (mm) | Cross (mm) | Up (mm) | difference from last survey Upstream (mm) | Cross (mm) | Up (mm) | Point Description |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| A1 | 3419.966 | 5397.788 | 1.028 | 44.130 | 32.245 | 3419.965 | 5397.788 | 1.027 | 44.130 | 32.244 | 0 | -1 | -1 | 0 | 0 | 0 | DROPPER |
| A2 | 3423.809 | 5393.843 | 1.222 | 45.583 | 37.557 | 3423.809 | 5393.843 | 1.222 | 45.583 | 37.557 | 0 | 0 | 0 | 1 | 0 | 0 | DROPPER |
| A3 | 3430.291 | 5386.757 | 1.678 | 47.822 | 46.896 | 3430.292 | 5386.758 | 1.678 | 47.823 | 46.896 | 1 | 0 | 0 | 0 | 0 | 0 | DROPPER |
| B1 | 3436.911 | 5408.174 | 1.003 | 63.985 | 31.364 | 3436.911 | 5408.174 | 1.002 | 63.985 | 31.364 | 0 | 0 | -1 | 0 | 1 | 1 | DROPPER |
| B2 | 3439.908 | 5402.809 | 1.270 | 64.010 | 37.509 | 3439.908 | 5402.809 | 1.270 | 64.009 | 37.509 | -1 | 0 | 0 | 0 | 1 | 1 | DROPPER |
| B3 | 3443.642 | 5394.044 | 1.845 | 63.032 | 46.987 | 3443.644 | 5394.043 | 1.845 | 63.033 | 46.988 | 1 | 1 | 0 | -1 | 1 | 1 | DROPPER |
| C1 | 3454.535 | 5417.408 | 1.199 | 83.877 | 31.820 | 3454.536 | 5417.408 | 1.200 | 83.878 | 31.821 | 1 | 1 | 1 | -1 | 1 | 1 | DROPPER |
| C2 | 3457.290 | 5412.807 | 1.489 | 84.059 | 37.180 | 3457.292 | 5412.806 | 1.489 | 84.061 | 37.182 | 2 | 2 | 0 | 0 | 1 | 0 | DROPPER |
| C3 | 3462.266 | 5404.294 | 2.339 | 84.290 | 47.037 | 3462.268 | 5404.294 | 2.340 | 84.292 | 47.039 | 2 | 2 | 1 | 0 | 0 | 1 | DROPPER |
| D1 | 3470.691 | 5430.835 | 1.051 | 104.515 | 27.897 | 3470.691 | 5430.836 | 1.052 | 104.515 | 27.896 | 0 | -1 | 1 | 0 | 0 | 1 | DROPPER |
| D2 | 3474.532 | 5422.866 | 1.620 | 104.016 | 36.729 | 3474.531 | 5422.867 | 1.621 | 104.016 | 36.728 | 0 | -1 | 1 | 0 | 0 | 0 | DROPPER |
| D3 | 3479.599 | 5413.862 | 2.441 | 104.089 | 47.061 | 3479.597 | 5413.864 | 2.443 | 104.088 | 47.058 | -1 | -3 | 2 | 0 | 0 | 1 | DROPPER |
| E1 | 3480.296 | 5432.819 | 1.046 | 113.879 | 30.812 | 3480.296 | 5432.820 | 1.046 | 113.879 | 30.812 | 0 | 0 | 0 | -1 | 0 | 1 | DROPPER |
| E2 | 3483.326 | 5427.807 | 1.642 | 114.103 | 36.665 | 3483.325 | 5427.807 | 1.641 | 114.102 | 36.665 | -1 | 0 | -1 | 0 | 0 | 1 | DROPPER |
| E3 | 3488.361 | 5418.747 | 2.466 | 114.120 | 47.030 | 3488.360 | 5418.747 | 2.467 | 114.119 | 47.029 | -1 | -1 | 1 | 0 | -1 | 1 | DROPPER |
| F1 | 3488.840 | 5437.796 | 1.056 | 123.764 | 30.596 | 3488.839 | 5437.797 | 1.052 | 123.764 | 30.594 | 0 | -2 | -4 | 0 | 0 | 0 | DROPPER |
| F2 | 3492.019 | 5432.772 | 1.662 | 124.113 | 36.531 | 3492.018 | 5432.773 | 1.661 | 124.112 | 36.530 | -1 | -1 | -1 | 0 | 0 | 1 | DROPPER |
| F3 | 3496.981 | 5423.846 | 2.492 | 124.131 | 46.744 | 3496.980 | 5423.846 | 2.493 | 124.131 | 46.743 | 0 | -1 | 1 | 1 | 0 | 2 | DROPPER |
| G1 | 3497.682 | 5443.746 | 1.070 | 134.382 | 29.672 | 3497.682 | 5443.746 | 1.070 | 134.382 | 29.672 | 0 | 0 | 0 | 0 | -1 | 1 | DROPPER |
| G2 | 3500.689 | 5437.819 | 1.624 | 134.142 | 36.315 | 3500.689 | 5437.819 | 1.623 | 134.142 | 36.314 | 0 | -1 | -1 | 0 | 0 | 0 | DROPPER |
| G3 | 3506.408 | 5428.601 | 2.579 | 134.682 | 47.149 | 3506.407 | 5428.601 | 2.581 | 134.681 | 47.148 | -1 | -1 | 2 | -1 | -1 | 2 | DROPPER |
| H1 | 3504.878 | 5450.787 | 1.024 | 144.088 | 26.997 | 3504.878 | 5450.787 | 1.025 | 144.088 | 26.997 | 0 | 0 | 1 | 0 | 0 | 1 | DROPPER |
| H2 | 3509.389 | 5442.710 | 1.690 | 144.122 | 36.248 | 3509.388 | 5442.708 | 1.690 | 144.121 | 36.249 | -1 | 1 | 0 | -1 | 0 | 0 | DROPPER |
| H3 | 3515.296 | 5433.593 | 2.588 | 144.876 | 47.086 | 3515.295 | 5433.592 | 2.589 | 144.875 | 47.085 | -1 | -1 | 1 | 0 | -1 | 1 | DROPPER |
| J1 | 3515.227 | 5452.854 | 1.136 | 154.143 | 30.200 | 3515.227 | 5452.854 | 1.136 | 154.143 | 30.200 | 0 | 0 | 0 | 0 | 0 | 1 | DROPPER |
| J2 | 3518.001 | 5447.804 | 1.577 | 154.125 | 35.962 | 3518.000 | 5447.802 | 1.577 | 154.122 | 35.963 | -3 | 1 | 0 | -1 | 0 | 1 | DROPPER |
| J3 | 3524.634 | 5438.883 | 2.580 | 155.608 | 46.979 | 3524.633 | 5438.883 | 2.581 | 155.607 | 46.979 | -1 | 0 | 1 | -1 | 0 | 1 | DROPPER |
| K1 | 3524.792 | 5456.028 | 1.428 | 164.049 | 32.055 | 3524.790 | 5456.027 | 1.427 | 164.047 | 32.055 | -2 | 0 | -1 | -1 | 0 | 2 | DROPPER |
| K2 | 3526.909 | 5452.487 | 1.767 | 164.186 | 36.179 | 3526.909 | 5452.486 | 1.766 | 164.186 | 36.180 | 0 | 1 | -1 | 0 | 0 | 0 | DROPPER |
| K3 | 3532.515 | 5443.180 | 2.605 | 164.584 | 47.037 | 3532.513 | 5443.180 | 2.606 | 164.582 | 47.036 | -2 | -1 | 1 | -1 | -1 | 1 | DROPPER |
| L1 | 3534.358 | 5466.862 | 1.051 | 177.665 | 27.210 | 3534.355 | 5466.861 | 1.050 | 177.662 | 27.209 | -3 | -1 | -1 | -2 | 0 | 1 | DROPPER |
| M1 | 3540.589 | 5472.468 | 1.106 | 185.832 | 25.322 | 3540.588 | 5472.467 | 1.103 | 185.830 | 25.323 | -2 | 1 | -3 | -2 | 0 | 0 | DROPPER |
| M2 | 3542.454 | 5468.314 | 1.324 | 185.452 | 29.860 | 3542.454 | 5468.314 | 1.322 | 185.451 | 29.860 | -1 | 0 | -2 | -2 | -1 | 1 | DROPPER |
| M3 | 3550.067 | 5452.828 | 2.624 | 184.613 | 47.096 | 3550.066 | 5452.827 | 2.625 | 184.611 | 47.096 | -2 | 0 | 1 | -2 | 0 | 1 | DROPPER |
| N1 | 3555.953 | 5487.047 | 1.257 | 206.334 | 20.007 | 3555.952 | 5487.048 | 1.255 | 206.334 | 20.006 | 0 | -1 | -2 | -1 | 0 | 1 | DROPPER |
| N2 | 3558.923 | 5482.788 | 1.438 | 206.869 | 25.172 | 3558.923 | 5482.787 | 1.437 | 206.870 | 25.173 | 1 | 1 | -1 | 1 | 1 | 1 | DROPPER |
| N3 | 3567.640 | 5462.354 | 2.315 | 204.600 | 47.271 | 3567.639 | 5462.355 | 2.316 | 204.600 | 47.270 | 0 | -1 | 1 | -1 | -1 | 1 | DROPPER |
| P1 | 3575.235 | 5490.935 | 1.051 | 225.087 | 25.944 | 3575.235 | 5490.936 | 1.050 | 225.087 | 25.943 | 0 | -1 | -1 | 0 | 1 | 3 | DROPPER |
| P2 | 3578.827 | 5483.557 | 1.759 | 224.656 | 34.138 | 3578.826 | 5483.558 | 1.763 | 224.655 | 34.137 | -1 | -1 | 4 | -1 | 0 | 2 | DROPPER |
| P3 | 3585.083 | 5472.121 | 2.586 | 224.591 | 47.173 | 3585.081 | 5472.122 | 2.587 | 224.590 | 47.172 | -1 | -1 | 1 | -1 | 0 | 2 | DROPPER |
| Q1 | 3593.448 | 5500.182 | 1.116 | 245.500 | 26.673 | 3593.448 | 5500.182 | 1.116 | 245.499 | 26.673 | -1 | 0 | 0 | 0 | 0 | 3 | DROPPER |
| Q2 | 3596.718 | 5493.412 | 1.754 | 245.082 | 34.180 | 3596.718 | 5493.411 | 1.758 | 245.082 | 34.181 | 0 | 1 | 4 | 0 | 1 | 3 | DROPPER |
| Q3 | 3602.552 | 5481.773 | 2.454 | 244.550 | 47.189 | 3602.550 | 5481.773 | 2.455 | 244.548 | 47.188 | -2 | -1 | 1 | 0 | 1 | 2 | DROPPER |
| R1 | 3610.337 | 5509.611 | 1.325 | 264.843 | 26.603 | 3610.337 | 5509.611 | 1.326 | 264.843 | 26.603 | 0 | 0 | 1 | 0 | 0 | 3 | DROPPER |
| R2 | 3613.887 | 5502.837 | 1.954 | 264.668 | 34.249 | 3613.886 | 5502.837 | 1.955 | 264.667 | 34.249 | -1 | 0 | 1 | -1 | 0 | 2 | DROPPER |

| | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **R3** | 3620.082 | 5491.510 | 2.364 | 264.603 | 47.160 | 3620.083 | 5491.510 | 2.367 | 264.603 | 47.160 | 0 | 0 | 3 | 0 | 1 | 3 | DROPPER |
| **S1** | 3626.946 | 5515.369 | 1.514 | 282.162 | 29.609 | 3626.944 | 5515.371 | 1.513 | 282.161 | 29.606 | -1 | -3 | -1 | -1 | -1 | 2 | DROPPER |
| **S2** | 3629.599 | 5511.492 | 1.861 | 282.606 | 34.286 | 3629.598 | 5511.492 | 1.863 | 282.605 | 34.286 | -1 | 0 | 2 | -1 | 1 | 3 | DROPPER |
| **S3** | 3635.344 | 5500.128 | 2.196 | 282.129 | 47.010 | 3635.344 | 5500.130 | 2.198 | 282.130 | 47.009 | 1 | -1 | 2 | 0 | 1 | 3 | DROPPER |
| | | | | | | | | | | **Max** | **1** | **1** | **4** | **1** | **1** | **3** | |
| | | | | | | | | | | **Min** | **-3** | **-3** | **-4** | **-2** | **-1** | **0** | |
| | | | | | | | | | | **Average** | **-1** | **-0** | **0** | **-1** | **-0** | **1** | |

**Notes:**

Max, Min & Average values are for monitoring droppers only
Coordinates are calculated from least squares adjustment.
Chainage & offset is relative to line approximately parrellel to river bank
Origin of Chainage & Offset Alignment: E 3 365.74 , N 5 404.627
End of Chainage & Offset Alignment: E 3 628.213, N 5 549.913
Cross movement is positive away from the river bank in a south easterly direction
Upstream movement is positive in an upstream (North westerly) direction
Movement shown is relative to first survey 2 February 2012
Design co-ordinate accuracy is +,- 3mm
Design elevation accuracy is +,- 2mm

**3/04/2012 Point F2 - Vehicle tracks indicate possible disturbancce**

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# Murray River Estate - Tailem Bend

RIVER BANK MOVEMENT MONITORING

03-July-2012

| | |
|---|---|
| Date of survey | 3-Jul-12 |
| Equipment | Set 59 |
| Surveyed by: | NRG |

**References:**
Murray View Estate
A&S: A078911.0004

| Point | First Survey 2 February 2012 Easting | Northing | Elevation | Chainage | Offset | Current Survey Easting | Northing | Elevation | Chainage | Offset | Current Survey Comparisons: difference from first survey Upstream (mm) | Cross (mm) | Up (mm) | difference from last survey Upstream (mm) | Cross (mm) | Up (mm) | Point Description |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| A1 | 3419.966 | 5397.788 | 1.028 | 44.130 | 32.245 | 3419.965 | 5397.787 | 1.026 | 44.129 | 32.244 | -1 | -1 | -2 | -1 | 0 | -1 | DROPPER |
| A2 | 3423.809 | 5393.843 | 1.222 | 45.583 | 37.557 | 3423.808 | 5393.843 | 1.222 | 45.582 | 37.557 | -1 | 0 | 0 | -1 | 0 | 0 | DROPPER |
| A3 | 3430.291 | 5386.757 | 1.678 | 47.822 | 46.896 | 3430.292 | 5386.756 | 1.678 | 47.822 | 46.897 | 0 | 1 | 0 | -1 | 1 | 0 | DROPPER |
| B1 | 3436.911 | 5408.174 | 1.003 | 63.985 | 31.364 | 3436.910 | 5408.173 | 1.001 | 63.984 | 31.365 | -1 | 1 | -2 | -1 | 1 | -1 | DROPPER |
| B2 | 3439.908 | 5402.809 | 1.270 | 64.010 | 37.509 | 3439.907 | 5402.808 | 1.269 | 64.008 | 37.510 | -2 | 1 | -1 | -1 | 1 | -1 | DROPPER |
| B3 | 3443.642 | 5394.044 | 1.845 | 63.032 | 46.987 | 3443.644 | 5394.043 | 1.845 | 63.033 | 46.988 | 1 | 1 | 0 | 0 | 0 | 0 | DROPPER |
| C1 | 3454.535 | 5417.408 | 1.199 | 83.877 | 31.820 | 3454.535 | 5417.408 | 1.198 | 83.877 | 31.821 | 0 | 1 | -1 | -1 | 0 | -2 | DROPPER |
| C2 | 3457.290 | 5412.807 | 1.489 | 84.059 | 37.180 | 3457.292 | 5412.806 | 1.489 | 84.060 | 37.182 | 1 | 2 | 0 | -1 | 0 | 0 | DROPPER |
| C3 | 3462.266 | 5404.294 | 2.339 | 84.290 | 47.037 | 3462.268 | 5404.293 | 2.339 | 84.292 | 47.040 | 2 | 3 | 0 | 0 | 1 | -1 | DROPPER |
| D1 | 3470.691 | 5430.835 | 1.051 | 104.515 | 27.897 | 3470.691 | 5430.835 | 1.051 | 104.515 | 27.896 | 0 | -1 | 0 | 0 | 0 | -1 | DROPPER |
| D2 | 3474.532 | 5422.866 | 1.620 | 104.016 | 36.729 | 3474.531 | 5422.866 | 1.621 | 104.015 | 36.729 | -1 | 0 | 1 | -1 | 1 | 0 | DROPPER |
| D3 | 3479.599 | 5413.862 | 2.441 | 104.089 | 47.061 | 3479.597 | 5413.863 | 2.443 | 104.088 | 47.059 | -1 | -2 | 2 | 0 | 1 | 0 | DROPPER |
| E1 | 3480.296 | 5432.819 | 1.046 | 113.879 | 30.812 | 3480.296 | 5432.819 | 1.045 | 113.879 | 30.812 | 0 | 0 | -1 | 0 | 0 | -1 | DROPPER |
| E2 | 3483.326 | 5427.807 | 1.642 | 114.103 | 36.665 | 3483.325 | 5427.806 | 1.640 | 114.101 | 36.665 | -2 | 0 | -2 | -1 | 0 | -1 | DROPPER |
| E3 | 3488.361 | 5418.747 | 2.466 | 114.120 | 47.030 | 3488.360 | 5418.746 | 2.466 | 114.119 | 47.030 | -1 | 0 | 0 | 0 | 1 | -1 | DROPPER |
| F1 | 3488.840 | 5437.796 | 1.056 | 123.764 | 30.596 | 3488.838 | 5437.796 | 1.051 | 123.763 | 30.595 | -1 | -1 | -5 | -1 | 1 | -1 | DROPPER |
| F2 | 3492.019 | 5432.772 | 1.662 | 124.113 | 36.531 | 3492.018 | 5432.772 | 1.660 | 124.111 | 36.531 | -2 | 0 | -2 | -1 | 1 | -1 | DROPPER |
| F3 | 3496.981 | 5423.846 | 2.492 | 124.131 | 46.744 | 3496.980 | 5423.844 | 2.492 | 124.130 | 46.744 | -1 | 0 | 0 | -1 | 1 | -1 | DROPPER |
| G1 | 3497.682 | 5443.746 | 1.070 | 134.382 | 29.672 | 3497.682 | 5443.745 | 1.069 | 134.381 | 29.673 | -1 | 1 | -1 | -1 | 1 | -1 | DROPPER |
| G2 | 3500.689 | 5437.819 | 1.624 | 134.142 | 36.315 | 3500.688 | 5437.818 | 1.623 | 134.142 | 36.315 | 0 | 0 | -1 | 0 | 1 | 0 | DROPPER |
| G3 | 3506.408 | 5428.601 | 2.579 | 134.682 | 47.149 | 3506.408 | 5428.599 | 2.580 | 134.681 | 47.150 | -1 | 1 | 1 | 0 | 2 | -1 | DROPPER |
| H1 | 3504.878 | 5450.787 | 1.024 | 144.088 | 26.997 | 3504.878 | 5450.786 | 1.024 | 144.087 | 26.997 | -1 | 0 | 0 | -1 | 0 | -1 | DROPPER |
| H2 | 3509.389 | 5442.710 | 1.690 | 144.122 | 36.248 | 3509.389 | 5442.709 | 1.689 | 144.122 | 36.249 | 0 | 1 | -1 | 1 | 0 | -1 | DROPPER |
| H3 | 3515.296 | 5433.593 | 2.588 | 144.876 | 47.086 | 3515.296 | 5433.593 | 2.589 | 144.876 | 47.085 | 0 | -1 | 1 | 1 | 0 | 0 | DROPPER |
| J1 | 3515.227 | 5452.854 | 1.136 | 154.143 | 30.200 | 3515.227 | 5452.854 | 1.134 | 154.143 | 30.200 | 0 | 0 | -2 | 0 | 0 | -2 | DROPPER |
| J2 | 3518.001 | 5447.804 | 1.577 | 154.125 | 35.962 | 3518.000 | 5447.802 | 1.576 | 154.122 | 35.963 | -3 | 1 | -1 | 0 | 0 | -1 | DROPPER |
| J3 | 3524.634 | 5438.883 | 2.580 | 155.608 | 46.979 | 3524.633 | 5438.883 | 2.580 | 155.607 | 46.979 | -1 | 0 | 0 | 0 | 0 | -1 | DROPPER |
| K1 | 3524.792 | 5456.028 | 1.428 | 164.049 | 32.055 | 3524.791 | 5456.027 | 1.425 | 164.047 | 32.055 | -2 | 0 | -3 | 0 | 0 | -2 | DROPPER |
| K2 | 3526.909 | 5452.487 | 1.767 | 164.186 | 36.179 | 3526.910 | 5452.486 | 1.765 | 164.187 | 36.180 | 1 | 1 | -2 | 1 | 0 | -1 | DROPPER |
| K3 | 3532.515 | 5443.180 | 2.605 | 164.584 | 47.037 | 3532.512 | 5443.179 | 2.605 | 164.580 | 47.036 | -4 | -1 | 0 | -2 | 0 | -1 | DROPPER |
| L1 | 3534.358 | 5466.862 | 1.051 | 177.665 | 27.210 | 3534.356 | 5466.861 | 1.048 | 177.663 | 27.209 | -2 | -1 | -3 | 1 | 0 | -2 | DROPPER |
| M1 | 3540.589 | 5472.468 | 1.106 | 185.832 | 25.322 | 3540.589 | 5472.467 | 1.102 | 185.831 | 25.323 | -1 | 1 | -4 | 1 | 0 | -1 | DROPPER |
| M2 | 3542.454 | 5468.314 | 1.324 | 185.452 | 29.860 | 3542.455 | 5468.312 | 1.321 | 185.451 | 29.862 | -1 | 2 | -3 | 0 | 2 | -1 | DROPPER |
| M3 | 3550.067 | 5452.828 | 2.624 | 184.613 | 47.096 | 3550.067 | 5452.828 | 2.626 | 184.612 | 47.096 | -1 | 0 | 2 | 1 | 0 | 1 | DROPPER |
| N1 | 3555.953 | 5487.047 | 1.257 | 206.334 | 20.007 | 3555.952 | 5487.049 | 1.253 | 206.334 | 20.005 | 0 | -2 | -4 | 0 | -1 | -2 | DROPPER |
| N2 | 3558.923 | 5482.788 | 1.438 | 206.869 | 25.172 | 3558.922 | 5482.787 | 1.436 | 206.869 | 25.172 | 0 | 0 | -2 | -1 | -1 | -1 | DROPPER |
| N3 | 3567.640 | 5462.354 | 2.315 | 204.600 | 47.271 | 3567.640 | 5462.356 | 2.315 | 204.601 | 47.270 | 1 | -1 | 0 | 1 | 0 | -1 | DROPPER |
| P1 | 3575.235 | 5490.935 | 1.051 | 225.087 | 25.944 | 3575.233 | 5490.936 | 1.048 | 225.086 | 25.942 | -1 | -2 | -3 | -1 | -1 | -2 | DROPPER |
| P2 | 3578.827 | 5483.557 | 1.759 | 224.656 | 34.138 | 3578.826 | 5483.559 | 1.764 | 224.656 | 34.136 | 0 | -2 | 5 | 1 | -1 | 1 | DROPPER |
| P3 | 3585.083 | 5472.121 | 2.586 | 224.591 | 47.173 | 3585.082 | 5472.122 | 2.587 | 224.591 | 47.172 | 0 | -1 | 1 | 1 | 0 | 0 | DROPPER |
| Q1 | 3593.448 | 5500.182 | 1.116 | 245.500 | 26.673 | 3593.447 | 5500.183 | 1.114 | 245.499 | 26.673 | -1 | 0 | -2 | 0 | 0 | -2 | DROPPER |
| Q2 | 3596.718 | 5493.412 | 1.754 | 245.082 | 34.180 | 3596.717 | 5493.413 | 1.758 | 245.082 | 34.179 | 0 | -1 | 4 | 0 | -2 | 0 | DROPPER |
| Q3 | 3602.552 | 5481.773 | 2.454 | 244.550 | 47.189 | 3602.550 | 5481.773 | 2.456 | 244.548 | 47.188 | -2 | -1 | 2 | 0 | 0 | 1 | DROPPER |
| R1 | 3610.337 | 5509.611 | 1.325 | 264.843 | 26.603 | 3610.337 | 5509.611 | 1.324 | 264.842 | 26.603 | -1 | 0 | -1 | -1 | 0 | -2 | DROPPER |
| R2 | 3613.887 | 5502.837 | 1.954 | 264.668 | 34.249 | 3613.886 | 5502.838 | 1.954 | 264.667 | 34.248 | -1 | -1 | 0 | 0 | -1 | -1 | DROPPER |

| | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **R3** | 3620.082 | 5491.510 | 2.364 | 264.603 | 47.160 | 3620.083 | 5491.510 | 2.366 | 264.603 | 47.160 | 0 | 0 | 2 | 0 | 0 | -1 | DROPPER |
| **S1** | 3626.946 | 5515.369 | 1.514 | 282.162 | 29.609 | 3626.944 | 5515.371 | 1.511 | 282.161 | 29.606 | -1 | -3 | -3 | 0 | 0 | -2 | DROPPER |
| **S2** | 3629.599 | 5511.492 | 1.861 | 282.606 | 34.286 | 3629.598 | 5511.492 | 1.861 | 282.605 | 34.285 | -1 | -1 | 0 | 0 | -1 | -2 | DROPPER |
| **S3** | 3635.344 | 5500.128 | 2.196 | 282.129 | 47.010 | 3635.344 | 5500.130 | 2.197 | 282.130 | 47.008 | 1 | -2 | 1 | 0 | -1 | -1 | DROPPER |
| | | | | | | | | | | **Max** | **1** | **2** | **5** | **1** | **2** | **1** | |
| | | | | | | | | | | **Min** | **-4** | **-3** | **-5** | **-2** | **-2** | **-2** | |
| | | | | | | | | | | **Average** | **-1** | **-0** | **-1** | **-0** | **0** | **-1** | |

**Notes:**

Max, Min & Average values are for monitoring droppers only
Coordinates are calculated from least squares adjustment.
Chainage & offset is relative to line approximately parrellel to river bank
Origin of Chainage & Offset Alignment: E 3 365.74 , N 5 404.627
End of Chainage & Offset Alignment: E 3 628.213, N 5 549.913
Cross movement is positive away from the river bank in a south easterly direction
Upstream movement is positive in an upstream (North westerly) direction
Movement shown is relative to first survey 2 February 2012
Design co-ordinate accuracy is +,- 3mm
Design elevation accuracy is +,- 2mm

**3/04/2012 Point F2 - Vehicle tracks indicate possible disturbancce**

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# Murray River Estate - Tailem Bend

## RIVER BANK MOVEMENT MONITORING

30-July-2012

| | |
|---|---|
| Date of survey | 30-Jul-12 |
| Equipment | Set 59 |
| Surveyed by: | NRG |

**References:**
Murray View Estate
A&S: A078911.0004

| | First Survey 2 February 2012 | | | | | Current Survey | | | | | Current Survey Comparisons | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | | difference from first survey | | | difference from last survey | | | |
| Point | Easting | Northing | Elevation | Chainage | Offset | Easting | Northing | Elevation | Chainage | Offset | Upstream (mm) | Cross (mm) | Up (mm) | Upstream (mm) | Cross (mm) | Up (mm) | Point Description |
| A1 | 3419.966 | 5397.788 | 1.028 | 44.130 | 32.245 | 3419.965 | 5397.786 | 1.026 | 44.129 | 32.246 | -1 | 1 | -2 | -0 | 2 | 0 | DROPPER |
| A2 | 3423.809 | 5393.843 | 1.222 | 45.583 | 37.557 | 3423.809 | 5393.841 | 1.221 | 45.582 | 37.559 | -1 | 2 | -2 | -0 | 2 | -2 | DROPPER |
| A3 | 3430.291 | 5386.757 | 1.678 | 47.822 | 46.896 | 3430.292 | 5386.756 | 1.676 | 47.822 | 46.898 | 0 | 2 | -2 | 0 | 1 | -2 | DROPPER |
| B1 | 3436.911 | 5408.174 | 1.003 | 63.985 | 31.364 | 3436.910 | 5408.172 | 1.000 | 63.984 | 31.365 | -1 | 1 | -3 | -0 | -0 | -1 | DROPPER |
| B2 | 3439.908 | 5402.809 | 1.270 | 64.010 | 37.509 | 3439.907 | 5402.807 | 1.268 | 64.008 | 37.510 | -2 | 1 | -2 | 0 | 0 | -1 | DROPPER |
| B3 | 3443.642 | 5394.044 | 1.845 | 63.032 | 46.987 | 3443.644 | 5394.042 | 1.843 | 63.033 | 46.989 | 1 | 2 | -2 | -1 | 1 | -2 | DROPPER |
| C1 | 3454.535 | 5417.408 | 1.199 | 83.877 | 31.820 | 3454.536 | 5417.407 | 1.198 | 83.877 | 31.821 | 0 | 1 | -2 | 0 | 0 | -0 | DROPPER |
| C2 | 3457.290 | 5412.807 | 1.489 | 84.059 | 37.180 | 3457.292 | 5412.805 | 1.488 | 84.060 | 37.183 | 1 | 2 | -1 | 0 | 0 | -1 | DROPPER |
| C3 | 3462.266 | 5404.294 | 2.339 | 84.290 | 47.037 | 3462.268 | 5404.293 | 2.338 | 84.291 | 47.040 | 1 | 3 | -1 | -1 | -0 | -1 | DROPPER |
| D1 | 3470.691 | 5430.835 | 1.051 | 104.515 | 27.897 | 3470.690 | 5430.836 | 1.050 | 104.515 | 27.896 | -1 | -1 | -1 | -1 | -0 | -1 | DROPPER |
| D2 | 3474.532 | 5422.866 | 1.620 | 104.016 | 36.729 | 3474.530 | 5422.867 | 1.619 | 104.015 | 36.728 | -1 | -1 | -1 | -0 | -1 | -2 | DROPPER |
| D3 | 3479.599 | 5413.862 | 2.441 | 104.089 | 47.061 | 3479.597 | 5413.863 | 2.441 | 104.087 | 47.059 | -2 | -2 | 0 | -1 | -0 | -2 | DROPPER |
| E1 | 3480.296 | 5432.819 | 1.046 | 113.879 | 30.812 | 3480.296 | 5432.820 | 1.044 | 113.880 | 30.812 | 0 | -0 | -2 | 0 | -0 | -1 | DROPPER |
| E2 | 3483.326 | 5427.807 | 1.642 | 114.103 | 36.665 | 3483.325 | 5427.806 | 1.639 | 114.101 | 36.665 | -2 | 0 | -3 | 0 | 0 | -1 | DROPPER |
| E3 | 3488.361 | 5418.747 | 2.466 | 114.120 | 47.030 | 3488.360 | 5418.746 | 2.465 | 114.119 | 47.030 | -1 | 0 | -1 | 0 | 0 | -1 | DROPPER |
| F1 | 3488.840 | 5437.796 | 1.056 | 123.764 | 30.596 | 3488.838 | 5437.797 | 1.051 | 123.764 | 30.594 | -0 | -2 | -6 | 1 | -1 | -0 | DROPPER |
| F2 | 3492.019 | 5432.772 | 1.662 | 124.113 | 36.531 | 3492.018 | 5432.772 | 1.659 | 124.112 | 36.530 | -1 | -1 | -3 | 1 | -1 | -1 | DROPPER |
| F3 | 3496.981 | 5423.846 | 2.492 | 124.131 | 46.744 | 3496.980 | 5423.845 | 2.490 | 124.130 | 46.744 | -1 | 0 | -2 | 0 | 0 | -2 | DROPPER |
| G1 | 3497.682 | 5443.746 | 1.070 | 134.382 | 29.672 | 3497.682 | 5443.746 | 1.068 | 134.382 | 29.672 | -1 | 0 | -2 | 0 | -1 | -1 | DROPPER |
| G2 | 3500.689 | 5437.819 | 1.624 | 134.142 | 36.315 | 3500.689 | 5437.819 | 1.621 | 134.142 | 36.314 | 0 | -1 | -3 | 0 | -1 | -2 | DROPPER |
| G3 | 3506.408 | 5428.601 | 2.579 | 134.682 | 47.149 | 3506.408 | 5428.600 | 2.579 | 134.681 | 47.149 | -1 | 0 | -0 | 0 | -1 | -1 | DROPPER |
| H1 | 3504.878 | 5450.787 | 1.024 | 144.088 | 26.997 | 3504.878 | 5450.788 | 1.023 | 144.088 | 26.996 | 0 | -1 | -1 | 1 | -1 | -1 | DROPPER |
| H2 | 3509.389 | 5442.710 | 1.690 | 144.122 | 36.248 | 3509.389 | 5442.709 | 1.688 | 144.122 | 36.249 | 0 | 1 | -2 | 0 | -0 | -1 | DROPPER |
| H3 | 3515.296 | 5433.593 | 2.588 | 144.876 | 47.086 | 3515.296 | 5433.593 | 2.588 | 144.876 | 47.085 | 0 | -1 | 0 | 0 | 0 | -1 | DROPPER |
| J1 | 3515.227 | 5452.854 | 1.136 | 154.143 | 30.200 | 3515.228 | 5452.855 | 1.134 | 154.144 | 30.200 | 1 | -0 | -2 | 1 | -0 | 0 | DROPPER |
| J2 | 3518.001 | 5447.804 | 1.577 | 154.125 | 35.962 | 3518.001 | 5447.803 | 1.575 | 154.124 | 35.963 | -1 | 1 | -2 | 2 | 0 | -1 | DROPPER |
| J3 | 3524.634 | 5438.883 | 2.580 | 155.608 | 46.979 | 3524.634 | 5438.883 | 2.580 | 155.608 | 46.979 | -0 | 0 | -1 | 1 | 0 | -1 | DROPPER |
| K1 | 3524.792 | 5456.028 | 1.428 | 164.049 | 32.055 | 3524.791 | 5456.028 | 1.424 | 164.048 | 32.056 | -1 | 1 | -4 | 1 | 1 | -1 | DROPPER |
| K2 | 3526.909 | 5452.487 | 1.767 | 164.186 | 36.179 | 3526.910 | 5452.486 | 1.764 | 164.186 | 36.180 | 0 | 1 | -3 | -1 | 0 | -1 | DROPPER |
| K3 | 3532.515 | 5443.180 | 2.605 | 164.584 | 47.037 | 3532.513 | 5443.179 | 2.604 | 164.581 | 47.036 | -3 | -1 | -1 | 1 | 0 | -1 | DROPPER |
| L1 | 3534.358 | 5466.862 | 1.051 | 177.665 | 27.210 | 3534.356 | 5466.860 | 1.048 | 177.662 | 27.210 | -3 | 0 | -3 | -1 | 1 | 0 | DROPPER |
| M1 | 3540.589 | 5472.468 | 1.106 | 185.832 | 25.322 | 3540.589 | 5472.466 | 1.102 | 185.830 | 25.324 | -2 | 2 | -4 | -1 | 1 | -0 | DROPPER |
| M2 | 3542.454 | 5468.314 | 1.324 | 185.452 | 29.860 | 3542.454 | 5468.311 | 1.321 | 185.450 | 29.862 | -2 | 2 | -3 | -1 | -0 | -0 | DROPPER |
| M3 | 3550.067 | 5452.828 | 2.624 | 184.613 | 47.096 | 3550.067 | 5452.827 | 2.626 | 184.612 | 47.096 | -1 | -0 | 2 | -0 | -0 | 0 | DROPPER |
| N1 | 3555.953 | 5487.047 | 1.257 | 206.334 | 20.007 | 3555.952 | 5487.047 | 1.253 | 206.333 | 20.007 | -1 | -0 | -4 | -1 | 2 | 0 | DROPPER |
| N2 | 3558.923 | 5482.788 | 1.438 | 206.869 | 25.172 | 3558.922 | 5482.787 | 1.436 | 206.869 | 25.172 | -0 | 0 | -2 | -0 | 0 | -0 | DROPPER |
| N3 | 3567.640 | 5462.354 | 2.315 | 204.600 | 47.271 | 3567.642 | 5462.355 | 2.315 | 204.603 | 47.271 | 3 | 0 | 0 | 2 | 1 | 0 | DROPPER |
| P1 | 3575.235 | 5490.935 | 1.051 | 225.087 | 25.944 | 3575.234 | 5490.935 | 1.048 | 225.086 | 25.943 | -1 | -1 | -3 | 0 | 1 | -0 | DROPPER |
| P2 | 3578.827 | 5483.557 | 1.759 | 224.656 | 34.138 | 3578.827 | 5483.557 | 1.763 | 224.656 | 34.138 | 0 | -0 | 4 | 0 | 2 | -1 | DROPPER |
| P3 | 3585.083 | 5472.121 | 2.586 | 224.591 | 47.173 | 3585.082 | 5472.122 | 2.587 | 224.591 | 47.173 | 0 | -0 | 1 | 0 | 1 | 0 | DROPPER |
| Q1 | 3593.448 | 5500.182 | 1.116 | 245.500 | 26.673 | 3593.448 | 5500.182 | 1.114 | 245.500 | 26.673 | -0 | 0 | -2 | 1 | 0 | -0 | DROPPER |
| Q2 | 3596.718 | 5493.412 | 1.754 | 245.082 | 34.180 | 3596.717 | 5493.413 | 1.758 | 245.082 | 34.179 | -0 | -1 | 4 | -0 | 0 | 0 | DROPPER |
| Q3 | 3602.552 | 5481.773 | 2.454 | 244.550 | 47.189 | 3602.551 | 5481.773 | 2.456 | 244.549 | 47.189 | -1 | -0 | 1 | 1 | 1 | -1 | DROPPER |
| R1 | 3610.337 | 5509.611 | 1.325 | 264.843 | 26.603 | 3610.337 | 5509.611 | 1.323 | 264.842 | 26.603 | -1 | -0 | -2 | 0 | -0 | -1 | DROPPER |
| R2 | 3613.887 | 5502.837 | 1.954 | 264.668 | 34.249 | 3613.886 | 5502.838 | 1.955 | 264.668 | 34.248 | -0 | -1 | 1 | 1 | -0 | 1 | DROPPER |

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| | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **R3** | 3620.082 | 5491.510 | 2.364 | 264.603 | 47.160 | 3620.083 | 5491.510 | 2.367 | 264.603 | 47.160 | 0 | -0 | 3 | 0 | -0 | 1 | DROPPER |
| **S1** | 3626.946 | 5515.369 | 1.514 | 282.162 | 29.609 | 3626.943 | 5515.373 | 1.510 | 282.162 | 29.604 | 0 | -5 | -4 | 1 | -2 | -1 | DROPPER |
| **S2** | 3629.599 | 5511.492 | 1.861 | 282.606 | 34.286 | 3629.599 | 5511.495 | 1.861 | 282.607 | 34.283 | 1 | -3 | -0 | 2 | -2 | -0 | DROPPER |
| **S3** | 3635.344 | 5500.128 | 2.196 | 282.129 | 47.010 | 3635.344 | 5500.132 | 2.197 | 282.131 | 47.007 | 2 | -3 | 1 | 1 | -1 | 0 | DROPPER |
| | | | | | | | | | | **Max** | **3** | **3** | **4** | **2** | **2** | **1** | |
| | | | | | | | | | | **Min** | **-3** | **-5** | **-6** | **-1** | **-2** | **-2** | |
| | | | | | | | | | | **Average** | **-0** | **-0** | **-1** | **0** | **-0** | **-0** | |

**Notes:**

Max, Min & Average values are for monitoring droppers only
Coordinates are calculated from least squares adjustment.
Chainage & offset is relative to line approximately parrellel to river bank
Origin of Chainage & Offset Alignment: E 3 365.74 , N 5 404.627
End of Chainage & Offset Alignment: E 3 628.213, N 5 549.913
Cross movement is positive away from the river bank in a south easterly direction
Upstream movement is positive in an upstream (North westerly) direction
Movement shown is relative to first survey 2 February 2012
Design co-ordinate accuracy is +,- 3mm
Design elevation accuracy is +,- 2mm

**3/04/2012 Point F2 - Vehicle tracks indicate possible disturbancce**

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# Murray River Estate - Tailem Bend

RIVER BANK MOVEMENT MONITORING

06-September-2012

| | |
|---|---|
| Date of survey | 6-Sep-12 |
| Equipment | Set 59 |
| Surveyed by: | NRG |

**References:**
Murray View Estate
A&S: A078911.0004

| Point | First Survey 2 February 2012 Easting | Northing | Elevation | Chainage | Offset | Current Survey Easting | Northing | Elevation | Chainage | Offset | Current Survey Comparisons: difference from first survey Upstream (mm) | Cross (mm) | Up (mm) | difference from last survey Upstream (mm) | Cross (mm) | Up (mm) | Point Description |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| A1 | 3419.966 | 5397.788 | 1.028 | 44.130 | 32.245 | 3419.965 | 5397.788 | 1.028 | 44.130 | 32.244 | 0 | -1 | 0 | 1 | -2 | 2 | DROPPER |
| A2 | 3423.809 | 5393.843 | 1.222 | 45.583 | 37.557 | 3423.809 | 5393.844 | 1.223 | 45.583 | 37.557 | 0 | -0 | 1 | 1 | -2 | 3 | DROPPER |
| A3 | 3430.291 | 5386.757 | 1.678 | 47.822 | 46.896 | 3430.292 | 5386.758 | 1.679 | 47.824 | 46.896 | 2 | -0 | 1 | 2 | -2 | 3 | DROPPER |
| B1 | 3436.911 | 5408.174 | 1.003 | 63.985 | 31.364 | 3436.911 | 5408.175 | 1.002 | 63.986 | 31.363 | 1 | -1 | -1 | 2 | -2 | 2 | DROPPER |
| B2 | 3439.908 | 5402.809 | 1.270 | 64.010 | 37.509 | 3439.908 | 5402.810 | 1.270 | 64.010 | 37.509 | -0 | -1 | 0 | 2 | -2 | 2 | DROPPER |
| B3 | 3443.642 | 5394.044 | 1.845 | 63.032 | 46.987 | 3443.644 | 5394.045 | 1.845 | 63.034 | 46.987 | 2 | -0 | 0 | 2 | -2 | 2 | DROPPER |
| C1 | 3454.535 | 5417.408 | 1.199 | 83.877 | 31.820 | 3454.537 | 5417.409 | 1.200 | 83.879 | 31.820 | 2 | -0 | 0 | 2 | -2 | 2 | DROPPER |
| C2 | 3457.290 | 5412.807 | 1.489 | 84.059 | 37.180 | 3457.293 | 5412.807 | 1.490 | 84.062 | 37.181 | 3 | 1 | 1 | 1 | -2 | 2 | DROPPER |
| C3 | 3462.266 | 5404.294 | 2.339 | 84.290 | 47.037 | 3462.268 | 5404.295 | 2.340 | 84.293 | 47.038 | 3 | 1 | 1 | 1 | -2 | 2 | DROPPER |
| D1 | 3470.691 | 5430.835 | 1.051 | 104.515 | 27.897 | 3470.692 | 5430.836 | 1.052 | 104.516 | 27.896 | 1 | -1 | 1 | 2 | 0 | 2 | DROPPER |
| D2 | 3474.532 | 5422.866 | 1.620 | 104.016 | 36.729 | 3474.533 | 5422.868 | 1.622 | 104.017 | 36.728 | 1 | -1 | 1 | 2 | 1 | 2 | DROPPER |
| D3 | 3479.599 | 5413.862 | 2.441 | 104.089 | 47.061 | 3479.598 | 5413.864 | 2.444 | 104.089 | 47.058 | 0 | -3 | 3 | 2 | -0 | 3 | DROPPER |
| E1 | 3480.296 | 5432.819 | 1.046 | 113.879 | 30.812 | 3480.297 | 5432.820 | 1.047 | 113.880 | 30.812 | 1 | 0 | 0 | 1 | 0 | 2 | DROPPER |
| E2 | 3483.326 | 5427.807 | 1.642 | 114.103 | 36.665 | 3483.326 | 5427.807 | 1.641 | 114.103 | 36.666 | -0 | 1 | -1 | 1 | 1 | 2 | DROPPER |
| E3 | 3488.361 | 5418.747 | 2.466 | 114.120 | 47.030 | 3488.361 | 5418.747 | 2.468 | 114.120 | 47.030 | 0 | 0 | 2 | 1 | -0 | 3 | DROPPER |
| F1 | 3488.840 | 5437.796 | 1.056 | 123.764 | 30.596 | 3488.840 | 5437.797 | 1.052 | 123.765 | 30.595 | 1 | -1 | -4 | 1 | 1 | 1 | DROPPER |
| F2 | 3492.019 | 5432.772 | 1.662 | 124.113 | 36.531 | 3492.019 | 5432.772 | 1.661 | 124.113 | 36.531 | 0 | 0 | -1 | 1 | 1 | 2 | DROPPER |
| F3 | 3496.981 | 5423.846 | 2.492 | 124.131 | 46.744 | 3496.981 | 5423.846 | 2.491 | 124.131 | 46.744 | 0 | -0 | -2 | 1 | -0 | 0 | DROPPER |
| G1 | 3497.682 | 5443.746 | 1.070 | 134.382 | 29.672 | 3497.682 | 5443.745 | 1.070 | 134.382 | 29.673 | 0 | 1 | -0 | 1 | 1 | 1 | DROPPER |
| G2 | 3500.689 | 5437.819 | 1.624 | 134.142 | 36.315 | 3500.690 | 5437.819 | 1.623 | 134.143 | 36.315 | 1 | -0 | -1 | 1 | 1 | 2 | DROPPER |
| G3 | 3506.408 | 5428.601 | 2.579 | 134.682 | 47.149 | 3506.409 | 5428.602 | 2.580 | 134.683 | 47.148 | 1 | -1 | 1 | 2 | -1 | 1 | DROPPER |
| H1 | 3504.878 | 5450.787 | 1.024 | 144.088 | 26.997 | 3504.879 | 5450.787 | 1.026 | 144.089 | 26.998 | 1 | 0 | 2 | 0 | 1 | 2 | DROPPER |
| H2 | 3509.389 | 5442.710 | 1.690 | 144.122 | 36.248 | 3509.389 | 5442.708 | 1.690 | 144.122 | 36.250 | 0 | 2 | -0 | -0 | 1 | 2 | DROPPER |
| H3 | 3515.296 | 5433.593 | 2.588 | 144.876 | 47.086 | 3515.295 | 5433.591 | 2.590 | 144.874 | 47.086 | -2 | 0 | 2 | -2 | 1 | 2 | DROPPER |
| J1 | 3515.227 | 5452.854 | 1.136 | 154.143 | 30.200 | 3515.227 | 5452.855 | 1.136 | 154.143 | 30.200 | -0 | -0 | -0 | -1 | -0 | 2 | DROPPER |
| J2 | 3518.001 | 5447.804 | 1.577 | 154.125 | 35.962 | 3518.001 | 5447.802 | 1.577 | 154.124 | 35.964 | -1 | 2 | -0 | 0 | 1 | 2 | DROPPER |
| J3 | 3524.634 | 5438.883 | 2.580 | 155.608 | 46.979 | 3524.634 | 5438.882 | 2.581 | 155.607 | 46.980 | -1 | 1 | 1 | -1 | 1 | 2 | DROPPER |
| K1 | 3524.792 | 5456.028 | 1.428 | 164.049 | 32.055 | 3524.791 | 5456.027 | 1.426 | 164.048 | 32.056 | -1 | 1 | -2 | -0 | 0 | 1 | DROPPER |
| K2 | 3526.909 | 5452.487 | 1.767 | 164.186 | 36.179 | 3526.911 | 5452.485 | 1.765 | 164.187 | 36.182 | 1 | 2 | -2 | 1 | 1 | 1 | DROPPER |
| K3 | 3532.515 | 5443.180 | 2.605 | 164.584 | 47.037 | 3532.512 | 5443.179 | 2.606 | 164.580 | 47.036 | -4 | -1 | 1 | -1 | 0 | 2 | DROPPER |
| L1 | 3534.358 | 5466.862 | 1.051 | 177.665 | 27.210 | 3534.357 | 5466.861 | 1.050 | 177.664 | 27.210 | -1 | -0 | -1 | 1 | -1 | 2 | DROPPER |
| M1 | 3540.589 | 5472.468 | 1.106 | 185.832 | 25.322 | 3540.589 | 5472.468 | 1.104 | 185.832 | 25.322 | -0 | 0 | -3 | 1 | -2 | 2 | DROPPER |
| M2 | 3542.454 | 5468.314 | 1.324 | 185.452 | 29.860 | 3542.455 | 5468.313 | 1.322 | 185.452 | 29.861 | 0 | 1 | -2 | 2 | -1 | 2 | DROPPER |
| M3 | 3550.067 | 5452.828 | 2.624 | 184.613 | 47.096 | 3550.068 | 5452.828 | 2.628 | 184.613 | 47.096 | -0 | 0 | 4 | 1 | 0 | 2 | DROPPER |
| N1 | 3555.953 | 5487.047 | 1.257 | 206.334 | 20.007 | 3555.953 | 5487.048 | 1.254 | 206.335 | 20.007 | 0 | -0 | -3 | 1 | -0 | 1 | DROPPER |
| N2 | 3558.923 | 5482.788 | 1.438 | 206.869 | 25.172 | 3558.923 | 5482.787 | 1.437 | 206.869 | 25.173 | 0 | 0 | -1 | 0 | 0 | 2 | DROPPER |
| N3 | 3567.640 | 5462.354 | 2.315 | 204.600 | 47.271 | 3567.640 | 5462.356 | 2.318 | 204.602 | 47.270 | 2 | -1 | 3 | -1 | -1 | 3 | DROPPER |
| P1 | 3575.235 | 5490.935 | 1.051 | 225.087 | 25.944 | 3575.232 | 5490.934 | 1.050 | 225.083 | 25.943 | -4 | -1 | -1 | -3 | -0 | 2 | DROPPER |
| P2 | 3578.827 | 5483.557 | 1.759 | 224.656 | 34.138 | 3578.825 | 5483.558 | 1.765 | 224.655 | 34.136 | -1 | -2 | 6 | -1 | -1 | 3 | DROPPER |
| P3 | 3585.083 | 5472.121 | 2.586 | 224.591 | 47.173 | 3585.081 | 5472.122 | 2.589 | 224.590 | 47.172 | -1 | -1 | 2 | -1 | -1 | 1 | DROPPER |
| Q1 | 3593.448 | 5500.182 | 1.116 | 245.500 | 26.673 | 3593.447 | 5500.181 | 1.116 | 245.499 | 26.674 | -1 | 1 | 0 | -1 | 1 | 2 | DROPPER |
| Q2 | 3596.718 | 5493.412 | 1.754 | 245.082 | 34.180 | 3596.719 | 5493.409 | 1.760 | 245.082 | 34.183 | -0 | 3 | 6 | 0 | 4 | 2 | DROPPER |
| Q3 | 3602.552 | 5481.773 | 2.454 | 244.550 | 47.189 | 3602.549 | 5481.773 | 2.457 | 244.547 | 47.187 | -3 | -2 | 3 | -2 | -2 | 2 | DROPPER |
| R1 | 3610.337 | 5509.611 | 1.325 | 264.843 | 26.603 | 3610.337 | 5509.611 | 1.325 | 264.842 | 26.603 | -1 | 0 | -0 | 0 | 1 | 1 | DROPPER |
| R2 | 3613.887 | 5502.837 | 1.954 | 264.668 | 34.249 | 3613.886 | 5502.837 | 1.956 | 264.667 | 34.249 | -1 | -0 | 2 | -1 | 1 | 1 | DROPPER |

| | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **R3** | 3620.082 | 5491.510 | 2.364 | 264.603 | 47.160 | 3620.082 | 5491.510 | 2.369 | 264.603 | 47.159 | -0 | -1 | 5 | -0 | -0 | 2 | DROPPER |
| **S1** | 3626.946 | 5515.369 | 1.514 | 282.162 | 29.609 | 3626.944 | 5515.371 | 1.511 | 282.162 | 29.606 | -0 | -3 | -3 | -0 | 2 | 1 | DROPPER |
| **S2** | 3629.599 | 5511.492 | 1.861 | 282.606 | 34.286 | 3629.597 | 5511.494 | 1.864 | 282.605 | 34.283 | -1 | -3 | 3 | -2 | 0 | 3 | DROPPER |
| **S3** | 3635.344 | 5500.128 | 2.196 | 282.129 | 47.010 | 3635.343 | 5500.131 | 2.199 | 282.130 | 47.007 | 1 | -3 | 3 | -1 | 0 | 2 | DROPPER |
| | | | | | | | | | | **Max** | **3** | **3** | **6** | **2** | **4** | **3** | |
| | | | | | | | | | | **Min** | **-4** | **-3** | **-4** | **-3** | **-2** | **0** | |
| | | | | | | | | | | **Average** | **-0** | **-0** | **1** | **-0** | **0** | **2** | |

**Notes:**

Max, Min & Average values are for monitoring droppers only
Coordinates are calculated from least squares adjustment.
Chainage & offset is relative to line approximately parrellel to river bank
Origin of Chainage & Offset Alignment: E 3 365.74 , N 5 404.627
End of Chainage & Offset Alignment: E 3 628.213, N 5 549.913
Cross movement is positive away from the river bank in a south easterly direction
Upstream movement is positive in an upstream (North westerly) direction
Movement shown is relative to first survey 2 February 2012
Design co-ordinate accuracy is +,- 3mm
Design elevation accuracy is +,- 2mm

**3/04/2012** **Point F2 - Vehicle tracks indicate possible disturbancce**
**6/09/2012** **Difficult observation conditions- strong wind and rain**

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# Murray River Estate - Tailem Bend

RIVER BANK MOVEMENT MONITORING

04-October-2012

| | |
|---|---|
| Date of survey | 4-Oct-12 |
| Equipment | Set 59 |
| Surveyed by: | NRG |

**References:**
Murray View Estate
A&S: A078911.0004

| | First Survey 2 February 2012 | | | | | Current Survey | | | | | Current Survey Comparisons: difference from first survey | | | Current Survey Comparisons: difference from last survey | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Point | Easting | Northing | Elevation | Chainage | Offset | Easting | Northing | Elevation | Chainage | Offset | Upstream (mm) | Cross (mm) | Up (mm) | Upstream (mm) | Cross (mm) | Up (mm) | Point Description |
| A1 | 3419.966 | 5397.788 | 1.028 | 44.130 | 32.245 | 3419.965 | 5397.787 | 1.027 | 44.130 | 32.245 | 0 | 0 | -1 | 0 | 1 | -1 | DROPPER |
| A2 | 3423.809 | 5393.843 | 1.222 | 45.583 | 37.557 | 3423.809 | 5393.843 | 1.222 | 45.583 | 37.557 | 0 | 0 | 0 | -0 | 0 | -1 | DROPPER |
| A3 | 3430.291 | 5386.757 | 1.678 | 47.822 | 46.896 | 3430.292 | 5386.758 | 1.678 | 47.824 | 46.896 | 2 | 0 | 0 | 0 | 0 | -1 | DROPPER |
| B1 | 3436.911 | 5408.174 | 1.003 | 63.985 | 31.364 | 3436.911 | 5408.174 | 1.001 | 63.986 | 31.364 | 1 | 0 | -2 | 0 | 1 | -1 | DROPPER |
| B2 | 3439.908 | 5402.809 | 1.270 | 64.010 | 37.509 | 3439.908 | 5402.809 | 1.270 | 64.009 | 37.509 | -1 | 0 | 0 | -1 | 1 | -0 | DROPPER |
| B3 | 3443.642 | 5394.044 | 1.845 | 63.032 | 46.987 | 3443.644 | 5394.044 | 1.845 | 63.033 | 46.988 | 1 | 1 | 0 | -1 | 1 | -0 | DROPPER |
| C1 | 3454.535 | 5417.408 | 1.199 | 83.877 | 31.820 | 3454.537 | 5417.409 | 1.199 | 83.879 | 31.820 | 2 | 0 | 0 | 0 | 0 | -0 | DROPPER |
| C2 | 3457.290 | 5412.807 | 1.489 | 84.059 | 37.180 | 3457.293 | 5412.806 | 1.490 | 84.061 | 37.182 | 2 | 2 | 1 | -1 | 1 | -0 | DROPPER |
| C3 | 3462.266 | 5404.294 | 2.339 | 84.290 | 47.037 | 3462.269 | 5404.295 | 2.340 | 84.293 | 47.039 | 3 | 2 | 1 | 0 | 1 | -0 | DROPPER |
| D1 | 3470.691 | 5430.835 | 1.051 | 104.515 | 27.897 | 3470.693 | 5430.835 | 1.051 | 104.516 | 27.898 | 1 | 1 | 0 | -0 | 2 | -1 | DROPPER |
| D2 | 3474.532 | 5422.866 | 1.620 | 104.016 | 36.729 | 3474.533 | 5422.866 | 1.621 | 104.017 | 36.730 | 1 | 1 | 1 | -0 | 2 | -0 | DROPPER |
| D3 | 3479.599 | 5413.862 | 2.441 | 104.089 | 47.061 | 3479.599 | 5413.863 | 2.443 | 104.089 | 47.060 | 0 | -1 | 2 | 0 | 2 | -1 | DROPPER |
| E1 | 3480.296 | 5432.819 | 1.046 | 113.879 | 30.812 | 3480.297 | 5432.818 | 1.045 | 113.880 | 30.814 | 1 | 2 | -1 | -0 | 2 | -2 | DROPPER |
| E2 | 3483.326 | 5427.807 | 1.642 | 114.103 | 36.665 | 3483.326 | 5427.805 | 1.640 | 114.102 | 36.666 | -1 | 1 | -2 | -1 | 0 | -1 | DROPPER |
| E3 | 3488.361 | 5418.747 | 2.466 | 114.120 | 47.030 | 3488.361 | 5418.746 | 2.467 | 114.120 | 47.031 | 0 | 1 | 1 | 0 | 1 | -1 | DROPPER |
| F1 | 3488.840 | 5437.796 | 1.056 | 123.764 | 30.596 | 3488.839 | 5437.795 | 1.051 | 123.763 | 30.596 | -1 | 0 | -5 | -1 | 1 | -1 | DROPPER |
| F2 | 3492.019 | 5432.772 | 1.662 | 124.113 | 36.531 | 3492.019 | 5432.771 | 1.660 | 124.112 | 36.531 | -1 | 0 | -2 | -1 | -0 | -1 | DROPPER |
| F3 | 3496.981 | 5423.846 | 2.492 | 124.131 | 46.744 | 3496.981 | 5423.844 | 2.492 | 124.131 | 46.745 | 0 | 1 | 0 | -0 | 1 | 2 | DROPPER |
| G1 | 3497.682 | 5443.746 | 1.070 | 134.382 | 29.672 | 3497.682 | 5443.745 | 1.069 | 134.382 | 29.673 | 0 | 1 | -1 | 0 | 0 | -1 | DROPPER |
| G2 | 3500.689 | 5437.819 | 1.624 | 134.142 | 36.315 | 3500.689 | 5437.818 | 1.623 | 134.142 | 36.315 | 0 | 0 | -1 | -1 | 0 | -0 | DROPPER |
| G3 | 3506.408 | 5428.601 | 2.579 | 134.682 | 47.149 | 3506.408 | 5428.601 | 2.580 | 134.682 | 47.149 | 0 | 0 | 1 | -1 | 1 | -0 | DROPPER |
| H1 | 3504.878 | 5450.787 | 1.024 | 144.088 | 26.997 | 3504.878 | 5450.786 | 1.024 | 144.088 | 26.998 | 0 | 1 | 0 | -1 | 1 | -2 | DROPPER |
| H2 | 3509.389 | 5442.710 | 1.690 | 144.122 | 36.248 | 3509.389 | 5442.708 | 1.689 | 144.122 | 36.250 | 0 | 2 | -1 | -0 | 0 | -1 | DROPPER |
| H3 | 3515.296 | 5433.593 | 2.588 | 144.876 | 47.086 | 3515.295 | 5433.591 | 2.589 | 144.874 | 47.087 | -2 | 1 | 1 | -0 | 1 | -1 | DROPPER |
| J1 | 3515.227 | 5452.854 | 1.136 | 154.143 | 30.200 | 3515.227 | 5452.854 | 1.135 | 154.143 | 30.200 | 0 | 0 | -1 | 0 | 0 | -1 | DROPPER |
| J2 | 3518.001 | 5447.804 | 1.577 | 154.125 | 35.962 | 3518.000 | 5447.803 | 1.576 | 154.123 | 35.963 | -2 | 1 | -1 | -1 | -1 | -1 | DROPPER |
| J3 | 3524.634 | 5438.883 | 2.580 | 155.608 | 46.979 | 3524.634 | 5438.882 | 2.581 | 155.607 | 46.980 | -1 | 1 | 1 | 0 | 0 | -0 | DROPPER |
| K1 | 3524.792 | 5456.028 | 1.428 | 164.049 | 32.055 | 3524.791 | 5456.028 | 1.425 | 164.048 | 32.055 | -1 | 0 | -3 | 0 | -1 | -0 | DROPPER |
| K2 | 3526.909 | 5452.487 | 1.767 | 164.186 | 36.179 | 3526.910 | 5452.487 | 1.766 | 164.187 | 36.179 | 1 | 0 | -1 | -0 | -2 | 1 | DROPPER |
| K3 | 3532.515 | 5443.180 | 2.605 | 164.584 | 47.037 | 3532.512 | 5443.179 | 2.605 | 164.581 | 47.036 | -3 | -1 | 0 | 1 | -0 | -1 | DROPPER |
| L1 | 3534.358 | 5466.862 | 1.051 | 177.665 | 27.210 | 3534.356 | 5466.862 | 1.049 | 177.663 | 27.208 | -2 | -2 | -2 | -0 | -2 | -1 | DROPPER |
| M1 | 3540.589 | 5472.468 | 1.106 | 185.832 | 25.322 | 3540.589 | 5472.468 | 1.102 | 185.832 | 25.322 | 0 | 0 | -4 | 0 | -0 | -1 | DROPPER |
| M2 | 3542.454 | 5468.314 | 1.324 | 185.452 | 29.860 | 3542.455 | 5468.312 | 1.322 | 185.452 | 29.862 | 0 | 2 | -2 | -0 | 1 | -0 | DROPPER |
| M3 | 3550.067 | 5452.828 | 2.624 | 184.613 | 47.096 | 3550.067 | 5452.827 | 2.628 | 184.612 | 47.096 | -1 | 0 | 4 | -1 | -0 | -0 | DROPPER |
| N1 | 3555.953 | 5487.047 | 1.257 | 206.334 | 20.007 | 3555.952 | 5487.049 | 1.253 | 206.334 | 20.005 | 0 | -2 | -4 | -0 | -2 | -1 | DROPPER |
| N2 | 3558.923 | 5482.788 | 1.438 | 206.869 | 25.172 | 3558.922 | 5482.786 | 1.436 | 206.868 | 25.173 | -1 | 1 | -2 | -1 | 0 | -1 | DROPPER |
| N3 | 3567.640 | 5462.354 | 2.315 | 204.600 | 47.271 | 3567.640 | 5462.355 | 2.317 | 204.601 | 47.270 | 1 | -1 | 2 | -1 | 0 | -1 | DROPPER |
| P1 | 3575.235 | 5490.935 | 1.051 | 225.087 | 25.944 | 3575.232 | 5490.937 | 1.048 | 225.085 | 25.941 | -2 | -3 | -3 | 2 | -2 | -2 | DROPPER |
| P2 | 3578.827 | 5483.557 | 1.759 | 224.656 | 34.138 | 3578.825 | 5483.558 | 1.763 | 224.655 | 34.137 | -1 | -1 | 4 | -0 | 1 | -2 | DROPPER |
| P3 | 3585.083 | 5472.121 | 2.586 | 224.591 | 47.173 | 3585.081 | 5472.121 | 2.588 | 224.590 | 47.172 | -1 | -1 | 2 | -0 | -0 | -0 | DROPPER |
| Q1 | 3593.448 | 5500.182 | 1.116 | 245.500 | 26.673 | 3593.448 | 5500.182 | 1.114 | 245.500 | 26.674 | 0 | 1 | -2 | 1 | 0 | -2 | DROPPER |
| Q2 | 3596.718 | 5493.412 | 1.754 | 245.082 | 34.180 | 3596.718 | 5493.412 | 1.759 | 245.082 | 34.181 | 0 | 1 | 5 | 0 | -2 | -1 | DROPPER |
| Q3 | 3602.552 | 5481.773 | 2.454 | 244.550 | 47.189 | 3602.549 | 5481.773 | 2.457 | 244.548 | 47.187 | -2 | -2 | 3 | 1 | -0 | -0 | DROPPER |
| R1 | 3610.337 | 5509.611 | 1.325 | 264.843 | 26.603 | 3610.337 | 5509.611 | 1.324 | 264.842 | 26.603 | -1 | 0 | -1 | -0 | -0 | -1 | DROPPER |
| R2 | 3613.887 | 5502.837 | 1.954 | 264.668 | 34.249 | 3613.887 | 5502.837 | 1.955 | 264.668 | 34.249 | 0 | 0 | 1 | 1 | 0 | -1 | DROPPER |

| | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **R3** | 3620.082 | 5491.510 | 2.364 | 264.603 | 47.160 | 3620.084 | 5491.510 | 2.368 | 264.604 | 47.160 | 1 | 0 | 4 | 1 | 1 | -1 | DROPPER |
| **S1** | 3626.946 | 5515.369 | 1.514 | 282.162 | 29.609 | 3626.944 | 5515.370 | 1.510 | 282.161 | 29.607 | -1 | -2 | -4 | -0 | 1 | -1 | DROPPER |
| **S2** | 3629.599 | 5511.492 | 1.861 | 282.606 | 34.286 | 3629.599 | 5511.492 | 1.861 | 282.606 | 34.286 | 0 | 0 | 0 | 1 | 3 | -3 | DROPPER |
| **S3** | 3635.344 | 5500.128 | 2.196 | 282.129 | 47.010 | 3635.345 | 5500.131 | 2.197 | 282.131 | 47.009 | 2 | -1 | 1 | 1 | 2 | -2 | DROPPER |
| | | | | | | | | | | **Max** | **3** | **2** | **5** | **2** | **3** | **2** | |
| | | | | | | | | | | **Min** | **-3** | **-3** | **-5** | **-1** | **-2** | **-3** | |
| | | | | | | | | | | **Average** | **-0** | **0** | **-0** | **-0** | **0** | **-1** | |

**Notes:**

Max, Min & Average values are for monitoring droppers only
Coordinates are calculated from least squares adjustment.
Chainage & offset is relative to line approximately parrellel to river bank
Origin of Chainage & Offset Alignment: E 3 365.74 , N 5 404.627
End of Chainage & Offset Alignment: E 3 628.213, N 5 549.913
Cross movement is positive away from the river bank in a south easterly direction
Upstream movement is positive in an upstream (North westerly) direction
Movement shown is relative to first survey 2 February 2012
Design co-ordinate accuracy is +,- 3mm
Design elevation accuracy is +,- 2mm

**3/04/2012** **Point F2 - Vehicle tracks indicate possible disturbancce**
**6/09/2012** **Difficult observation conditions- strong wind and rain**

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# Murray River Estate - Tailem Bend

## RIVER BANK MOVEMENT MONITORING

01-November-2012

| | |
|---|---|
| Date of survey | 1-Nov-12 |
| Equipment | Set 59 |
| Surveyed by: | AJW |

**References:**
Murray View Estate
A&S: A078911.0004

| | First Survey 2 February 2012 | | | | | Current Survey | | | | | Current Survey Comparisons: difference from first survey | | | Current Survey Comparisons: difference from last survey | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Point | Easting | Northing | Elevation | Chainage | Offset | Easting | Northing | Elevation | Chainage | Offset | Upstream (mm) | Cross (mm) | Up (mm) | Upstream (mm) | Cross (mm) | Up (mm) | Point Description |
| A1 | 3419.966 | 5397.788 | 1.028 | 44.130 | 32.245 | 3419.964 | 5397.790 | 1.028 | 44.130 | 32.242 | 0 | -3 | -0 | 0 | -3 | 1 | DROPPER |
| A2 | 3423.809 | 5393.843 | 1.222 | 45.583 | 37.557 | 3423.808 | 5393.846 | 1.223 | 45.583 | 37.555 | 0 | -2 | 0 | 0 | -2 | 0 | DROPPER |
| A3 | 3430.291 | 5386.757 | 1.678 | 47.822 | 46.896 | 3430.291 | 5386.759 | 1.678 | 47.823 | 46.894 | 1 | -2 | 0 | -1 | -2 | 0 | DROPPER |
| B1 | 3436.911 | 5408.174 | 1.003 | 63.985 | 31.364 | 3436.909 | 5408.176 | 1.001 | 63.985 | 31.362 | 0 | -2 | -2 | -1 | -2 | 0 | DROPPER |
| B2 | 3439.908 | 5402.809 | 1.270 | 64.010 | 37.509 | 3439.906 | 5402.811 | 1.269 | 64.009 | 37.506 | -1 | -3 | -1 | 0 | -3 | -1 | DROPPER |
| B3 | 3443.642 | 5394.044 | 1.845 | 63.032 | 46.987 | 3443.642 | 5394.046 | 1.844 | 63.033 | 46.985 | 1 | -2 | -1 | 0 | -3 | -1 | DROPPER |
| C1 | 3454.535 | 5417.408 | 1.199 | 83.877 | 31.820 | 3454.535 | 5417.410 | 1.198 | 83.879 | 31.818 | 2 | -2 | -1 | 0 | -2 | -1 | DROPPER |
| C2 | 3457.290 | 5412.807 | 1.489 | 84.059 | 37.180 | 3457.292 | 5412.808 | 1.489 | 84.061 | 37.180 | 2 | 0 | 0 | 0 | -2 | -1 | DROPPER |
| C3 | 3462.266 | 5404.294 | 2.339 | 84.290 | 47.037 | 3462.267 | 5404.296 | 2.339 | 84.292 | 47.037 | 2 | 0 | -0 | -1 | -2 | -1 | DROPPER |
| D1 | 3470.691 | 5430.835 | 1.051 | 104.515 | 27.897 | 3470.691 | 5430.836 | 1.051 | 104.515 | 27.896 | 0 | -1 | 0 | -1 | -2 | 0 | DROPPER |
| D2 | 3474.532 | 5422.866 | 1.620 | 104.016 | 36.729 | 3474.532 | 5422.868 | 1.620 | 104.017 | 36.728 | 1 | -1 | -0 | 0 | -2 | -1 | DROPPER |
| D3 | 3479.599 | 5413.862 | 2.441 | 104.089 | 47.061 | 3479.597 | 5413.865 | 2.442 | 104.088 | 47.057 | -1 | -4 | 1 | -1 | -3 | -1 | DROPPER |
| E1 | 3480.296 | 5432.819 | 1.046 | 113.879 | 30.812 | 3480.296 | 5432.821 | 1.045 | 113.879 | 30.811 | 0 | -1 | -1 | -1 | -3 | 0 | DROPPER |
| E2 | 3483.326 | 5427.807 | 1.642 | 114.103 | 36.665 | 3483.324 | 5427.807 | 1.639 | 114.101 | 36.664 | -2 | -1 | -3 | -1 | -2 | -1 | DROPPER |
| E3 | 3488.361 | 5418.747 | 2.466 | 114.120 | 47.030 | 3488.360 | 5418.748 | 2.466 | 114.120 | 47.029 | 0 | -1 | 0 | 0 | -2 | -1 | DROPPER |
| F1 | 3488.840 | 5437.796 | 1.056 | 123.764 | 30.596 | 3488.838 | 5437.798 | 1.051 | 123.764 | 30.593 | 0 | -3 | -5 | 1 | -3 | -0 | DROPPER |
| F2 | 3492.019 | 5432.772 | 1.662 | 124.113 | 36.531 | 3492.018 | 5432.772 | 1.659 | 124.112 | 36.530 | -1 | -1 | -3 | 0 | -1 | -1 | DROPPER |
| F3 | 3496.981 | 5423.846 | 2.492 | 124.131 | 46.744 | 3496.980 | 5423.847 | 2.491 | 124.131 | 46.742 | 0 | -2 | -1 | 0 | -3 | -1 | DROPPER |
| G1 | 3497.682 | 5443.746 | 1.070 | 134.382 | 29.672 | 3497.681 | 5443.747 | 1.069 | 134.382 | 29.671 | 0 | -1 | -1 | 0 | -2 | -0 | DROPPER |
| G2 | 3500.689 | 5437.819 | 1.624 | 134.142 | 36.315 | 3500.689 | 5437.816 | 1.622 | 134.141 | 36.317 | -1 | 2 | -2 | -1 | 2 | -1 | DROPPER |
| G3 | 3506.408 | 5428.601 | 2.579 | 134.682 | 47.149 | 3506.407 | 5428.602 | 2.578 | 134.682 | 47.147 | 0 | -2 | -1 | 0 | -2 | -2 | DROPPER |
| H1 | 3504.878 | 5450.787 | 1.024 | 144.088 | 26.997 | 3504.877 | 5450.788 | 1.025 | 144.087 | 26.996 | -1 | -1 | 0 | -1 | -2 | 0 | DROPPER |
| H2 | 3509.389 | 5442.710 | 1.690 | 144.122 | 36.248 | 3509.388 | 5442.709 | 1.688 | 144.122 | 36.249 | 0 | 1 | -2 | 0 | -1 | -1 | DROPPER |
| H3 | 3515.296 | 5433.593 | 2.588 | 144.876 | 47.086 | 3515.294 | 5433.592 | 2.589 | 144.873 | 47.086 | -3 | 0 | 0 | -1 | -1 | -1 | DROPPER |
| J1 | 3515.227 | 5452.854 | 1.136 | 154.143 | 30.200 | 3515.227 | 5452.855 | 1.134 | 154.143 | 30.199 | 0 | -1 | -2 | 0 | -1 | -1 | DROPPER |
| J2 | 3518.001 | 5447.804 | 1.577 | 154.125 | 35.962 | 3518.000 | 5447.803 | 1.575 | 154.123 | 35.962 | -2 | 0 | -2 | 0 | -1 | -2 | DROPPER |
| J3 | 3524.634 | 5438.883 | 2.580 | 155.608 | 46.979 | 3524.633 | 5438.883 | 2.580 | 155.606 | 46.979 | -2 | 0 | 0 | -1 | -1 | -1 | DROPPER |
| K1 | 3524.792 | 5456.028 | 1.428 | 164.049 | 32.055 | 3524.791 | 5456.029 | 1.424 | 164.048 | 32.054 | -1 | -1 | -4 | 0 | -1 | -1 | DROPPER |
| K2 | 3526.909 | 5452.487 | 1.767 | 164.186 | 36.179 | 3526.910 | 5452.487 | 1.765 | 164.187 | 36.179 | 1 | 0 | -2 | 0 | 0 | -2 | DROPPER |
| K3 | 3532.515 | 5443.180 | 2.605 | 164.584 | 47.037 | 3532.512 | 5443.179 | 2.604 | 164.580 | 47.035 | -4 | -2 | -1 | -1 | -1 | -1 | DROPPER |
| L1 | 3534.358 | 5466.862 | 1.051 | 177.665 | 27.210 | 3534.355 | 5466.861 | 1.049 | 177.662 | 27.209 | -3 | -1 | -2 | -1 | 1 | -0 | DROPPER |
| M1 | 3540.589 | 5472.468 | 1.106 | 185.832 | 25.322 | 3540.591 | 5472.469 | 1.102 | 185.833 | 25.322 | 1 | 0 | -4 | 1 | 0 | -0 | DROPPER |
| M2 | 3542.454 | 5468.314 | 1.324 | 185.452 | 29.860 | 3542.456 | 5468.314 | 1.322 | 185.453 | 29.861 | 1 | 1 | -2 | 1 | -1 | -0 | DROPPER |
| M3 | 3550.067 | 5452.828 | 2.624 | 184.613 | 47.096 | 3550.067 | 5452.829 | 2.626 | 184.613 | 47.095 | 0 | -1 | 2 | 1 | -1 | -2 | DROPPER |
| N1 | 3555.953 | 5487.047 | 1.257 | 206.334 | 20.007 | 3555.955 | 5487.050 | 1.253 | 206.337 | 20.006 | 3 | -1 | -4 | 3 | 1 | -0 | DROPPER |
| N2 | 3558.923 | 5482.788 | 1.438 | 206.869 | 25.172 | 3558.924 | 5482.787 | 1.435 | 206.870 | 25.173 | 1 | 1 | -3 | 2 | 0 | -1 | DROPPER |
| N3 | 3567.640 | 5462.354 | 2.315 | 204.600 | 47.271 | 3567.642 | 5462.356 | 2.316 | 204.603 | 47.270 | 3 | -1 | 1 | 2 | 0 | -2 | DROPPER |
| P1 | 3575.235 | 5490.935 | 1.051 | 225.087 | 25.944 | 3575.235 | 5490.937 | 1.048 | 225.088 | 25.942 | 1 | -2 | -3 | 3 | 1 | 0 | DROPPER |
| P2 | 3578.827 | 5483.557 | 1.759 | 224.656 | 34.138 | 3578.828 | 5483.558 | 1.762 | 224.658 | 34.138 | 2 | 0 | 3 | 3 | 1 | -1 | DROPPER |
| P3 | 3585.083 | 5472.121 | 2.586 | 224.591 | 47.173 | 3585.083 | 5472.122 | 2.587 | 224.592 | 47.172 | 1 | -1 | 1 | 2 | 0 | -1 | DROPPER |
| Q1 | 3593.448 | 5500.182 | 1.116 | 245.500 | 26.673 | 3593.449 | 5500.182 | 1.114 | 245.500 | 26.674 | 0 | 1 | -2 | 0 | 0 | -0 | DROPPER |
| Q2 | 3596.718 | 5493.412 | 1.754 | 245.082 | 34.180 | 3596.719 | 5493.412 | 1.757 | 245.083 | 34.181 | 1 | 1 | 3 | 1 | 0 | -2 | DROPPER |
| Q3 | 3602.552 | 5481.773 | 2.454 | 244.550 | 47.189 | 3602.550 | 5481.773 | 2.455 | 244.548 | 47.188 | -2 | -1 | 0 | 0 | 1 | -2 | DROPPER |
| R1 | 3610.337 | 5509.611 | 1.325 | 264.843 | 26.603 | 3610.338 | 5509.611 | 1.324 | 264.843 | 26.604 | 0 | 1 | -1 | 1 | 1 | -0 | DROPPER |
| R2 | 3613.887 | 5502.837 | 1.954 | 264.668 | 34.249 | 3613.888 | 5502.836 | 1.954 | 264.668 | 34.250 | 0 | 1 | 0 | 0 | 1 | -1 | DROPPER |

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| | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **R3** | 3620.082 | 5491.510 | 2.364 | 264.603 | 47.160 | 3620.084 | 5491.510 | 2.367 | 264.604 | 47.161 | 1 | 1 | 3 | 0 | 1 | -1 | DROPPER |
| **S1** | 3626.946 | 5515.369 | 1.514 | 282.162 | 29.609 | 3626.945 | 5515.370 | 1.509 | 282.162 | 29.608 | 0 | -1 | -5 | 1 | 1 | -1 | DROPPER |
| **S2** | 3629.599 | 5511.492 | 1.861 | 282.606 | 34.286 | 3629.599 | 5511.493 | 1.861 | 282.606 | 34.285 | 0 | -1 | 0 | 0 | -1 | 0 | DROPPER |
| **S3** | 3635.344 | 5500.128 | 2.196 | 282.129 | 47.010 | 3635.346 | 5500.130 | 2.197 | 282.131 | 47.009 | 2 | -1 | 1 | 0 | 0 | -0 | DROPPER |
| | | | | | | | | | | **Max** | **3** | **2** | **3** | **3** | **2** | **0** | |
| | | | | | | | | | | **Min** | **-4** | **-4** | **-5** | **-1** | **-3** | **-2** | |
| | | | | | | | | | | **Average** | **0** | **-1** | **-1** | **0** | **-0** | **-1** | |

**Notes:**

Max, Min & Average values are for monitoring droppers only
Coordinates are calculated from least squares adjustment.
Chainage & offset is relative to line approximately parrellel to river bank
Origin of Chainage & Offset Alignment: E 3 365.74 , N 5 404.627
End of Chainage & Offset Alignment: E 3 628.213, N 5 549.913
Cross movement is positive away from the river bank in a south easterly direction
Upstream movement is positive in an upstream (North westerly) direction
Movement shown is relative to first survey 2 February 2012
Design co-ordinate accuracy is +,- 3mm
Design elevation accuracy is +,- 2mm

**3/04/2012** **Point F2 - Vehicle tracks indicate possible disturbancce**
**6/09/2012** **Difficult observation conditions- strong wind and rain**

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# Murray River Estate - Tailem Bend

## RIVER BANK MOVEMENT MONITORING

30-November-2012

| | |
|---|---|
| Date of survey | 30-Nov-12 |
| Equipment | Set 59 |
| Surveyed by: | AJW |

**References:**
Murray View Estate
A&S: A078911.0004

| | First Survey 2 February 2012 | | | | | Current Survey | | | | | Current Survey Comparisons | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | | difference from first survey | | | difference from last survey | | | |
| Point | Easting | Northing | Elevation | Chainage | Offset | Easting | Northing | Elevation | Chainage | Offset | Upstream (mm) | Cross (mm) | Up (mm) | Upstream (mm) | Cross (mm) | Up (mm) | Point Description |
| A1 | 3419.966 | 5397.788 | 1.028 | 44.130 | 32.245 | 3419.966 | 5397.790 | 1.027 | 44.132 | 32.243 | 2 | -2 | -1 | 2 | 1 | -0 | DROPPER |
| A2 | 3423.809 | 5393.843 | 1.222 | 45.583 | 37.557 | 3423.810 | 5393.846 | 1.222 | 45.585 | 37.556 | 2 | -2 | 0 | 2 | 1 | -0 | DROPPER |
| A3 | 3430.291 | 5386.757 | 1.678 | 47.822 | 46.896 | 3430.293 | 5386.760 | 1.678 | 47.825 | 46.895 | 3 | -1 | -0 | 2 | 1 | -1 | DROPPER |
| B1 | 3436.911 | 5408.174 | 1.003 | 63.985 | 31.364 | 3436.911 | 5408.177 | 1.001 | 63.987 | 31.362 | 2 | -3 | -2 | 2 | -0 | -1 | DROPPER |
| B2 | 3439.908 | 5402.809 | 1.270 | 64.010 | 37.509 | 3439.908 | 5402.811 | 1.269 | 64.011 | 37.508 | 1 | -1 | -1 | 2 | 2 | -0 | DROPPER |
| B3 | 3443.642 | 5394.044 | 1.845 | 63.032 | 46.987 | 3443.645 | 5394.046 | 1.844 | 63.035 | 46.986 | 3 | -1 | -1 | 2 | 1 | 0 | DROPPER |
| C1 | 3454.535 | 5417.408 | 1.199 | 83.877 | 31.820 | 3454.537 | 5417.411 | 1.198 | 83.880 | 31.819 | 3 | -2 | -1 | 1 | 0 | -0 | DROPPER |
| C2 | 3457.290 | 5412.807 | 1.489 | 84.059 | 37.180 | 3457.293 | 5412.809 | 1.489 | 84.062 | 37.180 | 3 | -1 | -0 | 1 | -1 | -0 | DROPPER |
| C3 | 3462.266 | 5404.294 | 2.339 | 84.290 | 47.037 | 3462.268 | 5404.295 | 2.338 | 84.292 | 47.038 | 2 | 1 | -1 | 0 | 1 | -0 | DROPPER |
| D1 | 3470.691 | 5430.835 | 1.051 | 104.515 | 27.897 | 3470.693 | 5430.838 | 1.051 | 104.518 | 27.896 | 2 | -1 | -0 | 2 | -0 | -0 | DROPPER |
| D2 | 3474.532 | 5422.866 | 1.620 | 104.016 | 36.729 | 3474.533 | 5422.870 | 1.619 | 104.019 | 36.727 | 3 | -2 | -1 | 2 | -1 | -1 | DROPPER |
| D3 | 3479.599 | 5413.862 | 2.441 | 104.089 | 47.061 | 3479.598 | 5413.865 | 2.441 | 104.089 | 47.057 | 0 | -4 | 0 | 1 | 0 | -0 | DROPPER |
| E1 | 3480.296 | 5432.819 | 1.046 | 113.879 | 30.812 | 3480.297 | 5432.822 | 1.045 | 113.881 | 30.811 | 2 | -1 | -1 | 2 | -0 | 0 | DROPPER |
| E2 | 3483.326 | 5427.807 | 1.642 | 114.103 | 36.665 | 3483.326 | 5427.808 | 1.639 | 114.103 | 36.664 | -0 | -1 | -3 | 2 | -0 | -0 | DROPPER |
| E3 | 3488.361 | 5418.747 | 2.466 | 114.120 | 47.030 | 3488.361 | 5418.750 | 2.466 | 114.121 | 47.028 | 1 | -2 | -1 | 1 | -1 | -1 | DROPPER |
| F1 | 3488.840 | 5437.796 | 1.056 | 123.764 | 30.596 | 3488.839 | 5437.799 | 1.051 | 123.765 | 30.593 | 1 | -3 | -5 | 1 | -0 | -0 | DROPPER |
| F2 | 3492.019 | 5432.772 | 1.662 | 124.113 | 36.531 | 3492.019 | 5432.775 | 1.659 | 124.114 | 36.528 | 1 | -3 | -3 | 2 | -2 | -0 | DROPPER |
| F3 | 3496.981 | 5423.846 | 2.492 | 124.131 | 46.744 | 3496.981 | 5423.848 | 2.491 | 124.132 | 46.742 | 1 | -2 | -1 | 1 | -0 | 0 | DROPPER |
| G1 | 3497.682 | 5443.746 | 1.070 | 134.382 | 29.672 | 3497.682 | 5443.747 | 1.069 | 134.383 | 29.672 | 1 | -0 | -1 | 1 | 1 | -0 | DROPPER |
| G2 | 3500.689 | 5437.819 | 1.624 | 134.142 | 36.315 | 3500.690 | 5437.821 | 1.622 | 134.144 | 36.313 | 2 | -2 | -2 | 3 | -4 | -0 | DROPPER |
| G3 | 3506.408 | 5428.601 | 2.579 | 134.682 | 47.149 | 3506.409 | 5428.604 | 2.578 | 134.684 | 47.147 | 2 | -2 | -1 | 2 | -0 | 0 | DROPPER |
| H1 | 3504.878 | 5450.787 | 1.024 | 144.088 | 26.997 | 3504.879 | 5450.787 | 1.024 | 144.089 | 26.997 | 1 | 0 | 0 | 2 | 1 | -0 | DROPPER |
| H2 | 3509.389 | 5442.710 | 1.690 | 144.122 | 36.248 | 3509.389 | 5442.710 | 1.688 | 144.123 | 36.248 | 1 | -0 | -2 | 1 | -1 | -0 | DROPPER |
| H3 | 3515.296 | 5433.593 | 2.588 | 144.876 | 47.086 | 3515.296 | 5433.594 | 2.588 | 144.876 | 47.085 | -0 | -1 | 0 | 3 | -1 | -0 | DROPPER |
| J1 | 3515.227 | 5452.854 | 1.136 | 154.143 | 30.200 | 3515.228 | 5452.856 | 1.135 | 154.145 | 30.199 | 1 | -1 | -1 | 1 | -0 | 0 | DROPPER |
| J2 | 3518.001 | 5447.804 | 1.577 | 154.125 | 35.962 | 3518.001 | 5447.804 | 1.573 | 154.125 | 35.962 | 0 | 0 | -4 | 2 | 0 | -1 | DROPPER |
| J3 | 3524.634 | 5438.883 | 2.580 | 155.608 | 46.979 | 3524.634 | 5438.884 | 2.580 | 155.608 | 46.978 | 0 | -1 | 0 | 2 | -1 | -0 | DROPPER |
| K1 | 3524.792 | 5456.028 | 1.428 | 164.049 | 32.055 | 3524.792 | 5456.030 | 1.424 | 164.050 | 32.054 | 1 | -1 | -4 | 2 | 0 | -0 | DROPPER |
| K2 | 3526.909 | 5452.487 | 1.767 | 164.186 | 36.179 | 3526.909 | 5452.487 | 1.765 | 164.186 | 36.178 | 0 | -1 | -2 | -1 | -1 | 1 | DROPPER |
| K3 | 3532.515 | 5443.180 | 2.605 | 164.584 | 47.037 | 3532.513 | 5443.180 | 2.605 | 164.582 | 47.036 | -2 | -2 | -1 | 2 | 1 | 0 | DROPPER |
| L1 | 3534.358 | 5466.862 | 1.051 | 177.665 | 27.210 | 3534.357 | 5466.863 | 1.049 | 177.664 | 27.208 | -1 | -2 | -2 | 2 | -1 | 0 | DROPPER |
| M1 | 3540.589 | 5472.468 | 1.106 | 185.832 | 25.322 | 3540.592 | 5472.471 | 1.102 | 185.835 | 25.321 | 3 | -1 | -4 | 2 | -1 | 0 | DROPPER |
| M2 | 3542.454 | 5468.314 | 1.324 | 185.452 | 29.860 | 3542.457 | 5468.314 | 1.322 | 185.454 | 29.861 | 2 | 1 | -2 | 1 | 0 | 1 | DROPPER |
| M3 | 3550.067 | 5452.828 | 2.624 | 184.613 | 47.096 | 3550.068 | 5452.828 | 2.625 | 184.613 | 47.096 | 0 | -0 | 1 | 0 | 1 | -0 | DROPPER |
| N1 | 3555.953 | 5487.047 | 1.257 | 206.334 | 20.007 | 3555.955 | 5487.050 | 1.254 | 206.337 | 20.006 | 3 | -2 | -3 | 0 | -0 | 1 | DROPPER |
| N2 | 3558.923 | 5482.788 | 1.438 | 206.869 | 25.172 | 3558.926 | 5482.790 | 1.439 | 206.873 | 25.172 | 4 | -0 | 1 | 3 | -1 | 4 | DROPPER |
| N3 | 3567.640 | 5462.354 | 2.315 | 204.600 | 47.271 | 3567.641 | 5462.356 | 2.316 | 204.602 | 47.270 | 2 | -1 | 1 | -1 | 0 | 0 | DROPPER |
| P1 | 3575.235 | 5490.935 | 1.051 | 225.087 | 25.944 | 3575.235 | 5490.939 | 1.050 | 225.089 | 25.941 | 2 | -3 | -1 | 1 | -1 | 1 | DROPPER |
| P2 | 3578.827 | 5483.557 | 1.759 | 224.656 | 34.138 | 3578.828 | 5483.559 | 1.762 | 224.658 | 34.137 | 2 | -1 | 3 | 0 | -1 | -0 | DROPPER |
| P3 | 3585.083 | 5472.121 | 2.586 | 224.591 | 47.173 | 3585.083 | 5472.123 | 2.588 | 224.592 | 47.172 | 1 | -1 | 2 | 0 | 0 | 1 | DROPPER |
| Q1 | 3593.448 | 5500.182 | 1.116 | 245.500 | 26.673 | 3593.449 | 5500.184 | 1.116 | 245.502 | 26.673 | 2 | -0 | -1 | 2 | -2 | 2 | DROPPER |
| Q2 | 3596.718 | 5493.412 | 1.754 | 245.082 | 34.180 | 3596.719 | 5493.413 | 1.757 | 245.084 | 34.180 | 1 | -0 | 2 | 0 | -1 | -1 | DROPPER |
| Q3 | 3602.552 | 5481.773 | 2.454 | 244.550 | 47.189 | 3602.551 | 5481.774 | 2.455 | 244.549 | 47.187 | -1 | -2 | 1 | 1 | -1 | 0 | DROPPER |
| R1 | 3610.337 | 5509.611 | 1.325 | 264.843 | 26.603 | 3610.339 | 5509.612 | 1.325 | 264.845 | 26.603 | 1 | -0 | 0 | 1 | -1 | 2 | DROPPER |
| R2 | 3613.887 | 5502.837 | 1.954 | 264.668 | 34.249 | 3613.889 | 5502.838 | 1.956 | 264.670 | 34.249 | 2 | -0 | 2 | 2 | -1 | 1 | DROPPER |

| | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **R3** | 3620.082 | 5491.510 | 2.364 | 264.603 | 47.160 | 3620.085 | 5491.511 | 2.368 | 264.605 | 47.160 | 2 | -0 | 4 | 1 | -1 | 1 | DROPPER |
| **S1** | 3626.946 | 5515.369 | 1.514 | 282.162 | 29.609 | 3626.946 | 5515.371 | 1.511 | 282.163 | 29.607 | 1 | -2 | -3 | 1 | -1 | 2 | DROPPER |
| **S2** | 3629.599 | 5511.492 | 1.861 | 282.606 | 34.286 | 3629.600 | 5511.494 | 1.863 | 282.608 | 34.284 | 2 | -2 | 2 | 2 | -1 | 2 | DROPPER |
| **S3** | 3635.344 | 5500.128 | 2.196 | 282.129 | 47.010 | 3635.346 | 5500.131 | 2.198 | 282.132 | 47.009 | 3 | -1 | 2 | 1 | -0 | 2 | DROPPER |
| | | | | | | | | | | **Max** | **4** | **1** | **4** | **3** | **1** | **4** | |
| | | | | | | | | | | **Min** | **-2** | **-4** | **-5** | **-1** | **-4** | **-1** | |
| | | | | | | | | | | **Average** | **1** | **-1** | **-1** | **1** | **-1** | **1** | |

**Notes:**

Max, Min & Average values are for monitoring droppers only
Coordinates are calculated from least squares adjustment.
Chainage & offset is relative to line approximately parrellel to river bank
Origin of Chainage & Offset Alignment: E 3 365.74 , N 5 404.627
End of Chainage & Offset Alignment: E 3 628.213, N 5 549.913
Cross movement is positive away from the river bank in a south easterly direction
Upstream movement is positive in an upstream (North westerly) direction
Movement shown is relative to first survey 2 February 2012
Design co-ordinate accuracy is +,- 3mm
Design elevation accuracy is +,- 2mm

**3/04/2012** **Point F2 - Vehicle tracks indicate possible disturbancce**
**6/09/2012** **Difficult observation conditions- strong wind and rain**

Alexander Symonds11 King William Street KENT TOWN SA 5067 Ph 8130 1666 awilkinson@alexander.com.au

# Murray River Estate - Tailem Bend

## RIVER BANK MOVEMENT MONITORING

04-January-2013

| | |
|---|---|
| Date of survey | 4-Jan-13 |
| Equipment | Set 89 |
| Surveyed by: | AJW |

**References:**
Murray View Estate
A&S: A078911.0004

| | First Survey 2 February 2012 | | | | | Current Survey | | | | | Current Survey Comparisons: difference from first survey | | | Current Survey Comparisons: difference from last survey | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Point | Easting | Northing | Elevation | Chainage | Offset | Easting | Northing | Elevation | Chainage | Offset | Upstream (mm) | Cross (mm) | Up (mm) | Upstream (mm) | Cross (mm) | Up (mm) | Point Description |
| A1 | 3419.966 | 5397.788 | 1.028 | 44.130 | 32.245 | 3419.966 | 5397.789 | 1.028 | 44.131 | 32.244 | 1 | -1 | -0 | -1 | 1 | 0 | DROPPER |
| A2 | 3423.809 | 5393.843 | 1.222 | 45.583 | 37.557 | 3423.810 | 5393.845 | 1.222 | 45.584 | 37.556 | 1 | -1 | 0 | -1 | 0 | -0 | DROPPER |
| A3 | 3430.291 | 5386.757 | 1.678 | 47.822 | 46.896 | 3430.293 | 5386.759 | 1.677 | 47.824 | 46.895 | 2 | -1 | -1 | -1 | 0 | -1 | DROPPER |
| B1 | 3436.911 | 5408.174 | 1.003 | 63.985 | 31.364 | 3436.910 | 5408.174 | 1.000 | 63.985 | 31.363 | 0 | -1 | -3 | -2 | 2 | -0 | DROPPER |
| B2 | 3439.908 | 5402.809 | 1.270 | 64.010 | 37.509 | 3439.908 | 5402.810 | 1.269 | 64.010 | 37.508 | -0 | -1 | -1 | -1 | 1 | -0 | DROPPER |
| B3 | 3443.642 | 5394.044 | 1.845 | 63.032 | 46.987 | 3443.644 | 5394.045 | 1.842 | 63.034 | 46.986 | 2 | -1 | -3 | -1 | -0 | -2 | DROPPER |
| C1 | 3454.535 | 5417.408 | 1.199 | 83.877 | 31.820 | 3454.537 | 5417.410 | 1.198 | 83.879 | 31.819 | 2 | -1 | -1 | -1 | 1 | 0 | DROPPER |
| C2 | 3457.290 | 5412.807 | 1.489 | 84.059 | 37.180 | 3457.292 | 5412.810 | 1.489 | 84.062 | 37.178 | 3 | -2 | -1 | -0 | -1 | -0 | DROPPER |
| C3 | 3462.266 | 5404.294 | 2.339 | 84.290 | 47.037 | 3462.269 | 5404.295 | 2.338 | 84.293 | 47.038 | 3 | 1 | -1 | 0 | -0 | -1 | DROPPER |
| D1 | 3470.691 | 5430.835 | 1.051 | 104.515 | 27.897 | 3470.693 | 5430.838 | 1.051 | 104.517 | 27.895 | 2 | -2 | -0 | -1 | -0 | -0 | DROPPER |
| D2 | 3474.532 | 5422.866 | 1.620 | 104.016 | 36.729 | 3474.534 | 5422.871 | 1.617 | 104.019 | 36.725 | 3 | -4 | -4 | 1 | -2 | -2 | DROPPER |
| D3 | 3479.599 | 5413.862 | 2.441 | 104.089 | 47.061 | 3479.598 | 5413.865 | 2.441 | 104.089 | 47.057 | 0 | -4 | -0 | -0 | -0 | -0 | DROPPER |
| E1 | 3480.296 | 5432.819 | 1.046 | 113.879 | 30.812 | 3480.297 | 5432.822 | 1.045 | 113.881 | 30.810 | 2 | -2 | -1 | 0 | -1 | -0 | DROPPER |
| E2 | 3483.326 | 5427.807 | 1.642 | 114.103 | 36.665 | 3483.325 | 5427.809 | 1.636 | 114.102 | 36.663 | -1 | -2 | -6 | -1 | -1 | -3 | DROPPER |
| E3 | 3488.361 | 5418.747 | 2.466 | 114.120 | 47.030 | 3488.361 | 5418.749 | 2.466 | 114.121 | 47.028 | 1 | -2 | -0 | -1 | 1 | 0 | DROPPER |
| F1 | 3488.840 | 5437.796 | 1.056 | 123.764 | 30.596 | 3488.838 | 5437.800 | 1.051 | 123.764 | 30.591 | 0 | -5 | -5 | -1 | -1 | 0 | DROPPER |
| F2 | 3492.019 | 5432.772 | 1.662 | 124.113 | 36.531 | 3492.020 | 5432.774 | 1.657 | 124.114 | 36.530 | 1 | -1 | -5 | -1 | 2 | -2 | DROPPER |
| F3 | 3496.981 | 5423.846 | 2.492 | 124.131 | 46.744 | 3496.981 | 5423.847 | 2.491 | 124.132 | 46.743 | 1 | -1 | -1 | -1 | 1 | -0 | DROPPER |
| G1 | 3497.682 | 5443.746 | 1.070 | 134.382 | 29.672 | 3497.682 | 5443.748 | 1.068 | 134.383 | 29.670 | 0 | -2 | -2 | -0 | -1 | -1 | DROPPER |
| G2 | 3500.689 | 5437.819 | 1.624 | 134.142 | 36.315 | 3500.691 | 5437.820 | 1.621 | 134.144 | 36.314 | 2 | -1 | -3 | -0 | 1 | -1 | DROPPER |
| G3 | 3506.408 | 5428.601 | 2.579 | 134.682 | 47.149 | 3506.410 | 5428.603 | 2.578 | 134.684 | 47.147 | 2 | -2 | -1 | -0 | 1 | -0 | DROPPER |
| H1 | 3504.878 | 5450.787 | 1.024 | 144.088 | 26.997 | 3504.879 | 5450.787 | 1.024 | 144.088 | 26.997 | -0 | -0 | -0 | -1 | -0 | -1 | DROPPER |
| H2 | 3509.389 | 5442.710 | 1.690 | 144.122 | 36.248 | 3509.390 | 5442.710 | 1.687 | 144.123 | 36.249 | 1 | 1 | -3 | -0 | 1 | -1 | DROPPER |
| H3 | 3515.296 | 5433.593 | 2.588 | 144.876 | 47.086 | 3515.296 | 5433.593 | 2.588 | 144.875 | 47.085 | -1 | -1 | -0 | -0 | 0 | -1 | DROPPER |
| J1 | 3515.227 | 5452.854 | 1.136 | 154.143 | 30.200 | 3515.230 | 5452.856 | 1.134 | 154.146 | 30.200 | 3 | -0 | -2 | 2 | 1 | -1 | DROPPER |
| J2 | 3518.001 | 5447.804 | 1.577 | 154.125 | 35.962 | 3518.002 | 5447.805 | 1.572 | 154.125 | 35.962 | 0 | -0 | -5 | 0 | -0 | -1 | DROPPER |
| J3 | 3524.634 | 5438.883 | 2.580 | 155.608 | 46.979 | 3524.634 | 5438.884 | 2.580 | 155.607 | 46.978 | -1 | -1 | 0 | -1 | -0 | -0 | DROPPER |
| K1 | 3524.792 | 5456.028 | 1.428 | 164.049 | 32.055 | 3524.793 | 5456.029 | 1.424 | 164.050 | 32.055 | 1 | 0 | -4 | 0 | 1 | -0 | DROPPER |
| K2 | 3526.909 | 5452.487 | 1.767 | 164.186 | 36.179 | 3526.911 | 5452.486 | 1.765 | 164.187 | 36.181 | 1 | 2 | -2 | 1 | 2 | 0 | DROPPER |
| K3 | 3532.515 | 5443.180 | 2.605 | 164.584 | 47.037 | 3532.515 | 5443.180 | 2.604 | 164.583 | 47.036 | -1 | -1 | -1 | 1 | 1 | -1 | DROPPER |
| L1 | 3534.358 | 5466.862 | 1.051 | 177.665 | 27.210 | 3534.357 | 5466.863 | 1.048 | 177.664 | 27.208 | -1 | -2 | -3 | 0 | 0 | -1 | DROPPER |
| M1 | 3540.589 | 5472.468 | 1.106 | 185.832 | 25.322 | 3540.592 | 5472.473 | 1.101 | 185.836 | 25.319 | 4 | -3 | -5 | 1 | -2 | -1 | DROPPER |
| M2 | 3542.454 | 5468.314 | 1.324 | 185.452 | 29.860 | 3542.455 | 5468.315 | 1.320 | 185.452 | 29.859 | 0 | -1 | -4 | -2 | -3 | -2 | DROPPER |
| M3 | 3550.067 | 5452.828 | 2.624 | 184.613 | 47.096 | 3550.068 | 5452.829 | 2.624 | 184.614 | 47.095 | 1 | -1 | 0 | 0 | -0 | -1 | DROPPER |
| N1 | 3555.953 | 5487.047 | 1.257 | 206.334 | 20.007 | 3555.953 | 5487.052 | 1.251 | 206.336 | 20.003 | 2 | -4 | -6 | -1 | -3 | -3 | DROPPER |
| N2 | 3558.923 | 5482.788 | 1.438 | 206.869 | 25.172 | 3558.923 | 5482.789 | 1.434 | 206.870 | 25.171 | 1 | -1 | -4 | -3 | -1 | -5 | DROPPER |
| N3 | 3567.640 | 5462.354 | 2.315 | 204.600 | 47.271 | 3567.643 | 5462.355 | 2.314 | 204.603 | 47.272 | 3 | 1 | -1 | 1 | 1 | -2 | DROPPER |
| P1 | 3575.235 | 5490.935 | 1.051 | 225.087 | 25.944 | 3575.234 | 5490.939 | 1.047 | 225.087 | 25.940 | 0 | -4 | -4 | -2 | -1 | -3 | DROPPER |
| P2 | 3578.827 | 5483.557 | 1.759 | 224.656 | 34.138 | 3578.827 | 5483.559 | 1.759 | 224.657 | 34.136 | 1 | -2 | -0 | -2 | -1 | -3 | DROPPER |
| P3 | 3585.083 | 5472.121 | 2.586 | 224.591 | 47.173 | 3585.082 | 5472.122 | 2.586 | 224.591 | 47.172 | 0 | -1 | -0 | -1 | -0 | -2 | DROPPER |
| Q1 | 3593.448 | 5500.182 | 1.116 | 245.500 | 26.673 | 3593.449 | 5500.182 | 1.113 | 245.500 | 26.674 | -0 | 1 | -3 | -2 | 1 | -2 | DROPPER |
| Q2 | 3596.718 | 5493.412 | 1.754 | 245.082 | 34.180 | 3596.718 | 5493.413 | 1.752 | 245.082 | 34.179 | 0 | -1 | -2 | -1 | -0 | -4 | DROPPER |
| Q3 | 3602.552 | 5481.773 | 2.454 | 244.550 | 47.189 | 3602.550 | 5481.773 | 2.452 | 244.548 | 47.188 | -2 | -1 | -2 | -1 | 1 | -3 | DROPPER |
| R1 | 3610.337 | 5509.611 | 1.325 | 264.843 | 26.603 | 3610.339 | 5509.611 | 1.324 | 264.843 | 26.604 | 0 | 1 | -2 | -1 | 1 | -2 | DROPPER |
| R2 | 3613.887 | 5502.837 | 1.954 | 264.668 | 34.249 | 3613.888 | 5502.836 | 1.953 | 264.668 | 34.251 | 0 | 2 | -1 | -2 | 2 | -3 | DROPPER |

| | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **R3** | 3620.082 | 5491.510 | 2.364 | 264.603 | 47.160 | 3620.084 | 5491.509 | 2.365 | 264.603 | 47.161 | -0 | 1 | 1 | -2 | 2 | -3 | DROPPER |
| **S1** | 3626.946 | 5515.369 | 1.514 | 282.162 | 29.609 | 3626.947 | 5515.369 | 1.508 | 282.162 | 29.609 | 0 | 0 | -6 | -1 | 2 | -3 | DROPPER |
| **S2** | 3629.599 | 5511.492 | 1.861 | 282.606 | 34.286 | 3629.600 | 5511.492 | 1.860 | 282.606 | 34.287 | 0 | 1 | -1 | -2 | 2 | -3 | DROPPER |
| **S3** | 3635.344 | 5500.128 | 2.196 | 282.129 | 47.010 | 3635.346 | 5500.130 | 2.196 | 282.131 | 47.010 | 2 | 0 | -0 | -1 | 1 | -2 | DROPPER |
| | | | | | | | | | | **Max** | **4** | **2** | **1** | **2** | **2** | **0** | |
| | | | | | | | | | | **Min** | **-2** | **-5** | **-6** | **-3** | **-3** | **-5** | |
| | | | | | | | | | | **Average** | **1** | **-1** | **-2** | **-1** | **0** | **-2** | |

**Notes:**

Max, Min & Average values are for monitoring droppers only
Coordinates are calculated from least squares adjustment.
Chainage & offset is relative to line approximately parrellel to river bank
Origin of Chainage & Offset Alignment: E 3 365.74 , N 5 404.627
End of Chainage & Offset Alignment: E 3 628.213, N 5 549.913
Cross movement is positive away from the river bank in a south easterly direction
Upstream movement is positive in an upstream (North westerly) direction
Movement shown is relative to first survey 2 February 2012
Design co-ordinate accuracy is +,- 3mm
Design elevation accuracy is +,- 2mm

**3/04/2012** **Point F2 - Vehicle tracks indicate possible disturbancce**
**6/09/2012** **Difficult observation conditions- strong wind and rain**

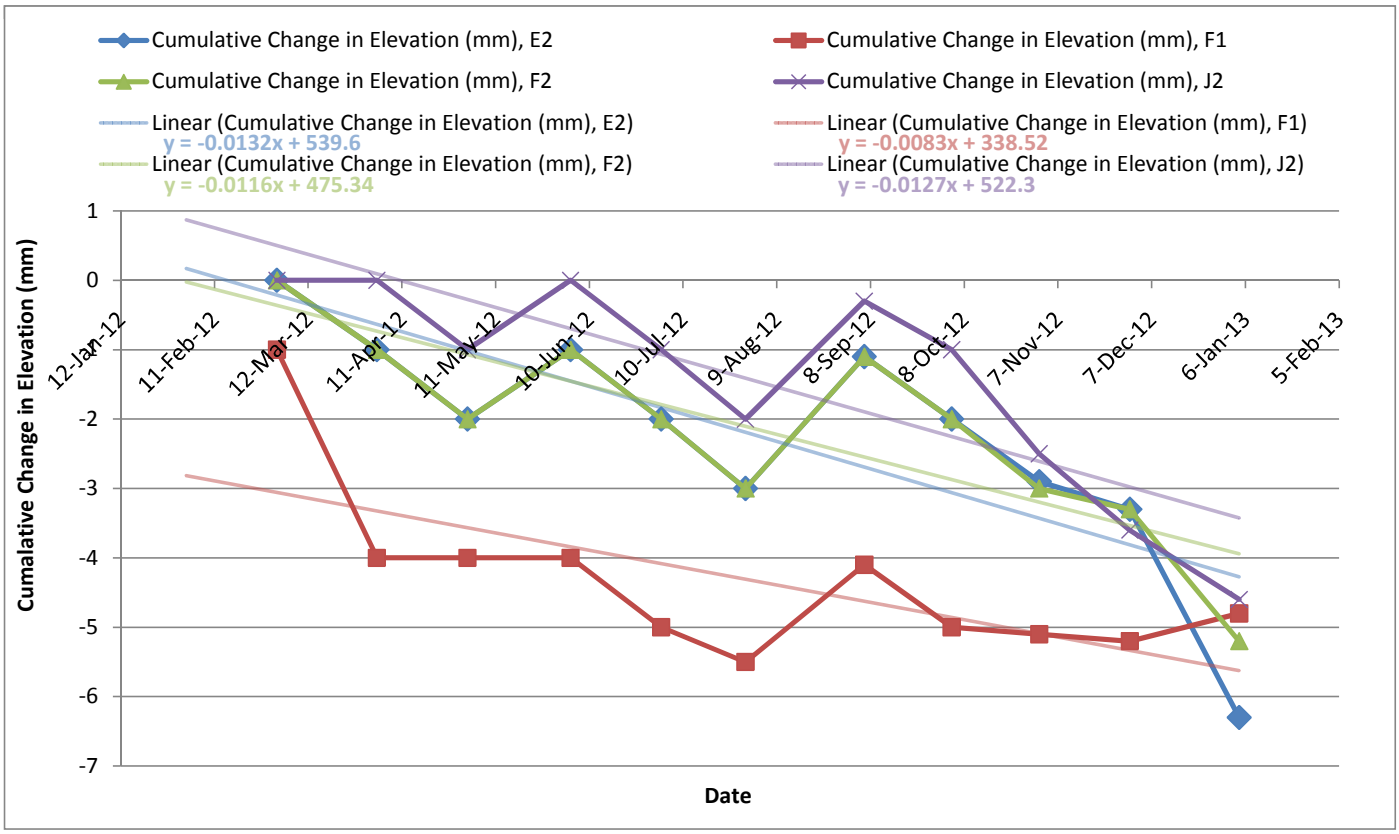
# Appendix B Analysis of Cumulative Vertical Movement

| E2 Date | Cumulative Change in Elevation (mm) | Change in Elevation (mm) |
|---|---|---|
| 2-Feb-12 | | 0 |
| 2-Mar-12 | 0 | 0 |
| 3-Apr-12 | -1 | -1 |
| 2-May-12 | -2 | -1 |
| 4-Jun-12 | -1 | 1 |
| 3-Jul-12 | -2 | -1 |
| 30-Jul-12 | -3 | -1 |
| 6-Sep-12 | -1 | 2 |
| 4-Oct-12 | -2 | -1 |
| 1-Nov-12 | -3 | -1 |
| 30-Nov-12 | -3 | 0 |
| 4-Jan-13 | -6 | -3 |

| F1 Date | Cumulative Change in Elevation (mm) | Change in Elevation (mm) |
|---|---|---|
| 2-Feb-12 | | 0 |
| 2-Mar-12 | -1 | -1 |
| 3-Apr-12 | -4 | -3 |
| 2-May-12 | -4 | 0 |
| 4-Jun-12 | -4 | 0 |
| 3-Jul-12 | -5 | -1 |
| 30-Jul-12 | -6 | 0 |
| 6-Sep-12 | -4 | 1 |
| 4-Oct-12 | -5 | -1 |
| 1-Nov-12 | -5 | 0 |
| 30-Nov-12 | -5 | 0 |
| 4-Jan-13 | -5 | 0 |

| F2 Date | Cumulative Change in Elevation (mm) | Change in Elevation (mm) |
|---|---|---|
| 2-Feb-12 | | 0 |
| 2-Mar-12 | 0 | 0 |
| 3-Apr-12 | -1 | -1 |
| 2-May-12 | -2 | -1 |
| 4-Jun-12 | -1 | 1 |
| 3-Jul-12 | -2 | -1 |
| 30-Jul-12 | -3 | -1 |
| 6-Sep-12 | -1 | 2 |
| 4-Oct-12 | -2 | -1 |
| 1-Nov-12 | -3 | -1 |
| 30-Nov-12 | -3 | 0 |
| 4-Jan-13 | -5 | -2 |

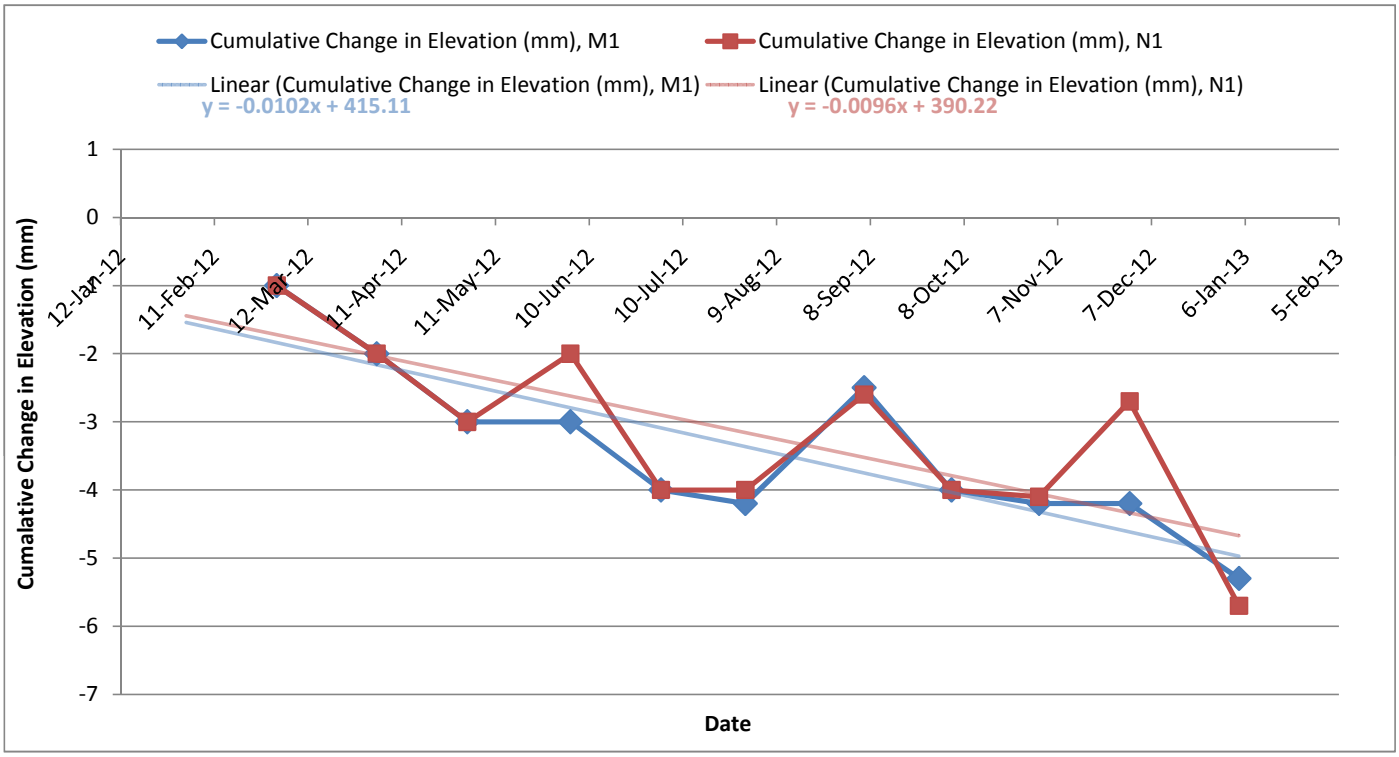
| J2 Date | Cumulative Change in Elevation (mm) | Change in Elevation (mm) |
|---|---|---|
| 2-Feb-12 | | 0 |
| 2-Mar-12 | 0 | 0 |
| 3-Apr-12 | 0 | 0 |
| 2-May-12 | -1 | -1 |
| 4-Jun-12 | 0 | 1 |
| 3-Jul-12 | -1 | -1 |
| 30-Jul-12 | -2 | -1 |
| 6-Sep-12 | 0 | 2 |
| 4-Oct-12 | -1 | -1 |
| 1-Nov-12 | -2 | -2 |
| 30-Nov-12 | -4 | -1 |
| 4-Jan-13 | -5 | -1 |




**SECTION 1 - ANALYSIS OF CUMULATIVE VERTICAL MOVEMENTS, WORST CASE**

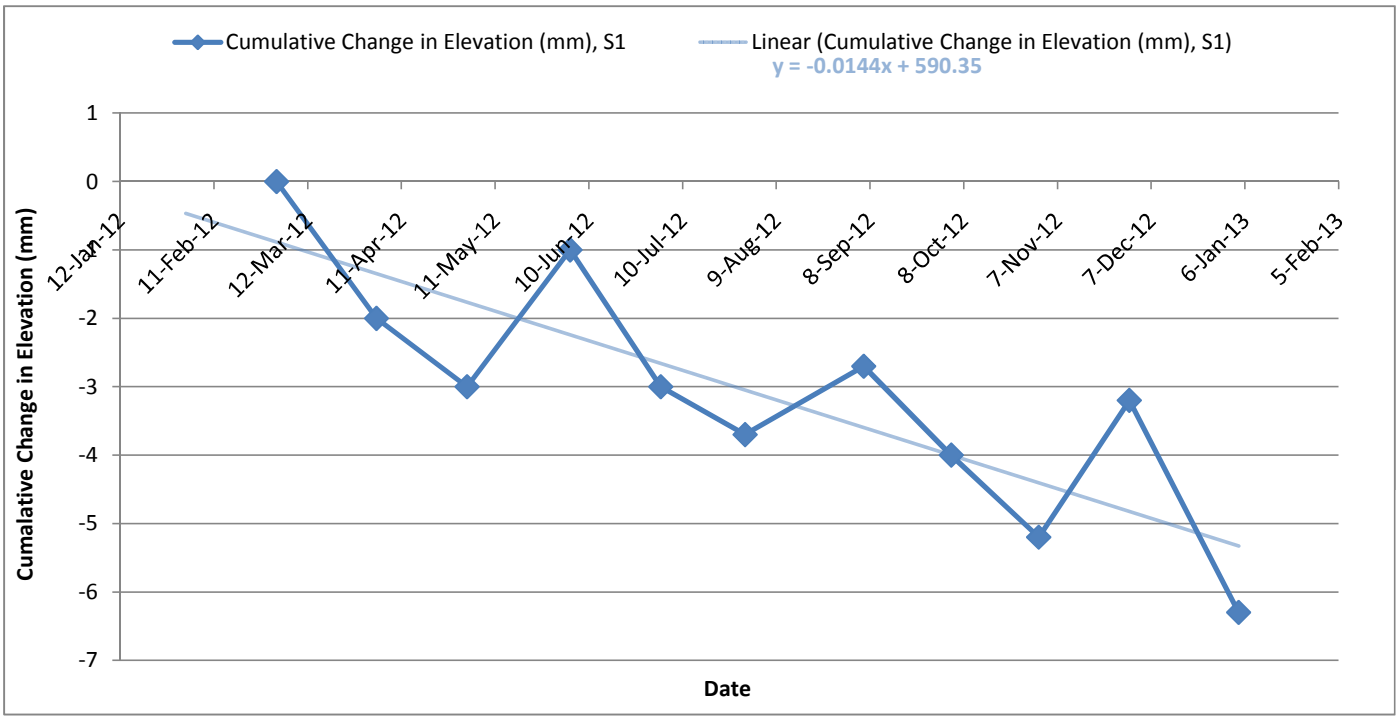
| M1 Date | Cumulative Change in Elevation (mm) | Change in Elevation (mm) |
|---|---|---|
| 2-Feb-12 | | 0 |
| 2-Mar-12 | -1 | -1 |
| 3-Apr-12 | -2 | -1 |
| 2-May-12 | -3 | -1 |
| 4-Jun-12 | -3 | 0 |
| 3-Jul-12 | -4 | -1 |
| 30-Jul-12 | -4 | 0 |
| 6-Sep-12 | -3 | 2 |
| 4-Oct-12 | -4 | -1 |
| 1-Nov-12 | -4 | 0 |
| 30-Nov-12 | -4 | 0 |
| 4-Jan-13 | -5 | -1 |

| N1 Date | Cumulative Change in Elevation (mm) | Change in Elevation (mm) |
|---|---|---|
| 2-Feb-12 | | 0 |
| 2-Mar-12 | -1 | -1 |
| 3-Apr-12 | -2 | -1 |
| 2-May-12 | -3 | -1 |
| 4-Jun-12 | -2 | 1 |
| 3-Jul-12 | -4 | -2 |
| 30-Jul-12 | -4 | 0 |
| 6-Sep-12 | -3 | 1 |
| 4-Oct-12 | -4 | -1 |
| 1-Nov-12 | -4 | 0 |
| 30-Nov-12 | -3 | 1 |
| 4-Jan-13 | -6 | -3 |




**SECTION 2 - ANALYSIS OF CUMULATIVE VERTICAL MOVEMENTS, WORST CASE**

| S1<br>Date | Cumulative Change in Elevation (mm) | Change in Elevation (mm) |
|---|---|---|
| 2-Feb-12 | | 0 |
| 2-Mar-12 | 0 | 0 |
| 3-Apr-12 | -2 | -2 |
| 2-May-12 | -3 | -1 |
| 4-Jun-12 | -1 | 2 |
| 3-Jul-12 | -3 | -2 |
| 30-Jul-12 | -4 | -1 |
| 6-Sep-12 | -3 | 1 |
| 4-Oct-12 | -4 | -1 |
| 1-Nov-12 | -5 | -1 |
| 30-Nov-12 | -3 | 2 |
| 4-Jan-13 | -6 | -3 |

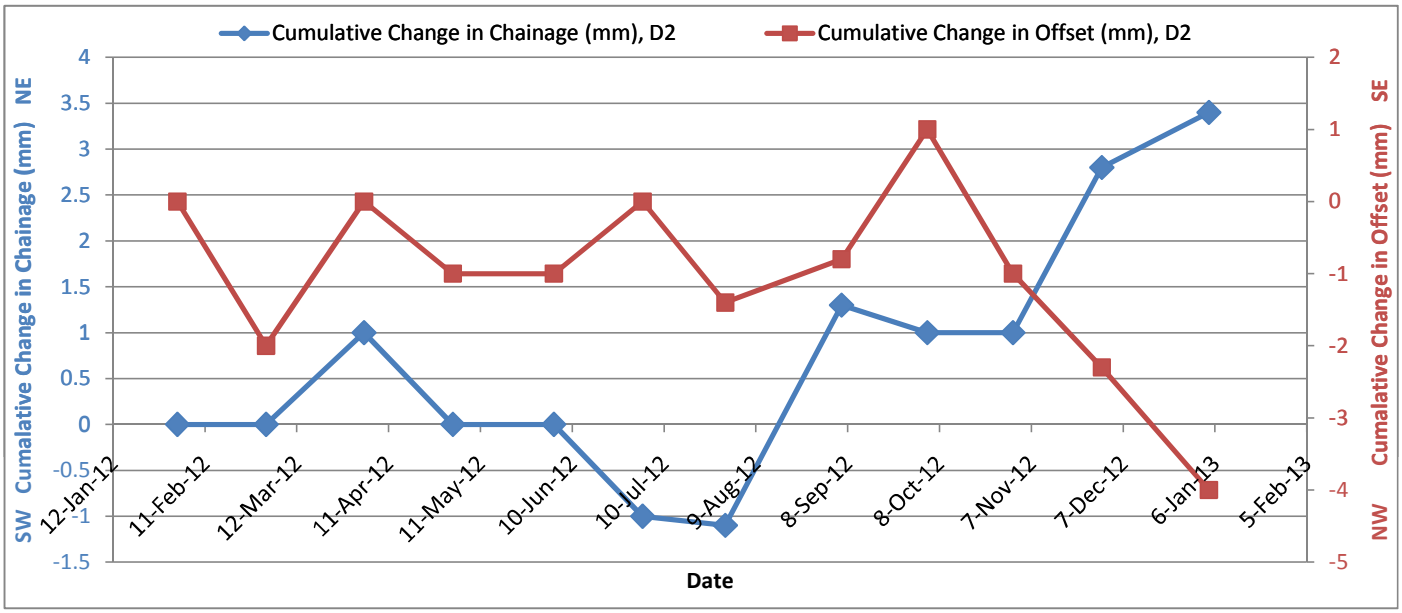



SECTION 3 - ANALYSIS OF CUMULATIVE VERTICAL MOVEMENTS, WORST CASE

# Appendix C Analysis of Cumulative Lateral Movement

| D2 Date | Cumulative Change in Chainage (mm) | Change in Chainage (mm) |
|---|---|---|
| 2-Feb-12 | 0 | 0 |
| 2-Mar-12 | 0 | 0 |
| 3-Apr-12 | 1 | 1 |
| 2-May-12 | 0 | -1 |
| 4-Jun-12 | 0 | 0 |
| 3-Jul-12 | -1 | -1 |
| 30-Jul-12 | -1 | 0 |
| 6-Sep-12 | 1 | 2 |
| 4-Oct-12 | 1 | 0 |
| 1-Nov-12 | 1 | 0 |
| 30-Nov-12 | 3 | 2 |
| 4-Jan-13 | 3 | 1 |

| D2 Date | Cumulative Change in Offset (mm) | Change in Offset (mm) |
|---|---|---|
| 2-Feb-12 | 0 | 0 |
| 2-Mar-12 | -2 | -2 |
| 3-Apr-12 | 0 | 2 |
| 2-May-12 | -1 | -1 |
| 4-Jun-12 | -1 | 0 |
| 3-Jul-12 | 0 | 1 |
| 30-Jul-12 | -1 | -1 |
| 6-Sep-12 | -1 | 1 |
| 4-Oct-12 | 1 | 2 |
| 1-Nov-12 | -1 | -2 |
| 30-Nov-12 | -2 | -1 |
| 4-Jan-13 | -4 | -2 |

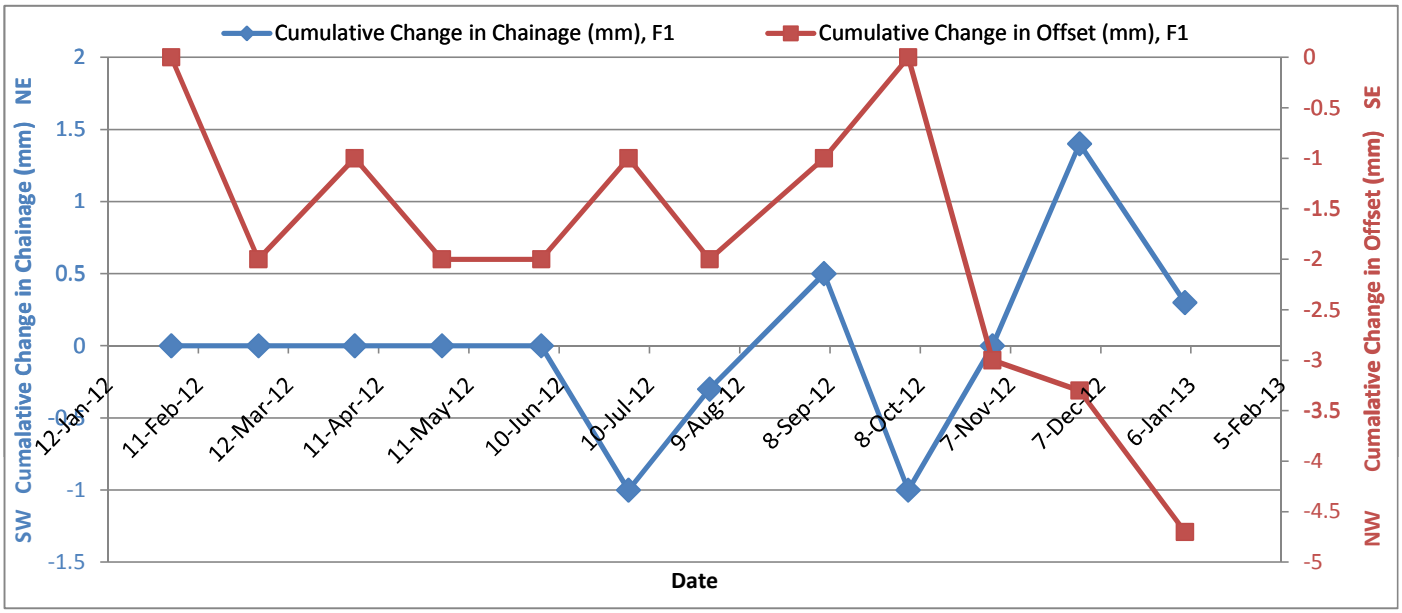



*NOTES*
*Chainage direction: N 45 E (parallel to riverbank)*
*Offset direction: N 45 W (perpendicular to riverbank)*

**SECTION 1 - ANALYSIS OF CUMULATIVE LATERAL MOVEMENTS, WORST CASE (D2)**

| F1 Date | Cumulative Change in Chainage (mm) | Change in Chainage (mm) |
|---|---|---|
| 2-Feb-12 | 0 | 0 |
| 2-Mar-12 | 0 | 0 |
| 3-Apr-12 | 0 | 0 |
| 2-May-12 | 0 | 0 |
| 4-Jun-12 | 0 | 0 |
| 3-Jul-12 | -1 | -1 |
| 30-Jul-12 | 0 | 1 |
| 6-Sep-12 | 1 | 1 |
| 4-Oct-12 | -1 | -1 |
| 1-Nov-12 | 0 | 1 |
| 30-Nov-12 | 1 | 1 |
| 4-Jan-13 | 0 | -1 |

| F1 Date | Cumulative Change in Offset (mm) | Change in Offset (mm) |
|---|---|---|
| 2-Feb-12 | 0 | 0 |
| 2-Mar-12 | -2 | -2 |
| 3-Apr-12 | -1 | 1 |
| 2-May-12 | -2 | -1 |
| 4-Jun-12 | -2 | 0 |
| 3-Jul-12 | -1 | 1 |
| 30-Jul-12 | -2 | -1 |
| 6-Sep-12 | -1 | 1 |
| 4-Oct-12 | 0 | 1 |
| 1-Nov-12 | -3 | -3 |
| 30-Nov-12 | -3 | 0 |
| 4-Jan-13 | -5 | -1 |

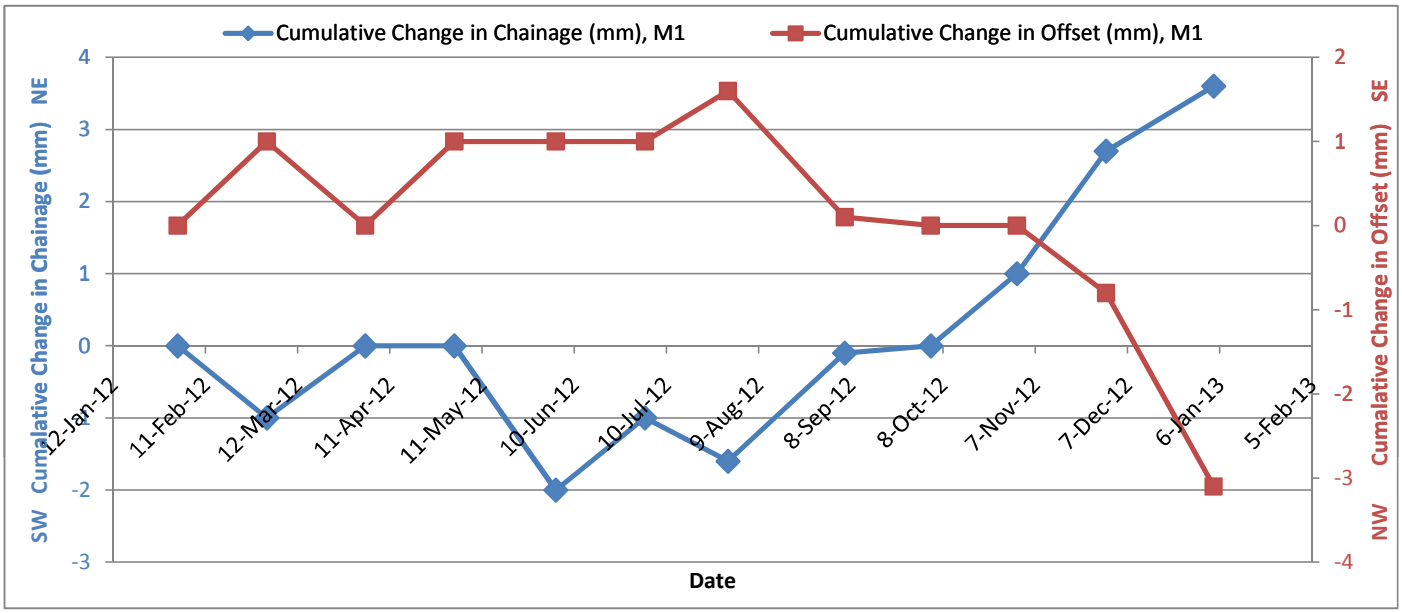



*NOTES*
*Chainage direction: N 45 E (parallel to riverbank)*
*Offset direction: N 45 W (perpendicular to riverbank)*

**SECTION 1 - ANALYSIS OF CUMULATIVE LATERAL MOVEMENTS, WORST CASE (F1)**

| M1 Date | Cumulative Change in Chainage (mm) | Change in Chainage (mm) |
|---|---|---|
| 2-Feb-12 | 0 | 0 |
| 2-Mar-12 | -1 | -1 |
| 3-Apr-12 | 0 | 1 |
| 2-May-12 | 0 | 0 |
| 4-Jun-12 | -2 | -2 |
| 3-Jul-12 | -1 | 1 |
| 30-Jul-12 | -2 | -1 |
| 6-Sep-12 | 0 | 1 |
| 4-Oct-12 | 0 | 0 |
| 1-Nov-12 | 1 | 1 |
| 30-Nov-12 | 3 | 2 |
| 4-Jan-13 | 4 | 1 |

| M1 Date | Cumulative Change in Offset (mm) | Change in Offset (mm) |
|---|---|---|
| 2-Feb-12 | 0 | 0 |
| 2-Mar-12 | 1 | 1 |
| 3-Apr-12 | 0 | -1 |
| 2-May-12 | 1 | 1 |
| 4-Jun-12 | 1 | 0 |
| 3-Jul-12 | 1 | 0 |
| 30-Jul-12 | 2 | 1 |
| 6-Sep-12 | 0 | -2 |
| 4-Oct-12 | 0 | 0 |
| 1-Nov-12 | 0 | 0 |
| 30-Nov-12 | -1 | -1 |
| 4-Jan-13 | -3 | -2 |

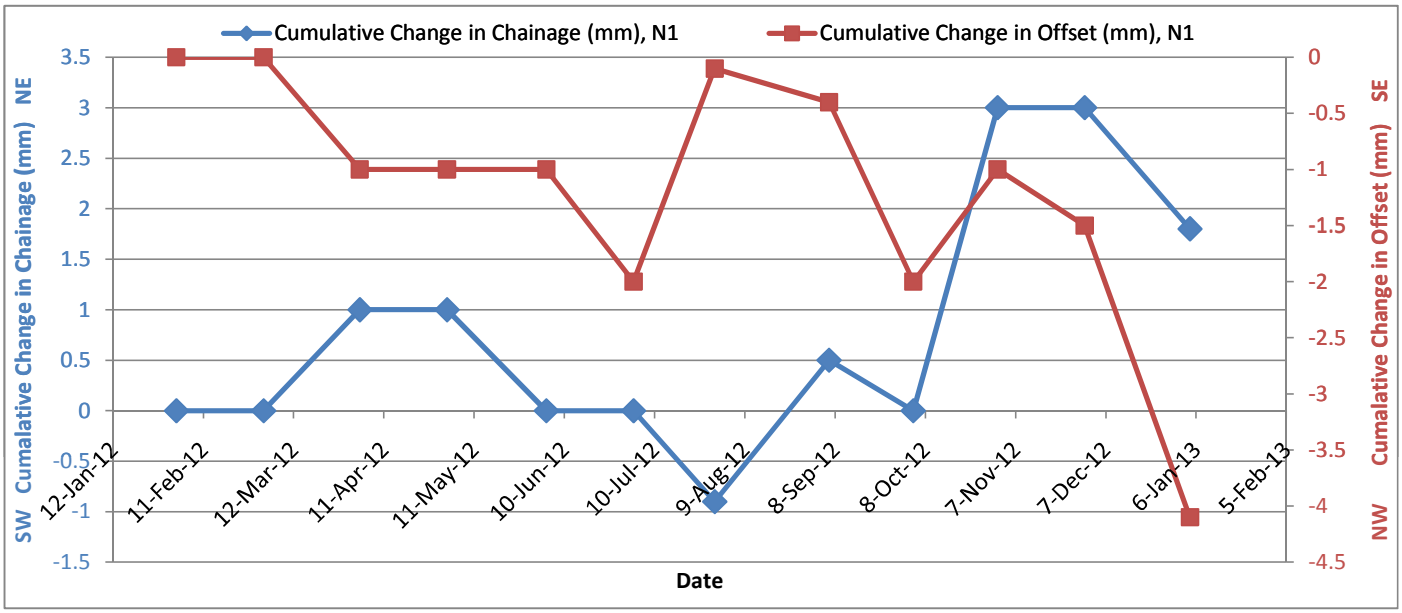



*NOTES*
*Chainage direction: N 45 E (parallel to riverbank)*
*Offset direction: N 45 W (perpendicular to riverbank)*

**SECTION 2 - ANALYSIS OF CUMULATIVE LATERAL MOVEMENTS, WORST CASE (M1)**

| N1 Date | Cumulative Change in Chainage (mm) | Change in Chainage (mm) |
|---|---|---|
| 2-Feb-12 | 0 | 0 |
| 2-Mar-12 | 0 | 0 |
| 3-Apr-12 | 1 | 1 |
| 2-May-12 | 1 | 0 |
| 4-Jun-12 | 0 | -1 |
| 3-Jul-12 | 0 | 0 |
| 30-Jul-12 | -1 | -1 |
| 6-Sep-12 | 0 | 1 |
| 4-Oct-12 | 0 | 0 |
| 1-Nov-12 | 3 | 3 |
| 30-Nov-12 | 3 | 0 |
| 4-Jan-13 | 2 | -1 |

| N1 Date | Cumulative Change in Offset (mm) | Change in Offset (mm) |
|---|---|---|
| 2-Feb-12 | 0 | 0 |
| 2-Mar-12 | 0 | 0 |
| 3-Apr-12 | -1 | -1 |
| 2-May-12 | -1 | 0 |
| 4-Jun-12 | -1 | 0 |
| 3-Jul-12 | -2 | -1 |
| 30-Jul-12 | 0 | 2 |
| 6-Sep-12 | 0 | 0 |
| 4-Oct-12 | -2 | -2 |
| 1-Nov-12 | -1 | 1 |
| 30-Nov-12 | -2 | 0 |
| 4-Jan-13 | -4 | -3 |




*NOTES*
*Chainage direction: N 45 E (parallel to riverbank)*
*Offset direction: N 45 W (perpendicular to riverbank)*

**SECTION 2 - ANALYSIS OF CUMULATIVE LATERAL MOVEMENTS, WORST CASE (M1)**