# Appendix C Gawler River levee bank discussion paper

# Levee Bank Discussion Paper

**Town of Gawler**

May 2018

Ref No. 20141387R007A

Tonkin CONSULTING

a better approach

# Document History and Status

| Rev | Description | Author | Reviewed | Approved | Date |
|---|---|---|---|---|---|
| A | Draft | TAK | MM | TAK | 28/5/18 |

# Contents



## Tables



## Appendices

# 1 Introduction

## 1.1 Background

A concept levee bank alignment has been proposed through portions of the Gawler township to reduce flood risk due to break out from the Gawler River. The levee alignment levels have been set relative to predicted flood levels based on flood modelling undertaken by Australian Water Environments.

The alignment of the levee was only conceptual and did not take into consideration a number of factors that have now been considered in more detail as part of this study.

Since the levee alignments were initially determined, the Gawler River flood plain maps have been updated. These show less flooding in the vicinity of the levee banks at a number of locations and as such the extents of the levee could potentially be reduced. However, for completeness, the full original alignment has been assessed as part of this report.

# 2 Levee Options

## 2.1 Introduction

The levee alignment has been digitised and overlaid onto the aerial photography and the digital terrain model (DTM). This has allowed for alignment iterations to be made to minimise clashes along the alignment with existing infrastructure.

There are three different levee options that have been considered along the alignment. The option selected in each area has typically been selected based on site constraints. The three types of levee are summarised below. The top of levee level has been set to be 300mm above the predicted 100-yr average recurrence interval (ARI) flood level.

### 2.1.1 Type 1: Standard Levee

The standard levee has been designed with a 2.5m top width to allow for a walking trail, if required, to be positioned on top of the levee. The levee batters are at 1 vertical to 4 horizontal, which allow for them to be maintained and easily traversable.

### 2.1.2 Type 2: Steep Batters

The Type 2 levee is similar to the Type 1 with the exception that one or both of the batters are steeper than 1 in 4. Batters as steep as 1 in 2 have been used. In these locations maintenance will be difficult, vegetation establishment will be more challenging and localised scour gullies may occur down the batters due to their steepness. These are typically required where there is not space to fit in a Type 1 levee.

### 2.1.3 Type 3: Vertical Wall Levee

The Type 3 levees are needed where space is constrained and the other types of levees would not fit. This type of levee would be in the form of a vertical wall and would not be traversable.

### 2.1.4 Temporary Levee

In a number of locations the levee will pass over areas that cannot be permanently blocked off, such as rail lines, roads and driveways. In these locations it is likely that a temporary levee would need to be installed by emergency services as part of flood response works.

# 3 Levee Detailed Concept Design Discussion

## 3.1 Introduction

The levee bank is comprised of five different sections. Each element has been designed along a separate design string. The name of each string, along with the design chainages is shown in Appendix A along with a layout plan, overlaid onto aerial photography.

### 3.1.1 MC00 – Southern Levee

*Table 3.1 Southern Levee Design Comments*

| Chainage | Levee Type | Discussion |
|---|---|---|
| 70-110 | Type 1 | All of levee within private property |
| 110-240 | Type 3 | Limited space available between car park and building and top of river bank. |
| 240-260 | Temporary | Temporary levee needed to allow access along Fourteenth Street. |
| 260-340 | Type 1 | Within reserve area |
| 340-720 | Type 2 | Steeper batters needed to reduce total width of levee that drops down into lower lying land to the north. Potential pedestrian path impacts. |
| 720-1000 | Type 1 | Top of levee matches closely with rail levels at chainage 790 and 840. Temporary levee potentially needed at these locations. |
| 1000-1150 | Type 2 | Steeper batters needed to fit levee between properties, Argent Lane and the top of river bank |
| 1150-1240 | Type 1 | Partly in private property |
| 1240-1380 | Type 3 | Vertical levee needed due to lack of space between existing dwelling and driveway and top of river bank. |
| 1380-1510 | Type 1 | Potential vegetation impacts |
| 1510-1850 | Type 2 | Steeper batters needed to reduce total width of levee. Vegetation impacts in some locations. |
| 1850-2490 | Type 1 | Relatively clear area for embankment works |

### 3.1.2 MC10 – Eastern Levee

*Table 3.2 Eastern Levee Design Comments*

| Chainage | Levee Type | Discussion |
|---|---|---|
| 0-140 | Type 3 | Very limited space between footpath along Paterson Terrace and the top of bank. Visual impacts due to close proximity to residential areas. |
| 140-160 | Temporary | Temporary levee needed to allow access into sports facility |
| 160-350 | Type 1 | Levee bank virtually all within open space. Alternative would be to have a vertical levee at the property boundary. Visual impacts due to close proximity to residential areas. |
| 354-440 | Type 3 | Vertical levee bank needed at property boundary to prevent impact on infrastructure within private property. Visual impacts due to close proximity to residential areas. |
| 440-450 | Temporary | Temporary levee needed to allow access into community centre. |
| 450-530 | Type 3 | Vertical levee bank needed at property boundary to prevent losing car parks. |

| Chainage | Levee Type | Discussion |
|---|---|---|
| 530-540 | Temporary | Temporary levee needed to allow access into community centre. |
| 540-660 | Type 1 | Significant tree impacts in this area. |
| 660-780 | Type 3 | Limited space would require vertical levee in this area. Levee will cross main access path to rail station which may require use of a temporary levee. |
| 780-900 | Type 1 | Significant tree impacts in this area. |
| 900-980 | Type 3 | Limited space available. |
| 980-1020 | Temporary | Temporary levee needed across rail line and across Hallam Drive |
| 1020-1050 | Type 3 | Limited space available. |
| 1050-1210 | Type 1 | Within private property. Some access issues and removal of existing infrastructure required. Significant tree impacts. Vertical walls and temporary levees potentially needed in this area. |
| 1210-1250 | Type 3 | Vertical levee likely to be required at back of footpath. |

### 3.1.3 MC20 – Drury Street Levee

*Table 3.3 Drury Street Levee Design Comments*

| Chainage | Levee Type | Discussion |
|---|---|---|
| 0-50 | Type 1 | Crosses a pedestrian track that would need to be mounded, unless a temporary levee is used. Levee also crosses over a local overland flood flow path and therefore would have the potential to locally increase flood risk. |
| 50-170 | Type 3 | Levee bank passes through private property that backs onto the river. Some existing fence and shed infrastructure would need removal and some blocks would be split into two. |
| 170-200 | Type 1 | Levee would potentially hinder existing access to property from southern end of Drury Street. |
| 200-270 | Type 2 | Steeper batters needed to ensure levee batters do not extend into main channel |

### 3.1.4 MC30 – Bright Street Levee

*Table 3.4 Bright Street Levee Design Comments*

| Chainage | Levee Type | Discussion |
|---|---|---|
| 0-70 | Type 1 | Levee crosses over an access road at the southern end of Bright Street. The road would either need to be mounded or have a temporary levee installed. |

### 3.1.5 MC40 – Kelly Road Levee

*Table 3.5 Kelly Road Levee Design Comments*

| Chainage | Levee Type | Discussion |
|---|---|---|
| 0-170 | Type 1 | Levee impacts on a large storage tank at chainage 120. A vertical wall may be needed at this location. |

| Chainage | Levee Type | Discussion |
|---|---|---|
| 170-230 | Type 3 | Levee bank passes at the rear of a car park that is in close proximity to the main river top of bank. A small portion of the car park is likely to be impacted. |
| 230-355 | Type 1 | A number of significant trees in this area. All of levee in private property and impacts on a driveway at chainage 290. |
| 355-370 | Temporary | Levee alignment crosses Kelly Road. A levee at this location will block a localised overland flood flow path |
| 370-430 | Type 1 | All within private property |
| 430-450 | Temporary | Levee alignment crosses the main access road to a large commercial facility |
| 450-750 | Type 1 | All within private property. Levee blocks a local overland flood flow path at chainage 745. |

# 4 Vegetation Impact Assessment

A vegetation impact assessment was undertaken by Eco Management Services that involved a field assessment along the full length of the levee. The levee alignment was separated into 38 portions. The potential impact on each section of levee bank was rated as low, moderate or high as summarised in Table 4.1Table 4.1.

The assessment did highlight significant vegetation impacts with approximately 24% of the alignment having high vegetation impacts.

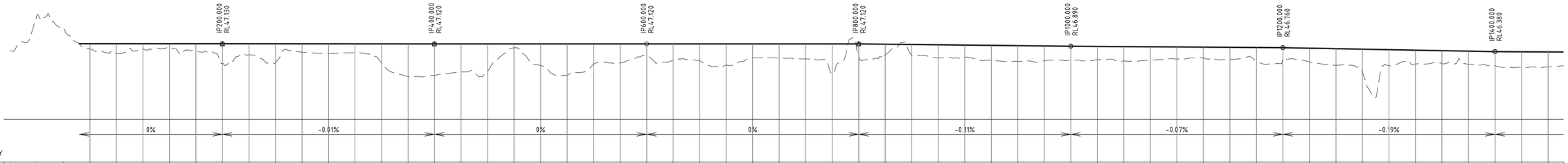
***Table 4.1 Vegetation Impacts Assessment Summary***

| Impact | Number of Sections | Length (m) | % of total |
|---|---|---|---|
| Low | 19 | 2,750 | 56 |
| Moderate | 6 | 620 | 13 |
| High | 10 | 1,190 | 24 |
| Unclassified (no access) | 3 | 330 | 7 |

The full assessment report is contained within Appendix B.

# Appendix A

# Levee Bank Preliminary Design Drawings




| CHAINAGE | DESIGN | EXISTING | + CUT / - FILL |
|---|---|---|---|
| 0.000 | | 46.483 | |
| 25.000 | | 49.794 | |
| 50.000 | | 48.563 | |
| 75.000 | 47.130 | 46.645 | -0.485 |
| 100.000 | 47.130 | 46.223 | -0.907 |
| 125.000 | 47.130 | 46.619 | -0.511 |
| 150.000 | 47.130 | 46.757 | -0.373 |
| 175.000 | 47.130 | 46.485 | -0.645 |
| 200.000 | 47.130 | 45.278 | -1.852 |
| 225.000 | 47.129 | 46.083 | -1.046 |
| 250.000 | 47.127 | 45.360 | -1.767 |
| 275.000 | 47.126 | 46.335 | -0.791 |
| 300.000 | 47.125 | 46.209 | -0.916 |
| 325.000 | 47.124 | 46.280 | -0.844 |
| 350.000 | 47.123 | 45.314 | -1.808 |
| 375.000 | 47.121 | 44.027 | -3.094 |
| 400.000 | 47.120 | 44.154 | -2.966 |
| 425.000 | 47.120 | 44.471 | -2.649 |
| 450.000 | 47.120 | 44.557 | -2.563 |
| 475.000 | 47.120 | 46.739 | -0.381 |
| 500.000 | 47.120 | 45.078 | -2.042 |
| 525.000 | 47.120 | 44.135 | -2.985 |
| 550.000 | 47.120 | 45.215 | -1.905 |
| 575.000 | 47.120 | 45.315 | -1.805 |
| 600.000 | 47.120 | 45.928 | -1.192 |
| 625.000 | 47.120 | 45.564 | -1.556 |
| 650.000 | 47.120 | 45.508 | -1.612 |
| 675.000 | 47.120 | 45.116 | -2.004 |
| 700.000 | 47.120 | 45.786 | -1.334 |
| 725.000 | 47.120 | 45.775 | -1.345 |
| 750.000 | 47.120 | 45.700 | -1.420 |
| 775.000 | 47.120 | 44.340 | -2.780 |
| 800.000 | 47.120 | 45.950 | -1.170 |
| 825.000 | 47.091 | 46.081 | -1.011 |
| 850.000 | 47.063 | 46.030 | -1.033 |
| 875.000 | 47.034 | 45.788 | -1.245 |
| 900.000 | 47.005 | 45.824 | -1.181 |
| 925.000 | 46.976 | 45.546 | -1.430 |
| 950.000 | 46.947 | 45.481 | -1.467 |
| 975.000 | 46.919 | 45.526 | -1.393 |
| 1000.000 | 46.890 | 45.555 | -1.335 |
| 1025.000 | 46.874 | 45.618 | -1.256 |
| 1050.000 | 46.858 | 45.536 | -1.322 |
| 1075.000 | 46.841 | 45.572 | -1.270 |
| 1100.000 | 46.825 | 45.702 | -1.123 |
| 1125.000 | 46.809 | 45.770 | -1.039 |
| 1150.000 | 46.792 | 45.650 | -1.142 |
| 1175.000 | 46.776 | 45.486 | -1.291 |
| 1200.000 | 46.760 | 45.714 | -1.046 |
| 1225.000 | 46.712 | 45.426 | -1.287 |
| 1250.000 | 46.665 | 45.095 | -1.570 |
| 1275.000 | 46.618 | 44.480 | -2.137 |
| 1300.000 | 46.570 | 45.070 | -1.500 |
| 1325.000 | 46.523 | 45.232 | -1.291 |
| 1350.000 | 46.475 | 45.264 | -1.211 |
| 1375.000 | 46.428 | 45.207 | -1.221 |
| 1400.000 | 46.380 | 45.071 | -1.309 |
| 1425.000 | 46.369 | 44.921 | -1.448 |
| 1450.000 | 46.358 | 44.949 | -1.409 |

## LONGITUDINAL PROFILE - MC00

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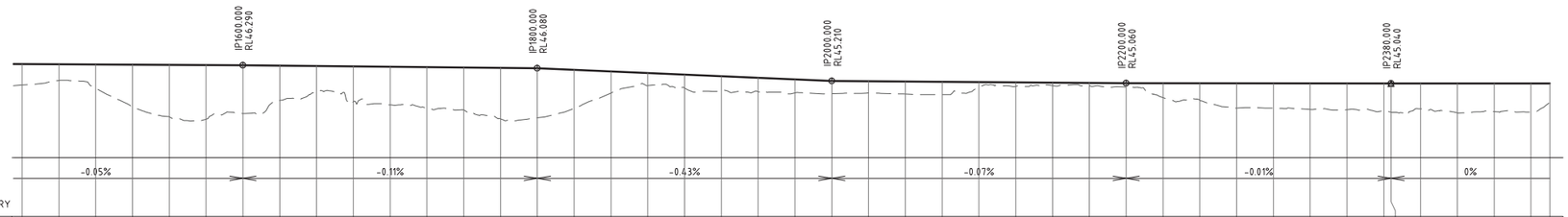
VERTICAL SCALE 1 : 200




| CHAINAGE | DESIGN | EXISTING | + CUT / - FILL |
|---|---|---|---|
| 1450.000 | 46.358 | 44.949 | -1.409 |
| 1475.000 | 46.346 | 45.255 | -1.091 |
| 1500.000 | 46.335 | 44.706 | -1.629 |
| 1525.000 | 46.324 | 43.452 | -2.872 |
| 1550.000 | 46.313 | 42.779 | -3.534 |
| 1575.000 | 46.301 | 42.616 | -3.685 |
| 1600.000 | 46.290 | 43.002 | -3.288 |
| 1625.000 | 46.264 | 43.900 | -2.364 |
| 1650.000 | 46.237 | 44.483 | -1.754 |
| 1675.000 | 46.211 | 43.804 | -2.408 |
| 1700.000 | 46.185 | 43.591 | -2.594 |
| 1725.000 | 46.159 | 43.349 | -2.810 |
| 1750.000 | 46.133 | 43.239 | -2.894 |
| 1775.000 | 46.106 | 42.627 | -3.479 |
| 1800.000 | 46.080 | 42.709 | -3.371 |
| 1825.000 | 45.971 | 43.353 | -2.618 |
| 1850.000 | 45.862 | 44.395 | -1.468 |
| 1875.000 | 45.754 | 44.894 | -0.859 |
| 1900.000 | 45.645 | 44.731 | -0.914 |
| 1925.000 | 45.536 | 44.528 | -1.008 |
| 1950.000 | 45.428 | 44.483 | -0.945 |
| 1975.000 | 45.319 | 44.407 | -0.912 |
| 2000.000 | 45.210 | 44.347 | -0.863 |
| 2025.000 | 45.191 | 44.395 | -0.796 |
| 2050.000 | 45.172 | 44.325 | -0.847 |
| 2075.000 | 45.154 | 44.281 | -0.873 |
| 2100.000 | 45.135 | 44.769 | -0.366 |
| 2125.000 | 45.116 | 44.850 | -0.267 |
| 2150.000 | 45.098 | 44.899 | -0.198 |
| 2175.000 | 45.079 | 44.891 | -0.188 |
| 2200.000 | 45.060 | 44.787 | -0.273 |
| 2225.000 | 45.057 | 44.087 | -0.971 |
| 2250.000 | 45.054 | 43.909 | -1.145 |
| 2275.000 | 45.052 | 43.377 | -1.674 |
| 2300.000 | 45.049 | 43.363 | -1.685 |
| 2325.000 | 45.046 | 43.274 | -1.772 |
| 2350.000 | 45.043 | 43.258 | -1.785 |
| 2375.000 | 45.041 | 43.189 | -1.851 |
| 2380.000 | 45.040 | 43.088 | -1.952 |
| 2400.000 | 45.040 | 43.321 | -1.719 |
| 2425.000 | 45.040 | 43.050 | -1.990 |
| 2450.000 | 45.040 | 43.131 | -1.909 |
| 2475.000 | 45.040 | 43.093 | -1.947 |
| 2487.872 | 45.040 | 43.796 | -1.244 |

## LONGITUDINAL PROFILE - MC00

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VERTICAL SCALE 1 : 200

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|---|---|---|---|---|---|---|---|
| 1 | ISSUED FOR COMMENT | 25.05.18 | P.Sm. | P.Sm. | | | T.K. |

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PRELIMINARY

SHEET SIZE A1

SCALE: 1:2000 1:200

ORIGINAL SURVEY BY

SURVEY DATE:

COORDS & DATUM
COORDS TO (MGA94 ZONE54)
ALL LEVELS TO A.H.D.

TOWN OF GAWLER, LIGHT REGIONAL AND BAROSSA COUNCILS

GAWLER AND SURROUNDS SMP
GAWLER RIVER LEVEE BANK CONCEPT DESIGN
LONGITUDINAL SECTIONS (1 OF 2)

| FILENAME: | JOB NUMBER | SHEET NUMBER | REVISION |
|---|---|---|---|
| 20141387_LEVEE.DWG | 20141387 | 01 | 1 |



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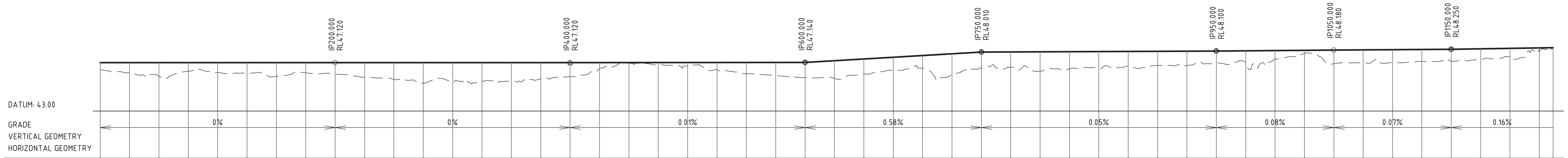

| | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| DESIGN | 47.120 | 47.120 | 47.120 | 47.120 | 47.120 | 47.120 | 47.120 | 47.120 | 47.120 | 47.120 | 47.120 | 47.120 | 47.120 |
| EXISTING | 46.484 | 46.249 | 45.967 | 46.386 | 46.264 | 46.185 | 45.950 | 46.248 | 46.150 | 45.862 | 45.699 | 45.381 | 45.451 |
| + CUT<br>- FILL | -0.636 | -0.871 | -1.153 | -0.734 | -0.856 | -0.935 | -1.170 | -0.872 | -0.970 | -1.258 | -1.421 | -1.739 | -1.669 |
| CHAINAGE | 0.000 | 25.000 | 50.000 | 75.000 | 100.000 | 125.000 | 150.000 | 175.000 | 200.000 | 225.000 | 250.000 | 275.000 | 300.000 |

| | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| DESIGN | 47.120 | 47.120 | 47.120 | 47.120 | 47.122 | 47.125 | 47.127 | 47.130 | 47.133 | 47.135 | 47.138 | 47.140 | 47.285 |
| EXISTING | 45.527 | 45.550 | 45.733 | 45.914 | 46.607 | 47.044 | 46.946 | 46.799 | 46.518 | 46.159 | 46.023 | 45.842 | 45.780 |
| + CUT<br>- FILL | -1.593 | -1.570 | -1.387 | -1.206 | -0.515 | -0.081 | -0.181 | -0.331 | -0.614 | -0.976 | -1.114 | -1.298 | -1.505 |
| CHAINAGE | 325.000 | 350.000 | 375.000 | 400.000 | 425.000 | 450.000 | 475.000 | 500.000 | 525.000 | 550.000 | 575.000 | 600.000 | 625.000 |

| | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| DESIGN | 47.430 | 47.575 | 47.720 | 47.865 | 48.010 | 48.021 | 48.032 | 48.044 | 48.055 | 48.066 | 48.078 | 48.089 | 48.100 |
| EXISTING | 46.131 | 46.486 | 46.643 | 46.120 | 46.656 | 46.748 | 46.387 | 46.601 | 46.646 | 46.857 | 46.871 | 46.873 | 47.096 |
| + CUT<br>- FILL | -1.299 | -1.089 | -1.077 | -1.745 | -1.354 | -1.273 | -1.646 | -1.443 | -1.409 | -1.209 | -1.207 | -1.216 | -1.004 |
| CHAINAGE | 650.000 | 675.000 | 700.000 | 725.000 | 750.000 | 775.000 | 800.000 | 825.000 | 850.000 | 875.000 | 900.000 | 925.000 | 950.000 |

| | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| DESIGN | 48.120 | 48.140 | 48.160 | 48.180 | 48.197 | 48.215 | 48.233 | 48.250 | 48.290 | 48.331 | 48.371 | 48.390 |
| EXISTING | 47.120 | 47.417 | 47.895 | 47.016 | 47.163 | 47.126 | 47.204 | 47.222 | 47.373 | 47.644 | 48.104 | 48.329 |
| + CUT<br>- FILL | -1.000 | -0.723 | -0.265 | -1.164 | -1.034 | -1.089 | -1.028 | -1.028 | -0.917 | -0.687 | -0.267 | -0.061 |
| CHAINAGE | 975.000 | 1000.000 | 1025.000 | 1050.000 | 1075.000 | 1100.000 | 1125.000 | 1150.000 | 1175.000 | 1200.000 | 1225.000 | 1236.711 |

## LONGITUDINAL PROFILE – MC10

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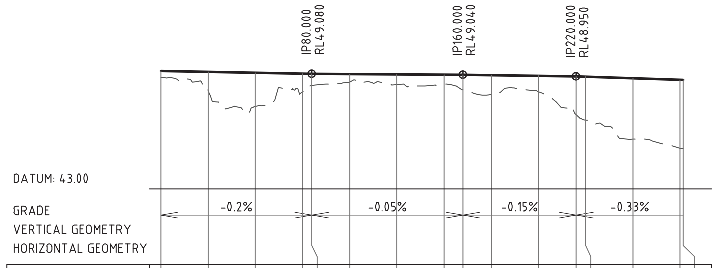

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| DESIGN | 49.240 | 49.190 | 49.140 | 49.090 | 49.080 | 49.070 | 49.057 | 49.045 |
| EXISTING | 48.902 | 48.210 | 47.358 | 48.137 | 48.471 | 48.644 | 48.513 | 48.530 |
| + CUT<br>- FILL | -0.338 | -0.980 | -1.782 | -0.953 | -0.609 | -0.426 | -0.545 | -0.515 |
| CHAINAGE | 0.000 | 25.000 | 50.000 | 75.000 | 80.000 | 100.000 | 125.000 | 150.000 |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| DESIGN | 49.040 | 49.017 | 48.980 | 48.950 | 48.933 | 48.850 | 48.766 | 48.760 |
| EXISTING | 48.240 | 47.995 | 48.145 | 46.912 | 46.641 | 45.635 | 45.150 | 45.127 |
| + CUT<br>- FILL | -0.800 | -1.023 | -0.835 | -2.038 | -2.292 | -3.215 | -3.616 | -3.633 |
| CHAINAGE | 160.000 | 175.000 | 200.000 | 220.000 | 225.000 | 250.000 | 275.000 | 276.725 |

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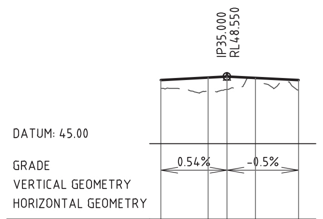

| | | | | | |
|---|---|---|---|---|---|
| DESIGN | 48.360 | 48.496 | 48.550 | 48.475 | 48.360 |
| EXISTING | 47.934 | 47.792 | 47.875 | 48.427 | 47.834 |
| + CUT<br>- FILL | -0.426 | -0.704 | -0.675 | -0.048 | -0.526 |
| CHAINAGE | 0.000 | 25.000 | 35.000 | 50.000 | 72.963 |

## LONGITUDINAL PROFILE – MC30

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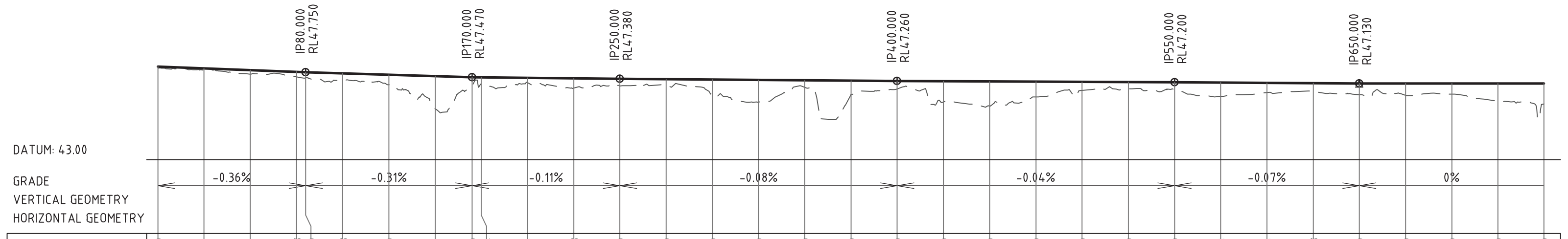
VERTICAL SCALE 1 : 200



| | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| DESIGN | 48.040 | 47.949 | 47.859 | 47.768 | 47.750 | 47.688 | 47.610 | 47.532 | 47.470 | 47.464 | 47.436 |
| EXISTING | 47.963 | 47.849 | 47.648 | 47.499 | 47.450 | 47.305 | 47.063 | 45.776 | 47.015 | 47.101 | 47.187 |
| + CUT<br>- FILL | -0.077 | -0.100 | -0.211 | -0.269 | -0.300 | -0.383 | -0.547 | -1.756 | -0.455 | -0.364 | -0.249 |
| CHAINAGE | 0.000 | 25.000 | 50.000 | 75.000 | 80.000 | 100.000 | 125.000 | 150.000 | 170.000 | 175.000 | 200.000 |

| | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| DESIGN | 47.408 | 47.380 | 47.360 | 47.340 | 47.320 | 47.300 | 47.280 | 47.260 | 47.250 | 47.240 | 47.230 |
| EXISTING | 46.891 | 47.002 | 47.064 | 46.620 | 46.127 | 46.928 | 46.521 | 46.839 | 46.129 | 45.898 | 46.406 |
| + CUT<br>- FILL | -0.517 | -0.378 | -0.296 | -0.720 | -1.193 | -0.372 | -0.759 | -0.421 | -1.121 | -1.342 | -0.824 |
| CHAINAGE | 225.000 | 250.000 | 275.000 | 300.000 | 325.000 | 350.000 | 375.000 | 400.000 | 425.000 | 450.000 | 475.000 |

| | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| DESIGN | 47.220 | 47.210 | 47.200 | 47.183 | 47.165 | 47.148 | 47.130 | 47.130 | 47.130 | 47.130 | 47.130 |
| EXISTING | 46.762 | 46.840 | 46.773 | 46.427 | 46.642 | 46.744 | 46.527 | 46.494 | 46.556 | 46.175 | 46.034 |
| + CUT<br>- FILL | -0.458 | -0.370 | -0.427 | -0.756 | -0.523 | -0.404 | -0.603 | -0.636 | -0.574 | -0.955 | -1.096 |
| CHAINAGE | 500.000 | 525.000 | 550.000 | 575.000 | 600.000 | 625.000 | 650.000 | 675.000 | 700.000 | 725.000 | 749.843 |

## LONGITUDINAL PROFILE – MC40

HORIZONTAL SCALE 1 : 2000
VERTICAL SCALE 1 : 200

| REV | AMENDMENT / REASON FOR ISSUE | DATE | DES. | DWN. | DWGCHK. | VERIFIED | APPROVED |
|---|---|---|---|---|---|---|---|
| 1 | ISSUED FOR COMMENT | 25.05.18 | P.Sm. | P.Sm. | | | T.K. |

0 20 40 80 120
1:2000 (A1); 1:4000 (A3)

100mm ON ORIGINAL DRAWING - DO NOT SCALE DRAWING

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PRELIMINARY

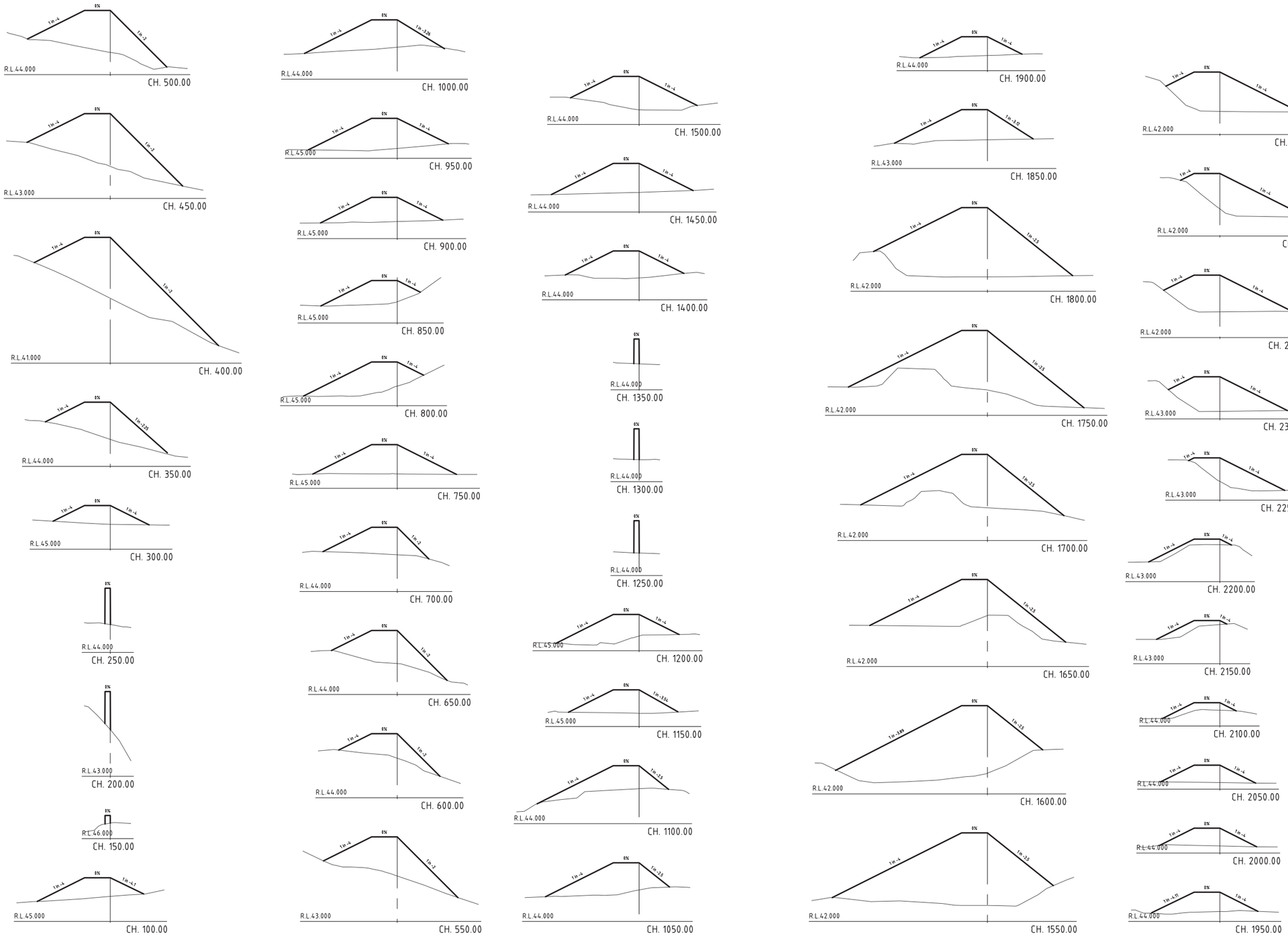
SHEET SIZE A1
SCALE: 1:2000
1:200
ORIGINAL SURVEY BY
SURVEY DATE:
COORDS & DATUM
COORDS TO (MGA94 ZONE54)
ALL LEVELS TO A.H.D.

TOWN OF GAWLER, LIGHT REGIONAL AND BAROSSA COUNCILS

GAWLER AND SURROUNDS SMP
GAWLER RIVER LEVEE BANK CONCEPT DESIGN
LONGITUDINAL SECTIONS (2 OF 2)

FILENAME: 20141387_LEVEE.DWG
JOB NUMBER 20141387
SHEET NUMBER 02
REVISION 1

T:\2014\20141387 GAWLER AND SURROUNDS SMP - TOWN OF GAWLER\3_DEVELOPMENT\1 ACAD\20141387_LEVEE.DWG [LSECT 2] May 28, 2018 13:25PM




PRELIMINARY

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|---|---|---|---|---|---|---|---|
| 1 | ISSUED FOR COMMENT | 25.05.18 | P.Sm. | P.Sm. | | | T.K. |

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0 1 2 4 6
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100mm ON ORIGINAL DRAWING - DO NOT SCALE DRAWING

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SHEET SIZE A1
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SURVEY DATE:
COORDS & DATUM
COORDS TO (MGA94 ZONE54)
ALL LEVELS TO A.H.D.

TOWN OF GAWLER, LIGHT REGIONAL AND BAROSSA COUNCILS

GAWLER AND SURROUNDS SMP
GAWLER RIVER LEVEE BANK CONCEPT DESIGN
CROSS SECTIONS (1 OF 2)

FILENAME: 20141387_LEVEE.DWG
JOB NUMBER 20141387
SHEET NUMBER 03
REVISION 1



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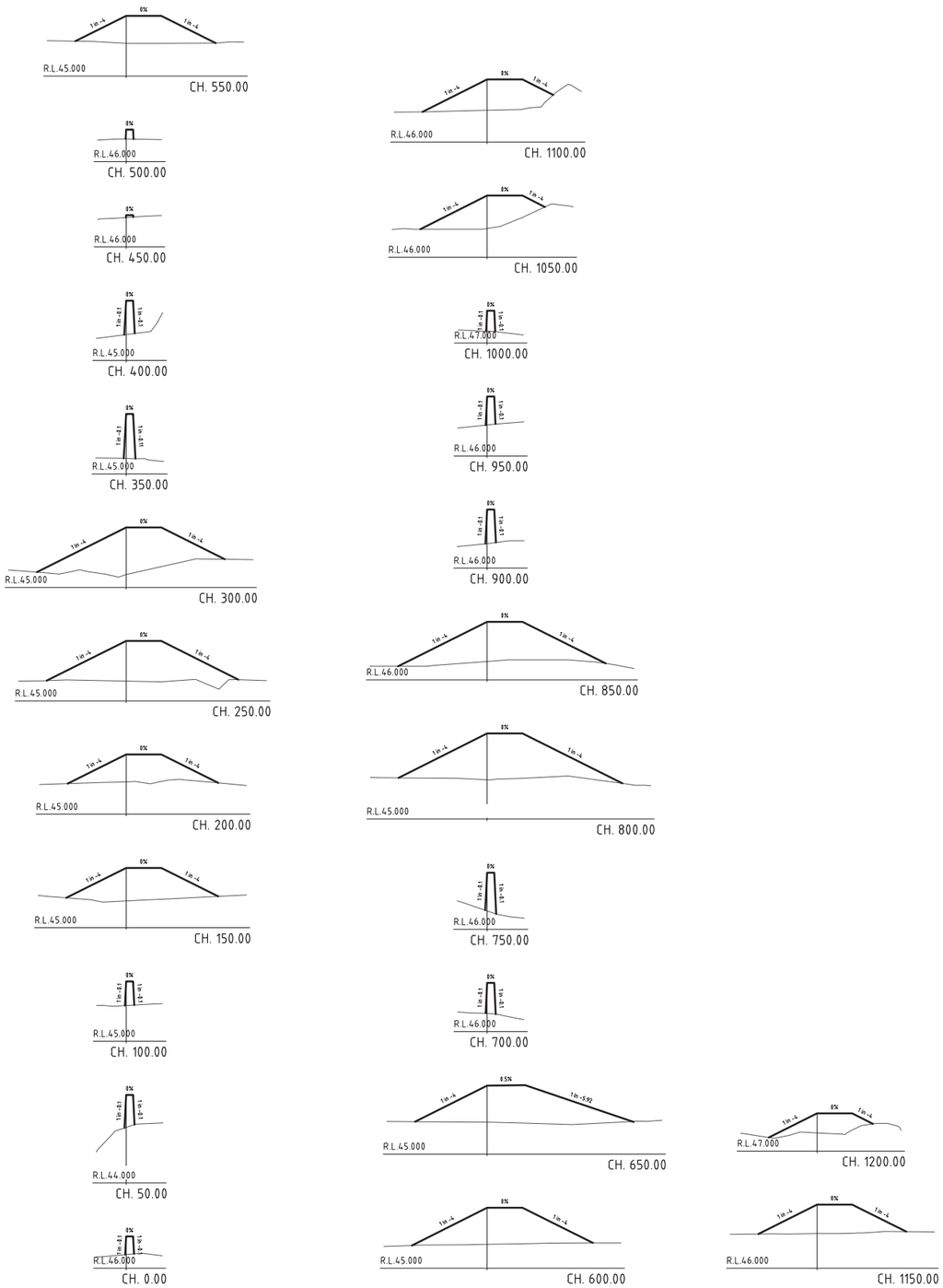


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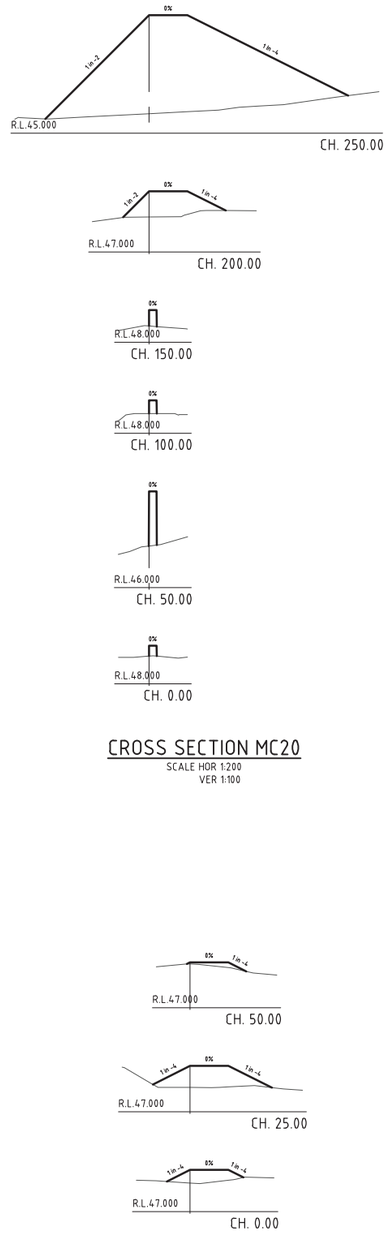


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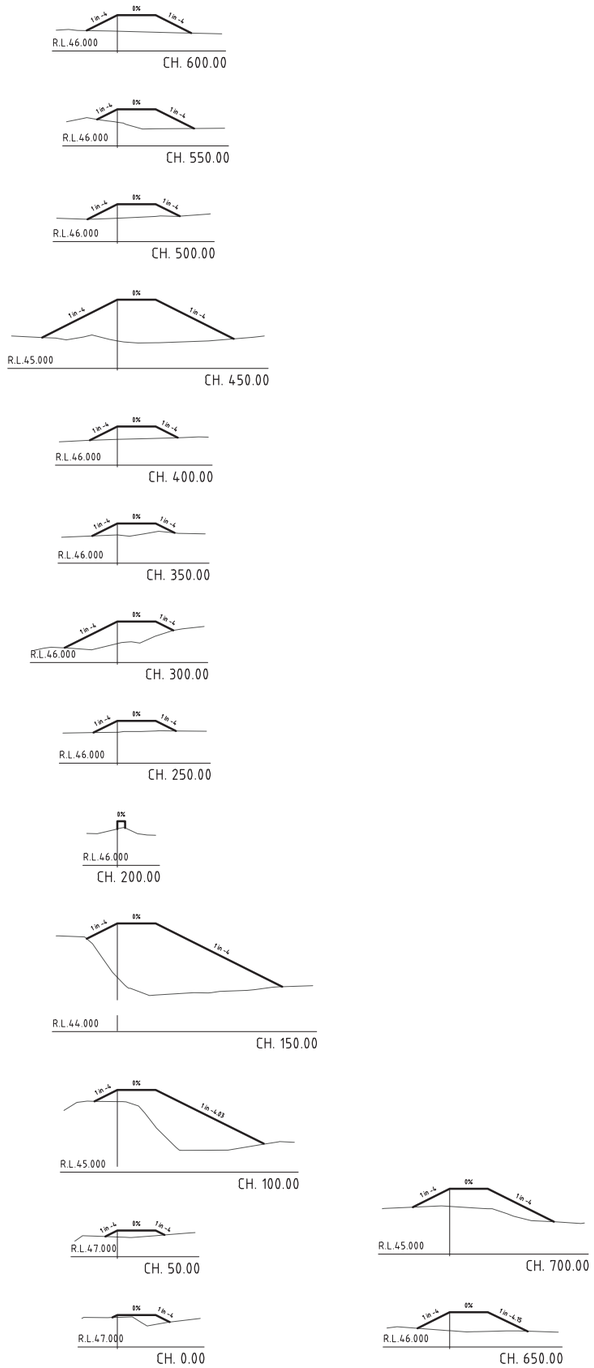
(NOTE 25m INTERVAL)

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1:200 (A1); 1:400 (A3)

1:100 (A1); 1:200 (A3)

100mm ON ORIGINAL DRAWING - DO NOT SCALE DRAWING

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SHEET SIZE A1

SCALE: 1:200 1:100

ORIGINAL SURVEY BY

SURVEY DATE:

COORDS & DATUM
COORDS TO (MGA94 ZONE54)
ALL LEVELS TO A.H.D.

PRELIMINARY

TOWN OF GAWLER, LIGHT REGIONAL AND BAROSSA COUNCILS

GAWLER AND SURROUNDS SMP
GAWLER RIVER LEVEE BANK CONCEPT DESIGN
CROSS SECTIONS (2 OF 2)

FILENAME: 20141387_LEVEE.DWG

| JOB NUMBER | SHEET NUMBER | REVISION |
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| 20141387 | 04 | 1 |



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a better approach

N
W E
S

Scale: 1:4,500
at A3

Job Number: 2014.1387
Filename: levee south.wor
Revision: A
Date: 04/09/2017
Drawn: TAK

Data Acknowledgement:

**Town of Gawler**

**LEVEE MC00**

**Figure 1**




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a better approach

N W E S

Scale: 1:4,500 at A3

| | |
|---|---|
| Job Number: | 2014.1387 |
| Filename: | levee north.wor |
| Revision: | A |
| Date: | 04/09/2017 |
| Drawn: | TAK |

Data Acknowledgement:
Cadastre supplied by PBBI Australia Pty Ltd
?? data supplied by ??
?? data supplied by ??

**Town of Gawler**

**MC10-MC40**

**Figure 2**

# Appendix B

# Levee Bank Assessment Report

# Gawler Stormwater Management Study

# Proposed Levee bank route, Vegetation

## 1 Introduction

As part of the development of strategies for the management of stormwater runoff from the City of Gawler, S.A., it is proposed to construct levee banks to control flooding. At the request of Tonkin consulting, a survey has been undertaken of the proposed route of the levee to examine vegetation and identify any issues, i.e. the location of any regulated or significant trees.

Maps showing the location of the levee are included in Appendix 1 and longitudinal profiles in Appendix 2. This information was supplied by Tonkin Consulting.

## 2 Field Assessment of Levee Route

As required an inspection was undertaken of the levee route to examine vegetation. Noting whether it is;

- Natural, native
- Planted, non-native, landcaping
- Regulated trees, circumference 2.0 m or more, at 1.0 nm above ground
- Significant trees, circumference 3.0 m or more, at 1.0 m above ground
- Whether in tree protection zones(TPZ) around regulated or significant trees

Also of importance is the degree to which any regulated or significant trees have the base of their trunks buried by the levee.

With regard to the location of the levee banks shown on the maps in Appendix 1, some sections already exist and will be modified, while other sections are new and the shown positions are approximate due to map scaling and would require more accurate positioning in detailed design. In some instances, small variations in the levee position could avoid trees if required.

The levee is on both public and private land. Council contacted all property owners seeking permission for access. All but two agreed. These are identified in the summary table below.

## 3 Field Assessment Results

The surveys were undertaken in October 2017 on public land and February 2018 on private land, after Council had obtained written consent from property owners for access. The results are summarised in Table 1 below, and various photo point locations (way points ) shown on Figure 1. The Eastings and Nothings for these locations is included in Attachment 1.

**Table 1** **Field Assessment, Summary of Assessment**

**MC20**

| Chainage | Photos | Comments / Vegetation Issues | Potential Impact on Important Vegetation |
|---|---|---|---|
| 0-200 | 2,3 | Mostly through private properties with planted vegetation | **Low** |
| 210 | 1 | **significant tree** | **High** |
| 220 - 270 | | No vegetation issues | **Low** |

**MC30**

| Chainage | Photos | Comments / Vegetation Issues | Potential Impact on Important Vegetation |
|---|---|---|---|
| 0-70 | | Proposed fill up to 0.7 m. No vegetation issues. | **Low** |

**MC40**

| Chainage | Photos | Comments / Vegetation Issues | Potential Impact on Important Vegetation |
|---|---|---|---|
| 0-220 | | No vegetation issues | **Low** |
| 220-350 | | Through private property with planted vegetation. Minor reroute to avoid TPZ of some large trees. | **Low** |
| 350 - 410 | 5 | No vegetation issues | **Low** |
| 420 | 4 | Through private property with planted vegetation. Minor reroute to avoid TPZ of one non-regulated non-native tree. | **Low** |
| 430 - 750 | 6 | Through private property with planted landscaped vegetation. Minor reroute to avoid TPZ of one large tree. | **Low** |

**MC10**

| Chainage | Photos | Comments / Vegetation Issues | Potential Impact on Important Vegetation |
|---|---|---|---|
| 0 - 80 | 28 | No vegetation issues. | **Low** |
| 80 | 27 | Align wall as far from base of **significant tree** as possible | **High** |
| 80 - 140 | 25,26 | Walled section within TPZ of pepper trees (exotic). No native or regulated tree issues. | **Low** |
| 140 - 350 | 22,23,24 | Embankment up to 1.7 m high and up to ~10 m wide will bury bases of most trees, all planted non- | **High** |

| Chainage | Photos | Comments / Vegetation Issues | Potential Impact on Important Vegetation |
|---|---|---|---|
| | | indigenous. | |
| 350 - 550 | 19 | Walled section along footpath up t 1.5 m high in places may need to be moved further east for footings to avoid root damage to trees. | **Moderate** |
| 550 - 750 | 18,20,21 | Bank and walled sections with numerous large **regulated and significant trees** between fence and paved area. Move alignment west to avoid TPZ of trees | **High** |
| 750 - 1000 | 14,15,16,17 | Bank and walled sections need to **negotiate between large significant trees** to avoid their TPZs. Move alignment closer to Thomas Tce where the Railway Station car parking area is, because it is too close to the front **row of significant trees** and well within their TPZs | **High** |
| 1000 - 1100 | 7,8,9 | Along existing embankment with **three significant trees** which will be affected. Move alignment to avoid TPZ of these trees | **High** |
| 1100 - 1180 | 10,11 | Along existing embankment with low planted landscaping shrubs. No tree impacts | **Low** |
| 1180 - 1210 | 13 | Continue walled section or move alignment closer to footpath to avoid burying base of **regulated tree** at ch. 1200 | **Moderate** |
| 1210 - 1240 | 12 | Along existing embankment with low planted landscaping shrubs. No tree impacts | **Low** |

**MC00**

| Chainage | Photos | Comments / Vegetation Issues | Potential Impact on Important Vegetation |
|---|---|---|---|
| 0 - 100 | 29 | No access available through private property. Buildings and trees potentially affected. | **Unknown** |
| 100 | 31 | **Significant tree**. Alignment would be better away from tree outside TPZ | **High** |
| 100 - 260 | 30,32 | Walled section very close to buildings and wall footings may affect large trees on top of embankment around footbridge. Keep outside TPZ of tree at ch. 250 | **Moderate** |
| 260 - 480 | 33,34 | One removal of exotic pepper tree at ch. 440 may be necessary. No vegetation issues. | **Low** |
| 480 - 750 | 35, 36 | Embankment up to 15 m wide and 2.5 m high. Two tree bases (one **regulated tree**) at ch. 490 will be buried. Proposed alignment will pass through one large *Schinus molle* (exotic, pepper tree), one *E.* | **High** |

| Chainage | Photos | Comments / Vegetation Issues | Potential Impact on Important Vegetation |
|---|---|---|---|
| | | *camaldulensis,* and will bury the bases of at least eight other large semi-mature *E. camaldulensis*., some of which are of **regulated** size, and all provide high amenity value. Realignment / use of low wall rather than bank, along footpath at road level will have much less impact | |
| 750 - 870 | 37, 38, 39 | Group of juvenile *E. camaldulensis* could be buried. Alignment passes through TPZ of one **significant** *E. camaldulensis* by rail line | **High** |
| 870 | 40 | **Regulated tree**. Ensure base is not buried by fill for embankment. | **Moderate** |
| 870 - 1100 | 41,42 | Roughly follows existing path along high ground and minor realignments can avoid damage to any trees. No vegetation issues. | **Low** |
| 1100 - 1200 | 43 | Embankment fill will bury bases of some **immature** ***E. camaldulensis***. One or two may require removal. | **Moderate** |
| 1200 - 1250 | 44 | Goat paddock. No vegetation issues | **Low** |
| 1250 - 1350 | | No entry permission granted. Private property with walled section very close to building and 3-4 large *E. camaldulensis*. **Potential vegetation issues**. | **Unknown** |
| 1350 | 45 | **Significant tree** in very poor condition | **High** |
| 1350 - 1470 | 46,47 | Group of immature *E. camaldulensis* along proposed centreline on top of existing embankment. Possibly use wall not bank | **Moderate** |
| 1470 - 1620 | 48,49 | Alignment should be relocated to follow this embankment. No vegetation issues | **Low** |
| 1620 - 1870 | 50 | Alignment should be relocated to follow this embankment. No vegetation issues | **Low** |
| 1870 - 2000 | 51 | No entry permission granted. Private property. potential impact on 3-4 *Schinus molle* (environmental weed) and one planted *Ficus macrophylla*, probably **significant** size. **Potential vegetation issues**. | **Unknown** |
| 2000 - 2200 | 52 | No entry permission granted. Private property. No apparent vegetation issues. | **Low** |
| 2200 - 2550 | 53,54 | Alignment should be relocated to follow this embankment. No vegetation issues. | **Low** |

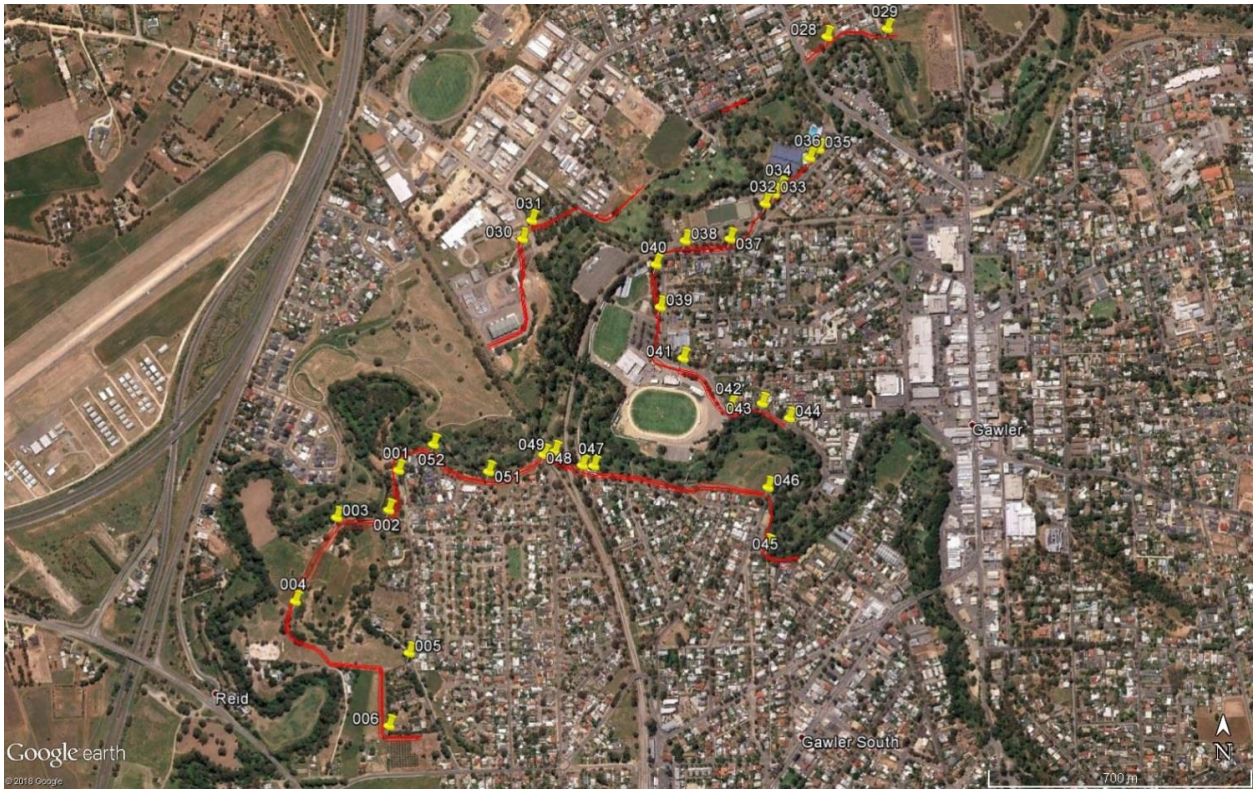


**Figure 1** **Locations of waypoints in photo captions**

**MC 20**

*Photo 1 wpt 28 ch 210 E. cam., 1.2m diam., 20 X 13m, Significant, right on top of bank. Move centreline of bank at least far enough so that trunk is not buried. TPZ 14m radius*

*Photo 2 looking east from ch 160 along walled section – no vegetation issues*

*Photo 3 looking west from wpt 29 ch 30 – walled section crosses private property. Garden vegetation, no native vegetation issues*

**MC 40**

*Photo 4 looking southwest to E. leucoxylon. at wpt 30 ch 420 on centreline of bank. Planted non-native, not Regulated size, 0.5m diam. 12m X 12m healthy. TPZ 6m radius*

*Photo 5 looking west from wpt 31 ch 360 – no vegetation issues*


*Photo 6 looking west from gate at end of Kelly Road – alignment passes through a private landscaped area with palms and lower shrubs. Garden plantings, no native vegetation issues*

**MC 10**

*Photo 7 looking west to tree at wpt 32 ch 1160, walled section. Right on bank centreline. E camaldulensis. 1.5m diam. Significant tree 23m X 20m. TPZ 15m radius. Move wall alignment*

*Photo 8 looking north to tree at wpt 33 ch 1120. Close to bank centreline. E cladocalyx. 0.95m diam. Significant tree 20m X 24m. TPZ 11.5m radius. Move bank alignment and/or use wall instead.*

*Photo 9 looking north to tree at wpt 34 ch 1105. Close to bank centreline. E cladocalyx. 1.05m diam. Significant tree 20m X 22m. TPZ 12.56 radius. Move bank alignment and/or use wall instead.*

*Photo 10  looking southwest along bank centreline – scope for moving to open area a few metres west to avoid trees*

*Photo 11  looking northeast along bank centreline – landscaping with shrubs*

*Photo 12  looking southwest along alignment from wpt 35 ch 1230, start of walled section – landscaping with shrubs*

*Photo 13  looking west to tree at wpt 36 ch 1200 – E. camaldulensis 1-2m west of bank centreline. Minor burying (0.5m deep) at base. Poor health, Regulated size 0.8m diam. 18m X 12m. Continue walled section or realign closer to footpath*

*Photo 14  looking northeast from wpt 37 ch 900, end of walled section – negotiate between trees*


*Photo 15  looking west from wpt 37 ch 900, end of walled section – bank centreline very close to front line of planted row of E. leucox. along parking area. All Significant trees. Will bury bases, and be well within TPZ of all these trees. Move south to edge of car park and/or use wall instead of bank*

*Photo 16  looking east from wpt 38 ch 780, end of walled section – bank centreline very close to front line of planted row of E. leucoxylon. along parking area. Will bury bases, and be well within TPZ of all these trees (approx.. 12m radius). Move south to edge of car park and/or use wall instead of bank*

*Photo 17  Looking west from start of walled section – deviate south to be outside TPZ of E. leucoxylon. Significant tree. TPZ 13m.*

*Photo 18  looking north along bank centreline from wpt 39 ch 550 (start of walled section) – move alignment 15m west to avoid all trees*


*Photo 19  looking south along wall centreline from wpt 39 ch 550 (start of walled section) – move alignment 10m east along footpath to avoid all trees*

*Photo 20  looking south from wpt 40 ch 660 (start of bank section) – move alignment 15m west to avoid all trees*

*Photo 21  looking northeast from wpt 40 ch 660 (end of walled section) – move slightly west to avoid larger trees*

*Photo 22  looking west from wpt 41 ch 350 (end of walled section) – no vegetation issues*

*Photo 23  looking east from wpt 41 ch 350 (start of bank section) – bank may bury base of one Lophostemon conferta (planted, not regulated tree) – scope for minor realignment to avoid all trees and other infrastructure*

*Photo 24  looking northwest from wpt 42 ch 160 (20m from end of bank section) – bank buries bases and passes through row of Bracychiton gregorii (planted, not Regulated size trees) – scope for realignment to avoid all trees and other infrastructure*

*Photo 25  looking east from wpt 42 ch 160 (20m from end of bank section) to tree at wpt 43 ch 80 along walled section – no native vegetation issues*

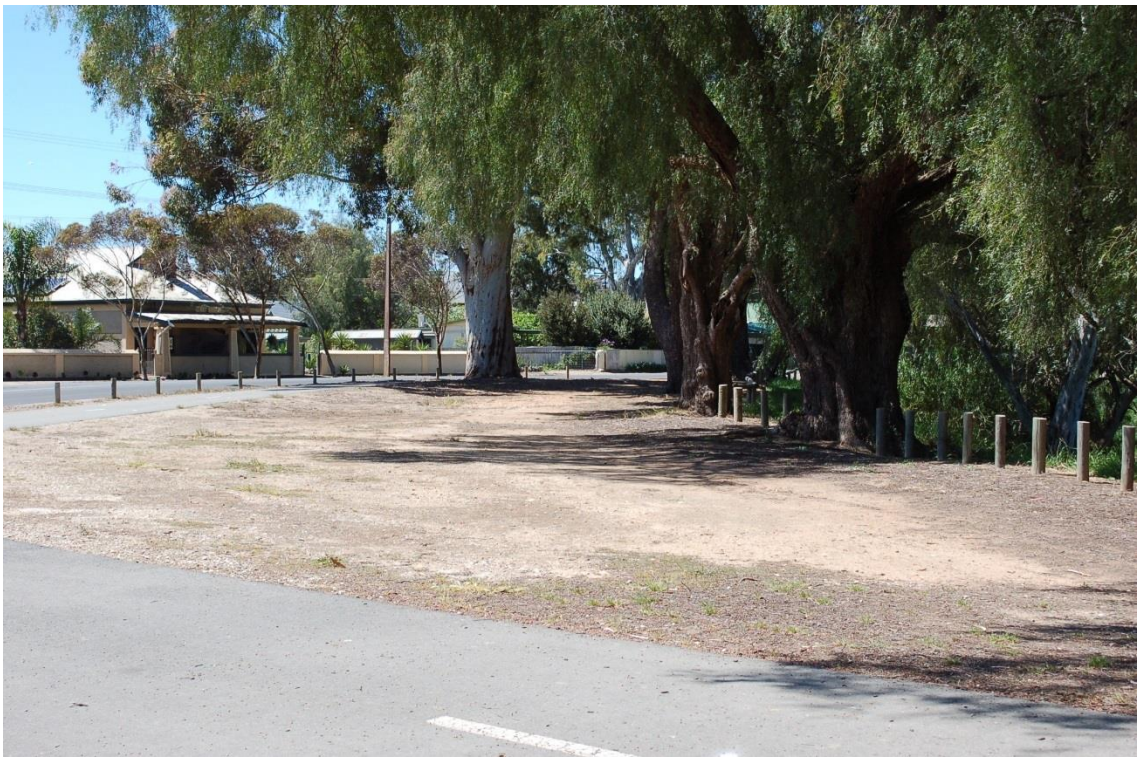

*Photo 26  looking east from end of bank section to tree at wpt 43 ch 80 along walled section – inside TPZ of all Schinus molle trees, but area already very compacted. These trees are non-native, non Regulated*

*Photo 27  looking west to tree at wpt 43 ch 80 E. cladocalyx 1.8m diam. 30m X 25m, Significant tree. Root zone already heavily impacted by paving and compaction, but tree health apparently good. Align walled section as far from base of this tree as possible.*

*Photo 28  looking northwest from end of walled section wpt 44 ch 0 (end MC10) – no vegetation issues*

**MC00**

*Photo 29  looking east from wpt 45 ch 100 – private property, numerous large trees. Proposed embankment appears to be sited on top of dwelling and outbuildings – unknown vegetation issues, not surveyed due to lack of access permission.*

*Photo 30  looking north from wpt 45 ch 100 (start of walled section) – planted landscaped shrubs around car park and public buildings*

*Photo 31  looking south to tree at wpt 45 ch 100 approx. 2m from centreline, at end of bank section. E. camaldulensis. 1.1m diam. Significant tree, 20m X 20m. Already paved to 1.5m from base (inside SRZ of tree), excavation and wall footings may affect tree further. Would be better to be further away from tree.*

*Photo 32  looking south from wpt 46 ch 260 along wall section (start of bank section) – no vegetation issues*

*Photo 33  looking west along alignment from wpt 46 ch 260 along bank section  – no vegetation issues*

*Photo 34  looking east from path to footbridge – bank passes 3m south of large old Schinus molle tree at ch. 440. Base will be buried. Non-native, non Regulated tree*

*Photo 35  looking west from path to footbridge – proposed alignment follows lower level footpath, requiring fill and embankment which will bury bases of two trees. Realignment / use of low wall rather than bank, along footpath at road level will have much less impact.*

*Photo 36 looking east along alignment from wpt 47 ch 730 – proposed alignment will pass through one large Schinus molle one E. cam. and will bury the bases of at least eight other large semi-mature E. camaldulensis., some of which are of Regulated size, and all provide high amenity value*

*Photo 37 looking east along alignment from wpt 47 ch 730 toward railway line – group of juvenile E. camaldulensis may be affected by burying. Alignment passes through TPZ of one large E. camaldulensis by rail line, 23m X 23m, Significant tree.*

*Photo 38  looking north to tree at wpt 48 ch 770 on centreline of embankment. Planted E. cladocalyx, spreading, poor form 0.4m diam.,11m X 15m.*

*Photo 39  looking east to railway line from wpt 49 ch 840 (on centreline, on other railway line) – no vegetation issues*

*Photo 40  looking west along alignment from wpt 49 ch 840. One E. camaldulensis. Wpt 50 ch 870, on centreline, 0.8m diam. 13m X 18m, Regulated size. Deviate alignment to avoid.*

*Photo 41  looking east along alignment from wpt 51 ch 1040 – no vegetation issues*

*Photo 42  looking west along alignment from wpt 51 ch 1040 – occasional small tree in batter zone*

*Photo 43  Looking east along alignment from wpt 52 ch 1200. One immature 0.3m diam. on centreline may require removal*

*Photo 44 Looking west along alignment from wpt 52 ch 1200 – private goat paddock. No vegetation issues*

*Photo 45  E. camaldulensis on alignment at wpt 1 ch 1350 – Significant Tree in very poor condition. 16m X 15m. Central trunk burnt out, numerous major limb failures*

*Photo 46  Looking south along alignment from wpt 1 ch 1350 – Start of bank section. Group of immature E. camaldulensis along proposed centreline on top of existing embankment. None Regulated size. Possibly use wall not bank.*

*Photo 47  Looking north along alignment from wpt 2 ch 1470 – Group of immature E. camaldulensis along proposed centreline on top of existing embankment. None Regulated size.*

*Photo 48  Looking west along alignment (and existing driveway) from wpt 2 ch 1470 –No vegetation issues*

*Photo 49  Looking northeast along existing bank from wpt 3 ch 1620. Alignment should be relocated to follow this embankment. Planted mixed Eucalypt varieties, all immature, none Regulated size. No vegetation issues.*

*Photo 50  Looking south along existing bank from wpt 3 ch 1620.  Alignment should be relocated to follow this embankment. No vegetation issues*

*Photo 51  Looking south along existing bank from wpt 4 ch 1870. Alignment should be relocated to follow this embankment. Chainage 1870 to 2200 not surveyed due to lack of access permission. Ch 1870 to ch 1970 – potential impact on 3-4 Schinus molle (environmental weed) and one Ficus macrophylla. F. macrophylla planted, probably Significant size, requires assessment.*

*Photo 52  Looking west towards alignment at ch 2200 from wpt 5 on Penrith Ave– Alignment should be relocated to follow this embankment. Chainage 1870 to 2200 not surveyed due to lack of access permission. No vegetation issues expected.*

*Photo 53  Looking north along existing bank from wpt 6 ch 2370. Alignment should be relocated to follow this embankment. Minor patch of Acacia spp. regrowth on embankment at chainage 2310. No vegetation issues.*

*Photo 54  Looking east along existing bank from wpt 6 ch 2370.  Alignment should be relocated to follow this embankment. No vegetation issues*

**Attachment 1** **Way point Eastings and Northings**

| WPT | Easting | Northing |
|---|---|---|
| 1 | 292066 | 6168883 |
| 2 | 292042 | 6168778 |
| 3 | 291904 | 6168755 |
| 4 | 291800 | 6168532 |
| 5 | 292104 | 6168404 |
| 6 | 292055 | 6168211 |
| 28 | 293176 | 6170048 |
| 29 | 293334 | 6170073 |
| 30 | 292381 | 6169499 |
| 31 | 292404 | 6169548 |
| 32 | 293021 | 6169606 |
| 33 | 293045 | 6169632 |
| 34 | 293061 | 6169649 |
| 35 | 293160 | 6169752 |
| 36 | 293137 | 6169728 |
| 37 | 292930 | 6169511 |
| 38 | 292812 | 6169503 |
| 39 | 292750 | 6169328 |
| 40 | 292736 | 6169439 |
| 41 | 292813 | 6169194 |
| 42 | 292942 | 6169072 |
| 43 | 293025 | 6169081 |
| 44 | 293098 | 6169043 |
| 45 | 293048 | 6168708 |
| 46 | 293046 | 6168860 |
| 47 | 292582 | 6168906 |
| 48 | 292553 | 6168907 |
| 49 | 292479 | 6168942 |
| 50 | 292449 | 6168933 |
| 51 | 292305 | 6168885 |
| 52 | 292157 | 6168953 |