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250 0 250 500 750 1000 1250m
1:25,000

Scale 1:25000 (A3)

FIGURE F.1.6

EXISTING CURRENT - WATER SURFACE LEVELS - SKM ULTIMATE 100 YEAR EVENT (Brem_E08d)

Rev: 0 Date: May 2012

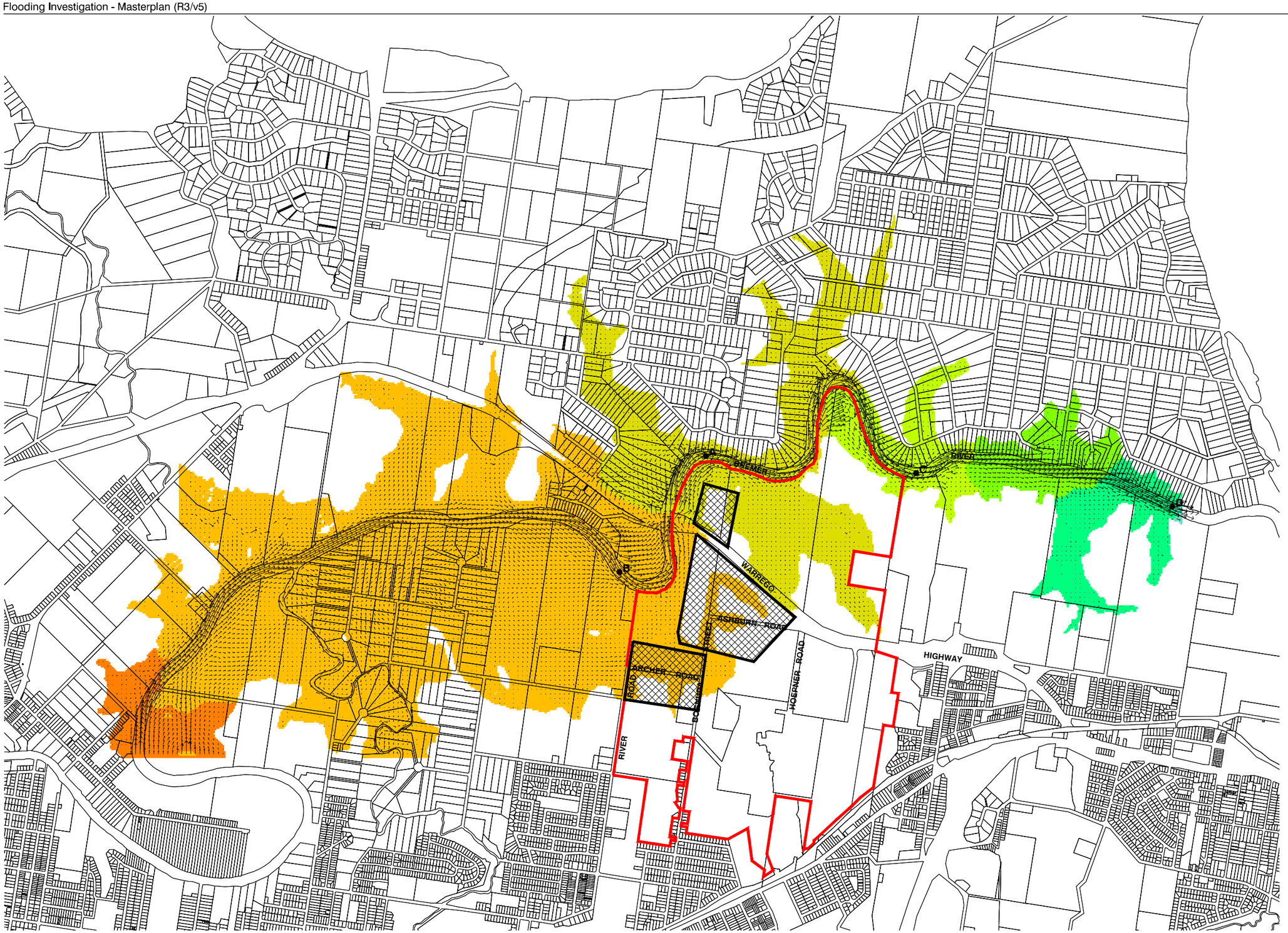
Project No.: LJ8714

Walker Corporation Pty Ltd

CAD FILE: C:\Users\james.martin\local settings\temp\AcPublish_5320\Figure_R3v5_E08d_Brem.dwg
XREF's: xref-Results; xr-Ipswich_DCDB_MGA

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Scale 1:25000 (A3)

FIGURE F.1.7
EXISTING CURRENT - WATER SURFACE LEVELS - SKM ULTIMATE 200 YEAR EVENT (Brem_E08d)

Rev: 0 Date: May 2012

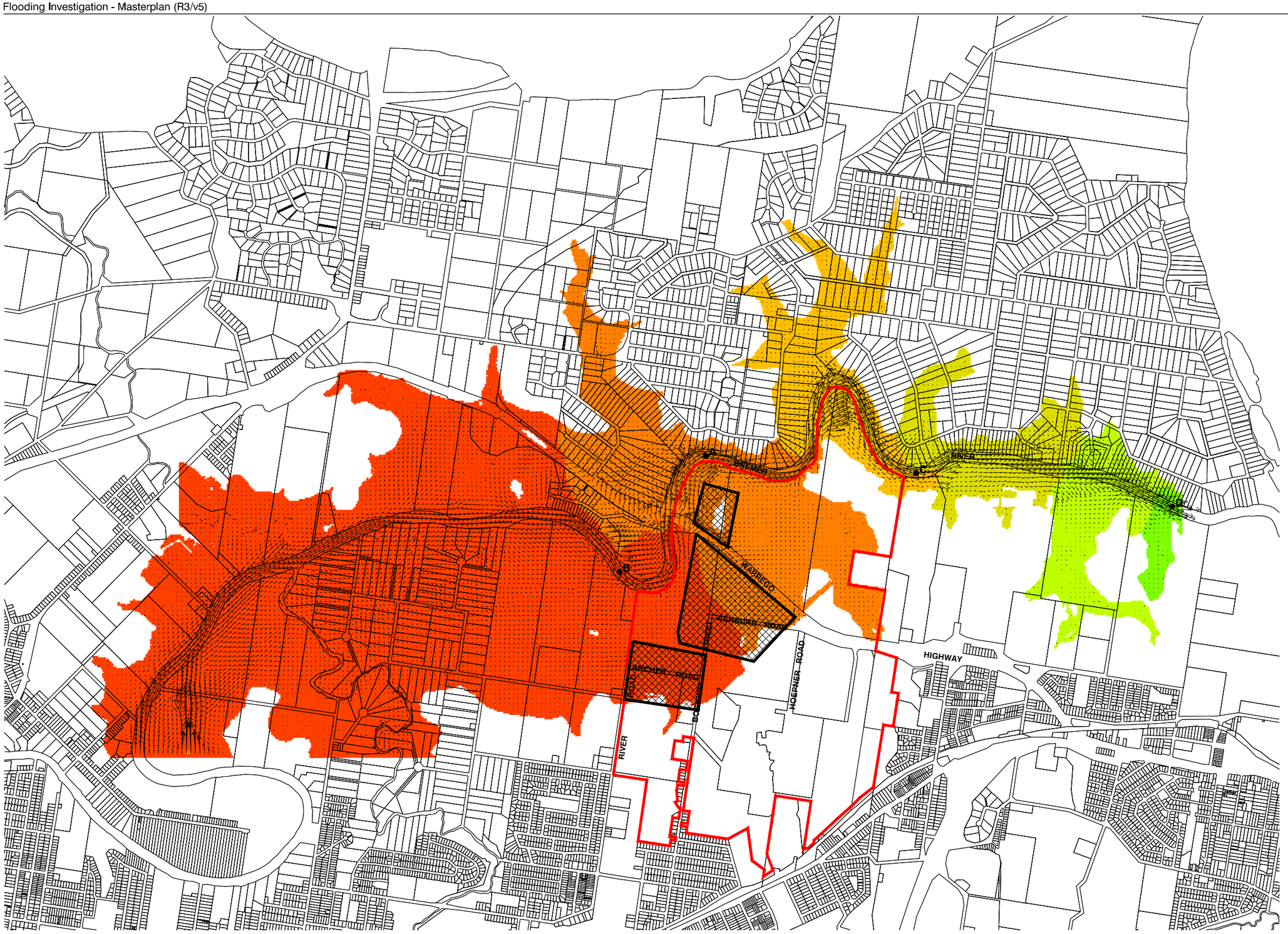
Project No.: LJ8714

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CAD FILE: C:\Users\james.martin\local settings\temp\AcPublish_5320\Figure_R3v5_E08d_Brem.dwg
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Scale 1:25000 (A3)

FIGURE F.1.8

EXISTING CURRENT - WATER SURFACE LEVELS - SKM ULTIMATE 500 YEAR EVENT (Brem_E08d)

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XREF's: xref-Results; xr-Ipswich_DCDB_MGA

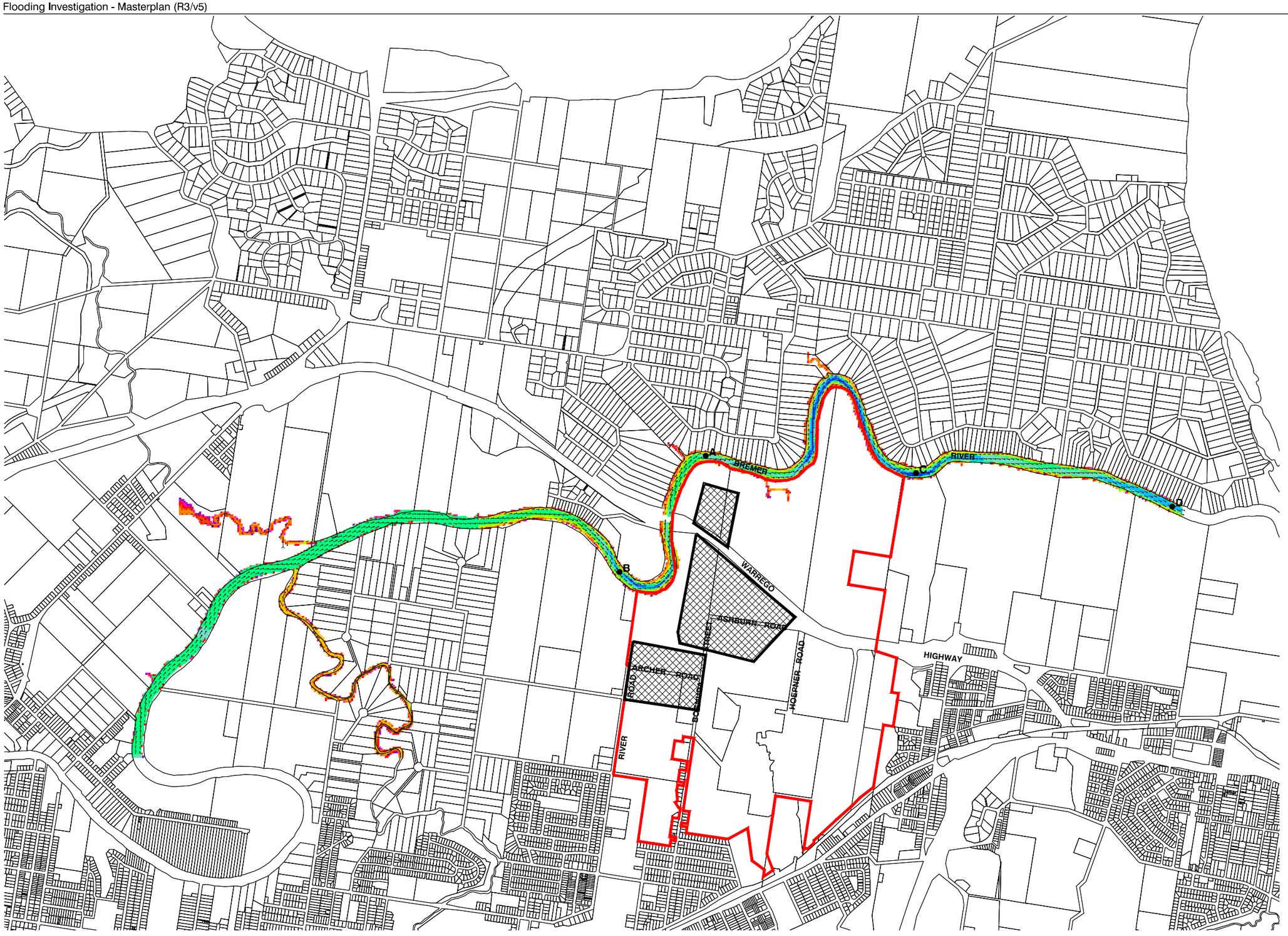
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Appendix F.2

Bremer River Flood SOBEK 2D Existing Current Case

Results – Depth

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250 0 250 500 750 1000 1250m
1:25,000

Scale 1:25000 (A3)

FIGURE F.2.1

EXISTING CURRENT - DEPTH - SKM ULTIMATE 2 YEAR EVENT (Brem_E08c)

Rev: 0 Date: May 2012

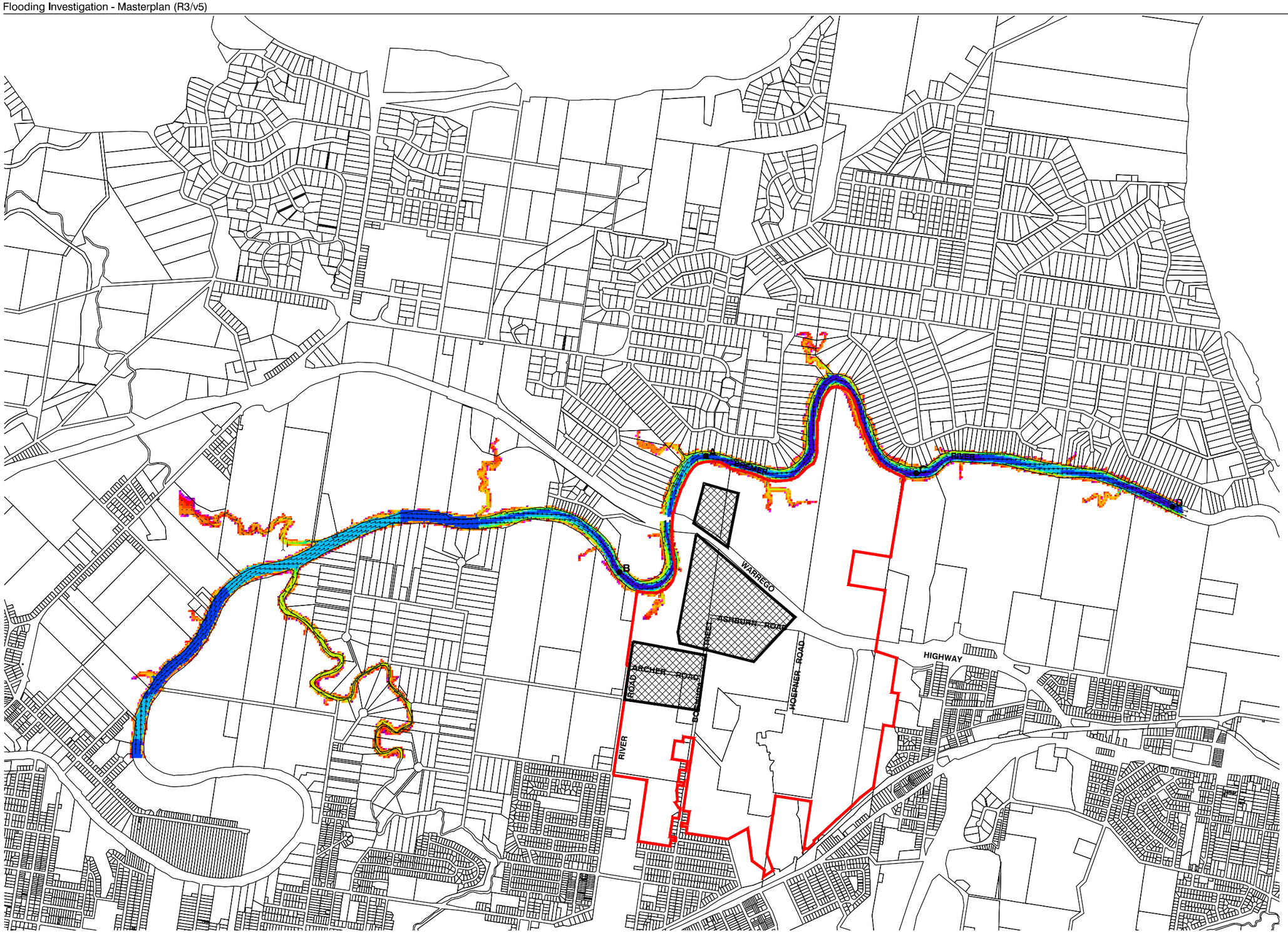
Project No.: LJ8714

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CAD FILE: C:\Users\james.martin\local settings\temp\AcPublish_5320\Figure_R3v5_E08c_Brem.dwg
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250 0 250 500 750 1000 1250m
1:25,000

Scale 1:25000 (A3)

FIGURE F.2.2

EXISTING CURRENT - DEPTH - SKM ULTIMATE 5 YEAR EVENT (Brem_E08c)

Rev: 0 Date: May 2012

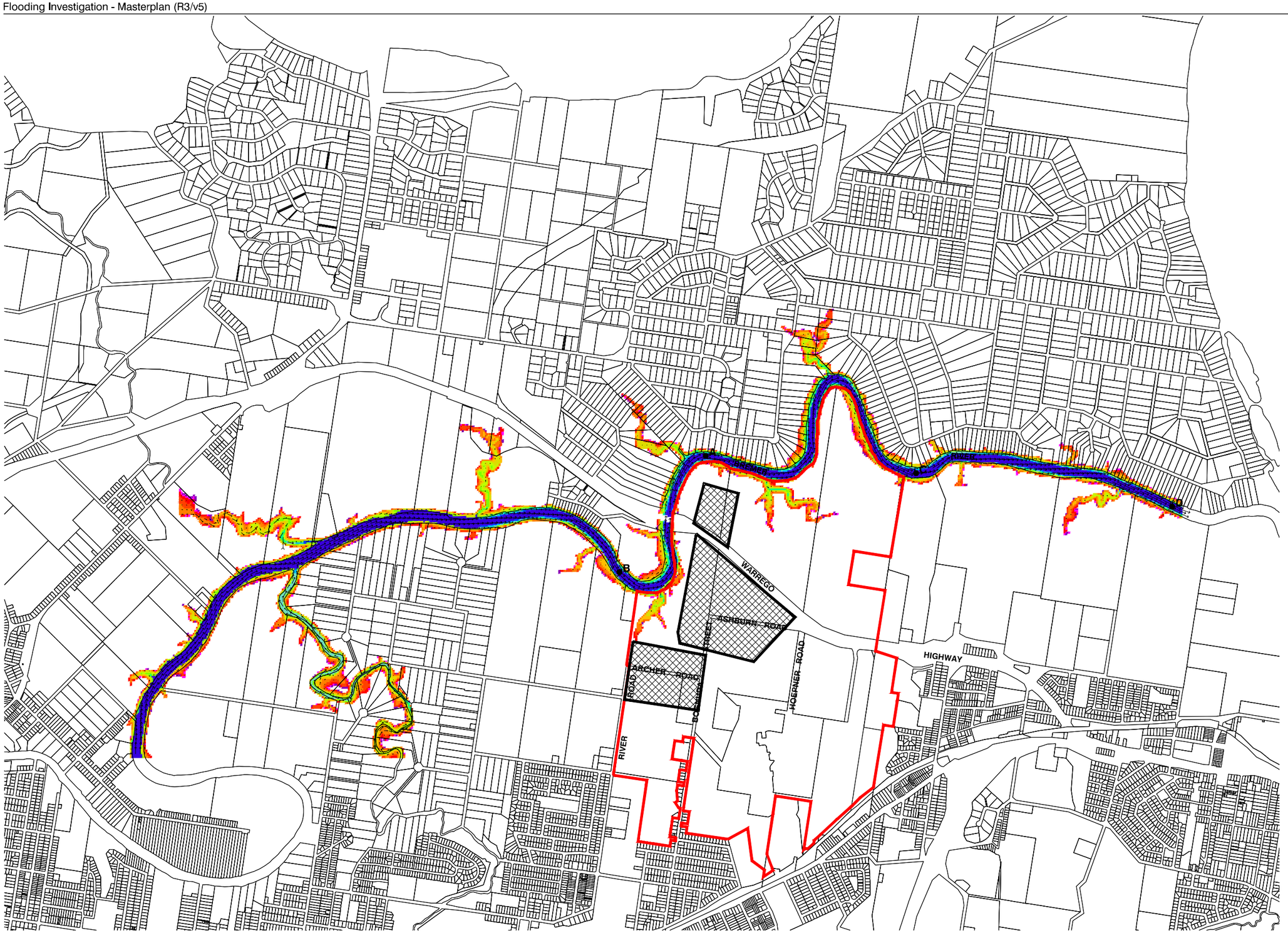
Project No.: LJ8714

Walker Corporation Pty Ltd

CAD FILE: C:\Users\james.martin\local settings\temp\AcPublish_5320\Figure_R3v5_E08c_Brem.dwg
XREF's: xref-Results; xr-Ipswich_DCDB_MGA

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250 0 250 500 750 1000 1250m
1:25,000

Scale 1:25000 (A3)

FIGURE F.2.3

EXISTING CURRENT - DEPTH - SKM ULTIMATE 10 YEAR EVENT (Brem_E08c)

Rev: 0 Date: May 2012

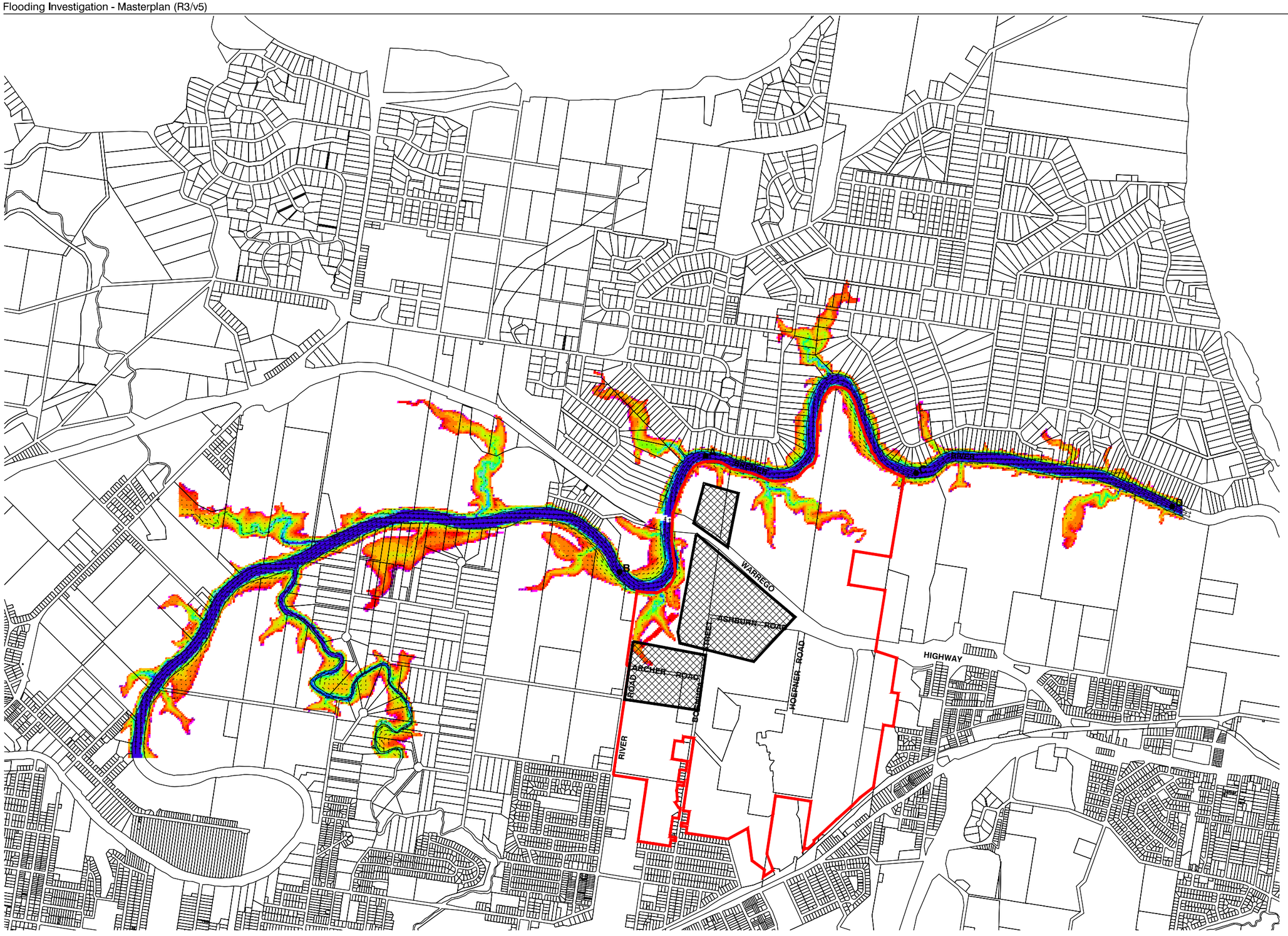
Project No.: LJ8714

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CAD FILE: C:\Users\james.martin\local settings\temp\AcPublish_5320\Figure_R3v5_E08c_Brem.dwg
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250 0 250 500 750 1000 1250m
1:25,000

Scale 1:25000 (A3)

FIGURE F.2.4

EXISTING CURRENT - DEPTH - SKM ULTIMATE 20 YEAR EVENT (Brem_E08c)

Rev: 0 Date: May 2012

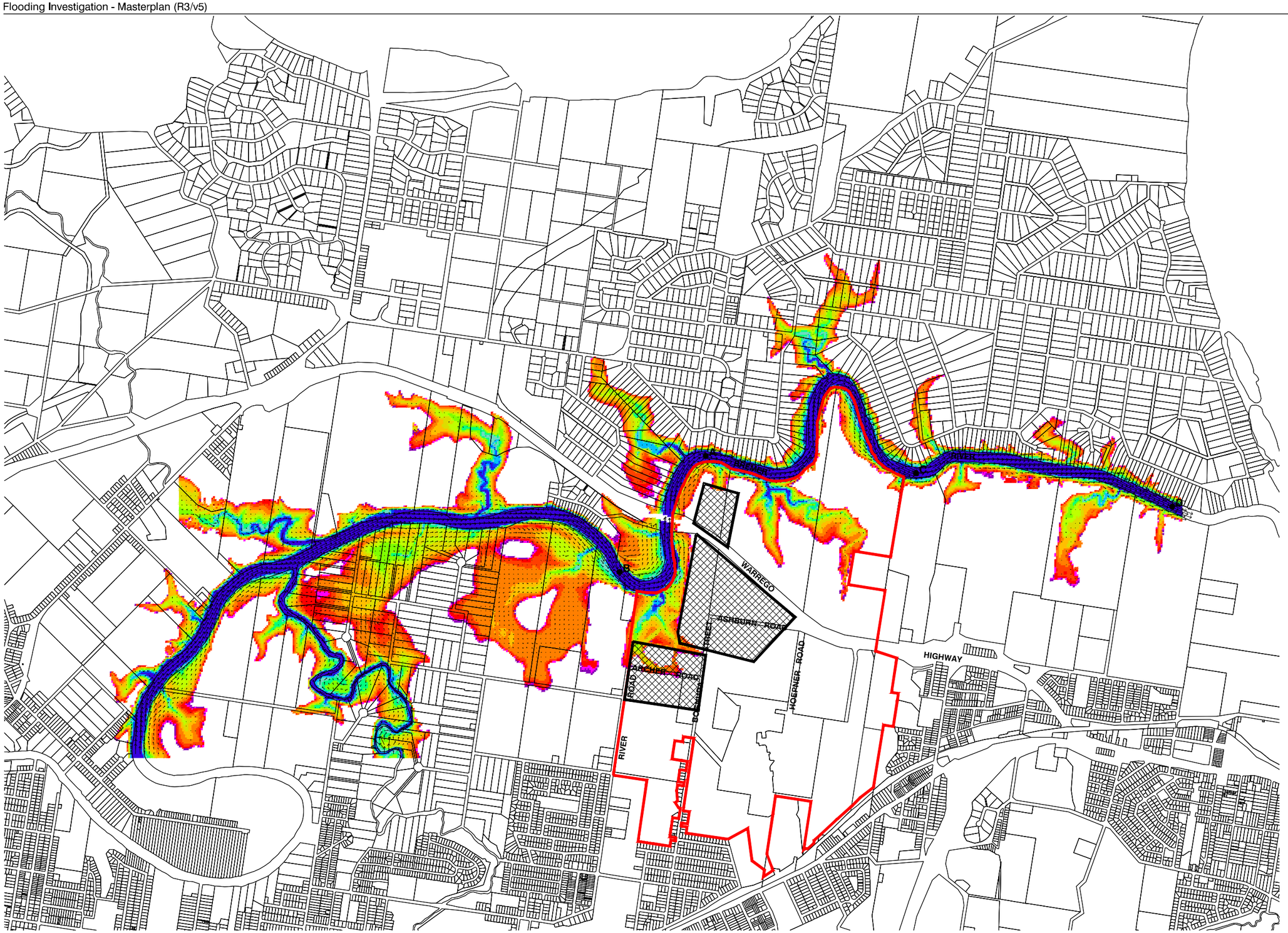
Project No.: LJ8714

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XREF's: xref-Results; xr-Ipswich_DCDB_MGA

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250 0 250 500 750 1000 1250m
1:25,000

Scale 1:25000 (A3)

FIGURE F.2.5

EXISTING CURRENT - DEPTH - SKM ULTIMATE 50 YEAR EVENT (Brem_E08c)

Rev: 0 Date: May 2012

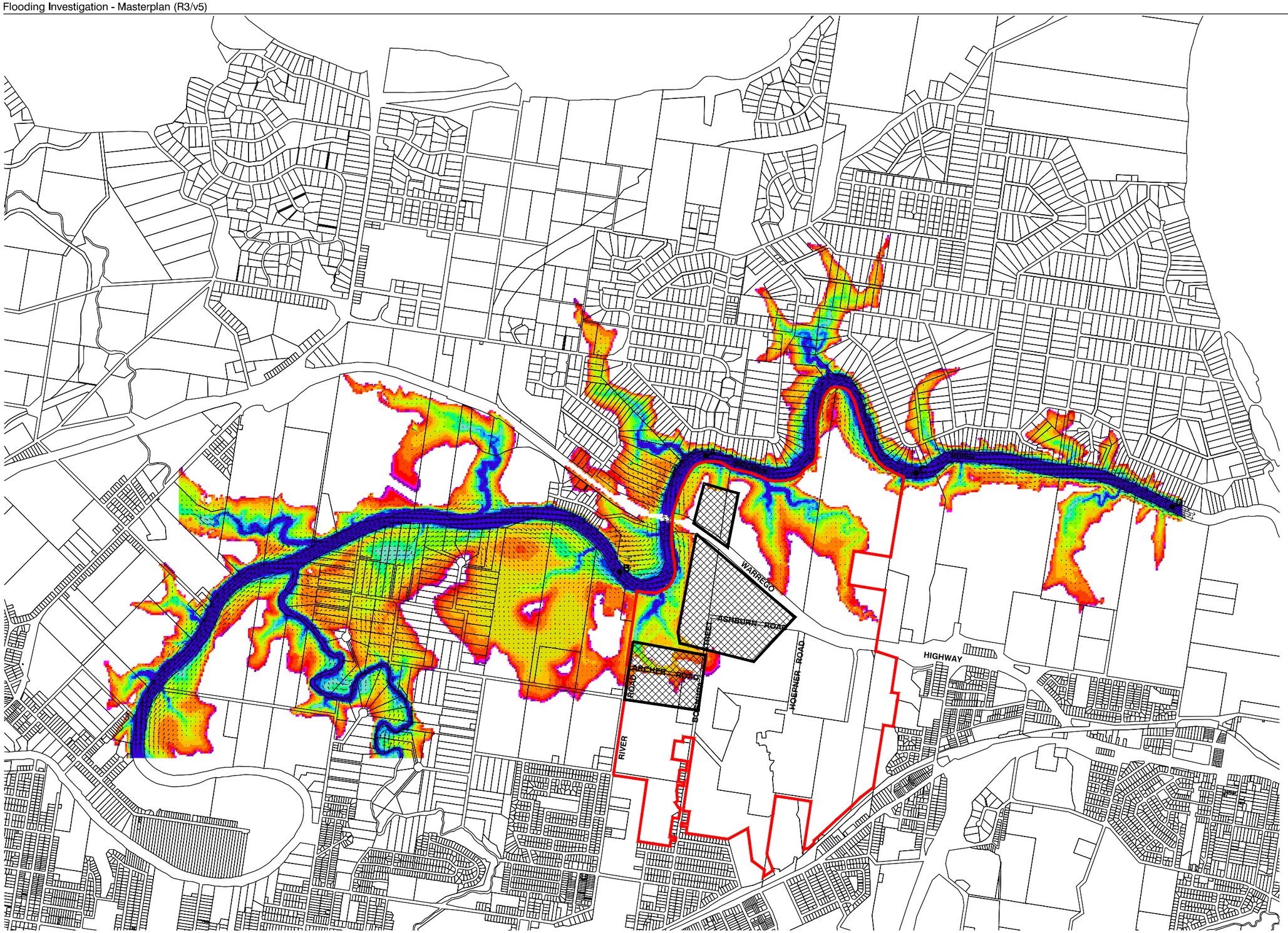
Project No.: LJ8714

Walker Corporation Pty Ltd

CAD FILE: C:\Users\james.martin\local settings\temp\AcPublish_5320\Figure_R3v5_E08c_Brem.dwg
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250 0 250 500 750 1000 1250m
1:25,000

Scale 1:25000 (A3)

FIGURE F.2.6

EXISTING CURRENT - DEPTH - SKM ULTIMATE 100 YEAR EVENT (Brem_E08d)

Rev: 0 Date: May 2012

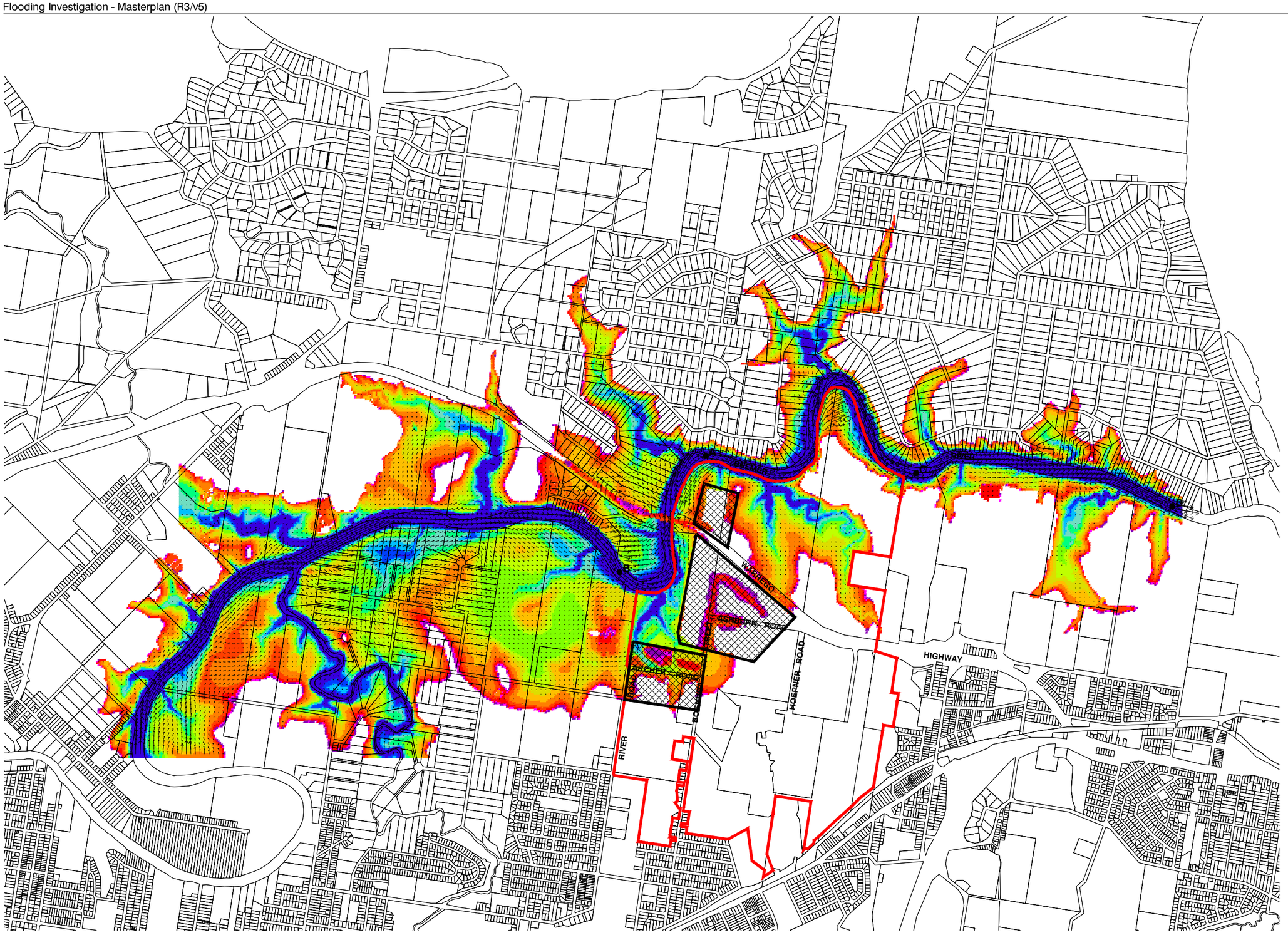
Project No.: LJ8714

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CAD FILE: C:\Users\james.martin\local settings\temp\AcPublish_5320\Figure_R3v5_E08d_Brem.dwg
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Scale 1:25000 (A3)

FIGURE F.2.7

EXISTING CURRENT - DEPTH - SKM ULTIMATE 200 YEAR EVENT (Brem_E08d)

Rev: 0 Date: May 2012

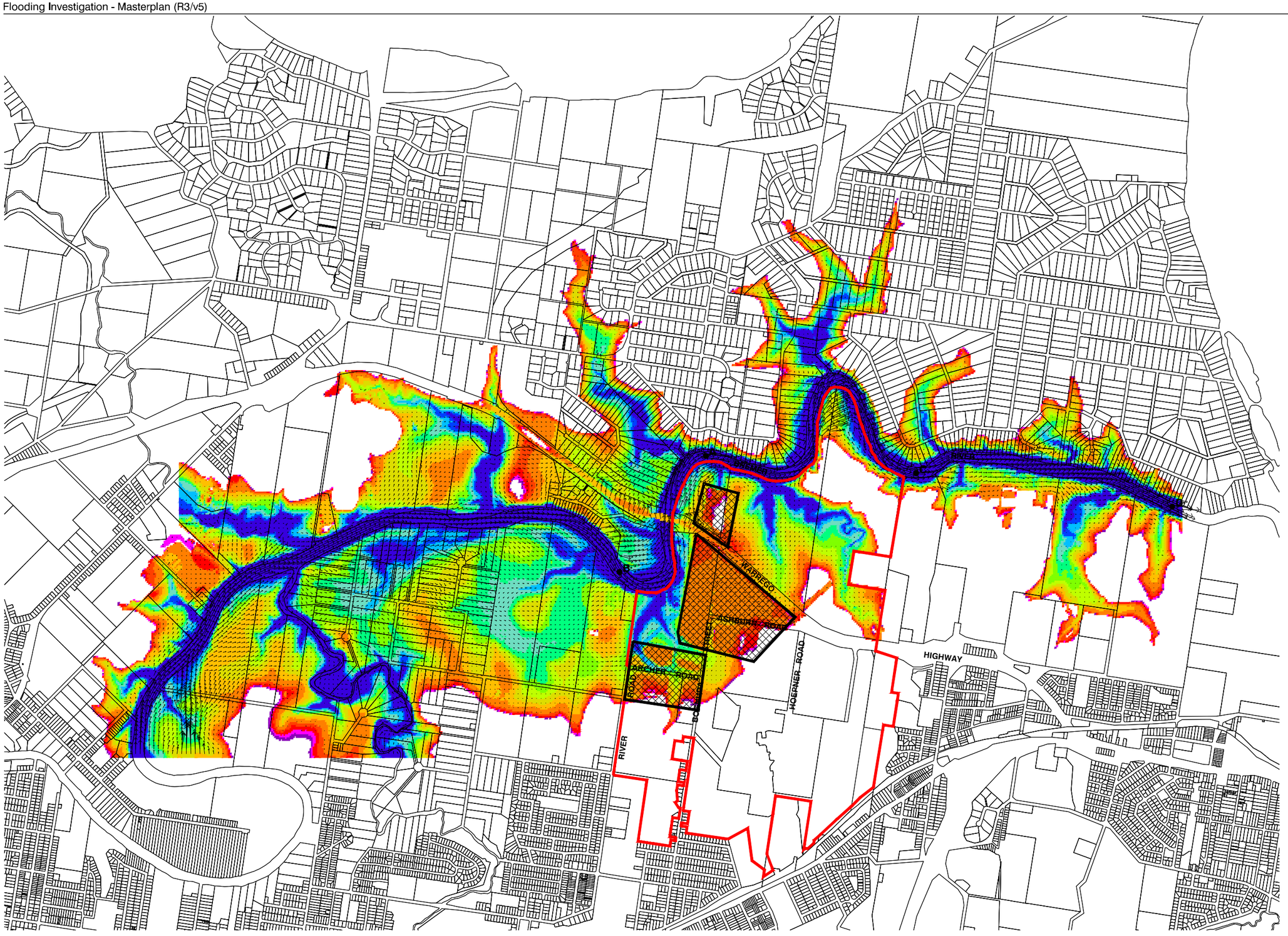
Project No.: LJ8714

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CAD FILE: C:\Users\james.martin\local settings\temp\AcPublish_5320\Figure_R3v5_E08d_Brem.dwg
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250 0 250 500 750 1000 1250m
1:25,000

Scale 1:25000 (A3)

FIGURE F.2.8

EXISTING CURRENT - DEPTH - SKM ULTIMATE 500 YEAR EVENT (Brem_E08d)

Rev: 0 Date: May 2012

Project No.: LJ8714

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XREF's: xref-Results; xr-Ipswich_DCDB_MGA

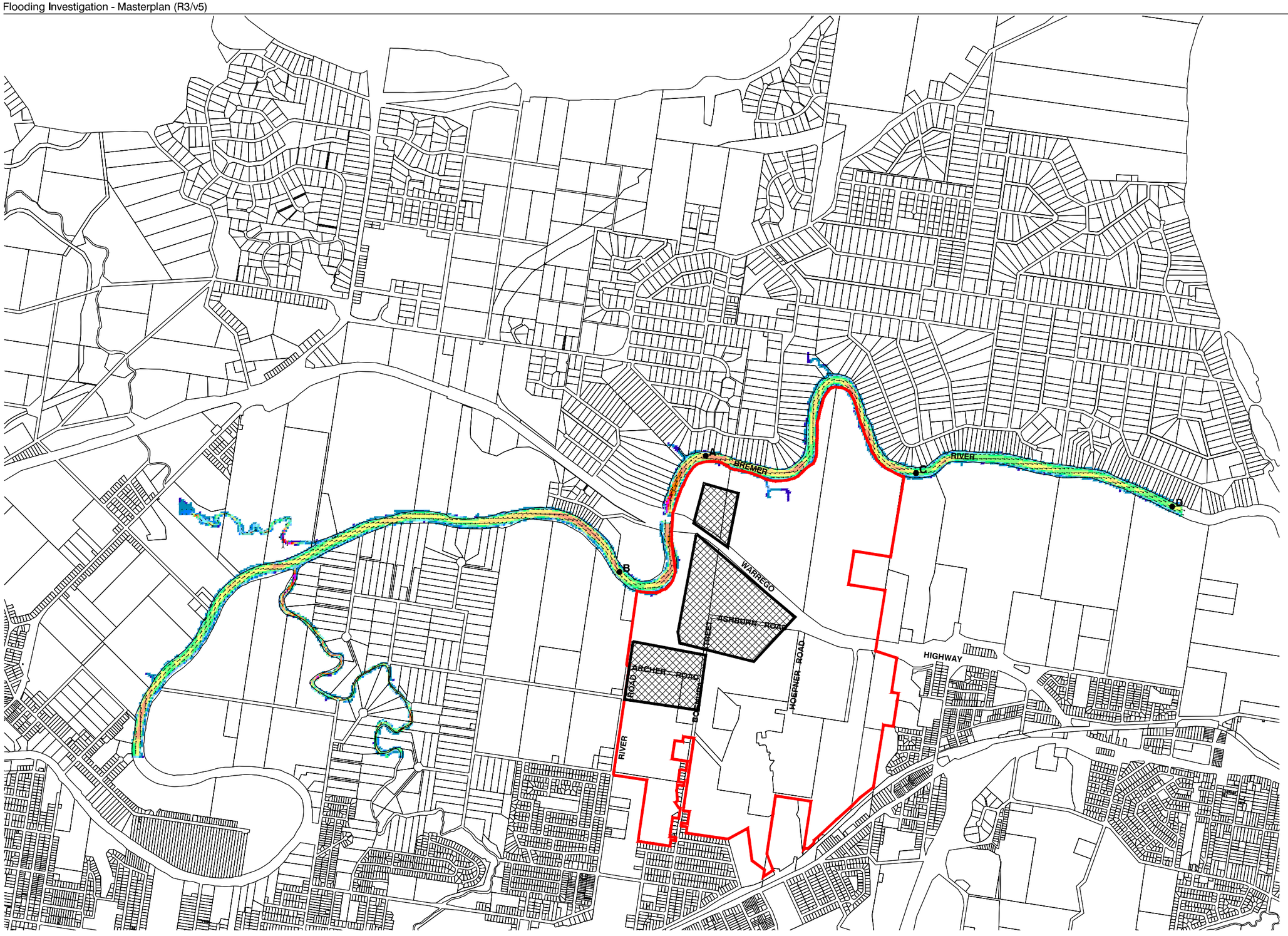
PRINT DATE: 11 May, 2012 - 3:24pm

Appendix F.3

Bremer River Flood SOBEK 2D Existing Current Case

Results – Speed

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250 0 250 500 750 1000 1250m
1:25,000

Scale 1:25000 (A3)

FIGURE F.3.1

EXISTING CURRENT - SPEED - SKM ULTIMATE 2 YEAR EVENT (Brem_E08c)

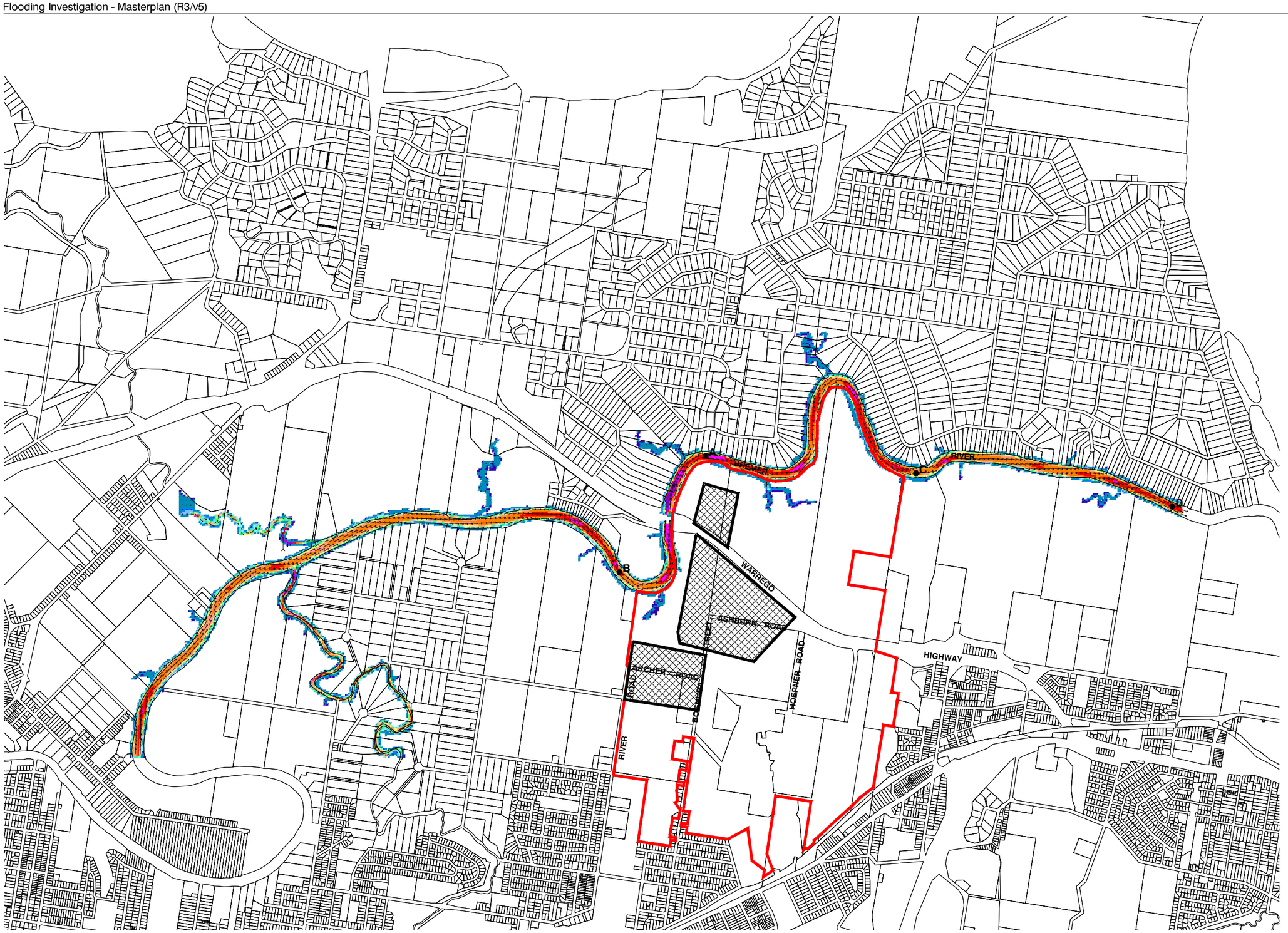
Rev: 0 Date: May 2012

Project No.: LJ8714

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250 0 250 500 750 1000 1250m
1:25,000

Scale 1:25000 (A3)

FIGURE F.3.2

EXISTING CURRENT - SPEED - SKM ULTIMATE 5 YEAR EVENT (Brem_E08c)

Rev: 0 Date: May 2012

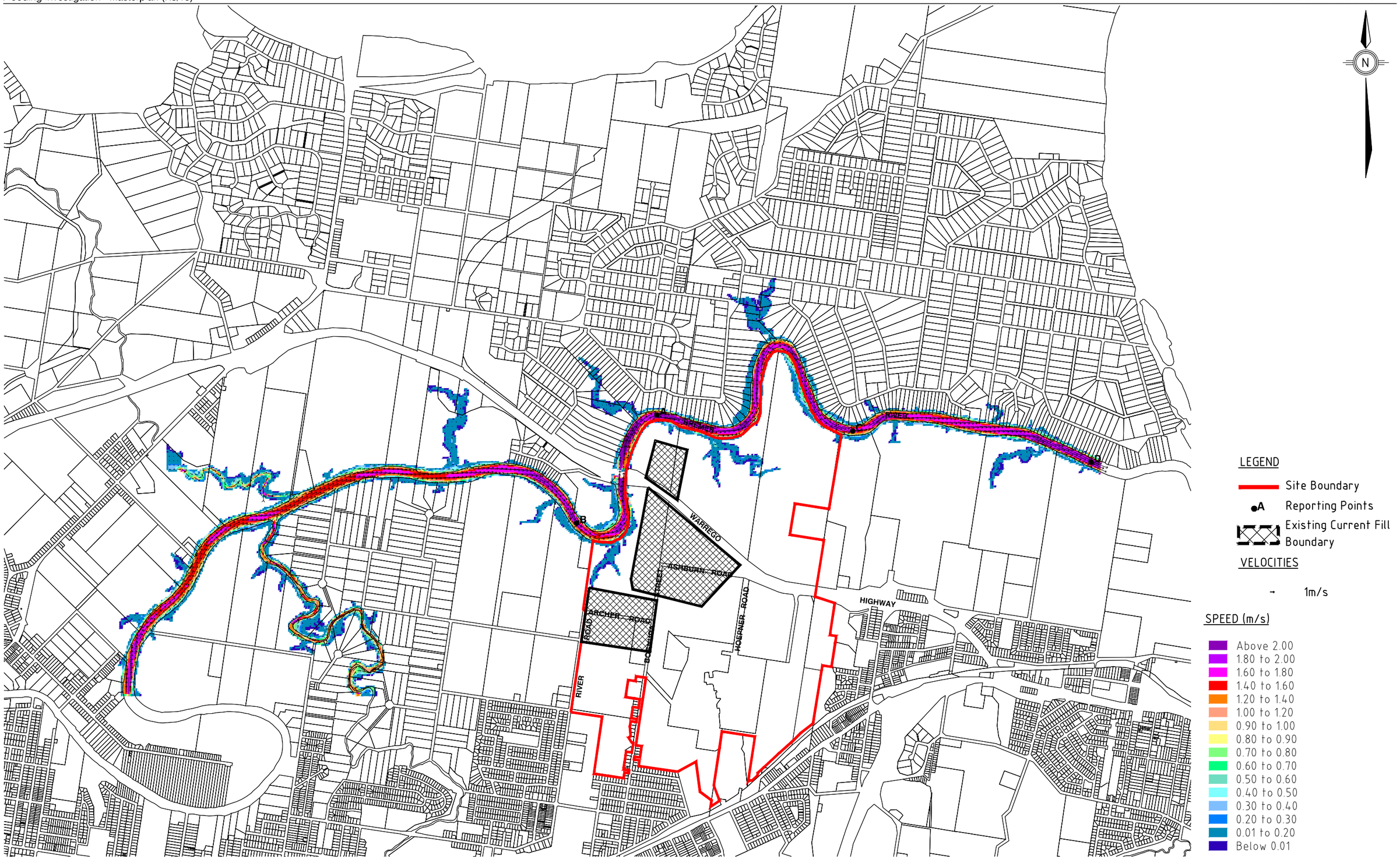
Project No.: LJ8714

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CAD FILE: C:\Users\james.martin\local settings\temp\AcPublish_5320\Figure_R3v5_E08c_Brem.dwg
XREF's: xref-Results; xr-Ipswich_DCDB_MGA

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250 0 250 500 750 1000 1250m
1:25,000

Scale 1:25000 (A3)

FIGURE F.3.3
EXISTING CURRENT - SPEED - SKM ULTIMATE 10 YEAR EVENT (Brem_E08c)

Rev: 0 Date: May 2012

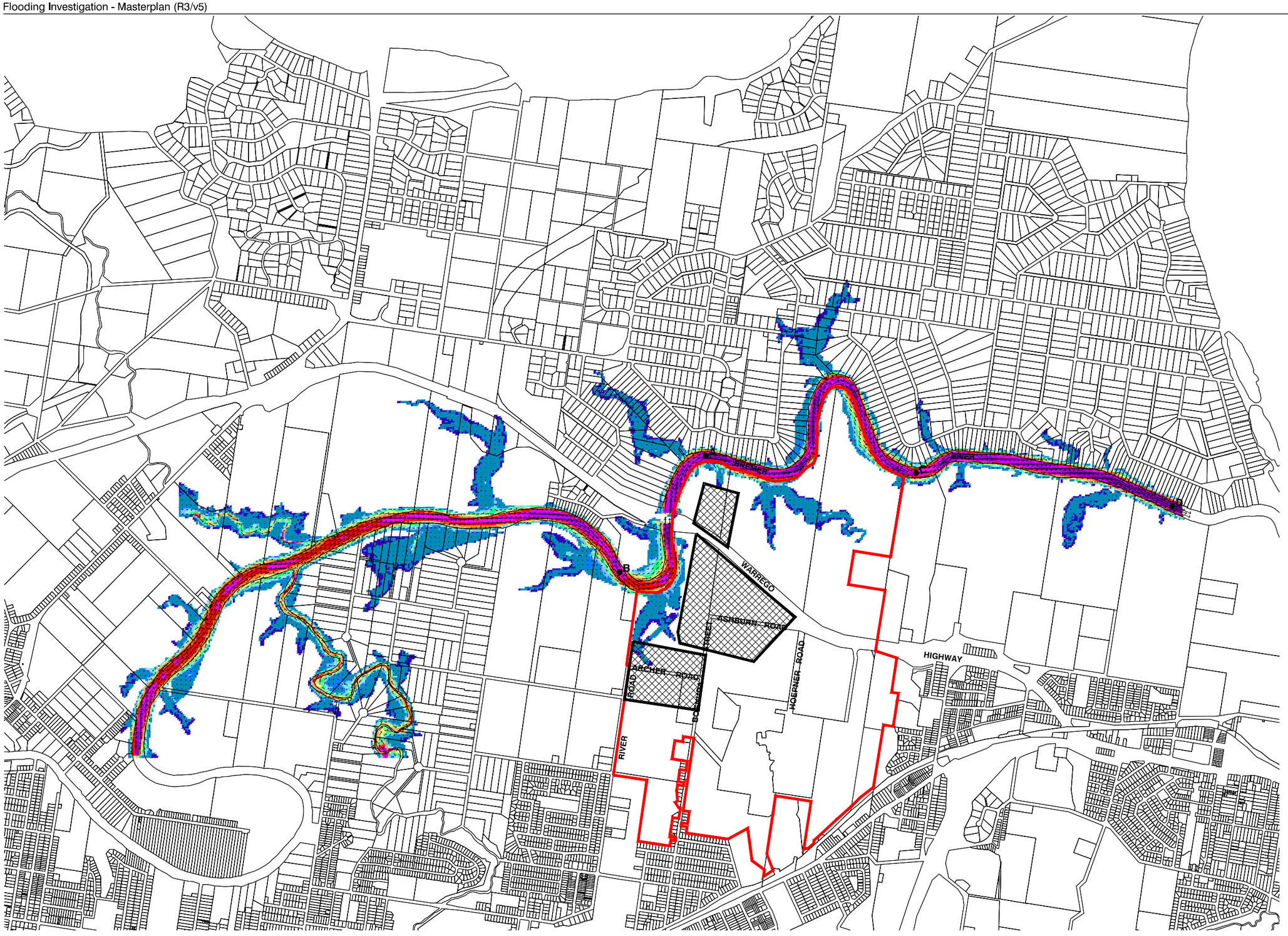
Project No.: LJ8714

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250 0 250 500 750 1000 1250m
1:25,000

Scale 1:25000 (A3)

FIGURE F.3.4

EXISTING CURRENT - SPEED - SKM ULTIMATE 20 YEAR EVENT (Brem_E08c)

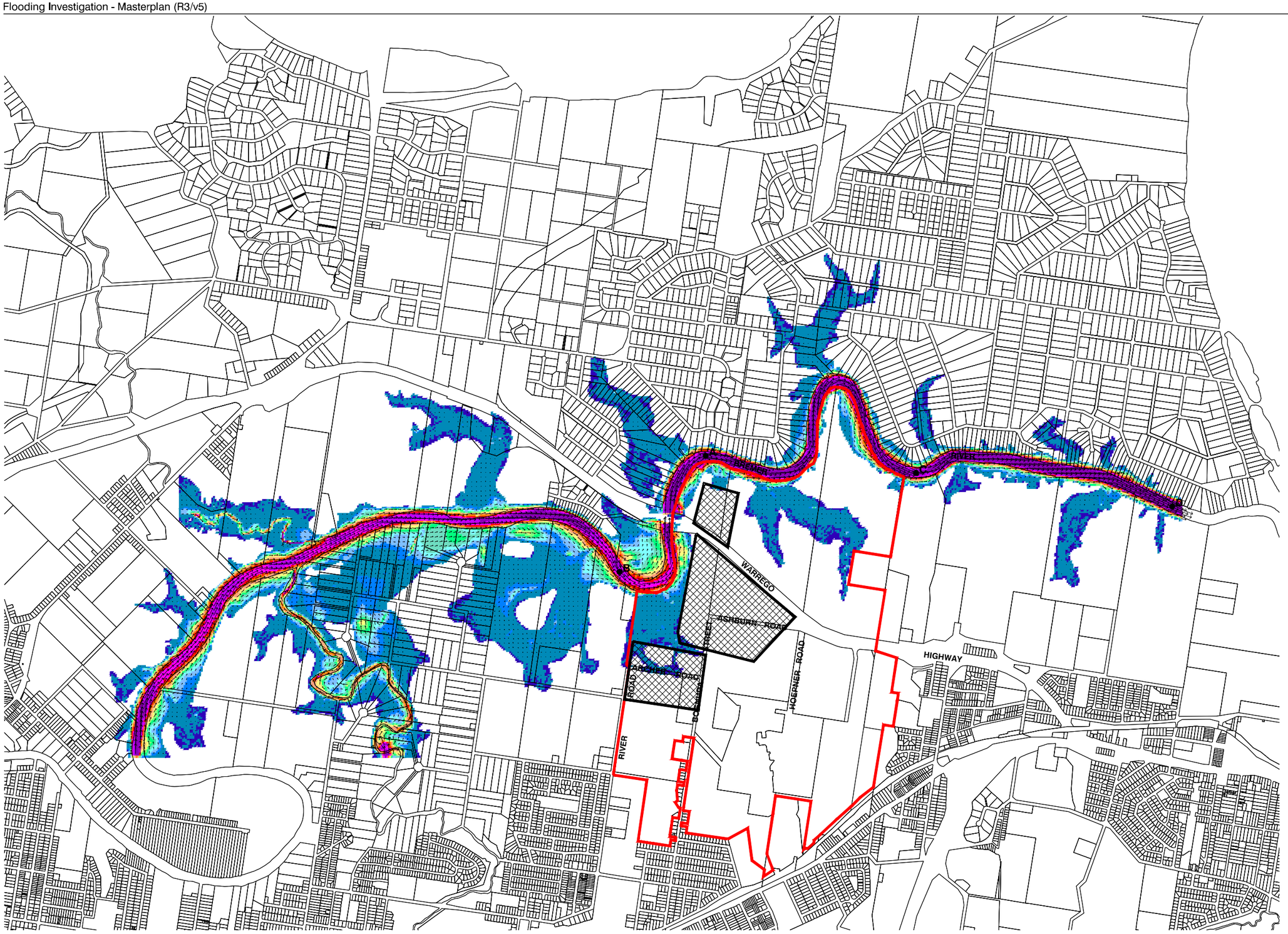
Rev: 0 Date: May 2012

Project No.: LJ8714

Walker Corporation Pty Ltd

CAD FILE: C:\Users\james.martin\local settings\temp\AcPublish_5320\Figure_R3v5_E08c_Brem.dwg
XREF's: xref-Results; xr-Ipswich_DCDB_MGA
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250 0 250 500 750 1000 1250m
1:25,000

Scale 1:25000 (A3)

FIGURE F.3.5

EXISTING CURRENT - SPEED - SKM ULTIMATE 50 YEAR EVENT (Brem_E08c)

Rev: 0 Date: May 2012

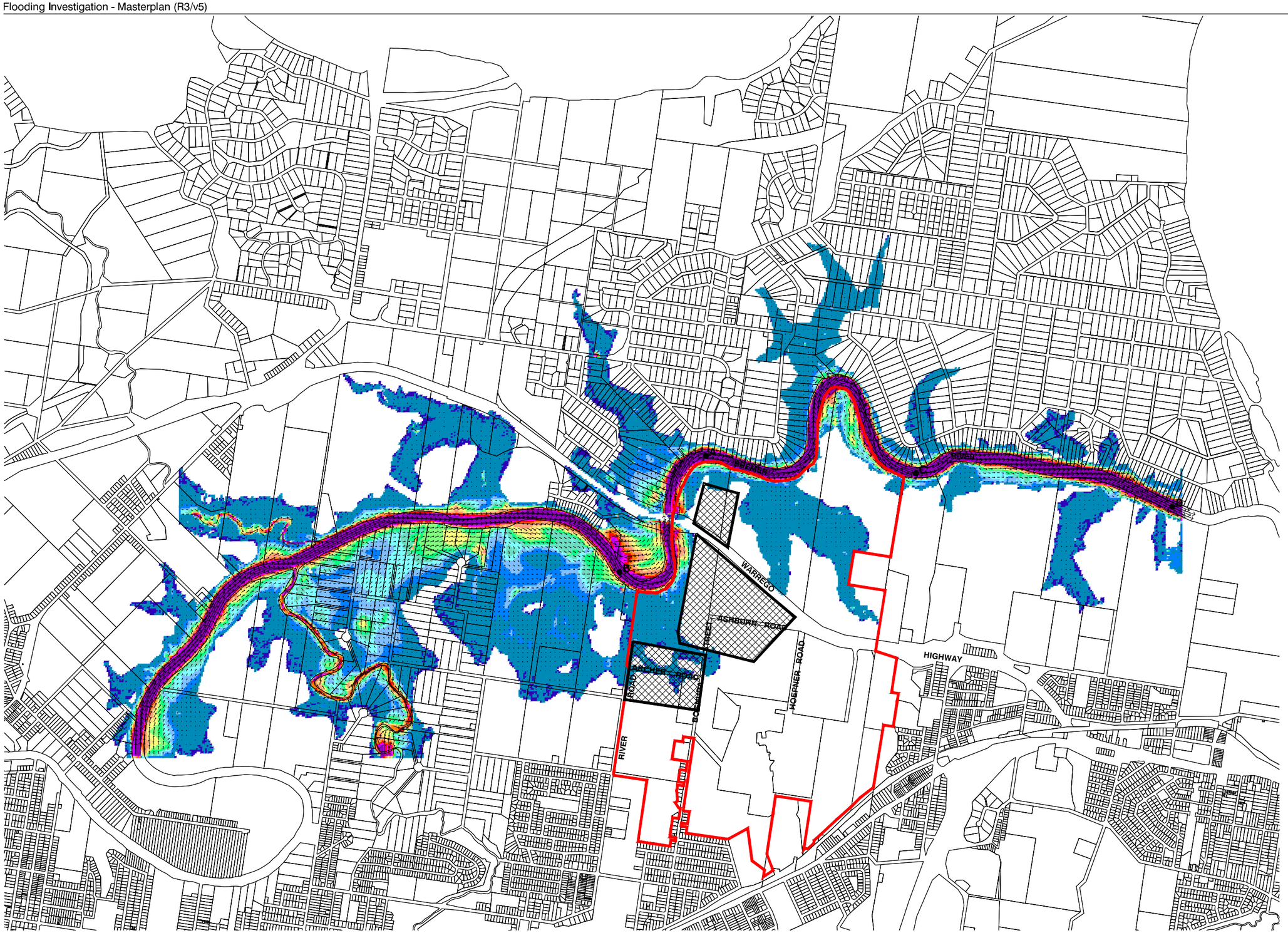
Project No.: LJ8714

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CAD FILE: C:\Users\james.martin\local settings\temp\AcPublish_5320\Figure_R3v5_E08c_Brem.dwg
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Scale 1:25000 (A3)

FIGURE F.3.6

EXISTING CURRENT - SPEED - SKM ULTIMATE 100 YEAR EVENT (Brem_E08d)

Rev: 0 Date: May 2012

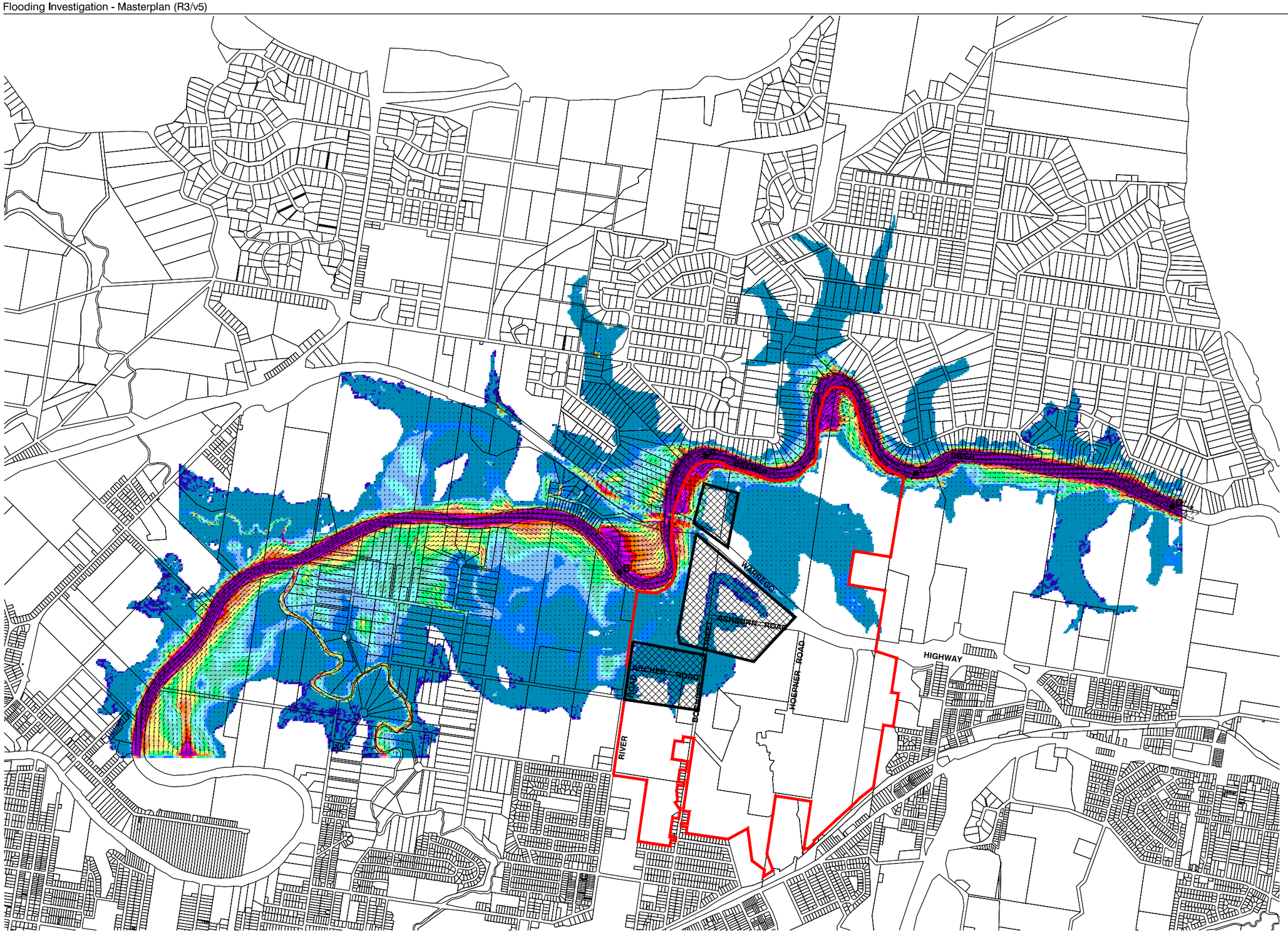
Project No.: LJ8714

Walker Corporation Pty Ltd

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XREF's: xref-Results; xr-Ipswich_DCDB_MGA

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250 0 250 500 750 1000 1250m
1:25,000

Scale 1:25000 (A3)

FIGURE F.3.7

EXISTING CURRENT - SPEED - SKM ULTIMATE 200 YEAR EVENT (Brem_E08d)

Rev: 0 Date: May 2012

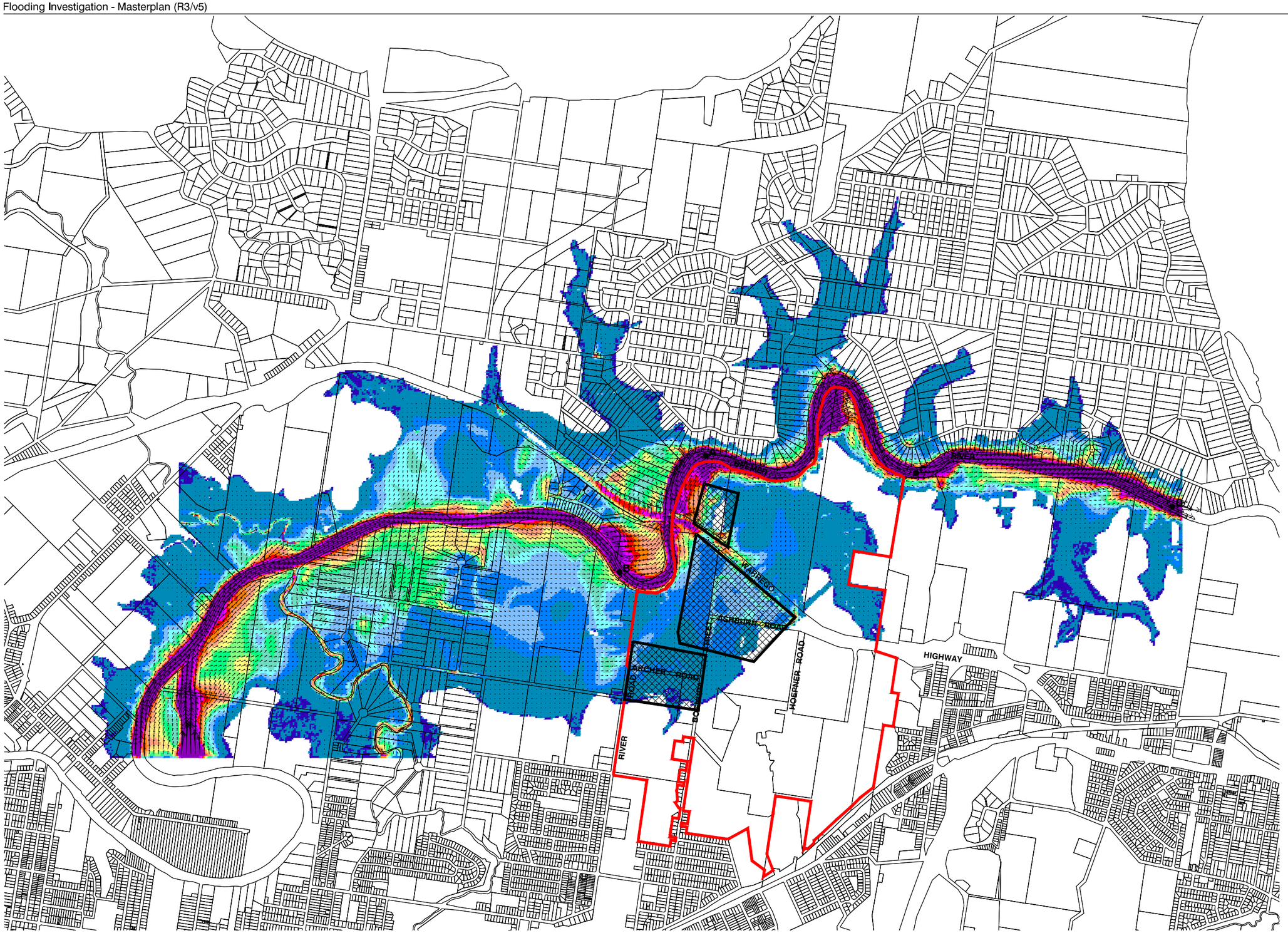
Project No.: LJ8714

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250 0 250 500 750 1000 1250m
1:25,000

Scale 1:25000 (A3)

FIGURE F.3.8

EXISTING CURRENT - SPEED - SKM ULTIMATE 500 YEAR EVENT (Brem_E08d)

Rev: 0 Date: May 2012

Project No.: LJ8714

Walker Corporation Pty Ltd

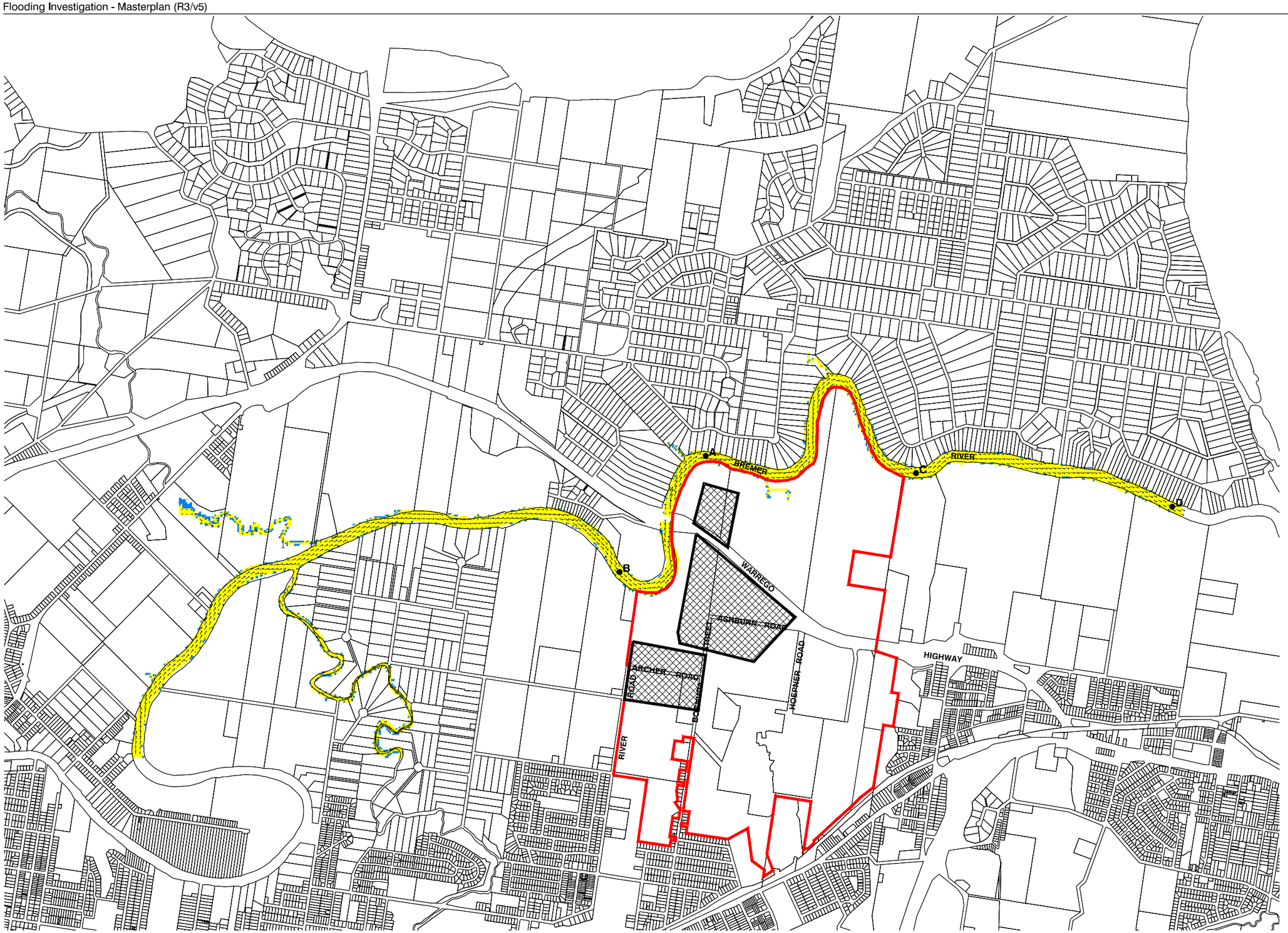
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XREF's: xref-Results; xr-Ipswich_DCDB_MGA
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Appendix F.4

Bremer River Flood SOBEK 2D Existing Current Case

Results – Hazard (Safety Product)

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250 0 250 500 750 1000 1250m
1:25,000

Scale 1:25000 (A3)

FIGURE F.4.1

EXISTING CURRENT - HAZARD (SAFETY PRODUCT) - SKM ULTIMATE 2 YEAR EVENT (Brem_E08c)

Rev: 0 Date: May 2012

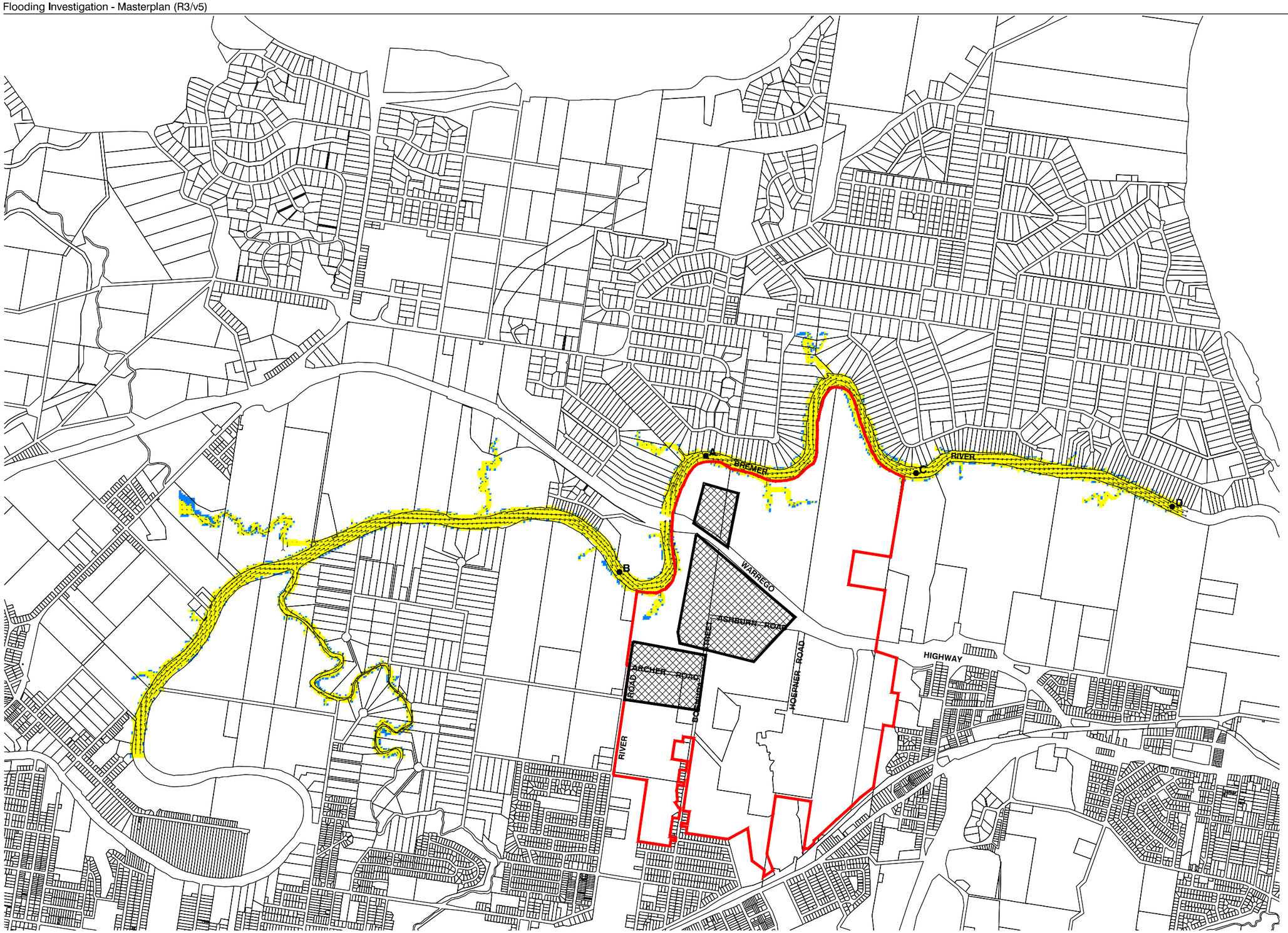
Project No.: LJ8714

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CAD FILE: C:\Users\james.martin\local settings\temp\AcPublish_5320\Figure_R3v5_E08c_Brem.dwg
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Scale 1:25000 (A3)

FIGURE F.4.2

EXISTING CURRENT - HAZARD (SAFETY PRODUCT) - SKM ULTIMATE 5 YEAR EVENT (Brem_E08c)

Rev: 0 Date: May 2012

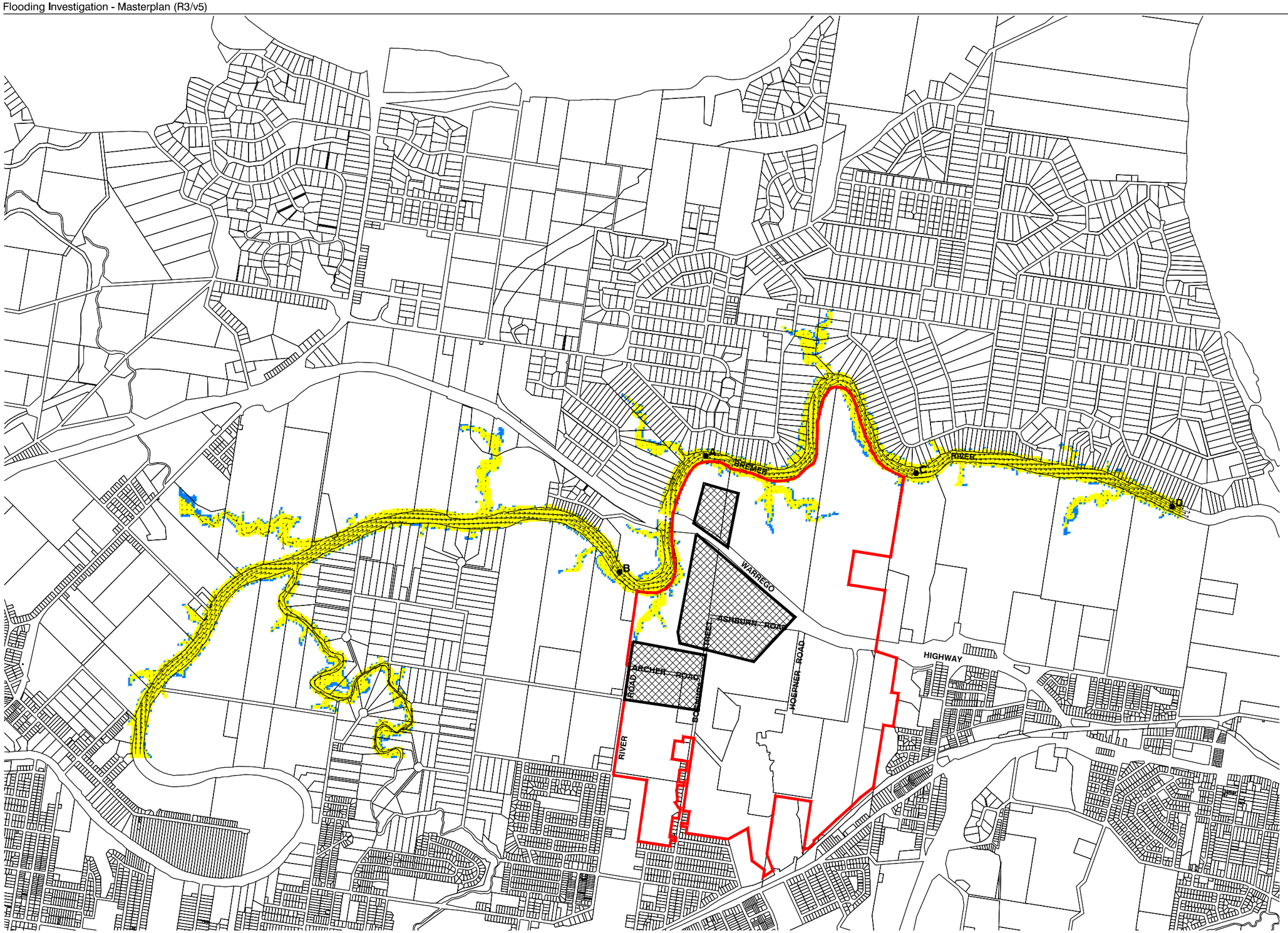
Project No.: LJ8714

Walker Corporation Pty Ltd

CAD FILE: C:\Users\james.martin\local settings\temp\AcPublish_5320\Figure_R3v5_E08c_Brem.dwg
XREF's: xref-Results; xr-Ipswich_DEDB_MGA

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250 0 250 500 750 1000 1250m
1:25,000

Scale 1:25000 (A3)

FIGURE F.4.3
EXISTING CURRENT - HAZARD (SAFETY PRODUCT) - SKM ULTIMATE 10 YEAR EVENT (Brem_E08c)

Rev: 0 Date: May 2012

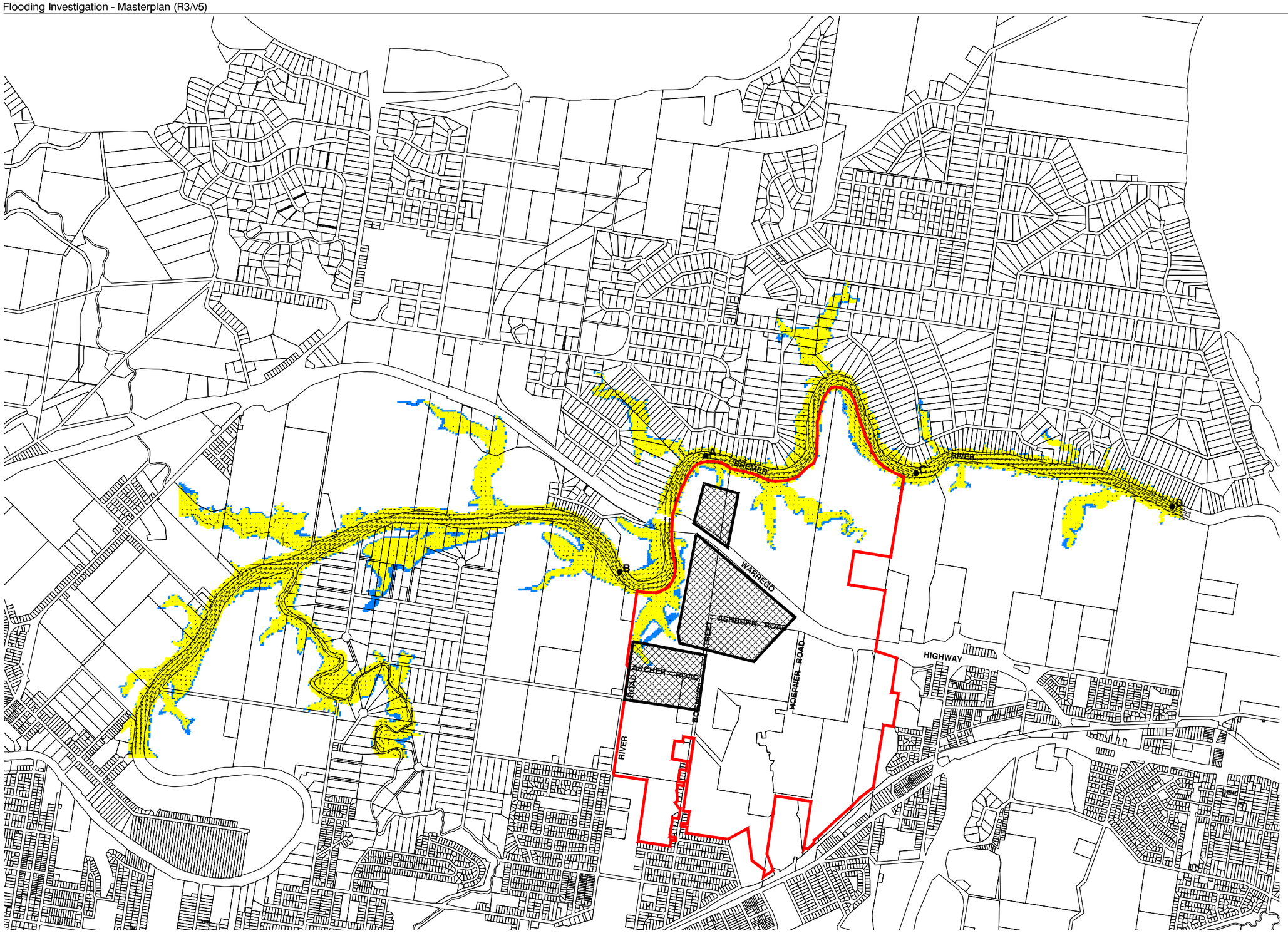
Project No.: LJ8714

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Scale 1:25000 (A3)

FIGURE F.4.4

EXISTING CURRENT - HAZARD (SAFETY PRODUCT) - SKM ULTIMATE 20 YEAR EVENT (Brem_E08c)

Rev: 0 Date: May 2012

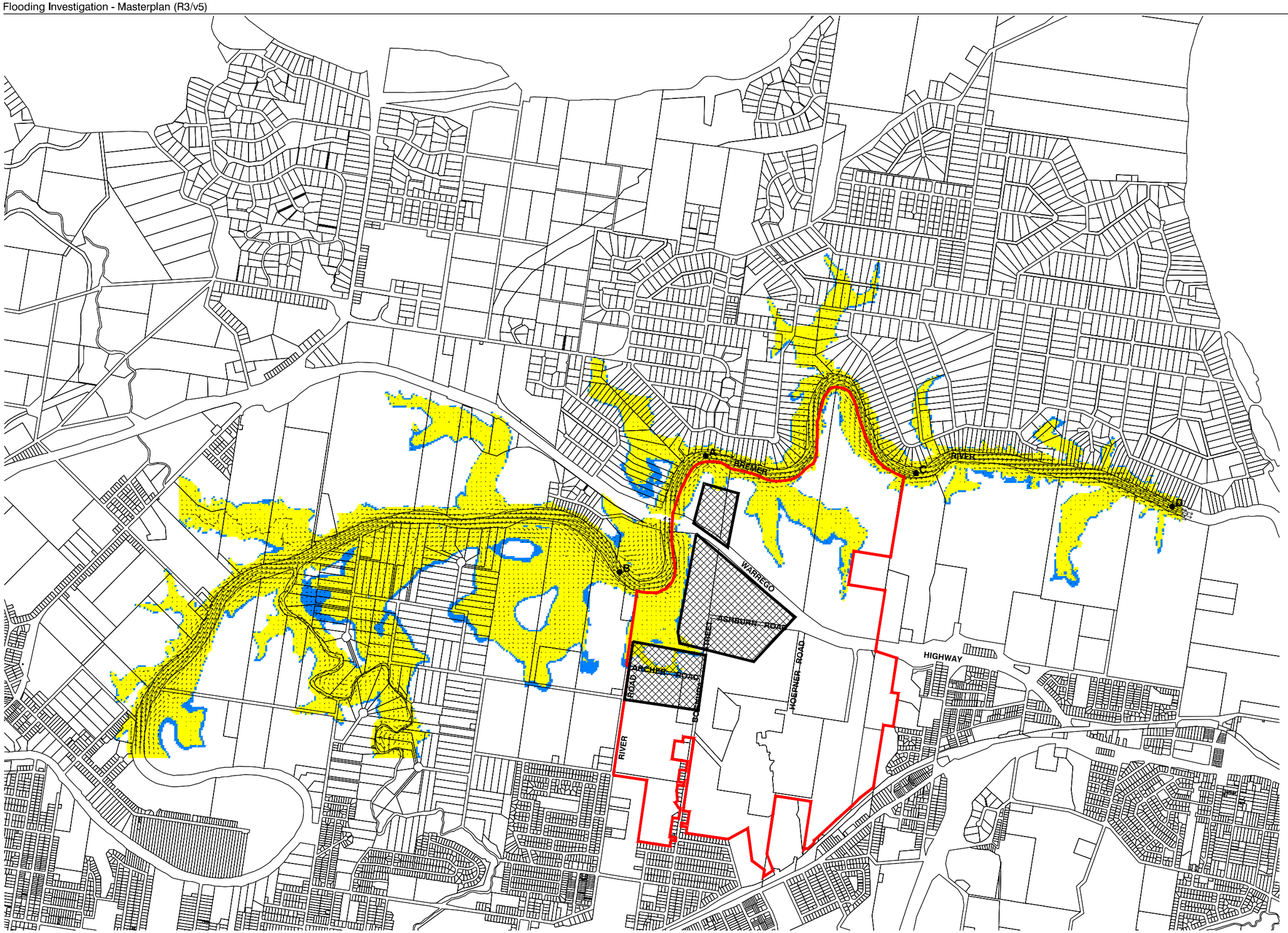
Project No.: LJ8714

Walker Corporation Pty Ltd

CAD FILE: C:\Users\james.martin\local settings\temp\AcPublish_5320\Figure_R3v5_E08c_Brem.dwg
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Scale 1:25000 (A3)

FIGURE F.4.5

EXISTING CURRENT - HAZARD (SAFETY PRODUCT) - SKM ULTIMATE 50 YEAR EVENT (Brem_E08c)

Rev: 0 Date: May 2012

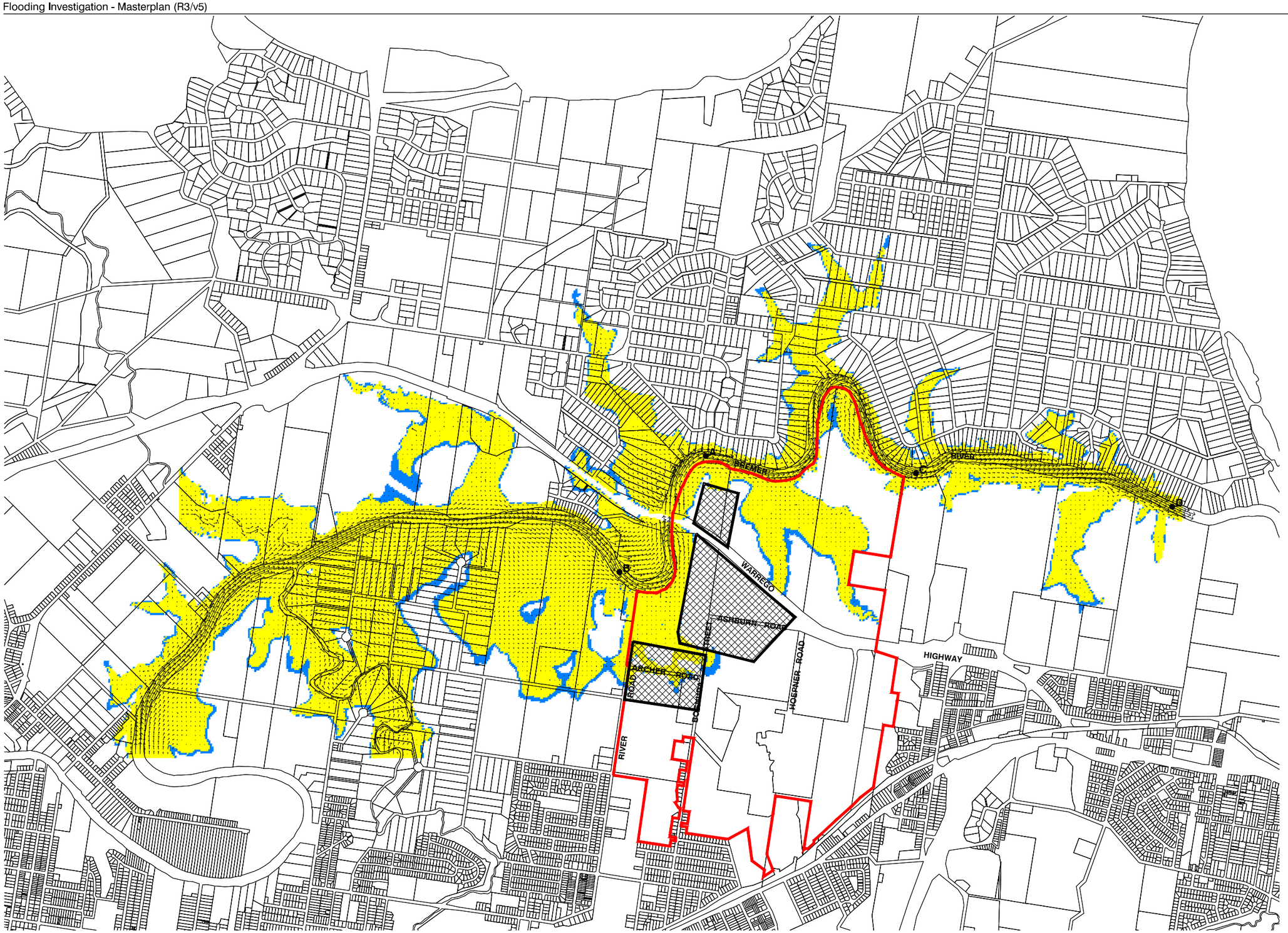
Project No.: LJ8714

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CAD FILE: C:\Users\james.martin\local settings\temp\AcPublish_5320\Figure_R3v5_E08c_Brem.dwg
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250 0 250 500 750 1000 1250m
1:25,000

Scale 1:25000 (A3)

FIGURE F.4.6

EXISTING CURRENT - HAZARD (SAFETY PRODUCT) - SKM ULTIMATE 100 YEAR EVENT (Brem_E08d)

Rev: 0 Date: May 2012

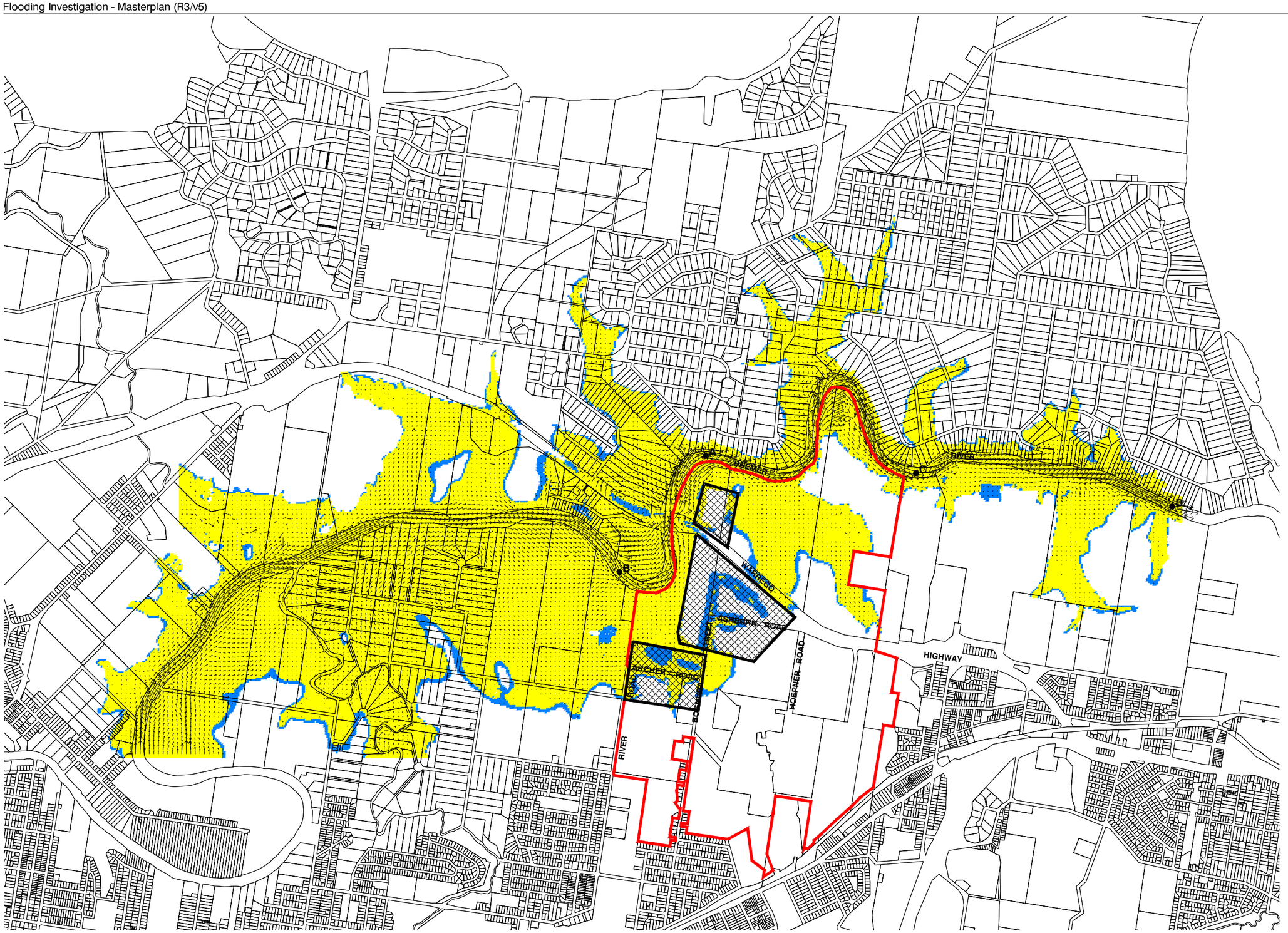
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Scale 1:25000 (A3)

FIGURE F.4.7

EXISTING CURRENT - HAZARD (SAFETY PRODUCT) - SKM ULTIMATE 200 YEAR EVENT (Brem_E08d)

Rev: 0 Date: May 2012

Project No.: LJ8714

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CAD FILE: O:\LJ8714\Figures\R3v5_Masterplan_Flooding\Appendices\App F\Figure_R3v5_E08d_Brem.dwg
XREF's: xref-Results; xr-Ipswich_DCDB_MGA

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250 0 250 500 750 1000 1250m
1:25,000

Scale 1:25000 (A3)

FIGURE F.4.8

EXISTING CURRENT - HAZARD (SAFETY PRODUCT) - SKM ULTIMATE 500 YEAR EVENT (Brem_E08d)

Rev: 0 Date: May 2012

Project No.: LJ8714

PRINT DATE: 11 May, 2012 - 5:01pm

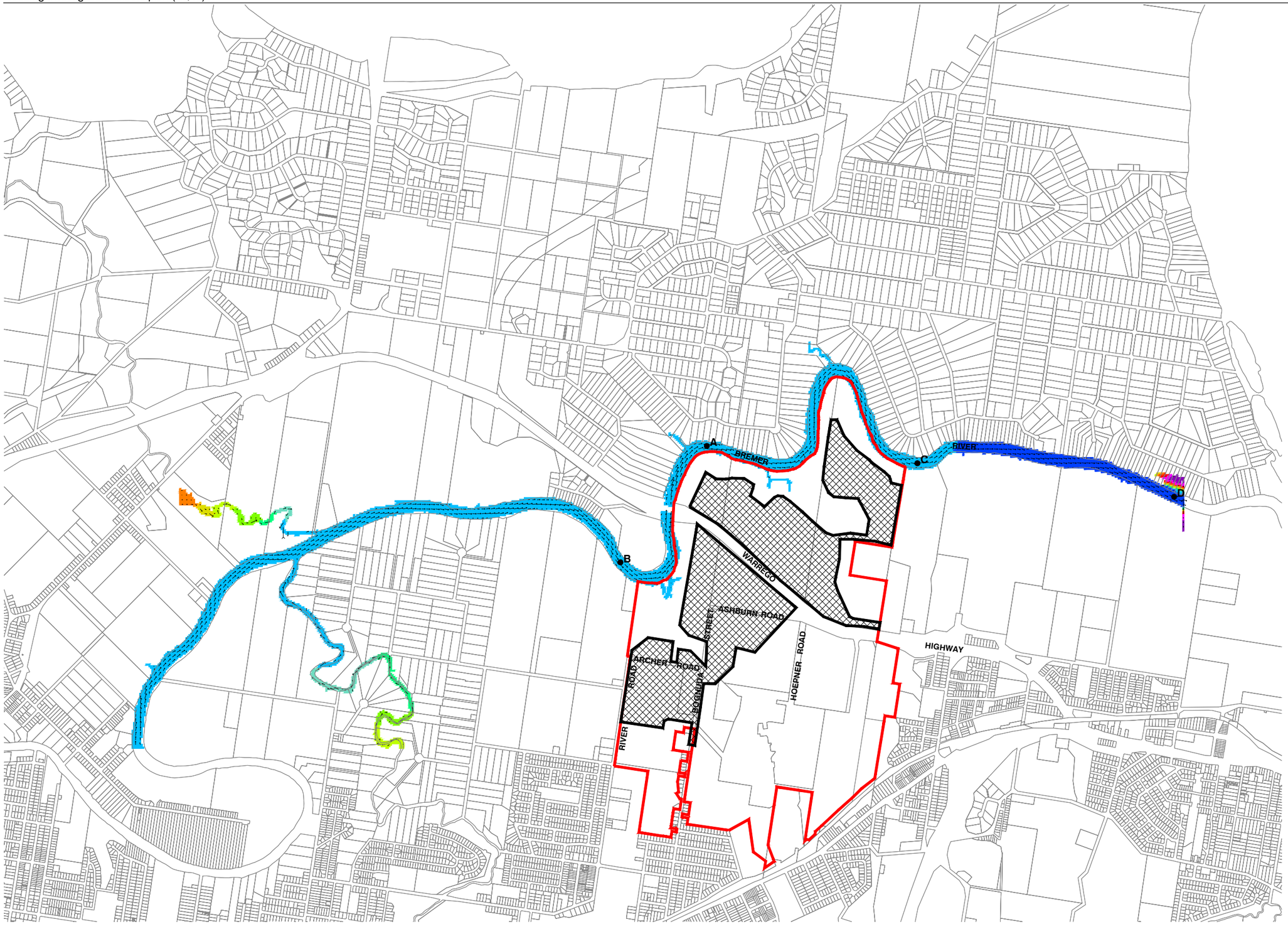
Walker Corporation Pty Ltd

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XREF's: xref-Results; xr-Ipswich_DCDB_MGA

Appendix G.1

Bremer River Flood SOBEK 2D Masterplan Ultimate Case Results – Water Surface Level

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250 0 250 500 750 1000 1250m
1:25,000

Scale 1:25000 (A3)

FIGURE G.1.1

MASTERPLAN - WATER SURFACE LEVELS - SKM ULTIMATE 2 YEAR EVENT (Brem_D14)

Rev: 0 Date: May 2012

Project No.: LJ8714

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CAD FILE: O:\LJ8714\Figures\R3v5_Masterplan_Flooding\Appendices\App G\Figure_R3v5_D14_Brem.dwg
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250 0 250 500 750 1000 1250m
1:25,000

Scale 1:25000 (A3)

FIGURE G.1.2

MASTERPLAN - WATER SURFACE LEVELS - SKM ULTIMATE 5 YEAR EVENT (Brem_D14)

Rev: 0 Date: May 2012

Project No.: LJ8714

Walker Corporation Pty Ltd

CAD FILE: O:\LJ8714\Figures\R3v5_Masterplan_Flooding\Appendices\App G\Figure_R3v5_D14_Brem.dwg
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250 0 250 500 750 1000 1250m
1:25,000

Scale 1:25000 (A3)

FIGURE G.1.3

MASTERPLAN - WATER SURFACE LEVELS - SKM ULTIMATE 10 YEAR EVENT (Brem_D14)

Rev: 0 Date: May 2012

Project No.: LJ8714

Walker Corporation Pty Ltd

CAD FILE: O:\LJ8714\Figures\R3v5_Masterplan_Flooding\Appendices\App G\Figure_R3v5_D14_Brem.dwg
XREFs: xref-Results; xr-Ipswich_DEOR_M6A

PRINT DATE: 11 May, 2012 - 7:43pm

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N

LEGEND

- Site Boundary
- A Reporting Points
- MasterPlan Fill Boundary

VELOCITIES

→ 1m/s

WATER SURFACE LEVEL (mAHD)

- Above 13.00
- 12.00 to 13.00
- 11.00 to 12.00
- 10.00 to 11.00
- 9.00 to 10.00
- 8.00 to 9.00
- 7.00 to 8.00
- 6.00 to 7.00
- 5.00 to 6.00
- 4.00 to 5.00
- 3.00 to 4.00
- 2.00 to 3.00
- 1.00 to 2.00
- Below 1.00

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250 0 250 500 750 1000 1250m
1:25,000

Scale 1:25000 (A3)

FIGURE G.1.4

MASTERPLAN - WATER SURFACE LEVELS - SKM ULTIMATE 20 YEAR EVENT (Brem_D14)

Rev: 0 Date: May 2012

Project No.: LJ8714

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XREFs: xref-Results; xr-Ipswich_DCDB_MGA

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N

LEGEND

- Site Boundary
- A Reporting Points
- MasterPlan Fill Boundary

VELOCITIES

→ 1m/s

WATER SURFACE LEVEL (mAHD)

- Above 13.00
- 12.00 to 13.00
- 11.00 to 12.00
- 10.00 to 11.00
- 9.00 to 10.00
- 8.00 to 9.00
- 7.00 to 8.00
- 6.00 to 7.00
- 5.00 to 6.00
- 4.00 to 5.00
- 3.00 to 4.00
- 2.00 to 3.00
- 1.00 to 2.00
- Below 1.00

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250 0 250 500 750 1000 1250m
1:25,000

Scale 1:25000 (A3)

FIGURE G.1.5

MASTERPLAN - WATER SURFACE LEVELS - SKM ULTIMATE 50 YEAR EVENT (Brem_D14)

Rev: 0 Date: May 2012

Project No.: LJ8714

Walker Corporation Pty Ltd

CAD FILE: O:\LJ8714\Figures\R3v5_Masterplan_Flooding\Appendices\App G\Figure_R3v5_D14_Brem.dwg
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Scale 1:25000 (A3)

FIGURE G.1.6

MASTERPLAN - WATER SURFACE LEVELS - SKM ULTIMATE 100 YEAR EVENT (Brem_D14a)

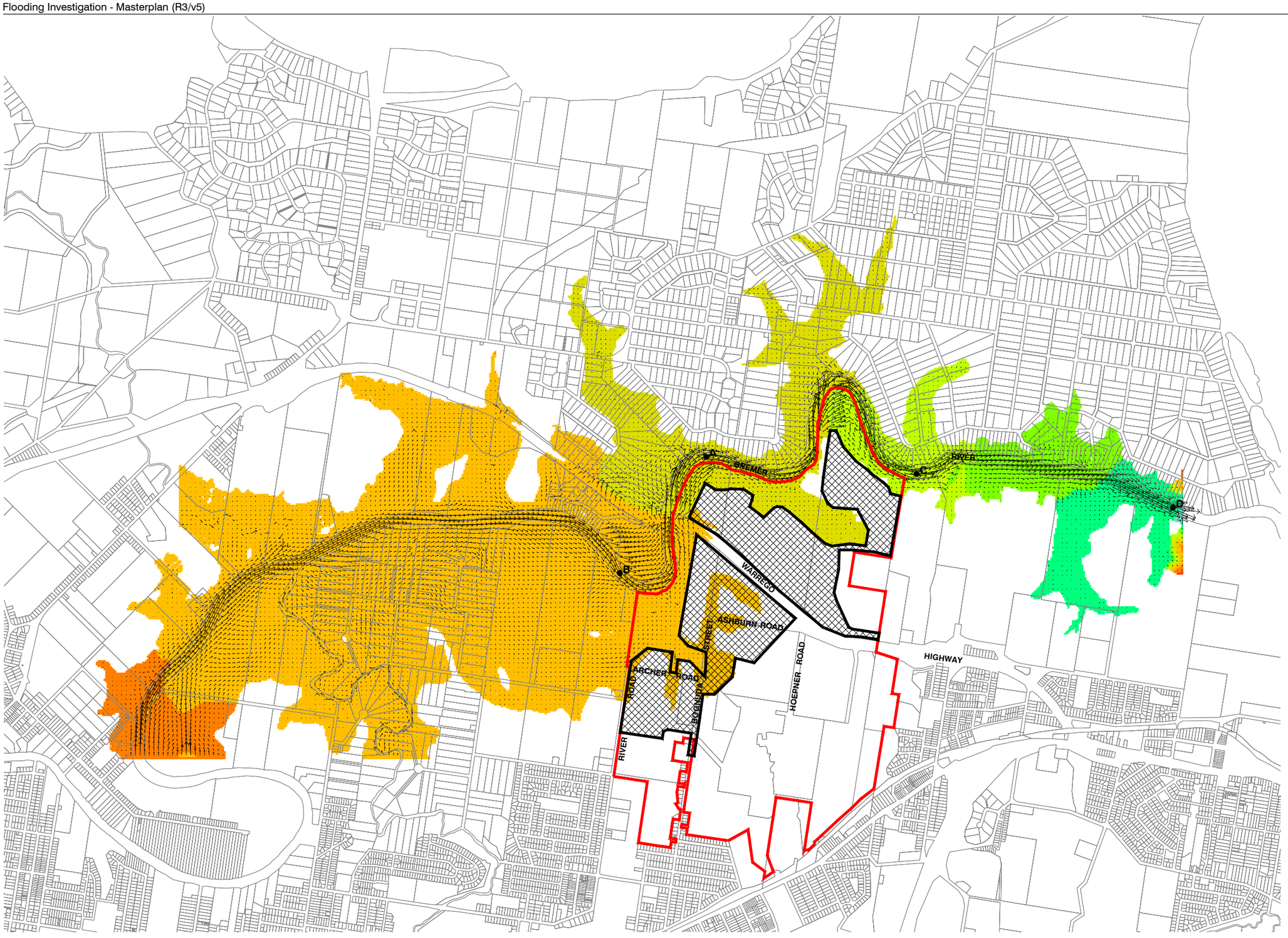
Rev: 0 Date: May 2012

Project No.: LJ8714

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CAD FILE: O:\LJ8714\Figures\R3v5_Masterplan_Flooding\Appendices\App G\Figure_R3v5_D14a_Brem.dwg
XREFs: xref-Results; xr-Inswich_DEDB_M6A
PRINT DATE: 11 May, 2012 - 7:10pm

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N

LEGEND

Site Boundary

A Reporting Points

Masterplan Fill Boundary

VELOCITIES

→ 1m/s

WATER SURFACE LEVEL (mAHD)

- Above 21.00
- 20.00 to 21.00
- 19.00 to 20.00
- 18.00 to 19.00
- 17.00 to 18.00
- 16.00 to 17.00
- 15.00 to 16.00
- 14.00 to 15.00
- 13.00 to 14.00
- 12.00 to 13.00
- 11.00 to 12.00
- 10.00 to 11.00
- 9.00 to 10.00
- Below 9.00

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250 0 250 500 750 1000 1250m
1:25,000

Scale 1:25000 (A3)

FIGURE G.1.7

MASTERPLAN - WATER SURFACE LEVELS - SKM ULTIMATE 200 YEAR EVENT (Brem_D14a)

Rev: 0 Date: May 2012

Project No.: LJ8714

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250 0 250 500 750 1000 1250m
1:25,000

Scale 1:25000 (A3)

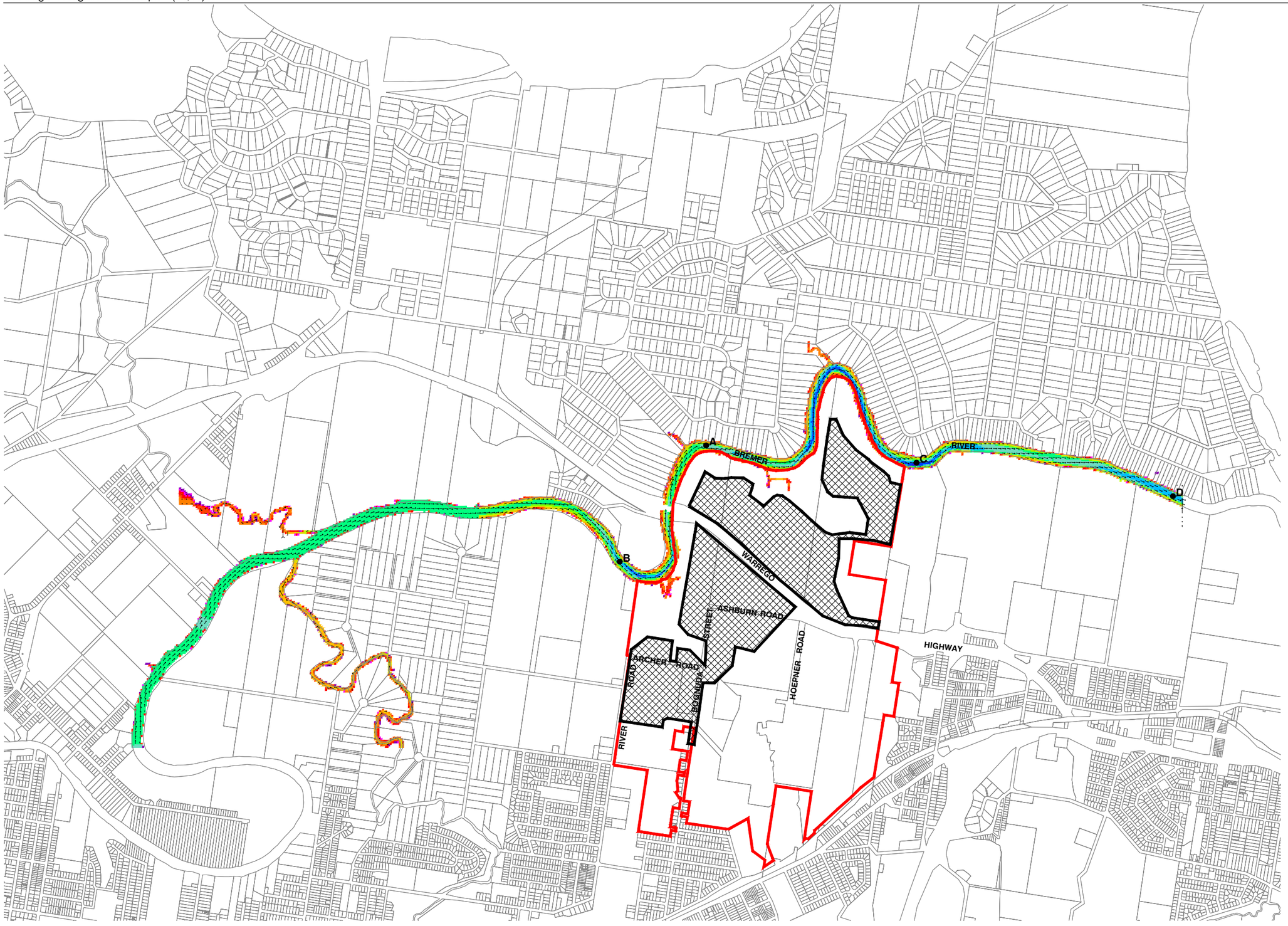
FIGURE G.1.8

MASTERPLAN - WATER SURFACE LEVELS - SKM ULTIMATE 500 YEAR EVENT (Brem_D14a)

Appendix G.2

Bremer River Flood SOBEK 2D Masterplan Ultimate Case Results – Depth

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Scale 1:25000 (A3)

FIGURE G.2.1

MASTERPLAN - DEPTH - SKM ULTIMATE 2 YEAR EVENT (Brem_D14)

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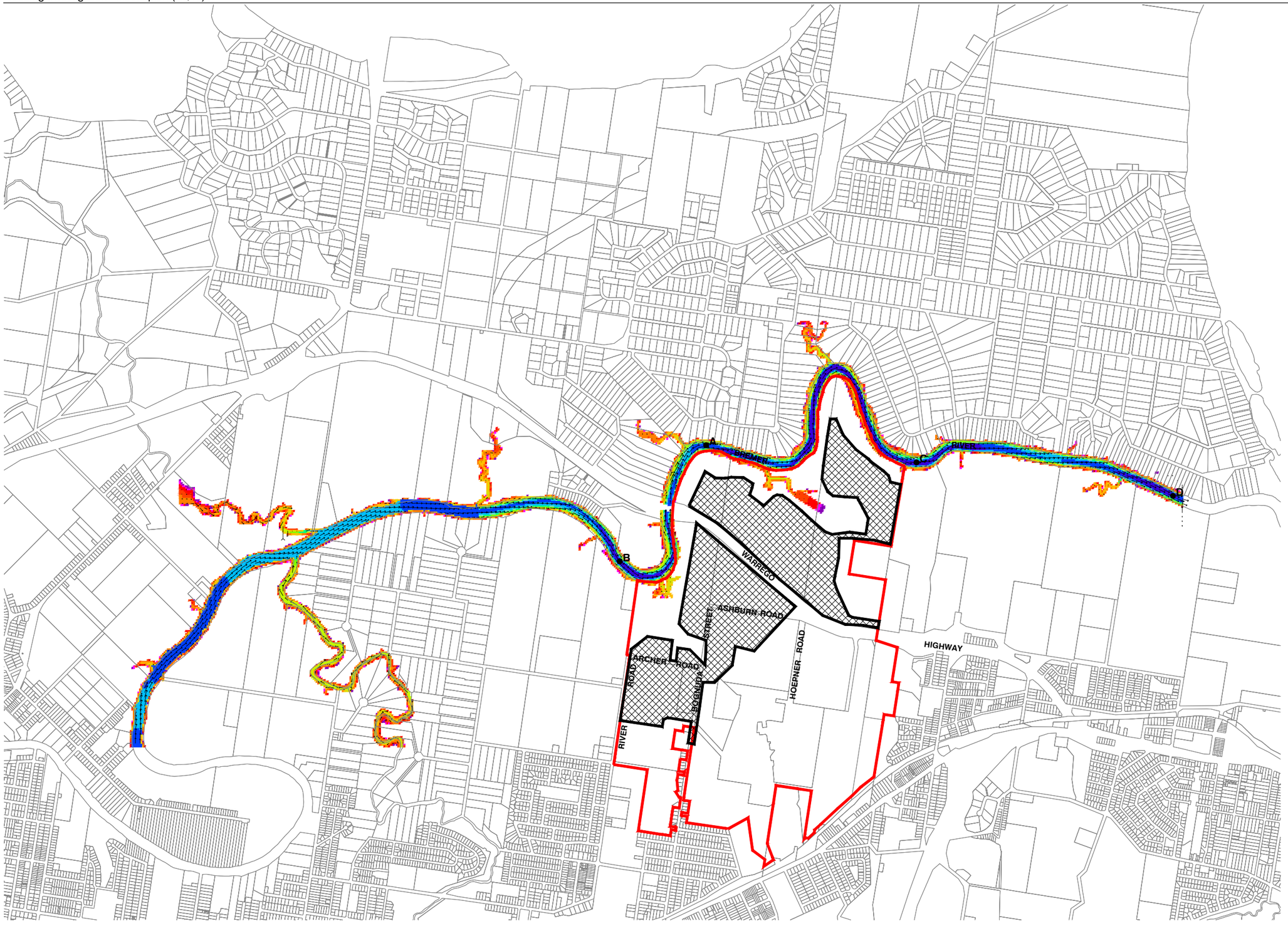
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250 0 250 500 750 1000 1250m
1:25,000

Scale 1:25000 (A3)

FIGURE G.2.2

MASTERPLAN - DEPTH - SKM ULTIMATE 5 YEAR EVENT (Brem_D14)

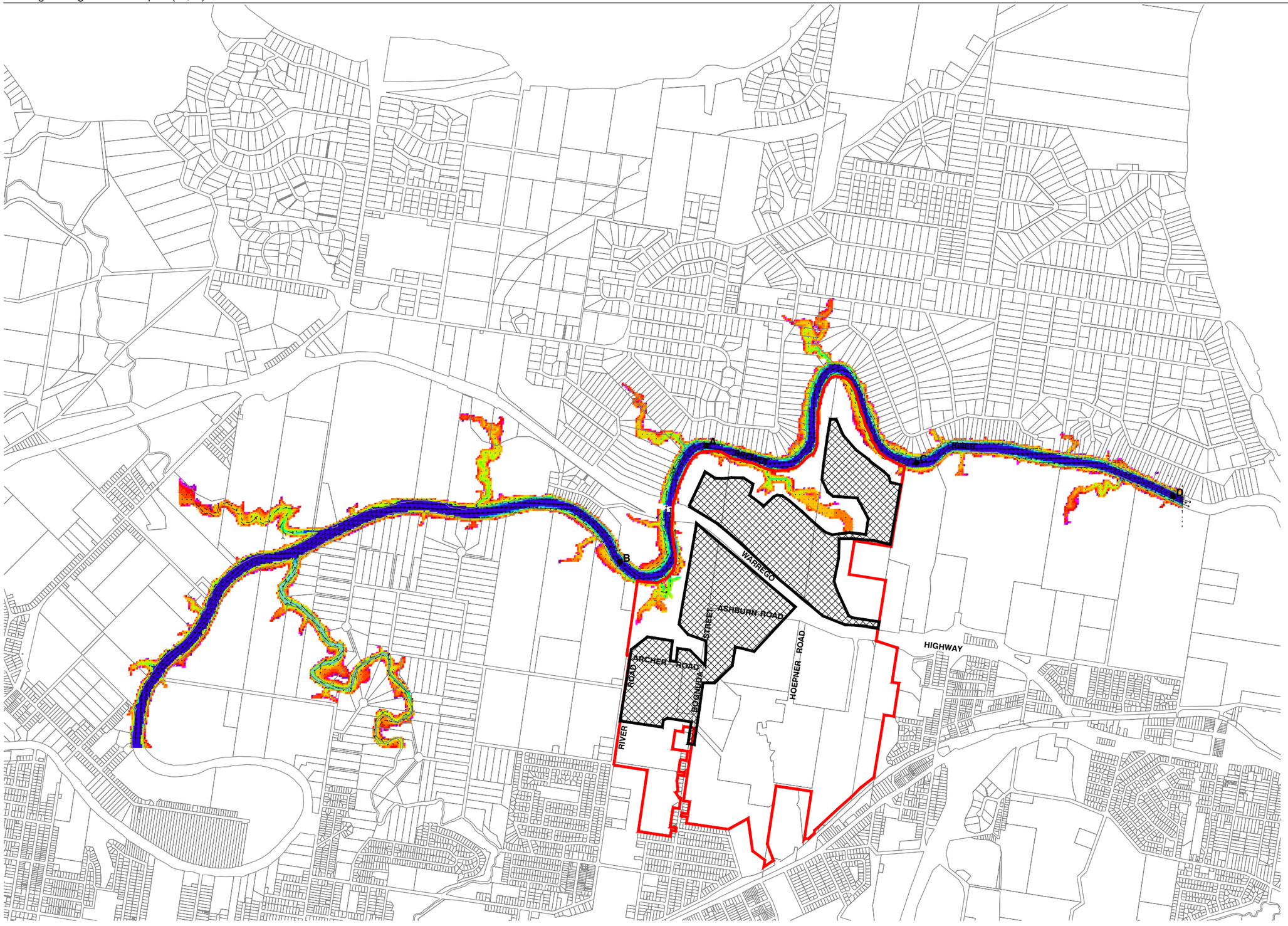
Rev: 0 Date: May 2012

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N

LEGEND

- Site Boundary
- A Reporting Points
- MasterPlan Fill Boundary

VELOCITIES

→ 1m/s

DEPTH (m)

- Above 10.00
- 9.00 to 10.00
- 8.00 to 9.00
- 7.00 to 8.00
- 6.00 to 7.00
- 5.00 to 6.00
- 4.00 to 5.00
- 3.00 to 4.00
- 2.00 to 3.00
- 1.00 to 2.00
- 0.50 to 1.00
- 0.20 to 0.50
- 0.10 to 0.20
- 0.01 to 0.10

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250 0 250 500 750 1000 1250m
1:25,000

Scale 1:25000 (A3)

FIGURE G.2.3

MASTERPLAN - DEPTH - SKM ULTIMATE 10 YEAR EVENT (Brem_D14)

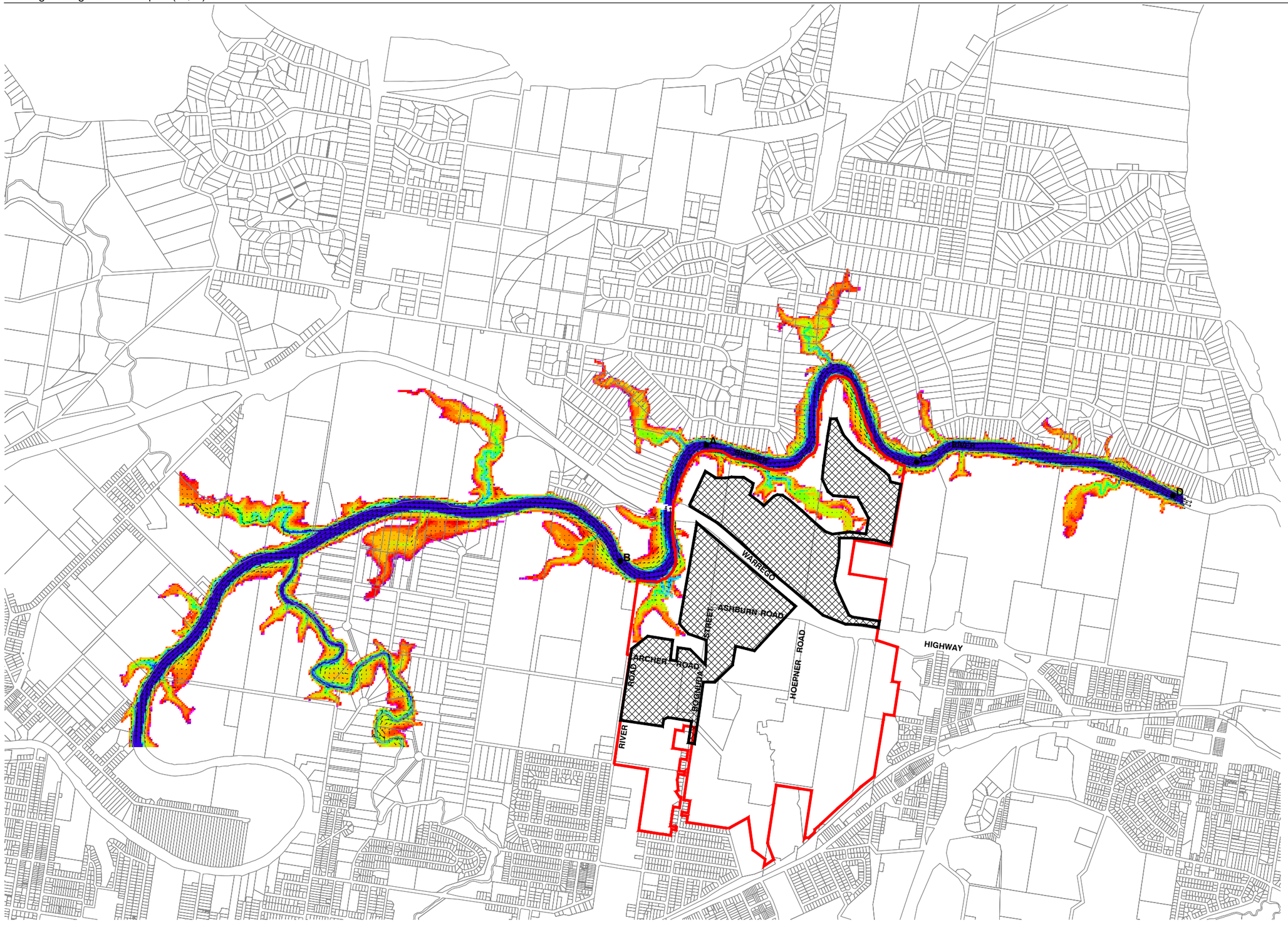
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250 0 250 500 750 1000 1250m
1:25,000

Scale 1:25000 (A3)

FIGURE G.2.4

MASTERPLAN - DEPTH - SKM ULTIMATE 20 YEAR EVENT (Brem_D14)

Rev: 0 Date: May 2012

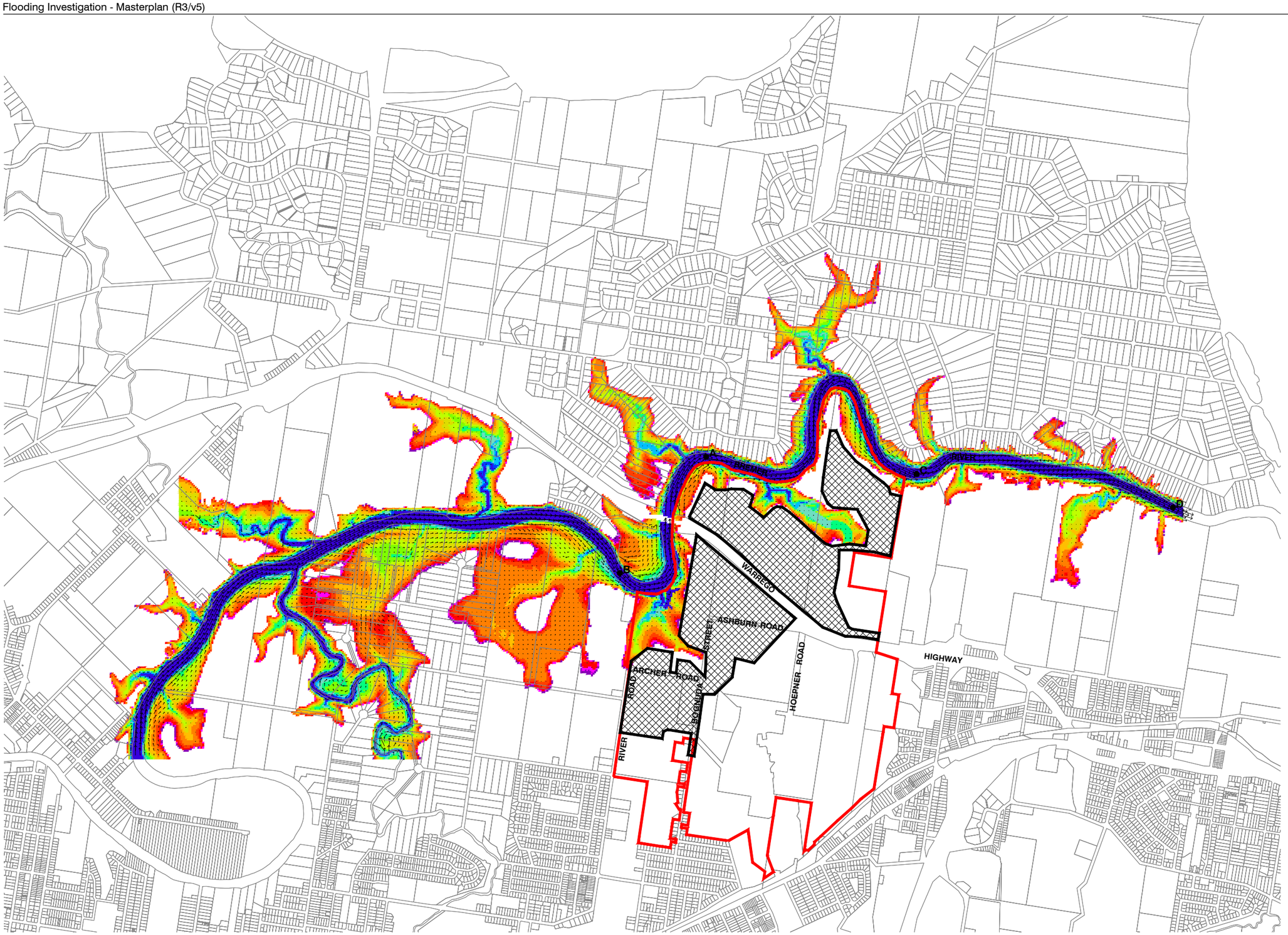
Project No.: LJ8714

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250 0 250 500 750 1000 1250m
1:25,000

Scale 1:25000 (A3)

FIGURE G.2.5
MASTERPLAN - DEPTH - SKM ULTIMATE 50 YEAR EVENT (Brem_D14)

Rev: 0 Date: May 2012

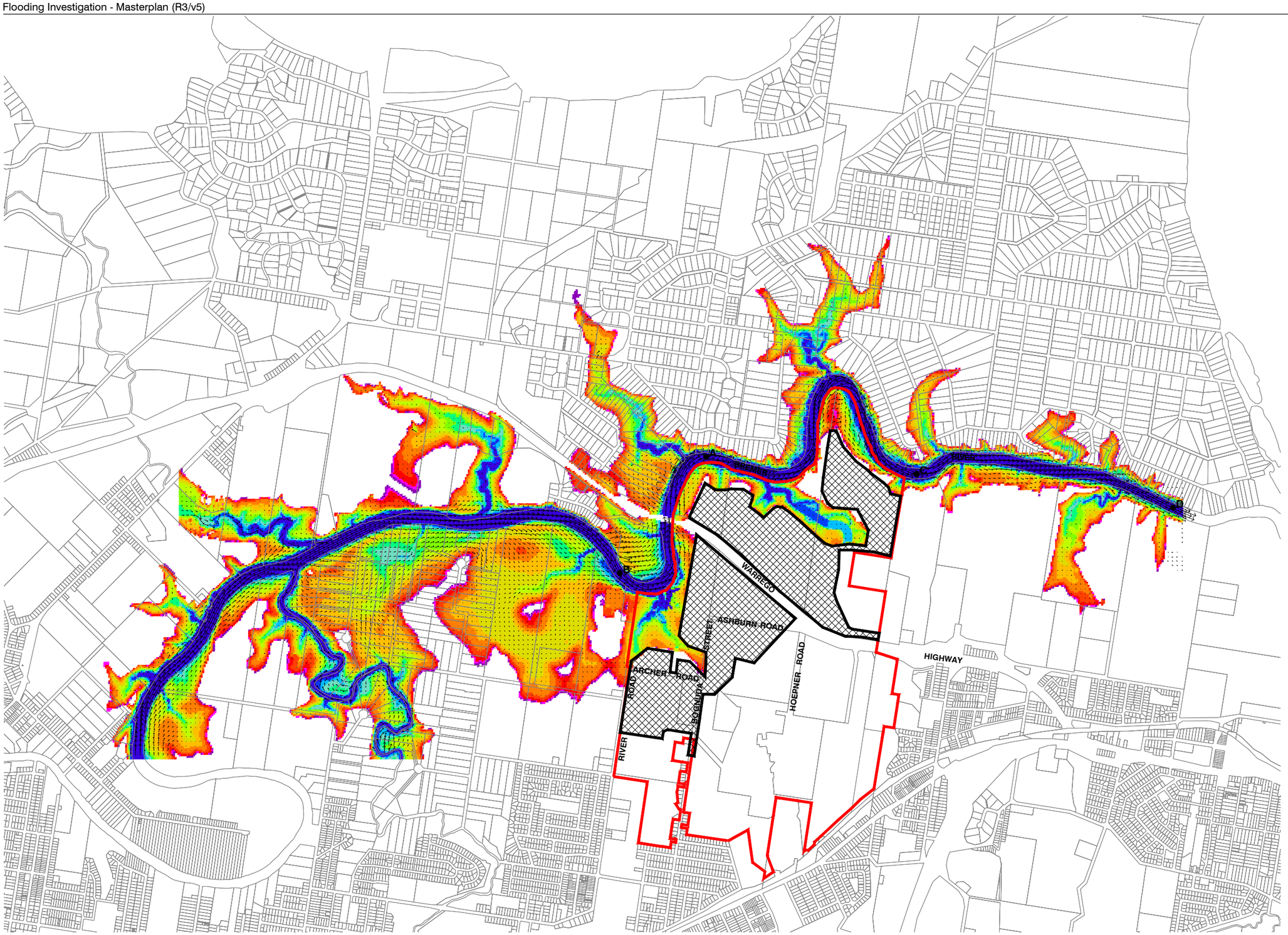
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Scale 1:25000 (A3)

FIGURE G.2.6

MASTERPLAN - DEPTH - SKM ULTIMATE 100 YEAR EVENT (Brem_D14a)

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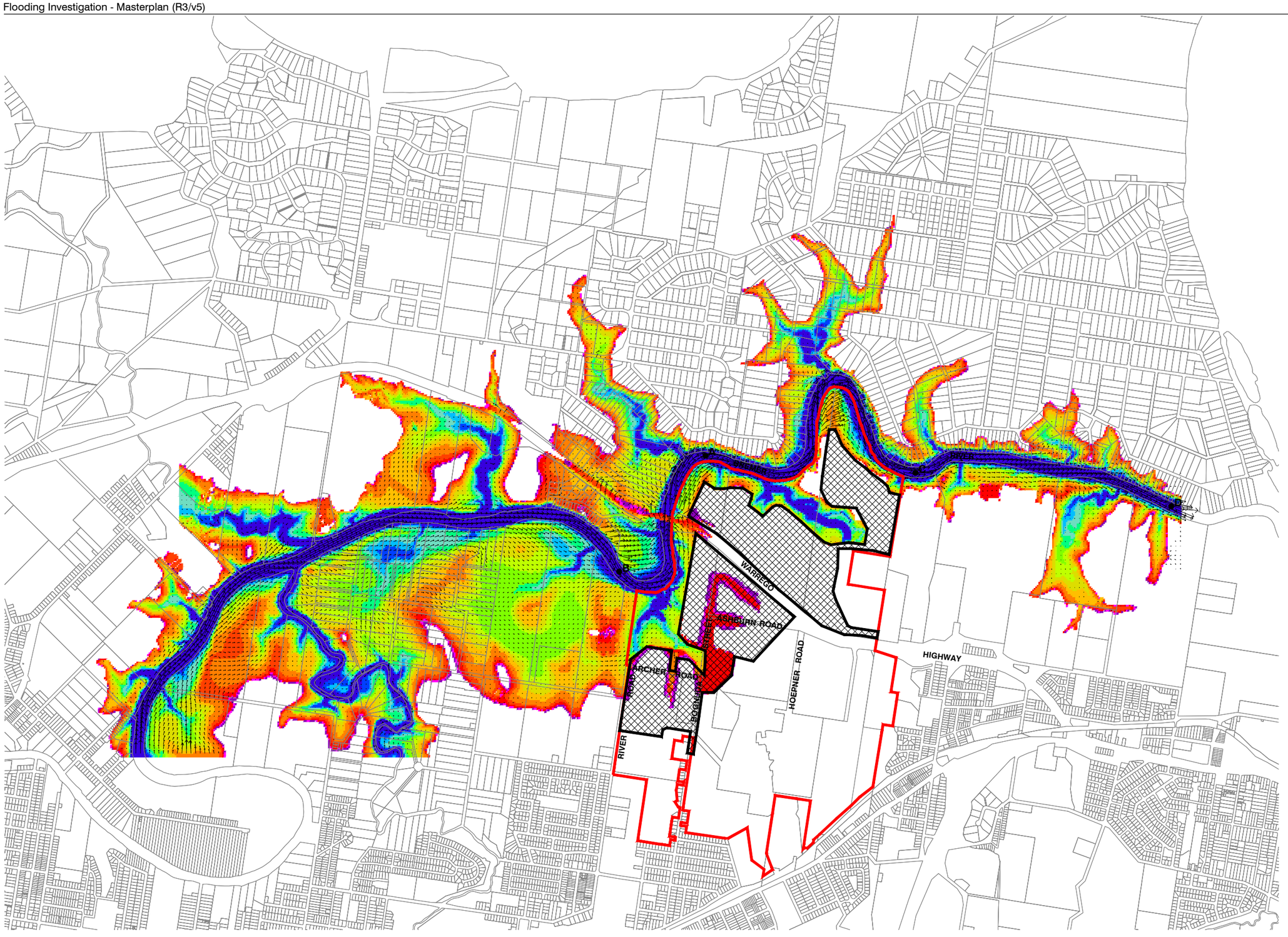
Project No.: LJ8714

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Scale 1:25000 (A3)

FIGURE G.2.7

MASTERPLAN - DEPTH - SKM ULTIMATE 200 YEAR EVENT (Brem_D14a)

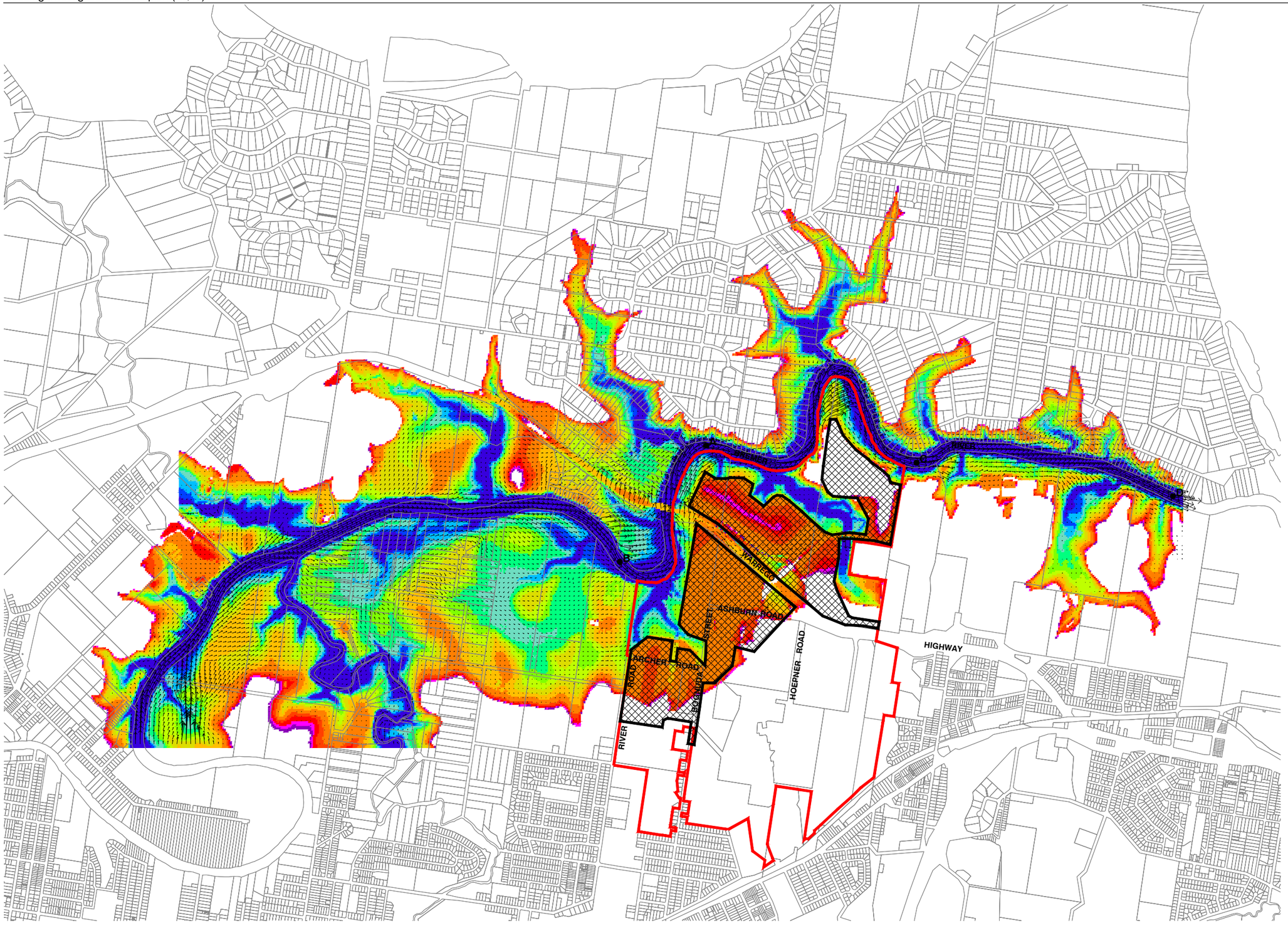
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250 0 250 500 750 1000 1250m
1:25,000

Scale 1:25000 (A3)

FIGURE G.2.8

MASTERPLAN - DEPTH - SKM ULTIMATE 500 YEAR EVENT (Brem_D14a)

Rev: 0 Date: May 2012

Project No.: LJ8714

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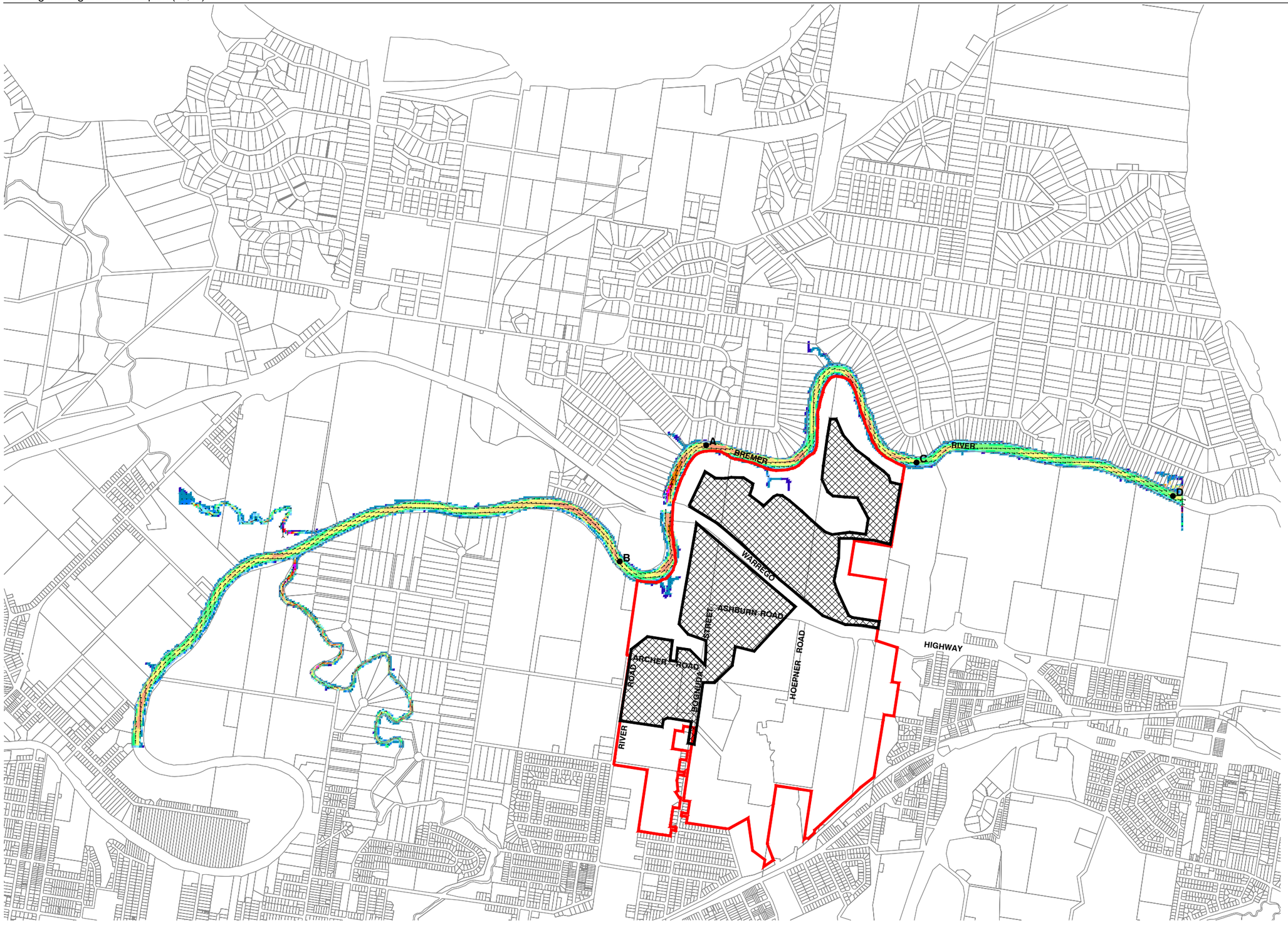
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Appendix G.3

Bremer River Flood SOBEK 2D Masterplan Ultimate

Case Results – Speed

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250 0 250 500 750 1000 1250m
1:25,000

Scale 1:25000 (A3)

FIGURE G.3.1

MASTERPLAN - SPEED - SKM ULTIMATE 2 YEAR EVENT (Brem_D14)

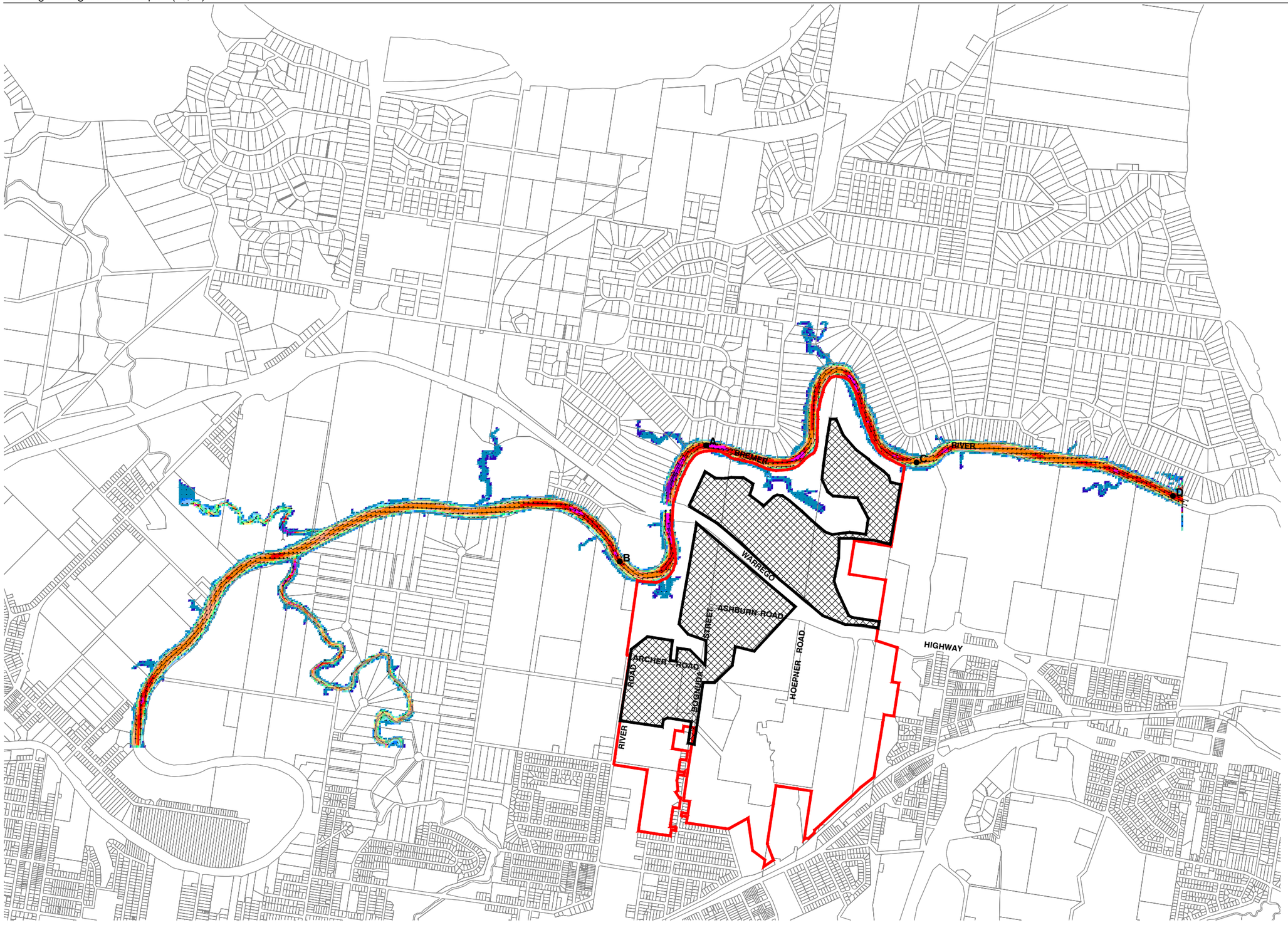
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250 0 250 500 750 1000 1250m
1:25,000

Scale 1:25000 (A3)

FIGURE G.3.2

MASTERPLAN - SPEED - SKM ULTIMATE 5 YEAR EVENT (Brem_D14)

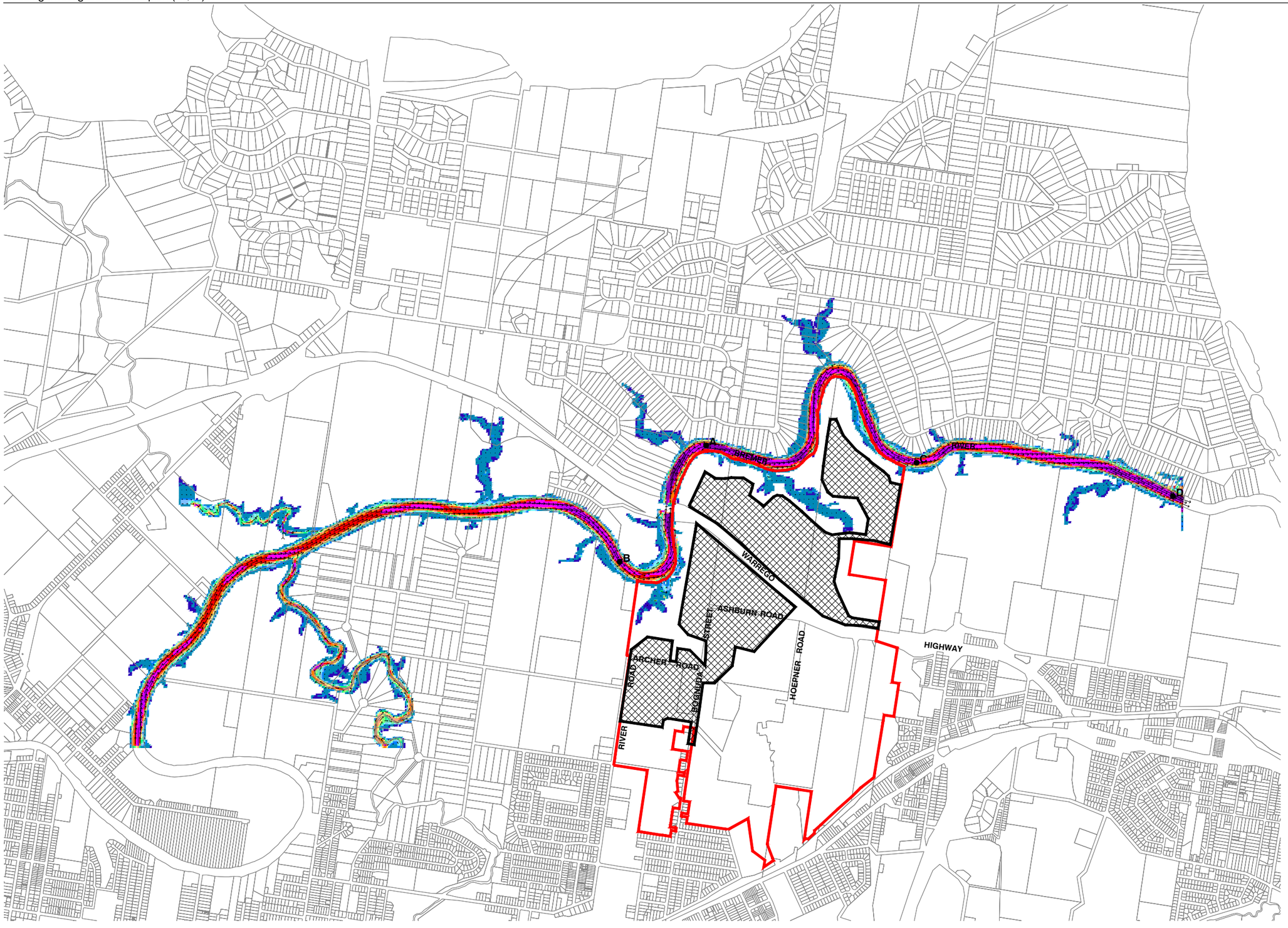
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1:25,000

Scale 1:25000 (A3)

FIGURE G.3.3

MASTERPLAN - SPEED - SKM ULTIMATE 10 YEAR EVENT (Brem_D14)

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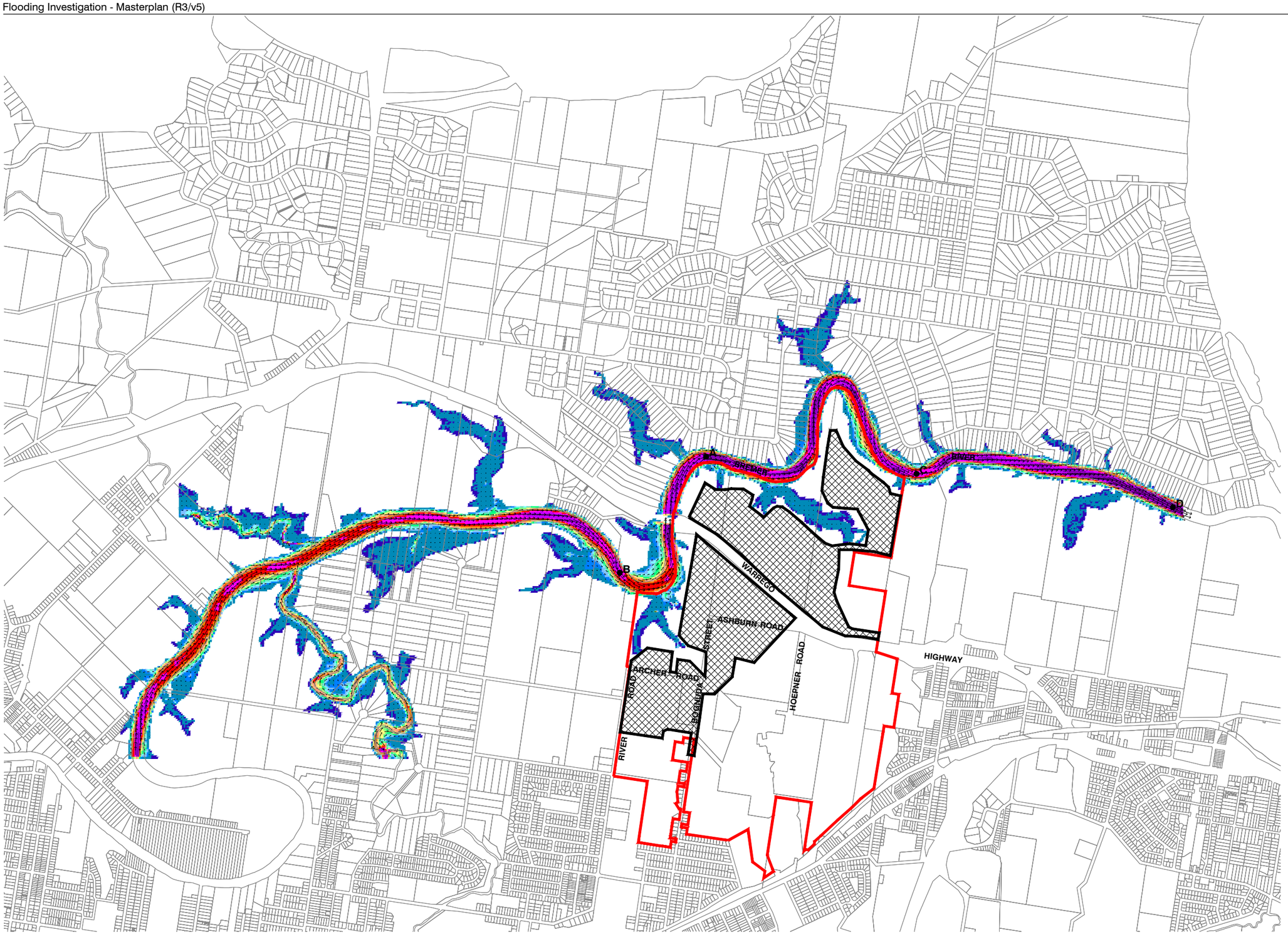
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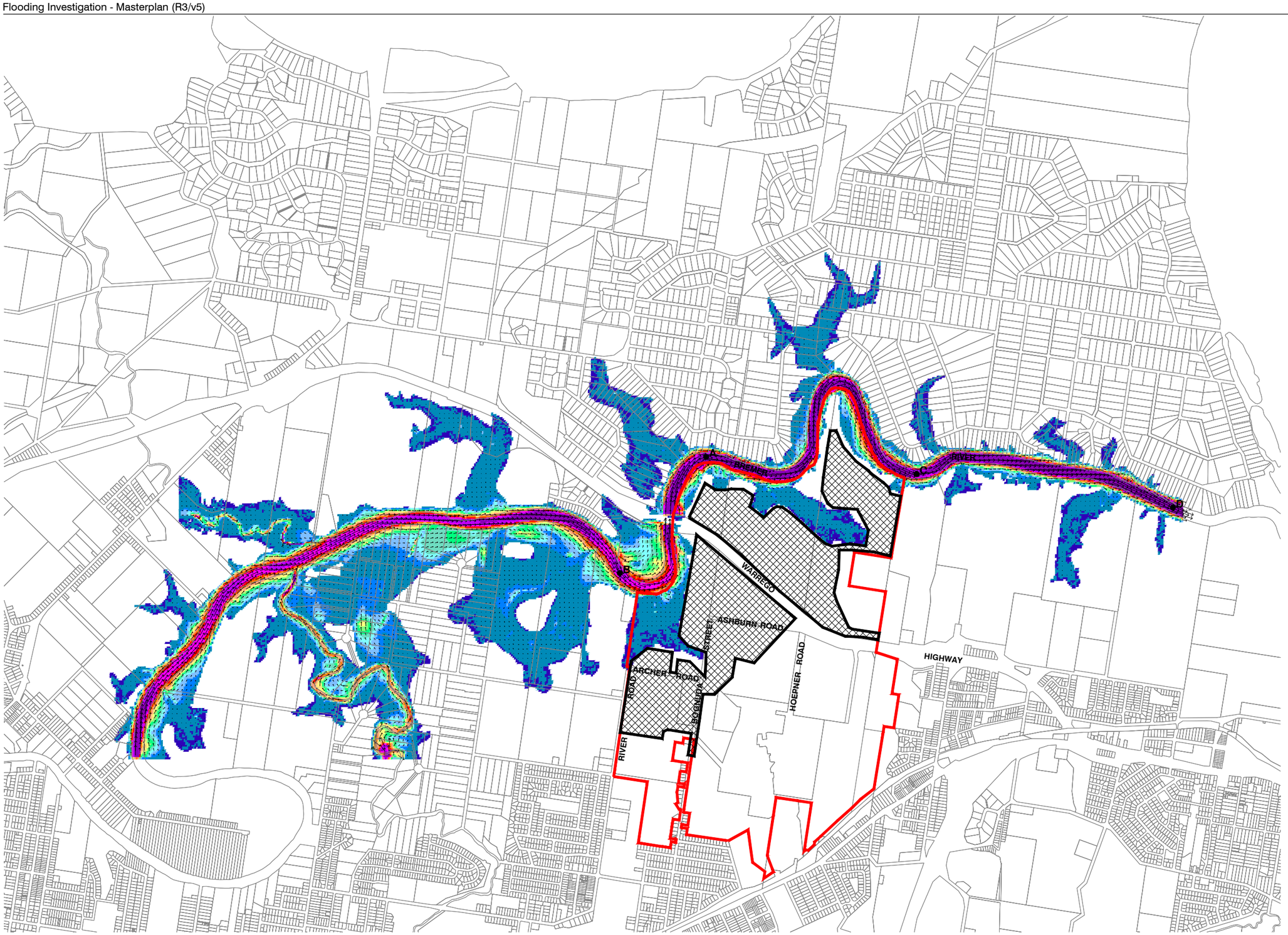
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Scale 1:25000 (A3)

FIGURE G.3.4

MASTERPLAN - SPEED - SKM ULTIMATE 20 YEAR EVENT (Brem_D14)

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Scale 1:25000 (A3)

FIGURE G.3.5

MASTERPLAN - SPEED - SKM ULTIMATE 50 YEAR EVENT (Brem_D14)

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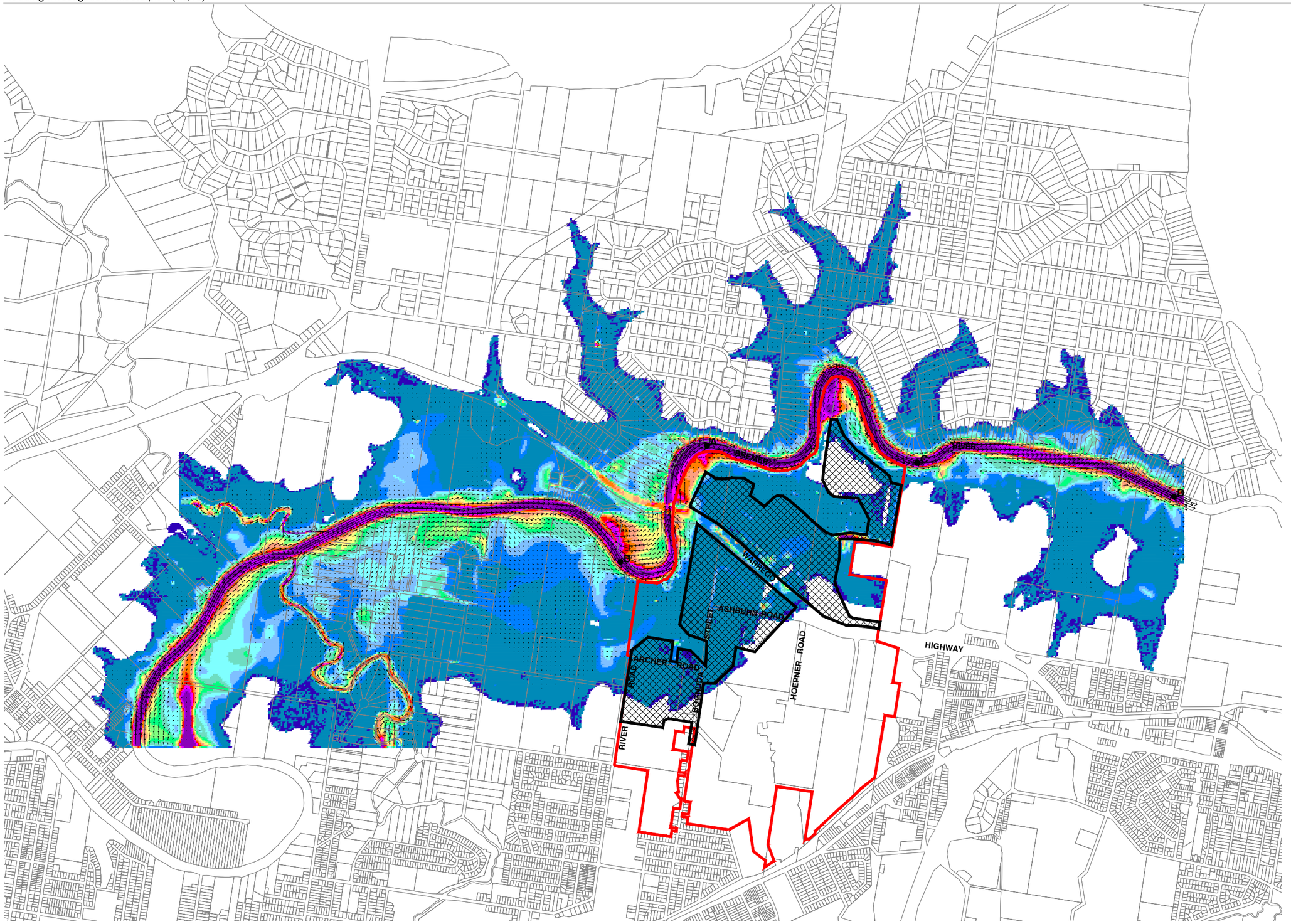
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250 0 250 500 750 1000 1250m
1:25,000

Scale 1:25000 (A3)

FIGURE G.3.6

MASTERPLAN - SPEED - SKM ULTIMATE 100 YEAR EVENT (Brem_D14a)

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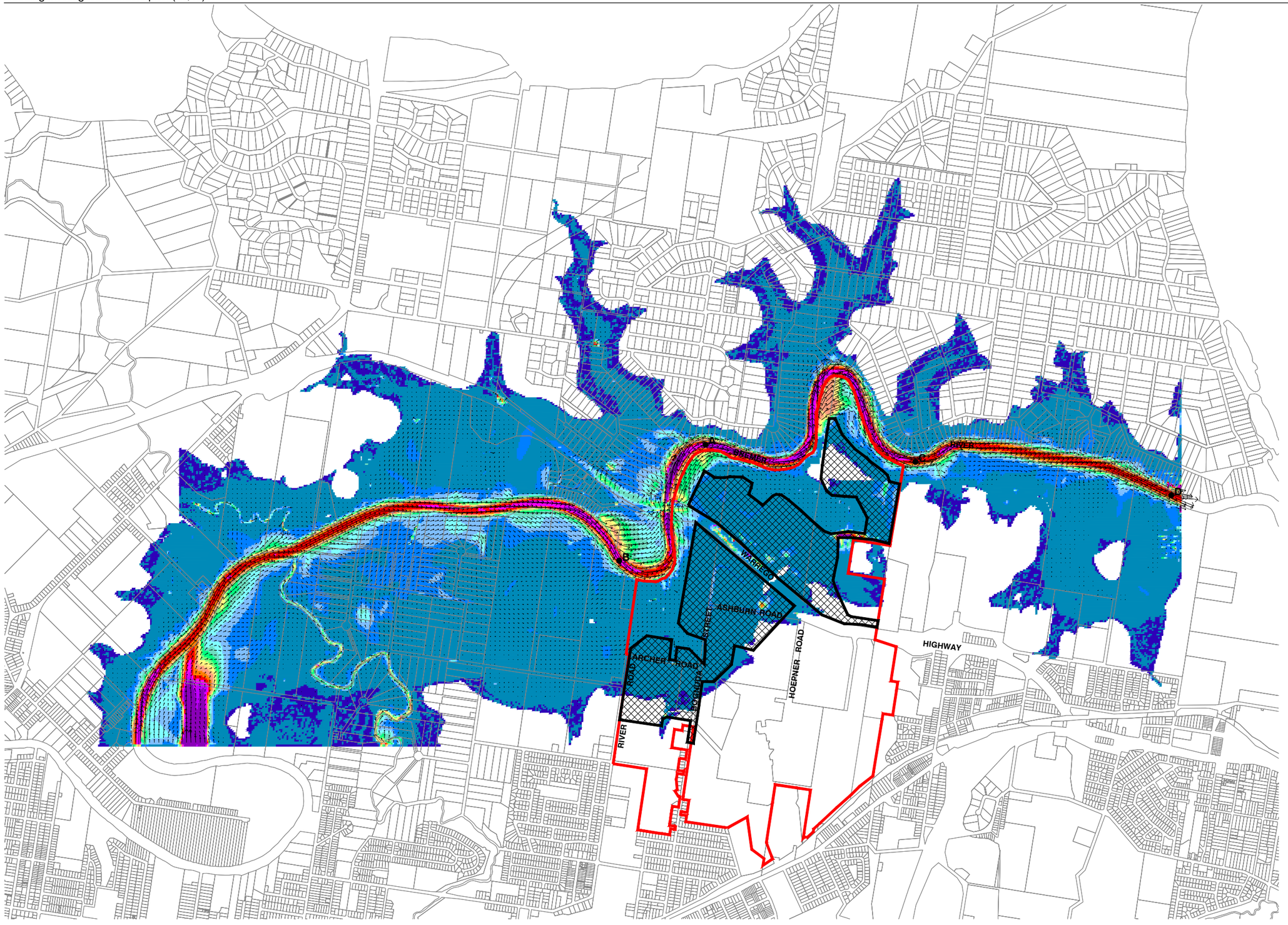
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Scale 1:25000 (A3)

FIGURE G.3.7

MASTERPLAN - SPEED - SKM ULTIMATE 200 YEAR EVENT (Brem_D14a)

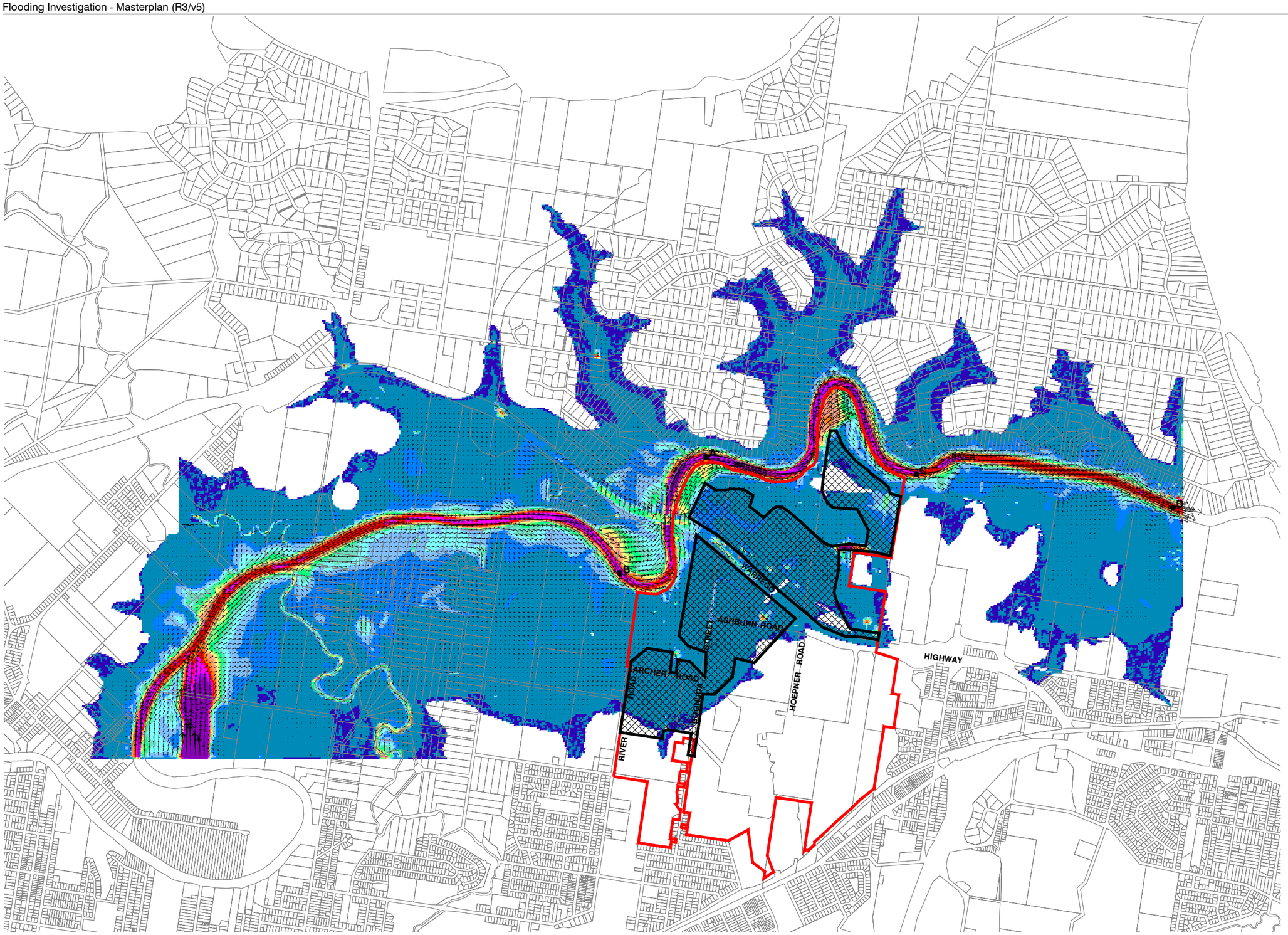
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250 0 250 500 750 1000 1250m
1:25,000

Scale 1:25000 (A3)

FIGURE G.3.8

MASTERPLAN - SPEED - SKM ULTIMATE 500 YEAR EVENT (Brem_D14a)

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Project No.: LJ8714

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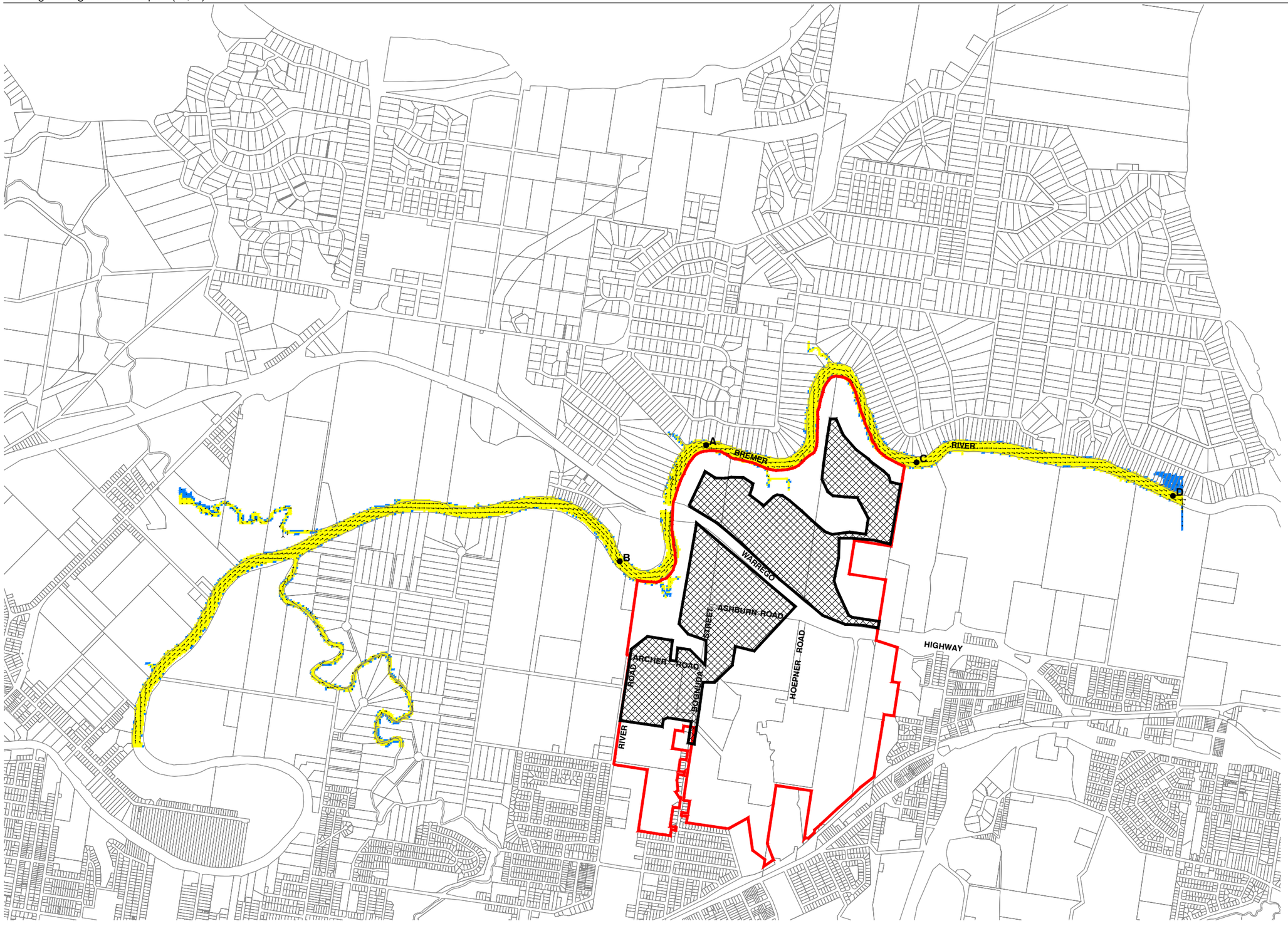
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PRINT DATE: 11 May, 2012 - 7:15pm

Appendix G.4

Bremer River Flood SOBEK 2D Masterplan Ultimate Case Results – Hazard (Safety Product)

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Scale 1:25000 (A3)

FIGURE G.4.1

MASTERPLAN - HAZARD (SAFETY PRODUCT) - SKM ULTIMATE 2 YEAR EVENT (Brem_D14)

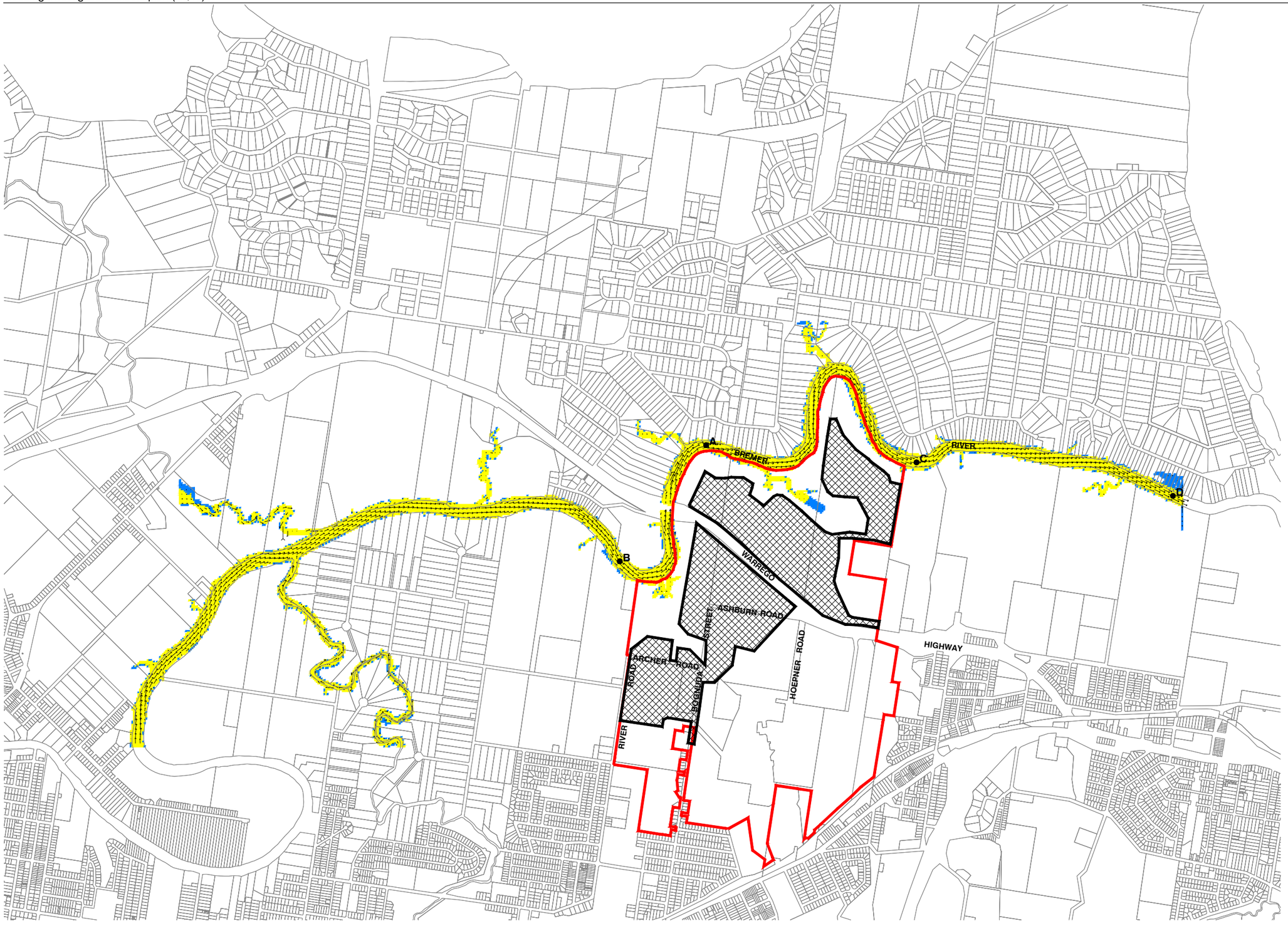
Rev: A1 Date: August 2012

Project No.: LJ8714

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Scale 1:25000 (A3)

FIGURE G.4.2

MASTERPLAN - HAZARD (SAFETY PRODUCT) - SKM ULTIMATE 5 YEAR EVENT (Brem_D14)

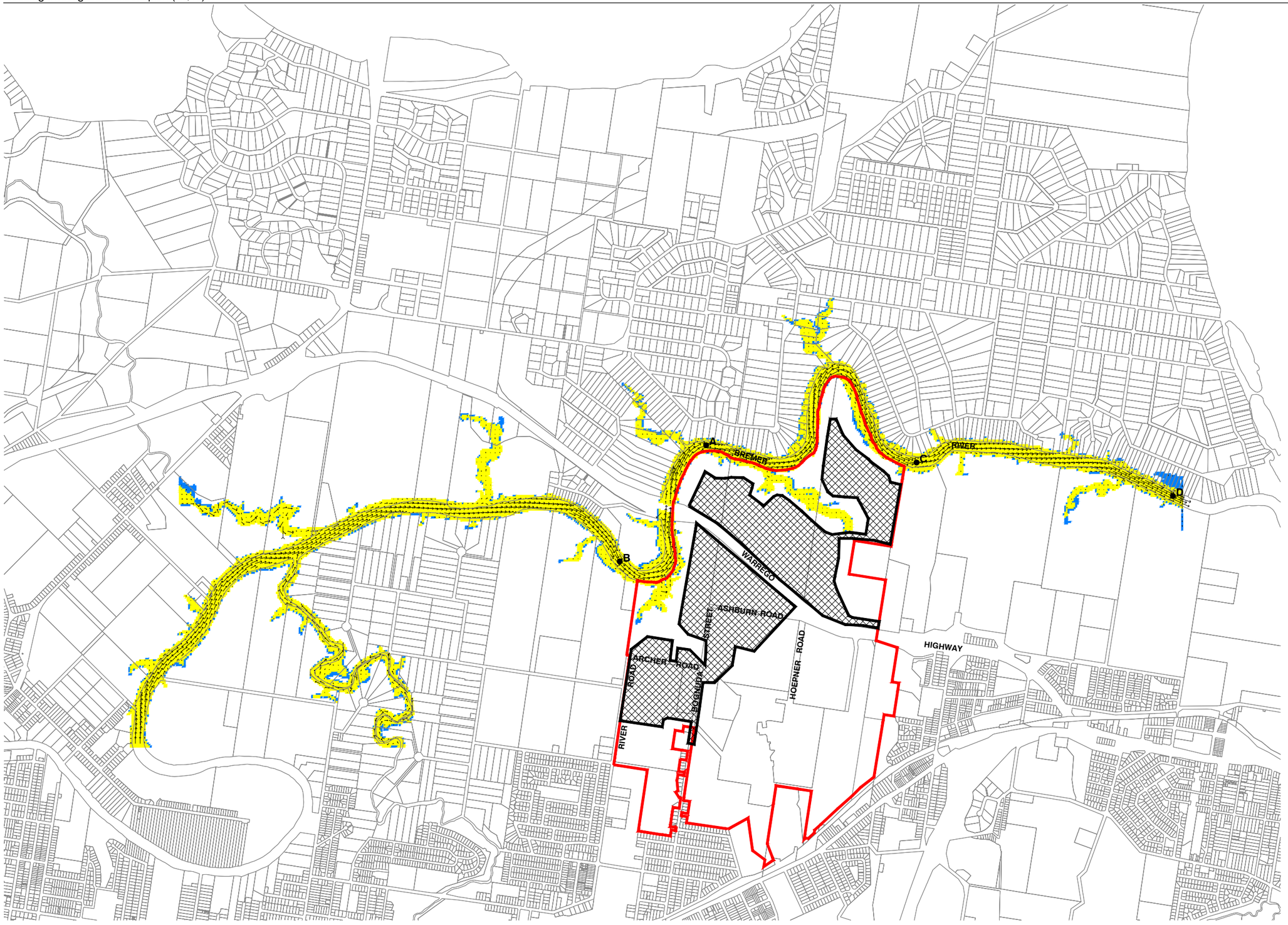
Rev: A1 Date: August 2012

Project No.: LJ8714

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Scale 1:25000 (A3)

FIGURE G.4.3

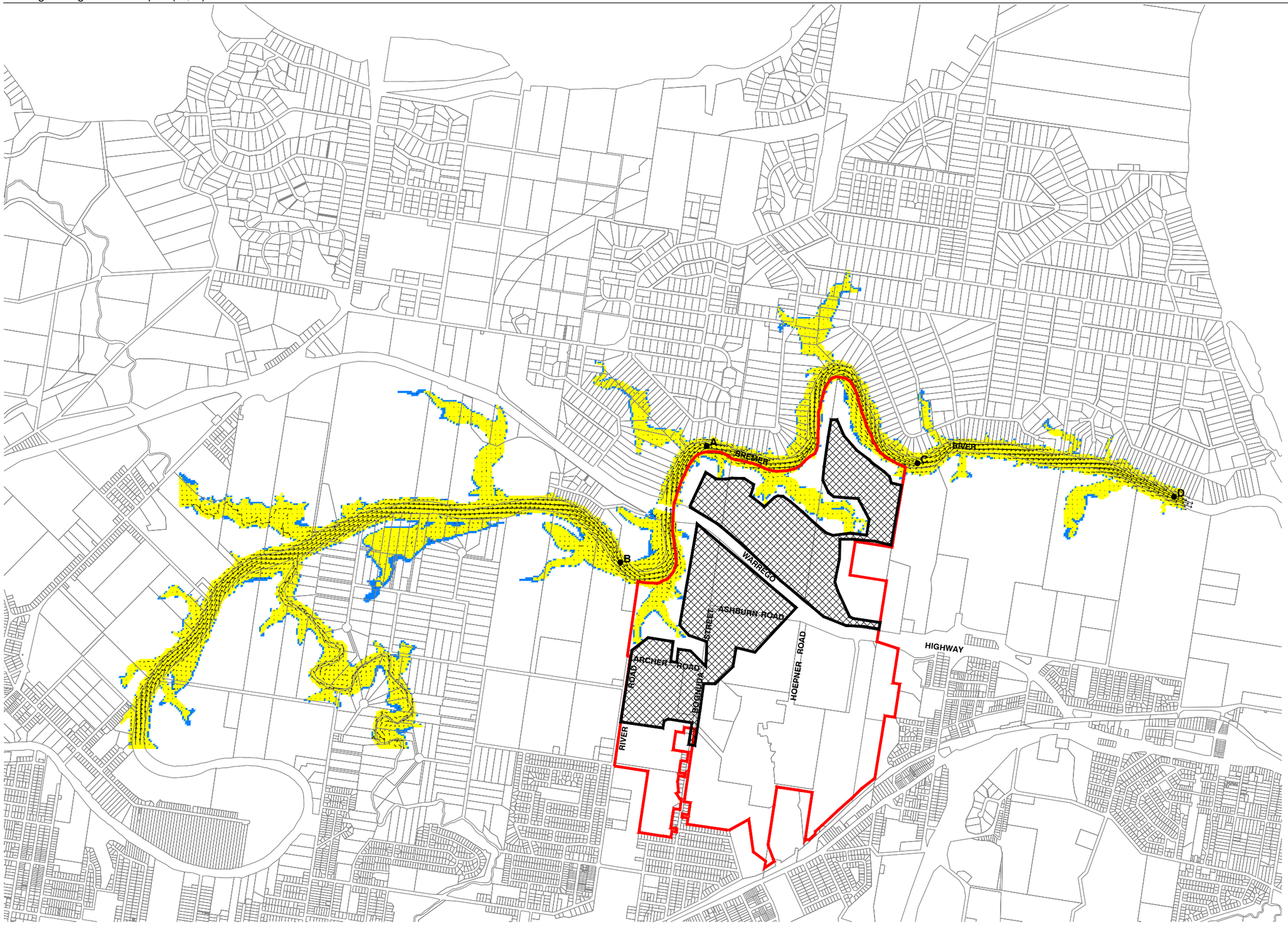
MASTERPLAN - HAZARD (SAFETY PRODUCT) - SKM ULTIMATE 10 YEAR EVENT (Brem_D14)

Rev: 0 Date: May 2012

Project No.: LJ8714

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N

LEGEND

Site Boundary

A Reporting Points

MasterPlan Fill Boundary

VELOCITIES

1m/s

High

Low

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250 0 250 500 750 1000 1250m
1:25,000

Scale 1:25000 (A3)

FIGURE G.4.4

MASTERPLAN - HAZARD (SAFETY PRODUCT) - SKM ULTIMATE 20 YEAR EVENT (Brem_D14)

Rev: 0 Date: May 2012

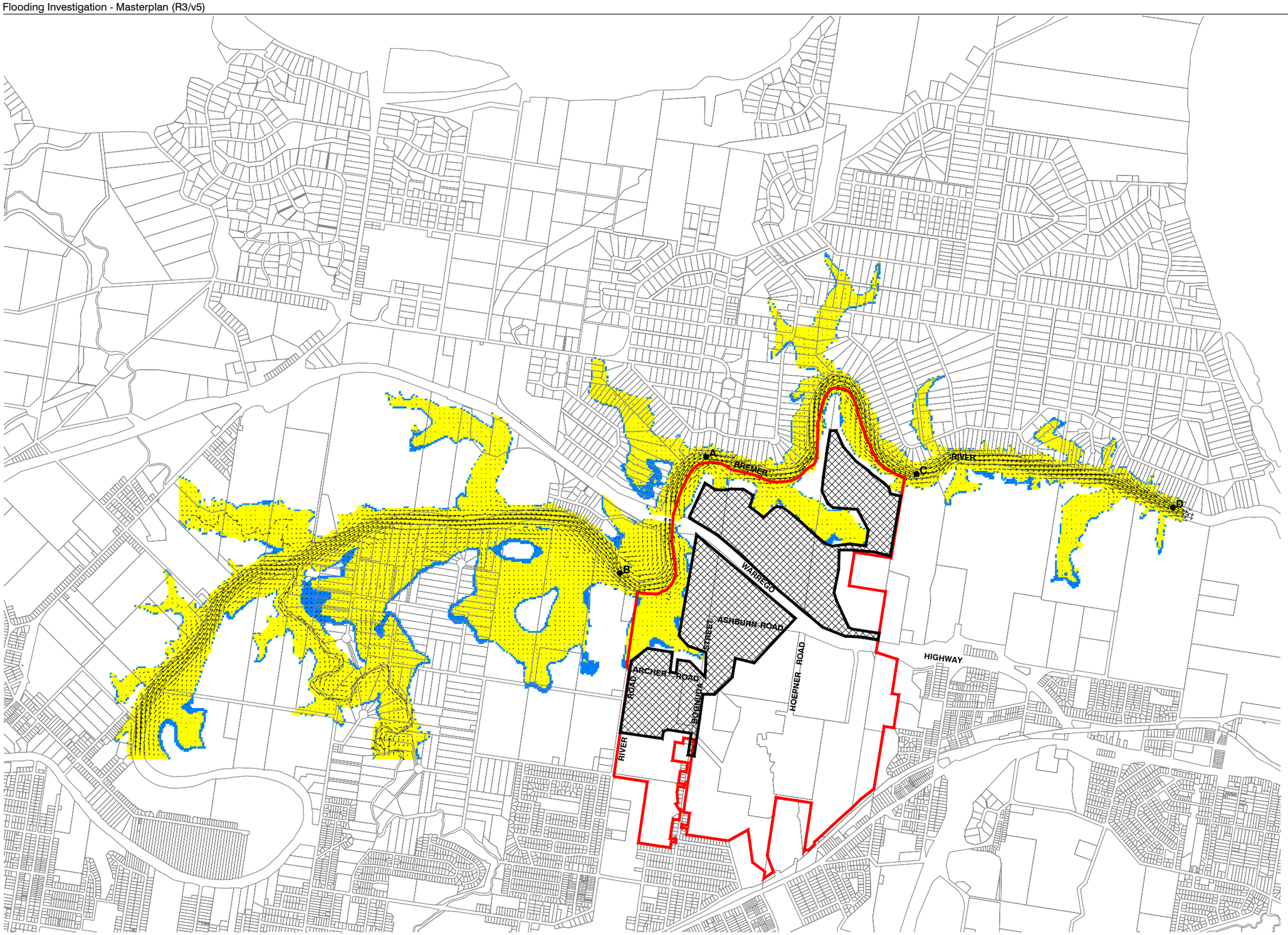
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Scale 1:25000 (A3)

FIGURE G.4.5

MASTERPLAN - HAZARD (SAFETY PRODUCT) - SKM ULTIMATE 50 YEAR EVENT (Brem_D14)

Rev: 0 Date: May 2012

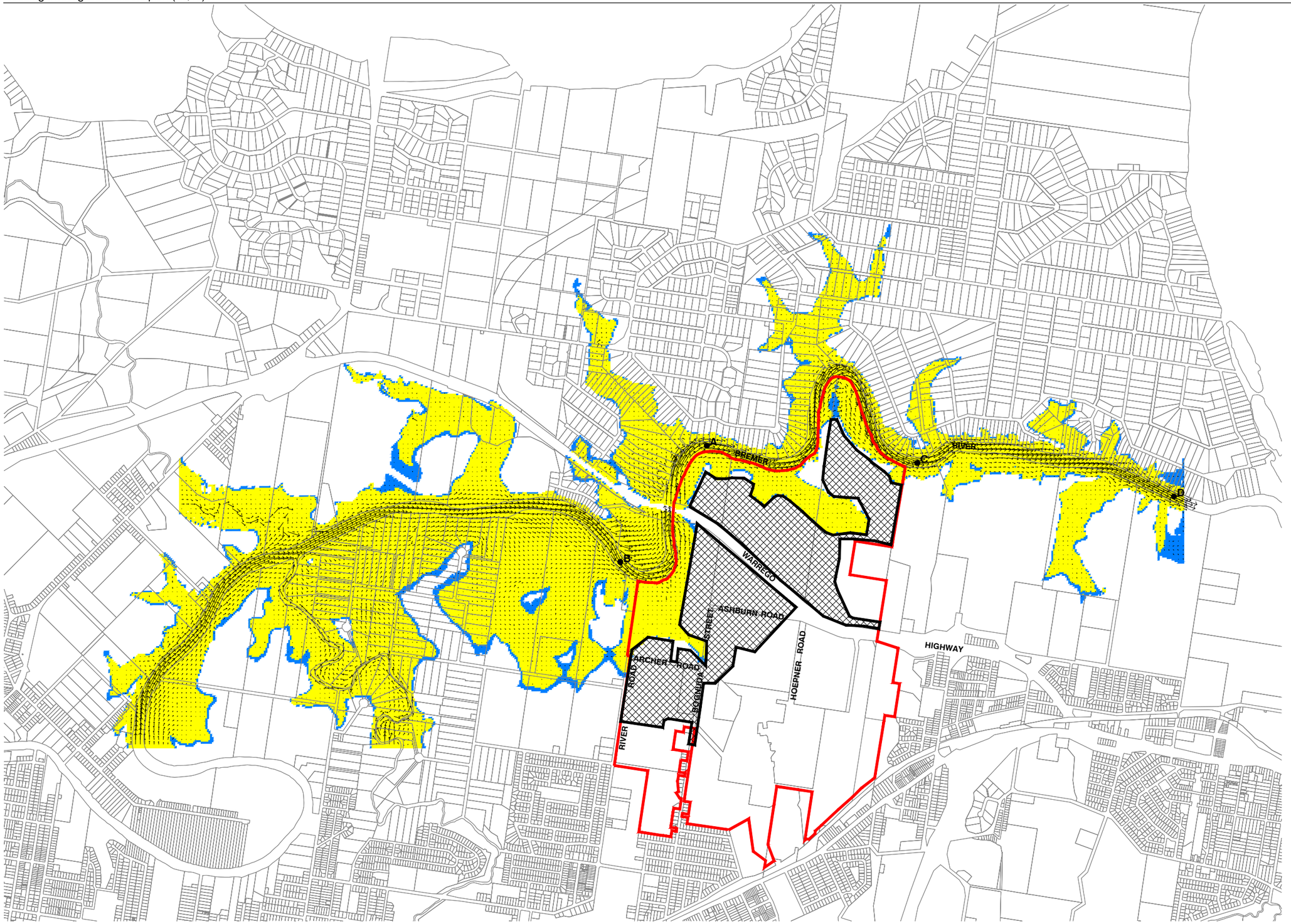
Project No.: LJ8714

Walker Corporation Pty Ltd

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FIGURE G.4.6

MASTERPLAN - HAZARD (SAFETY PRODUCT) - SKM ULTIMATE 100 YEAR EVENT (Brem_D14a)

Rev: 0 Date: May 2012

Project No.: LJ8714

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Scale 1:25000 (A3)

FIGURE G.4.7

MASTERPLAN - HAZARD (SAFETY PRODUCT) - SKM ULTIMATE 200 YEAR EVENT (Brem_D14a)

Rev: 0 Date: May 2012

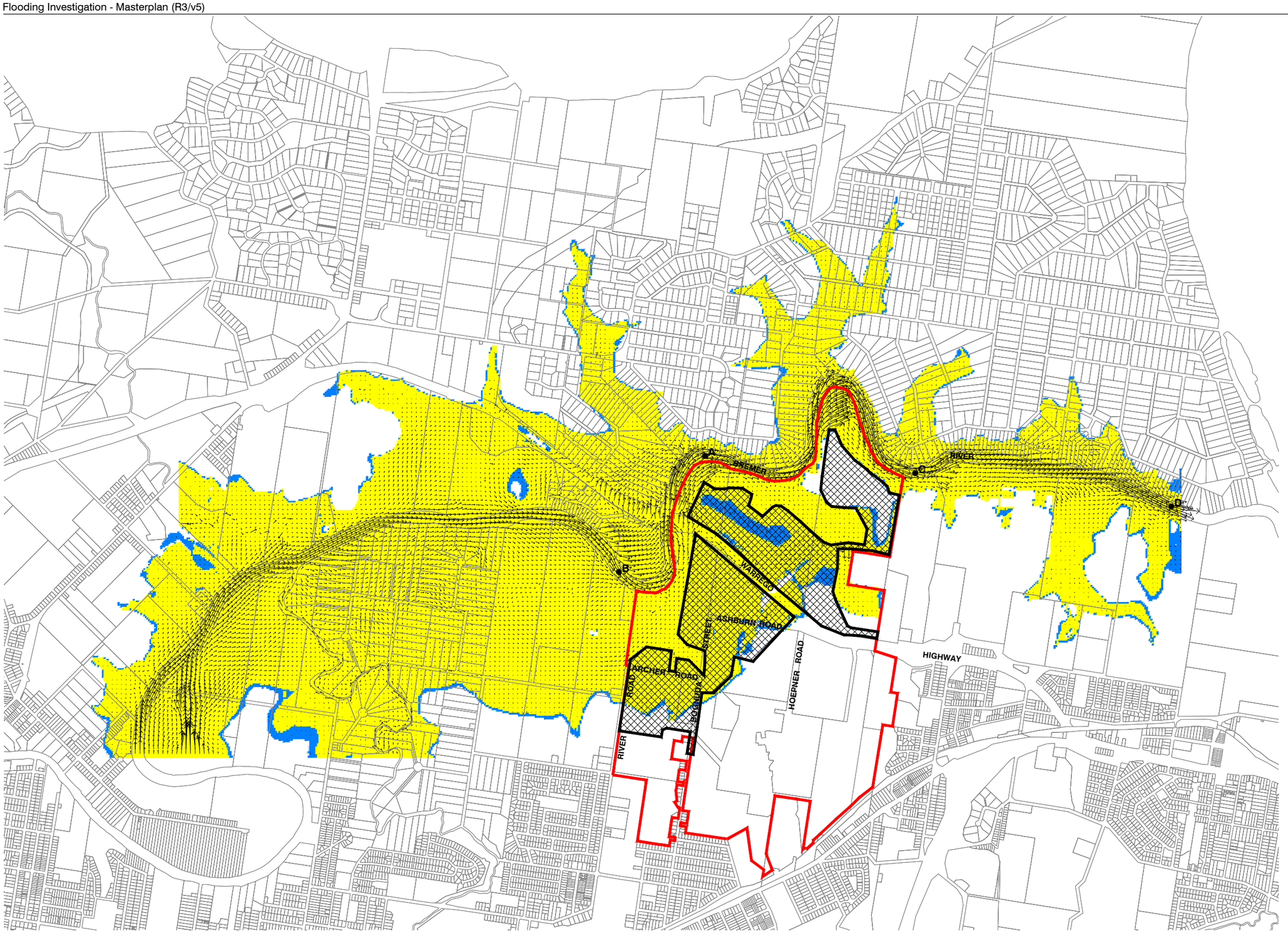
Project No.: LJ8714

Walker Corporation Pty Ltd

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N

LEGEND

- Site Boundary
- A Reporting Points
- Masterplan Fill Boundary

VELOCITIES

→ 1m/s

HAZARD (v×d Product)

- High
- Low

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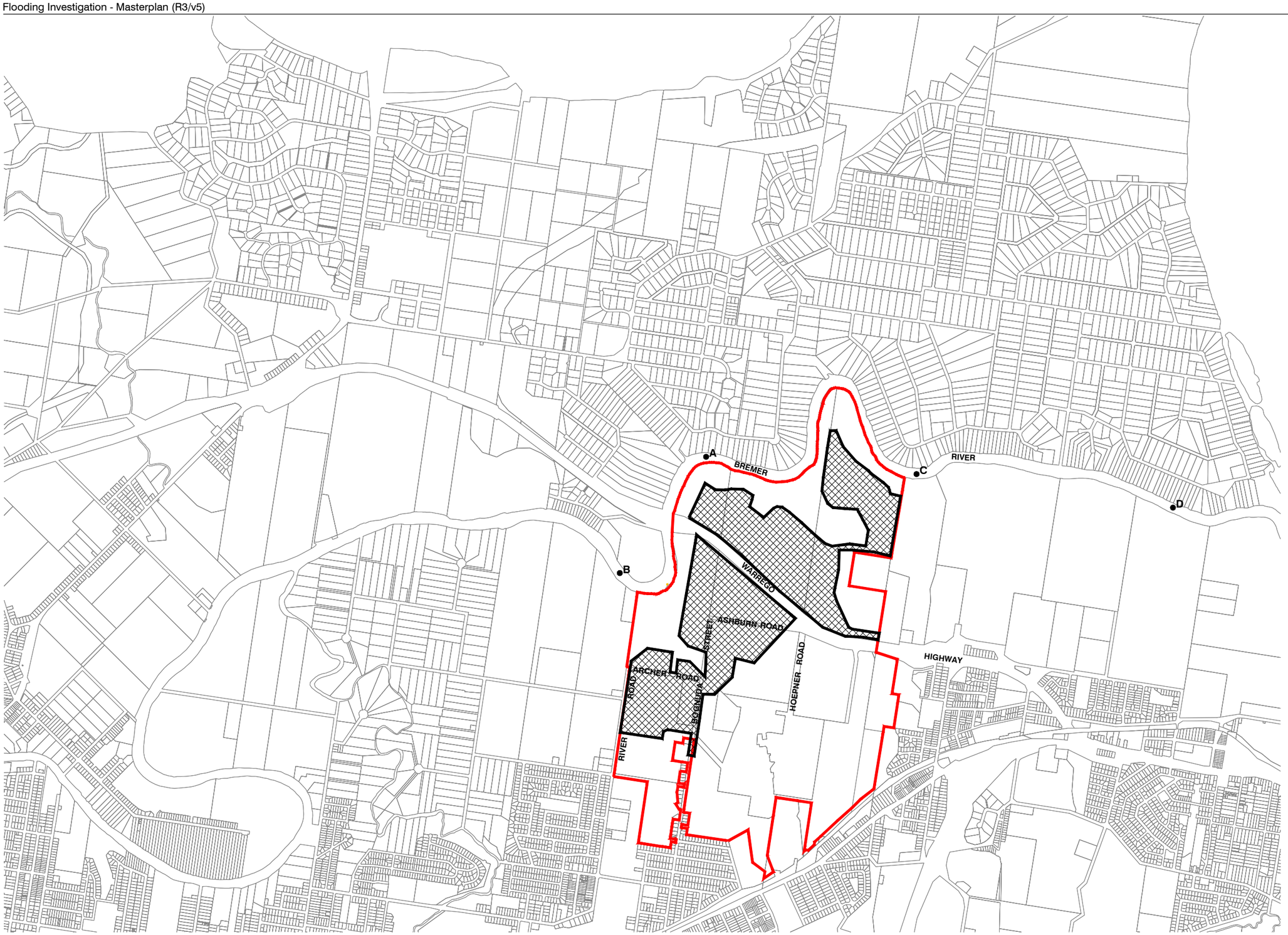
FIGURE G.4.8
MASTERPLAN - HAZARD (SAFETY PRODUCT) - SKM ULTIMATE 500 YEAR EVENT (Brem_D14a)

Appendix H.1

Bremer River Flood SOBEK 2D Impact Plots –

Masterplan Ultimate Case vs Pre-Developed Base Case

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FIGURE H.1.1

MASTERPLAN - IMPACTS - SKM ULTIMATE 2 YEAR EVENT (Brem_D14 vs Brem_E08)

Rev: 0 Date: May 2012

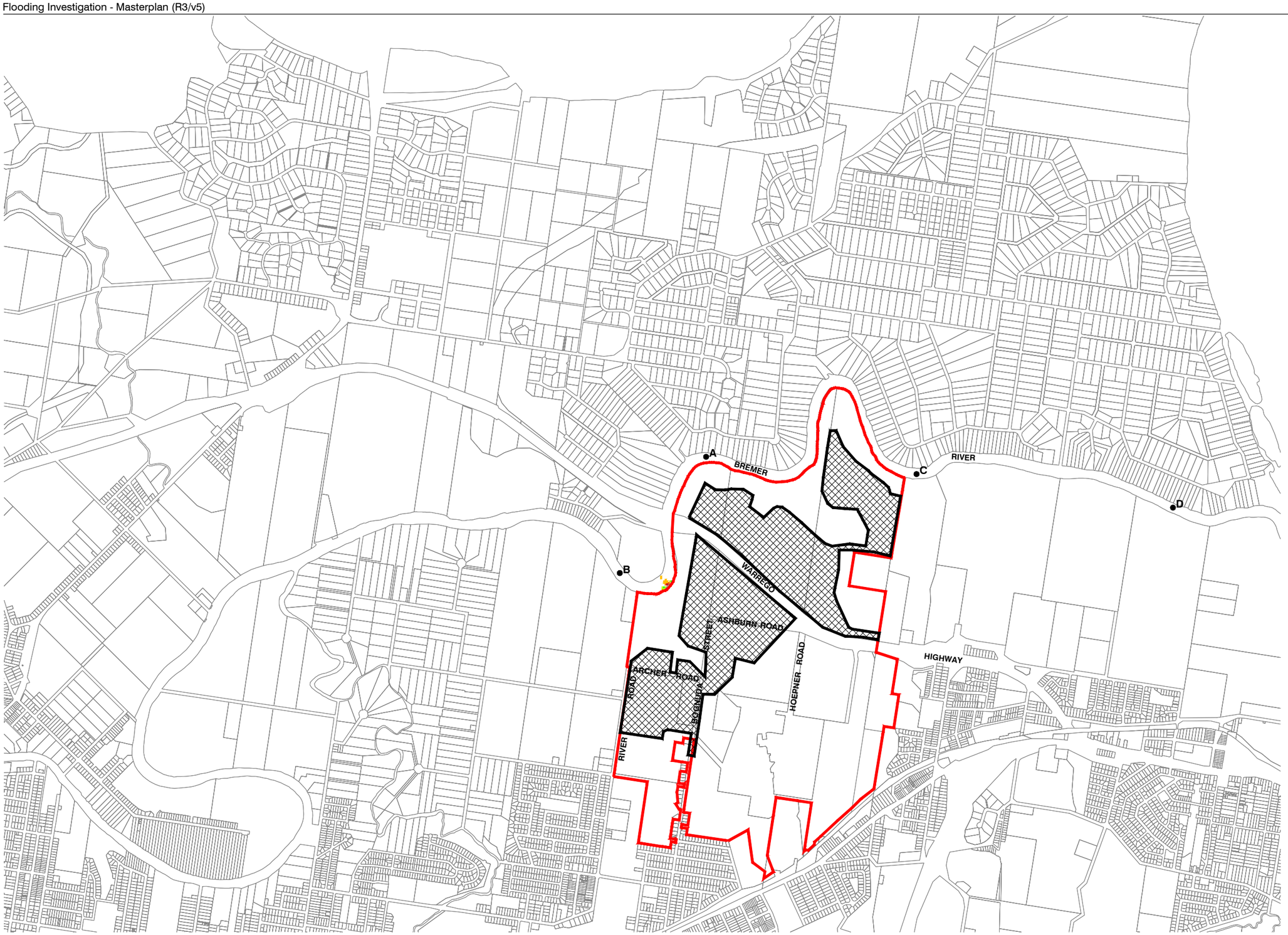
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FIGURE H.1.2

MASTERPLAN - IMPACTS - SKM ULTIMATE 5 YEAR EVENT (Brem_D14 vs Brem_E08)

Rev: 0 Date: May 2012

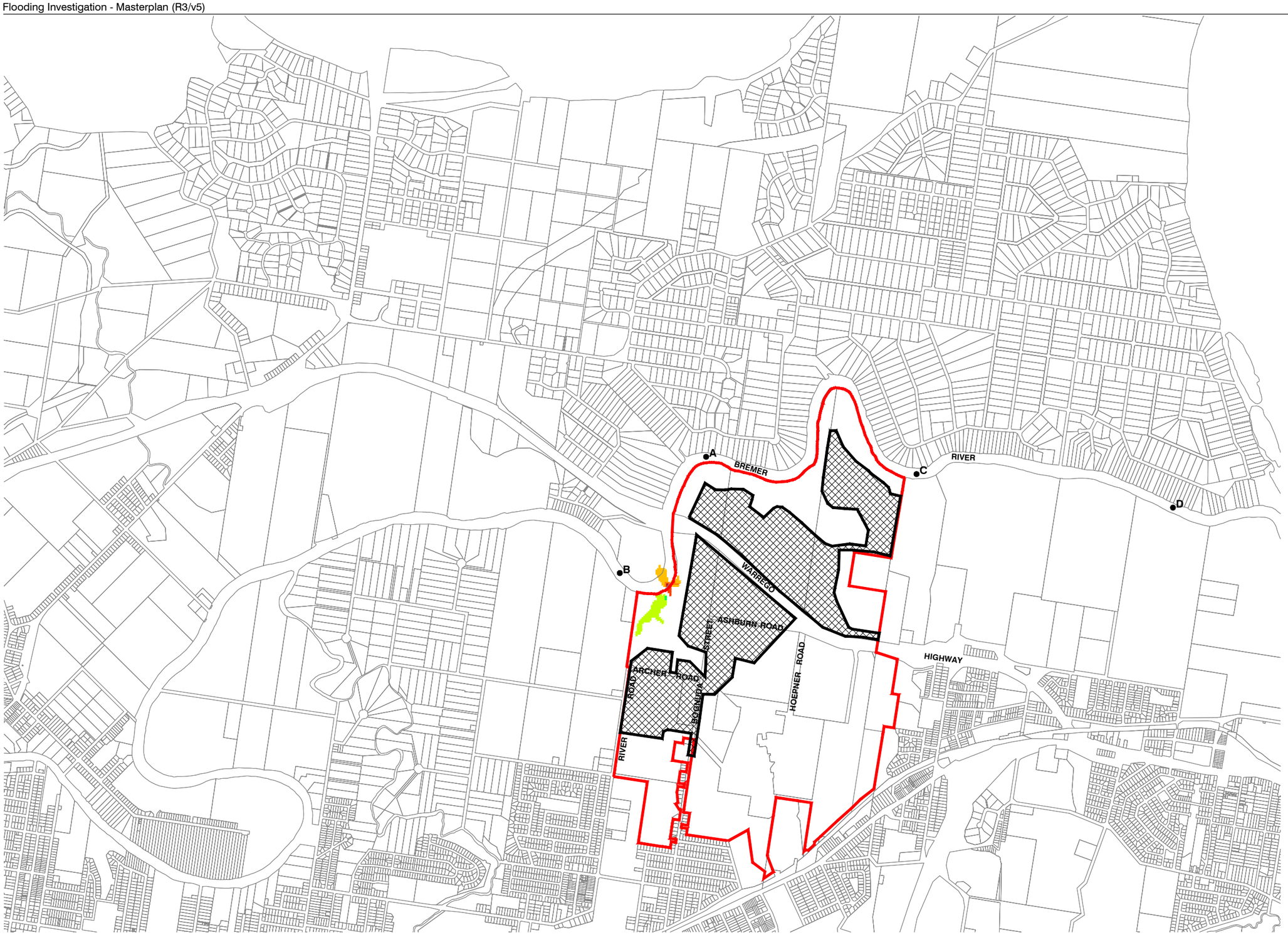
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FIGURE H.1.3

MASTERPLAN - IMPACTS - SKM ULTIMATE 10 YEAR EVENT (Brem_D14 vs Brem_E08)

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Project No.: LJ8714

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FIGURE H.1.4

MASTERPLAN - IMPACTS - SKM ULTIMATE 20 YEAR EVENT (Brem_D14 vs Brem_E08)

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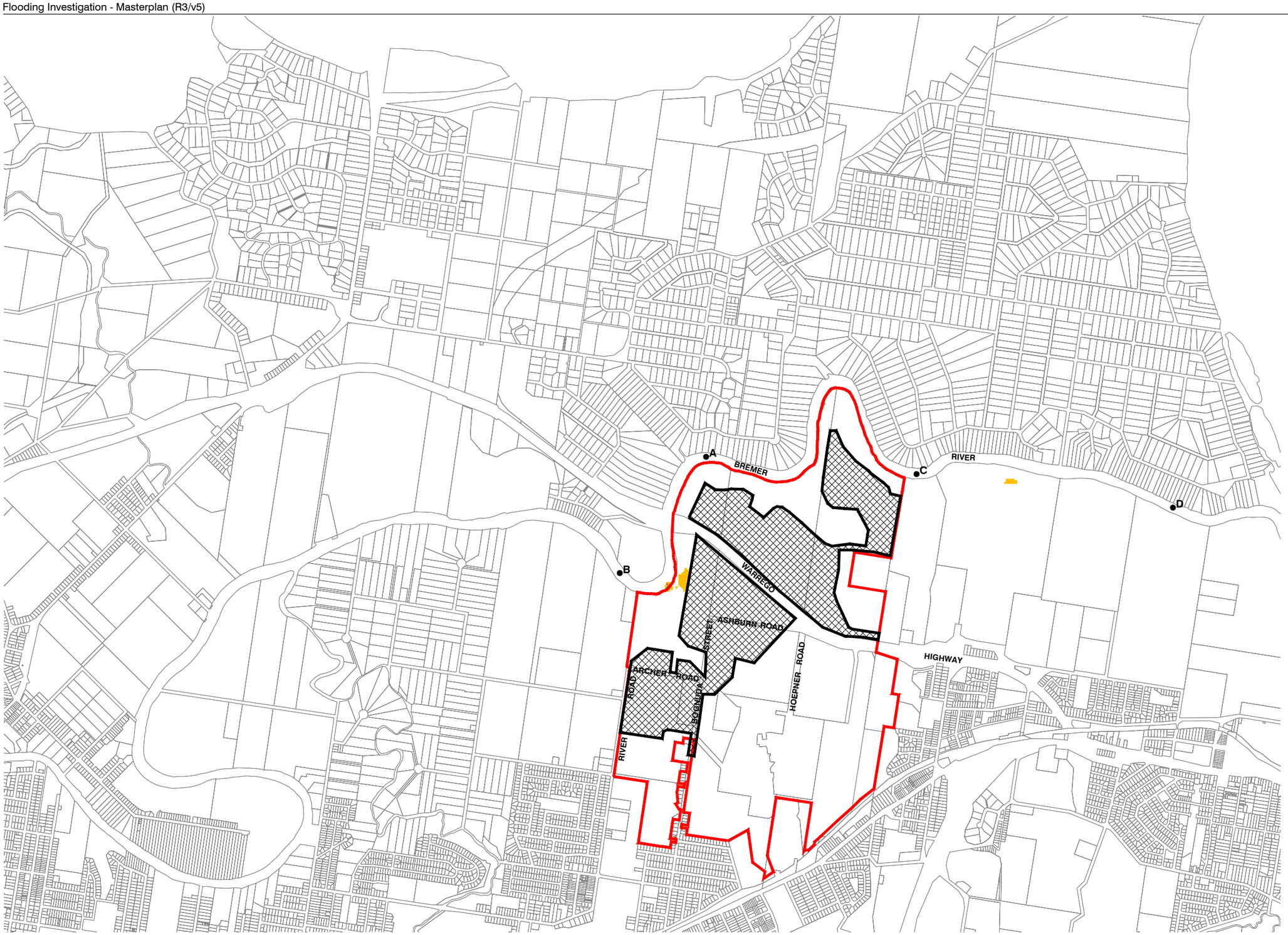
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FIGURE H.1.5

MASTERPLAN - IMPACTS - SKM ULTIMATE 50 YEAR EVENT (Brem_D14 vs Brem_E08)

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Project No.: LJ8714

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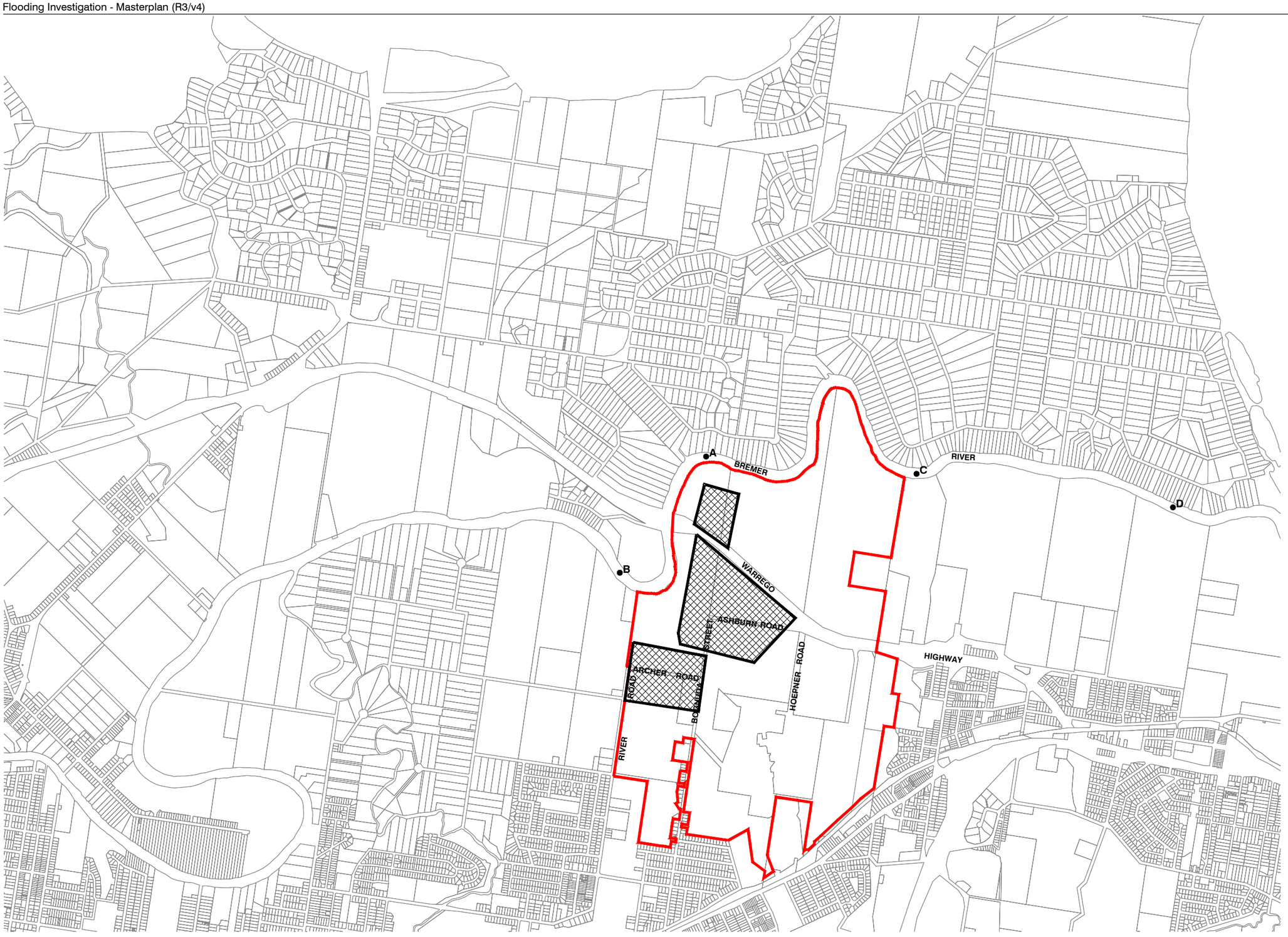
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XREF's: xref-Results; xr-Ipswich_DEDB_MGA

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Appendix H.2

Bremer River Flood SOBEK 2D Impact Plots – Existing Current Case vs Pre-Developed Base Case

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FIGURE H.2.1

EXISTING CURRENT - IMPACTS - SKM ULTIMATE 2 YEAR EVENT (Brem_E08c vs Brem_E08)

Rev: 0 Date: April 2012

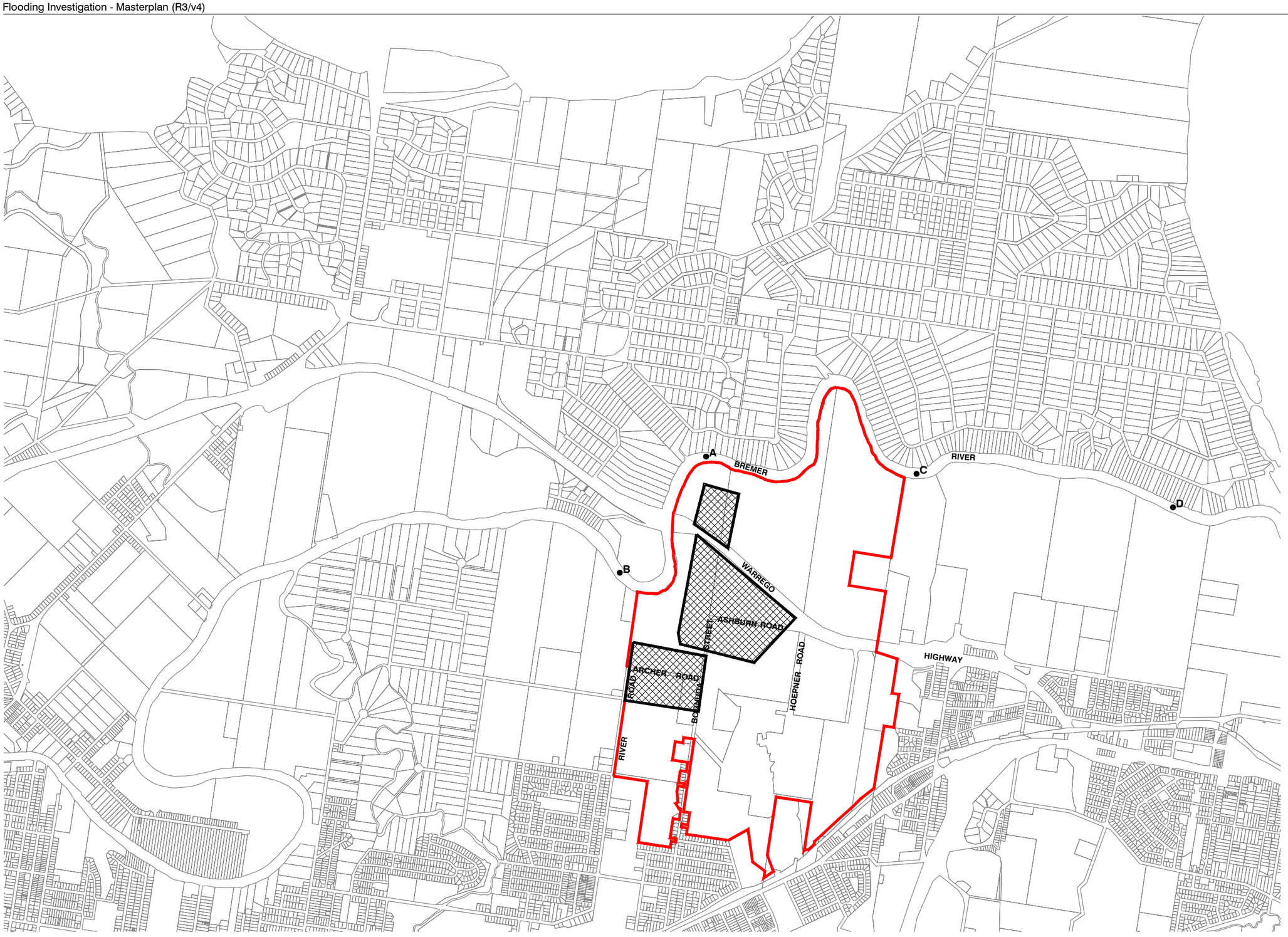
Project No.: LJ8714

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FIGURE H.2.2

EXISTING CURRENT - IMPACTS - SKM ULTIMATE 5 YEAR EVENT (Brem_E08c vs Brem_E08)

Rev: 0 Date: April 2012

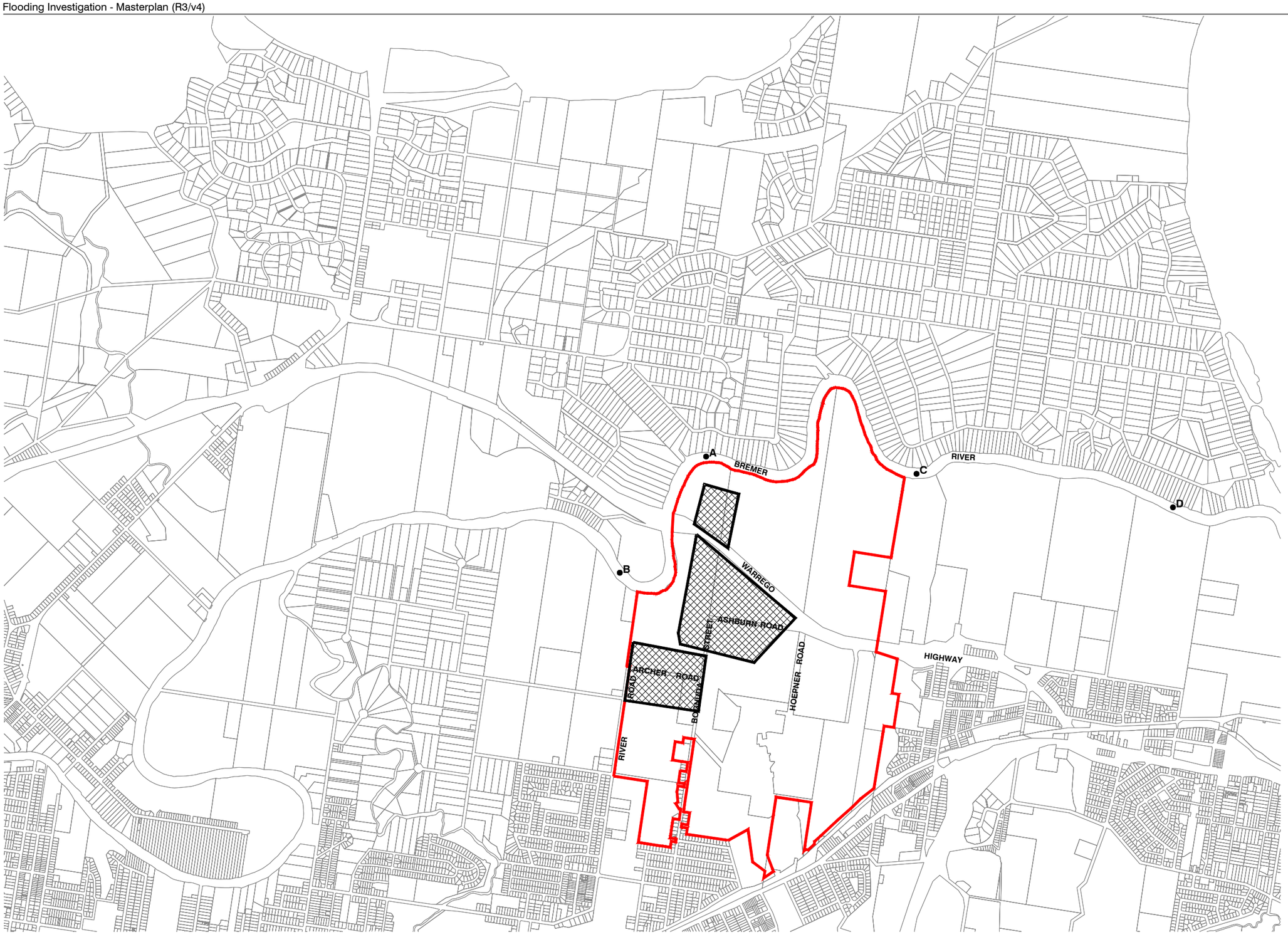
Project No.: LJ8714

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FIGURE H.2.3

EXISTING CURRENT - IMPACTS - SKM ULTIMATE 10 YEAR EVENT (Brem_E08c vs Brem_E08)

Rev: 0 Date: April 2012

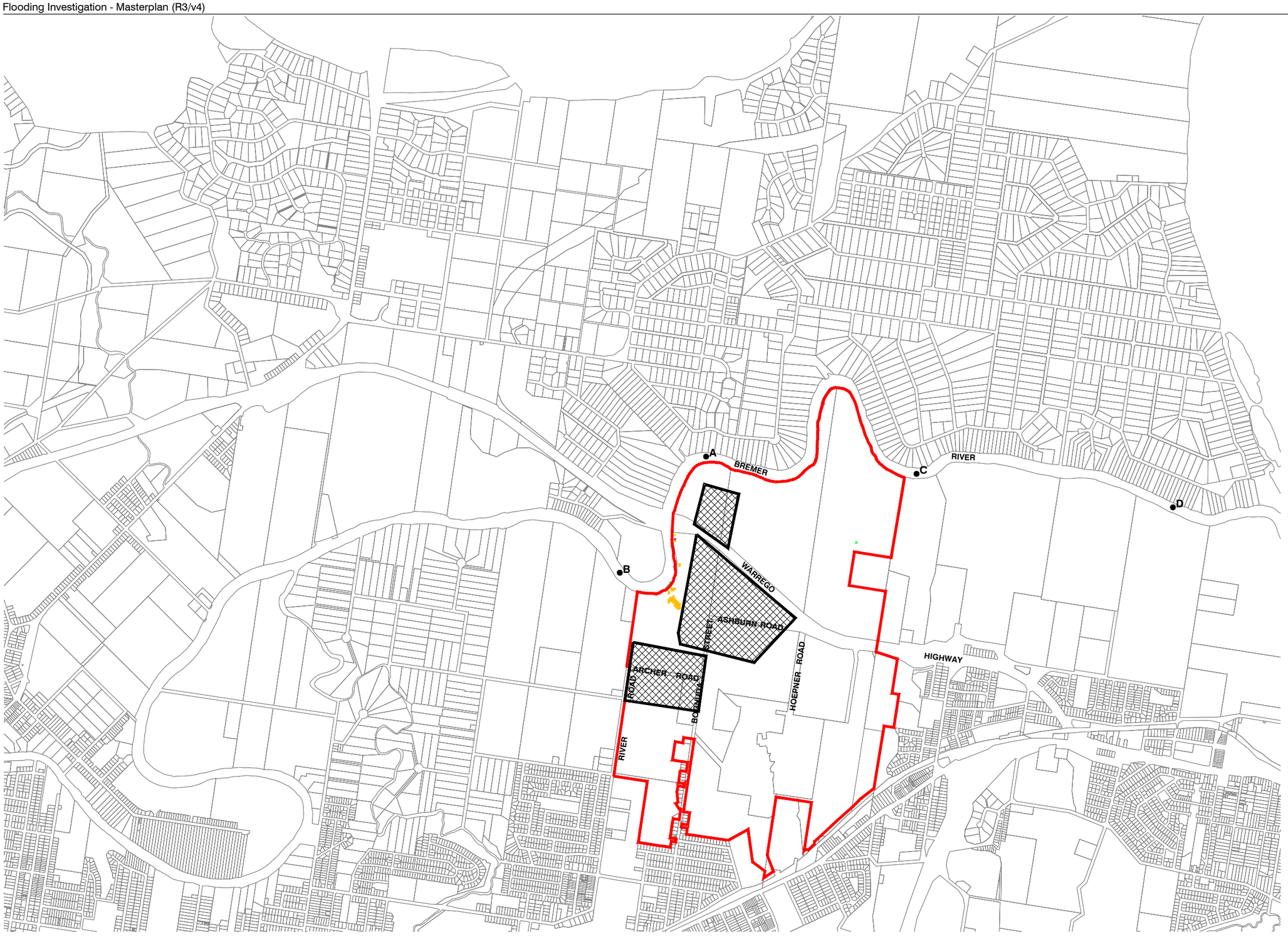
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FIGURE H.2.4

EXISTING CURRENT - IMPACTS - SKM ULTIMATE 20 YEAR EVENT (Brem_E08c vs Brem_E08)

Rev: 0 Date: April 2012

Project No.: LJ8714

Walker Corporation Pty Ltd

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XREFs: xref-Results; xr-Inswich_DEOB_M6A

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Scale 1:25000 (A3)

FIGURE H.2.5

EXISTING CURRENT - IMPACTS - SKM ULTIMATE 50 YEAR EVENT (Brem_E08c vs Brem_E08)

Rev: 0 Date: April 2012

Project No.: LJ8714

Walker Corporation Pty Ltd

PRINT DATE: 17 April, 2012 - 2:19pm

CAD FILE: C:\DOCUME~1\KRISZE~1.DEC\LOCALS~1\Temp\AcPublish_5140\Figure_R3v4_E08c_Brem_Impacts.dwg
XREFs: xref-Results; xr-Ipswich_DEOR_M6A

Appendix I

Mike11 Cumulative Impact Results

MIKE11		SKM Ultimate 30 hour duration 50 year ARI Predicted Peak Water Surface Levels (mAHD)					SKM Ultimate 30 hour duration 50 year ARI Predicted Peak Volume (m3 x 1000)				
Branch	xs ID	E01	P01	Impact P01 c.f. E01	P02	Impact P02 c.f. E01	E01	P01	Impact P01 c.f. E01	P02	Impact P02 c.f. E01
BREM	1021460.00	16.219	16.219	0.000	16.219	0.000	1922.650	1394.32	-528.33	1922.65	0.00
BREM	1022300.00	16.219	16.218	-0.001	16.219	0.000	4378.73	3754.65	-624.08	4378.72	-0.01
BREM	1022950.00	16.218	16.218	0.000	16.218	0.000	4990.41	4835.67	-154.74	5221.70	231.29
BREM	1023490.00	16.218	16.218	0.000	16.218	0.000	754.31	735.55	-18.76	754.31	0.00
BREM	1023510.00	Warrego Highway					Warrego Highway				
BREM	1023870.00	16.217	16.217	0.000	16.217	0.000	1484.81	1348.06	-136.75	1484.81	0.00
BREM	1024220.00	16.217	16.217	0.000	16.217	0.000	892.47	748.86	-143.61	892.47	0.00
BREM	1024520.00	16.217	16.217	0.000	16.217	0.000	1120.85	1035.37	-85.48	1120.85	0.00
BREM	1024750.00	16.217	16.216	-0.001	16.217	0.000	1258.49	1212.37	-46.12	1258.49	0.00
BREM	1025300.00	16.216	16.216	0.000	16.216	0.000	1512.36	1489.38	-22.98	1512.36	0.00
BREM	1025670.00	16.216	16.216	0.000	16.216	0.000	949.38	943.54	-5.84	949.38	0.00
BREM	1025920.00	16.216	16.216	0.000	16.216	0.000	701.45	674.50	-26.95	701.45	0.00
BREM	1026150.00	16.216	16.216	0.000	16.216	0.000	983.36	887.76	-95.60	983.36	0.00
BREM	1026560.00	16.216	16.216	0.000	16.216	0.000	1553.60	1511.97	-41.63	1553.60	0.00
BREM	1027100.00	16.216	16.216	0.000	16.216	0.000	1682.99	1517.01	-165.98	1682.99	0.00
BREM	1027640.00	16.216	16.216	0.000	16.216	0.000	1068.18	1025.63	-42.55	1068.18	0.00
BREM	1027840.00	16.216	16.216	0.000	16.216	0.000	832.43	749.60	-82.83	832.43	0.00
BREM	1028190.00	16.215	16.215	0.000	16.215	0.000	2487.60	2430.47	-57.13	2487.60	0.00
BREM	1028490.00	16.206	16.206	0.000	16.206	0.000	359.73	349.45	-10.28	359.73	0.00
BNE	1005325.00	16.554	16.554	0.000	16.553	-0.001	1353.29	1353.32	0.03	1353.29	0.00
BNE	1005870.00	16.276	16.276	0.000	16.276	0.000	1048.14	1048.16	0.02	1048.14	0.00
BNE	1006200.00	16.206	16.206	0.000	16.206	0.000	651.50	651.50	0.00	651.50	0.00
BNE	1006300.00	16.180	16.180	0.000	16.180	0.000	196.67	196.67	0.00	196.67	0.00
BNE	1006910.00	16.006	16.006	0.000	16.006	0.000	2666.44	2666.45	0.01	2666.44	0.00
BNE	1007410.00	15.946	15.946	0.000	15.946	0.000	1518.64	1518.64	0.00	1518.64	0.00

Appendix J

SOBEK 2D Cumulative Impact Results

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250 0 250 500 750 1000 1250m
1:25,000

Scale 1:25000 (A3)

FIGURE J.□

CUMULATIVE CASE - SKM ULTIMATE 50 YEAR ARI - SOBEK 2D TOPOGRAPHY (CASE D04a)

Rev: 0 **Date: April 2012**

Project No.: LJ8714

Walker Corporation Pty Ltd

CAD FILE: O:\LJ8714\Figures\SOBEK2D_figs\D04a_BRIS\Figure_R3v4.dwg
XREFs: xref-Results; xr-Ipswich_DCDB_MGA; VEC_Q100

PRINT DATE: 17 April, 2012 - 4:07pm

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250 0 250 500 750 1000 1250m
1:25,000

Scale 1:25000 (A3)

FIGURE J.2

STORAGE CASE - SKM ULTIMATE 50 YEAR ARI - SOBEK 2D TOPOGRAPHY (CASE D04b)

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Scale 1:25000 (A3)

FIGURE J.3

CUMULATIVE CASE - SKM ULTIMATE 50 YEAR ARI - IMPACT (CASE D04a-D04b)

Rev: 0 Date: April 2012

Project No.: LJ8714

Walker Corporation Pty Ltd

CAD FILE: C:\DOCUME~1\KRISZE~1.DEC\LOCALS~1\Temp\AcPublish_5140\Figure_R3v4.dwg
XREFs: xref-Results; xr-Ipswich_DEDB_MGA_VEC_0100

PRINT DATE: 17 April, 2012 - 4:11pm

Appendix K

Rational Method Results

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Shaping the Future

Project Title: **Citiswich Masterplan**
Subject: **Rational Method Hydrology Calculations** Job No.: **LJ8714**
Designer: **YY** Check: **DNN** Date: **28/3/2012** Page: **of**

Rain Fall Data Used:

Location: Ipswich, Qld, QUT Uni

AR&R Vol 2 1987 Parameters

Skewness	0.17
F2	4.39
F50	17.13

Time (hrs)	i_2 ($^{mm}/_{hr}$)	i_{50} ($^{mm}/_{hr}$)
1	45.97	92.33
12	7.17	14.58
72	1.98	4.23

Column and Variable Definition

Variable	ARI (years)						
	1	**2**	**5**	**10**	**20**	**50**	**100**
f_y	0.80	0.85	0.95	1.00	1.05	1.15	1.20

Catchment Data for Bremer River

Variable	Value	Unit
Area	452.77	ha
f_i	0.262	Fraction
C_{10}	0.635	Fraction

Catchment Discharges for Bremer River

Adopted Time: **70** Minutes (or 1.17 hours)

Variable	ARI (Years)						
	1	**2**	**5**	**10**	**20**	**50**	**100**
f_y	0.80	0.85	0.95	1.00	1.05	1.15	1.20
Intensity	31.2	40.7	53.3	61.1	71.5	85.7	96.9
Discharge	19.95	27.61	40.43	48.83	59.99	78.71	92.85

Cardno LawsonTreloar
Shaping the Future

Project Title: **Citiswich Masterplan**
Subject: **Rational Method Hydrology Calculations** Job No.: **LJ8714**
Designer: **YY** Check: **DNN** Date: **28/3/2012** Page: **of**

Rain Fall Data Used:

Location: Ipswich, Qld, QUT Uni

AR&R Vol 2 1987 Parameters

Skewness	0.17
F2	4.39
F50	17.13

Time (hrs)	i_2 ($^{mm}/_{hr}$)	i_{50} ($^{mm}/_{hr}$)
1	45.97	92.33
12	7.17	14.58
72	1.98	4.23

Column and Variable Definition

Variable	ARI (years)						
	1	**2**	**5**	**10**	**20**	**50**	**100**
f_y	0.80	0.85	0.95	1.00	1.05	1.15	1.20

Catchment Data for Bremer River

Variable	Value	Unit
Area	216.16	ha
f_i	0.224	Fraction
C_{10}	0.780	Fraction

Catchment Discharges for Bremer River

Adopted Time: **50** Minutes (or 0.83 hours)

Variable	ARI (Years)						
	1	**2**	**5**	**10**	**20**	**50**	**100**
f_y	0.80	0.85	0.95	1.00	1.05	1.15	1.20
Intensity	38.7	50.4	65.8	75.4	88.1	105.4	119.0
Discharge	14.51	20.06	29.29	35.31	43.33	56.77	66.89

Appendix L

Detailed WBNM Results

Flow Comparison							
ARI (Years)	Left1a - T						
	Pre-Developed			Post-Developed			Impact (m^3/s)
	Flow (m^3/s)	Critical Duration (min)	Time to peak (min)	Flow (m^3/s)	Critical Duration (min)	Time to peak (min)	
1	3.07	25	15	3.07	25	15	0.00
2	4.10	25	15	4.10	25	15	0.00
5	5.51	25	15	5.51	25	15	0.00
10	6.54	25	15	6.54	25	15	0.00
20	7.73	25	15	7.73	25	15	0.00
50	8.64	25	15	8.65	25	15	0.00
100	9.82	25	15	9.82	25	15	0.00

Flow Comparison							
ARI (Years)	Left1 - T						
	Pre-Developed			Post-Developed			Impact (Pre v Post) (m^3/s)
	Flow (m^3/s)	Critical Duration (min)	Time to peak (min)	Flow (m^3/s)	Critical Duration (min)	Time to peak (min)	
1	3.79	60	35	4.82	25	15	1.03
2	5.20	60	35	6.54	25	15	1.34
5	7.26	60	34	8.98	60	25	1.73
10	8.84	60	30	10.84	60	25	2.00
20	10.67	60	30	13.00	60	25	2.33
50	12.96	60	30	15.47	60	25	2.51
100	14.92	60	30	17.76	60	25	2.84

Flow Comparison							
ARI (Years)	Left2 - T						
	Pre-Developed			Post-Developed			Impact (Pre v Post) (m3/s)
	Flow (m^3/s)	Critical Duration (min)	Time to peak (min)	Flow (m^3/s)	Critical Duration (min)	Time to peak (min)	
1	4.26	60	40	5.05	60	35	0.80
2	5.90	60	38	6.91	60	35	1.00
5	8.36	60	37	9.63	60	35	1.26
10	10.25	60	35	11.61	60	34	1.36
20	12.42	60	35	13.96	60	33	1.55
50	15.22	60	35	16.90	60	33	1.68
100	17.55	60	35	19.44	60	32	1.90

Flow Comparison							
ARI (Years)	Left4 - T						
	Pre-Development			Masterplan Development			Impact (Pre v Post) (m^3/s)
	Flow (m^3/s)	Critical Duration (min)	Time to peak (min)	Flow (m^3/s)	Critical Duration (min)	Time to peak (min)	
1	2.24	25	15	4.07	25	15	1.83
2	3.08	25	15	5.27	25	15	2.19
5	4.26	25	15	6.90	25	15	2.64
10	5.18	25	15	7.94	25	15	2.76
20	6.19	25	15	9.27	25	15	3.09
50	7.16	60	25	10.12	25	15	2.96
100	8.21	60	25	11.42	25	15	3.21

Flow Comparison							
ARI (Years)	Left6 - T						
	Pre-Developed			Post-Developed			Impact (Pre v Post) (m3/s)
	Flow (m^3/s)	Critical Duration (min)	Time to peak (min)	Flow (m^3/s)	Critical Duration (min)	Time to peak (min)	
1	4.17	60	36	5.37	60	35	1.20
2	5.70	60	35	7.12	60	35	1.42
5	7.93	60	35	9.65	60	34	1.73
10	9.55	60	35	11.35	60	34	1.80
20	11.44	60	35	13.47	60	34	2.03
50	13.73	60	35	15.82	60	34	2.09
100	15.73	60	34	18.03	60	34	2.30

Flow Comparison							
ARI (Years)	Left7 - T						
	Pre-Developed			Post-Developed			Impact (Pre v Post) (m3/s)
	Flow (m^3/s)	Critical Duration (min)	Time to peak (min)	Flow (m^3/s)	Critical Duration (min)	Time to peak (min)	
1	8.75	60	46	10.36	60	44	1.61
2	12.18	60	45	14.16	60	42	1.98
5	17.23	60	43	19.82	60	41	2.59
10	21.07	60	42	23.94	60	40	2.88
20	25.50	60	41	28.86	60	40	3.36
50	31.39	60	40	35.23	60	39	3.84
100	36.23	60	40	40.56	60	38	4.33

Flow Comparison							
ARI (Years)	Left10 - T						
	Pre-Developed			Post-Developed			Impact (Pre v Post) (m3/s)
	Flow (m^3/s)	Critical Duration (min)	Time to peak (min)	Flow (m^3/s)	Critical Duration (min)	Time to peak (min)	
1	3.86	60	25	8.30	25	15	4.45
2	5.29	60	25	10.75	25	15	5.46
5	7.40	60	25	14.03	25	15	6.63
10	9.00	60	25	16.11	25	15	7.11
20	10.83	60	25	18.83	25	15	8.00
50	12.94	60	25	20.62	25	15	7.69
100	14.87	60	25	23.28	25	15	8.40

Flow Comparison							
ARI (Years)	Left8 - T						
	Pre-Developed			Post-Developed			Impact (Pre v Post) (m3/s)
	Flow (m^3/s)	Critical Duration (min)	Time to peak (min)	Flow (m^3/s)	Critical Duration (min)	Time to peak (min)	
1	8.99	60	55	14.43	60	39	5.44
2	12.61	60	54	19.65	60	38	7.05
5	18.03	60	51	27.42	60	37	9.39
10	22.19	60	50	33.02	60	37	10.82
20	26.99	60	48	39.80	60	37	12.81
50	33.78	60	47	48.47	60	37	14.70
100	39.11	60	46	55.86	60	36	16.75

Flow Comparison							
ARI (Years)	Left11 - T						
	Pre-Developed			Post-Developed			Impact (Pre v Post) (m3/s)
	Flow (m^3/s)	Critical Duration (min)	Time to peak (min)	Flow (m^3/s)	Critical Duration (min)	Time to peak (min)	
1	4.15	60	36	5.92	25	15	1.77
2	5.76	60	35	7.62	25	15	1.86
5	8.12	60	35	9.89	25	15	1.77
10	9.88	60	35	11.30	25	15	1.42
20	11.90	60	34	13.16	25	15	1.27
50	14.48	60	34	14.31	25	15	-0.17
100	16.67	60	33	16.11	25	15	-0.56

Flow Comparison							
ARI (Years)	Left9						
	Pre-Developed			Post-Developed			Impact (Pre v Post) (m3/s)
	Flow (m^3/s)	Critical Duration (min)	Time to peak (min)	Flow (m^3/s)	Critical Duration (min)	Time to peak (min)	
1	12.30	60	55	14.79	60	45	2.50
2	17.27	60	53	20.18	60	45	2.91
5	24.72	60	51	28.19	60	43	3.47
10	30.46	60	49	33.95	60	42	3.50
20	37.07	60	48	40.95	60	41	3.88
50	46.50	60	47	50.06	60	41	3.57
100	53.83	60	46	57.72	60	41	3.89

Flow Comparison							
ARI (Years)	RPWest						
	Pre-Developed			Post-Developed			Impact (Pre v Post) (m3/s)
	Flow (m^3/s)	Critical Duration (min)	Time to peak (min)	Flow (m^3/s)	Critical Duration (min)	Time to peak (min)	
1	14.05	60	53	20.36	60	37	6.31
2	19.76	60	50	27.49	60	36	7.73
5	28.32	60	49	38.08	60	36	9.75
10	34.96	60	47	45.58	60	36	10.63
20	42.61	60	45	54.80	60	36	12.18
50	53.58	60	45	66.33	60	36	12.75
100	62.04	60	45	76.33	60	36	14.29

Flow Comparison							
ARI (Years)	A1 - T						
	Pre-Developed			Post-Developed			Impact (Exist v Post) (m^3/s)
	Flow (m^3/s)	Critical Duration (min)	Time to peak (min)	Flow (m^3/s)	Critical Duration (min)	Time to peak (min)	
1	2.27	60	35	2.27	60	35	0.00
2	3.17	60	25	3.17	60	25	0.00
5	4.57	60	25	4.57	60	25	0.00
10	5.72	60	25	5.72	60	25	0.00
20	6.95	60	25	6.95	60	25	0.00
50	8.47	60	25	8.47	60	25	0.00
100	9.79	60	25	9.79	60	25	0.00

Flow Comparison							
ARI (Years)	A2 - T						
	Pre-Developed			Post-Developed			Impact (Exist v Post) (m3/s)
	Flow (m^3/s)	Critical Duration (min)	Time to peak (min)	Flow (m^3/s)	Critical Duration (min)	Time to peak (min)	
1	3.40	60	40	3.40	60	40	0.00
2	4.80	60	40	4.80	60	40	0.00
5	6.91	60	35	6.91	60	35	0.00
10	8.64	60	35	8.64	60	35	0.00
20	10.52	60	35	10.52	60	35	0.00
50	13.08	60	35	13.08	60	35	0.00
100	15.11	60	35	15.11	60	35	0.00

Flow Comparison							
ARI (Years)	A3 - T						
	Pre-Developed			Post-Developed			Impact (Exist v Post) (m3/s)
	Flow (m^3/s)	Critical Duration (min)	Time to peak (min)	Flow (m^3/s)	Critical Duration (min)	Time to peak (min)	
1	4.45	60	45	4.45	60	45	0.00
2	6.29	60	35	6.29	60	35	0.00
5	9.12	60	35	9.12	60	35	0.00
10	11.45	60	35	11.45	60	35	0.00
20	14.00	60	35	14.00	60	35	0.00
50	17.63	60	35	17.63	60	35	0.00
100	20.48	60	35	20.48	60	35	0.00

Flow Comparison							
ARI (Years)	A4a - T						
	Pre-Developed			Post-Developed			Impact (Exist v Post) (m3/s)
	Flow (m^3/s)	Critical Duration (min)	Time to peak (min)	Flow (m^3/s)	Critical Duration (min)	Time to peak (min)	
1	5.29	60	45	5.27	60	45	-0.03
2	7.48	60	45	7.43	60	45	-0.05
5	10.76	60	45	10.68	60	45	-0.09
10	13.38	60	42	13.29	60	40	-0.09
20	16.33	60	40	16.23	60	40	-0.10
50	20.61	60	41	20.49	60	40	-0.13
100	23.91	60	40	23.76	60	40	-0.14

Flow Comparison							
ARI (Years)	A5 - T						
	Pre-Developed			Post-Developed			Impact (Exist v Post) (m3/s)
	Flow (m^3/s)	Critical Duration (min)	Time to peak (min)	Flow (m^3/s)	Critical Duration (min)	Time to peak (min)	
1	8.89	25	15	8.89	25	15	-0.01
2	11.86	25	15	11.85	25	15	-0.01
5	15.93	25	15	15.92	25	15	-0.01
10	18.92	25	15	18.91	25	15	-0.01
20	22.38	25	15	22.37	25	15	-0.01
50	25.37	60	25	25.36	60	25	-0.01
100	28.98	60	25	28.97	60	25	-0.01

Flow Comparison							
ARI (Years)	A6 - T						
	Pre-Development			Post-Developed			Impact (Pre v Post) (m^3/s)
	Flow (m^3/s)	Critical Duration (min)	Time to peak (min)	Flow (m^3/s)	Critical Duration (min)	Time to peak (min)	
1	10.45	60	35	10.45	60	35	0.00
2	14.30	60	35	14.29	60	35	-0.01
5	20.02	60	35	20.01	60	35	-0.01
10	24.28	60	35	24.27	60	35	-0.01
20	29.27	60	35	29.26	60	35	-0.01
50	35.87	60	35	35.86	60	35	-0.01
100	41.32	60	35	41.31	60	35	-0.01

Flow Comparison							
ARI (Years)	B8W - T						
	Pre-Development			Post-Developed			Impact (Pre v Post) (m^3/s)
	Flow (m^3/s)	Critical Duration (min)	Time to peak (min)	Flow (m^3/s)	Critical Duration (min)	Time to peak (min)	
1	2.46	25	15	2.46	25	15	0.00
2	3.17	25	15	3.17	25	15	0.00
5	4.12	25	15	4.12	25	15	0.00
10	4.72	25	15	4.72	25	15	0.00
20	5.50	25	15	5.50	25	15	0.00
50	5.97	25	15	5.97	25	15	0.00
100	6.72	25	15	6.72	25	15	0.00

Flow Comparison							
ARI (Years)	B8E - T						
	Pre-Development			Post-Developed			Impact (Pre v Post) (m^3/s)
	Flow (m^3/s)	Critical Duration (min)	Time to peak (min)	Flow (m^3/s)	Critical Duration (min)	Time to peak (min)	
1	1.14	60	41	1.14	60	41	0.00
2	1.57	60	40	1.57	60	41	0.00
5	2.20	60	39	2.20	60	39	0.00
10	2.60	60	39	2.60	60	39	0.00
20	2.99	60	39	2.99	60	39	0.00
50	3.67	60	39	3.67	60	39	0.00
100	4.56	60	37	4.56	60	37	0.00

Flow Comparison							
ARI (Years)	A7 - T						
	Pre-Developed			Post-Developed			Impact (Pre v Post) (m^3/s)
	Flow (m^3/s)	Critical Duration (min)	Time to peak (min)	Flow (m^3/s)	Critical Duration (min)	Time to peak (min)	
1	15.29	60	55	15.56	60	54	0.26
2	21.30	60	55	21.52	60	52	0.22
5	30.22	60	55	30.43	60	50	0.22
10	37.03	60	53	37.20	60	50	0.17
20	44.89	60	52	45.03	60	50	0.14
50	56.63	60	52	56.64	60	50	0.01
100	65.41	60	51	65.39	60	50	-0.01

Flow Comparison							
ARI (Years)	B1 - T						
	Pre-Developed			Post-Developed			Impact (m^3/s)
	Flow (m^3/s)	Critical Duration (min)	Time to peak (min)	Flow (m^3/s)	Critical Duration (min)	Time to peak (min)	
1	4.37	60	25	6.56	25	15	2.19
2	6.00	60	25	8.61	25	15	2.61
5	8.41	60	25	11.39	25	15	2.98
10	10.26	60	25	13.27	25	15	3.01
20	12.36	60	25	15.62	25	15	3.26
50	14.84	60	25	17.46	60	25	2.62
100	17.09	60	25	19.89	60	25	2.81

Flow Comparison							
ARI (Years)	B2 - T						
	Pre-Developed			Post-Developed			Impact (m^3/s)
	Flow (m^3/s)	Critical Duration (min)	Time to peak (min)	Flow (m^3/s)	Critical Duration (min)	Time to peak (min)	
1	4.91	60	38	3.21	25	15	-1.70
2	6.78	60	37	4.13	25	15	-2.66
5	9.58	60	36	5.35	25	15	-4.23
10	11.69	60	35	6.11	25	15	-5.57
20	14.12	60	35	7.12	25	15	-7.00
50	17.21	60	35	7.71	25	15	-9.50
100	19.81	60	35	8.68	25	15	-11.13

Flow Comparison							
ARI (Years)	B3 - T						
	Pre-Developed			Post-Developed			Impact (m^3/s)
	Flow (m^3/s)	Critical Duration (min)	Time to peak (min)	Flow (m^3/s)	Critical Duration (min)	Time to peak (min)	
1	0.83	60	25	8.14	60	30	7.31
2	1.16	60	25	10.79	60	30	9.63
5	1.65	60	25	14.67	60	29	13.02
10	2.03	25	15	17.29	60	29	15.26
20	2.44	25	15	20.59	60	29	18.15
50	2.87	60	25	24.22	60	29	21.35
100	3.30	60	25	27.70	60	28	24.40

Flow Comparison							
ARI (Years)	A9 - T						
	Pre-Developed			Post-Developed			Impact (m^3/s)
	Flow (m^3/s)	Critical Duration (min)	Time to peak (min)	Flow (m^3/s)	Critical Duration (min)	Time to peak (min)	
1	17.64	90	85	17.43	90	80	-0.21
2	24.62	90	82	24.13	90	78	-0.50
5	35.07	90	80	34.16	90	75	-0.91
10	42.90	90	77	41.60	90	75	-1.30
20	52.03	90	76	50.29	90	73	-1.75
50	65.64	60	61	63.95	60	60	-1.68
100	76.19	60	61	74.04	60	59	-2.14

Flow Comparison							
ARI (Years)	RPEast - T						
	Pre-Developed			Post-Developed			Impact (Pre v Post) (m^3/s)
	Flow (m^3/s)	Critical Duration (min)	Time to peak (min)	Flow (m^3/s)	Critical Duration (min)	Time to peak (min)	
1	20.55	90	79	20.40	90	75	-0.15
2	28.59	90	76	28.03	90	73	-0.56
5	40.58	90	75	39.69	60	50	-0.89
10	49.48	90	73	48.62	60	50	-0.87
20	59.93	60	57	59.15	60	50	-0.78
50	76.45	60	57	74.87	60	50	-1.58
100	88.68	60	56	86.76	60	50	-1.92

Appendix M.1

Western Tributary Detailed SOBEK1D Results (Pre- & Post-Development Comparison)

Pre-Development Case: EX07a
Post-Development Case: DE23a

SOBEK Cross-ID	Peak Water Level (m AHD)																				
	100 Year ARI			50 Year ARI			20 Year ARI			10 Year ARI			5 Year ARI			2 Year ARI			1 Year ARI		
	Ex.	Dev.	Impact	Ex.	Dev.	Impact	Ex.	Dev.	Impact	Ex.	Dev.	Impact	Ex.	Dev.	Impact	Ex.	Dev.	Impact	Ex.	Dev.	Impact
	Reach 1 Western Tributary																				
RCH_0_EX_01	35.50	35.50		35.49	35.48	-0.01	35.47	35.47		35.45	35.45		35.43	35.43		35.40	35.40		35.37	35.37	
RCH_0_EX_02	35.24	35.23	-0.01	35.20	35.20		35.17	35.17		35.13	35.12	-0.01	35.08	35.08		34.99	34.98	-0.01	34.76	34.76	
RCH_0_EX_03	35.24	35.23	-0.01	35.20	35.20		35.17	35.17		35.13	35.13		35.08	35.08		35.00	35.00		34.93	34.84	-0.09
RCH_0_EX_04	34.60	34.59	-0.01	34.57	34.56	-0.01	34.54	34.53	-0.01	34.50	34.49	-0.01	34.45	34.44	-0.01	34.34	34.34		34.25	34.18	-0.07
RCH_0_EX_05	34.19	34.13	-0.06	34.17	34.11	-0.06	34.15	34.09	-0.06	34.12	34.06	-0.06	34.08	34.02	-0.06	34.00	33.96	-0.04	33.94	33.90	-0.04
	Site Boundary																				
RCH_0_DEV_01	34.05	33.21	-0.84	34.03	33.16	-0.87	34.01	33.13	-0.88	33.99	33.10	-0.89	33.96	33.07	-0.89	33.90	33.03	-0.87	33.85	33.00	-0.85
RCH_0_DEV_02	32.75	33.21	0.46	32.69	33.17	0.48	32.63	33.13	0.50	32.56	33.10	0.54	32.48	33.08	0.60	32.36	33.02	0.66	32.29	33.00	0.71
	Road Crossing 1																				
RCH_0_DEV_03	32.57	32.12	-0.45	32.51	32.06	-0.45	32.46	32.01	-0.45	32.39	31.95	-0.44	32.32	31.88	-0.44	32.20	31.79	-0.41	32.14	31.74	-0.40
RCH_0_DEV_03b	31.98	31.42	-0.56	31.93	31.36	-0.57	31.89	31.31	-0.58	31.84	31.26	-0.58	31.77	31.20	-0.57	31.66	31.11	-0.55	31.60	31.06	-0.54
RCH_0_DEV_04	31.30	30.73	-0.57	31.26	30.67	-0.59	31.21	30.61	-0.60	31.16	30.54	-0.62	31.11	30.47	-0.64	31.04	30.37	-0.67	31.00	30.32	-0.68
	Road Crossing 2																				
RCH_0_DEV_05	30.19	30.41	0.22	30.17	30.37	0.20	30.14	30.33	0.19	30.11	30.29	0.18	30.07	30.24	0.17	30.02	30.17	0.15	29.99	30.13	0.14
RCH_0_DEV_06	29.18	29.72	0.54	29.15	29.70	0.55	29.11	29.67	0.56	29.07	29.65	0.58	29.04	29.62	0.58	28.98	29.58	0.60	28.95	29.55	0.60
RCH_0_DEV_07	28.31	27.76	-0.55	28.28	27.75	-0.53	28.25	27.73	-0.52	28.20	27.72	-0.48	28.16	27.70	-0.46	28.10	27.67	-0.43	28.06	27.65	-0.41
RCH_0_DEV_08	26.37	25.72	-0.65	26.35	25.70	-0.65	26.32	25.67	-0.65	26.30	25.65	-0.65	26.27	25.62	-0.65	26.24	25.58	-0.66	26.22	25.56	-0.66
RCH_0_DEV_09	24.60	24.12	-0.48	24.58	23.85	-0.73	24.56	23.59	-0.97	24.54	23.40	-1.14	24.51	23.28	-1.23	24.48	23.17	-1.31	24.45	23.07	-1.38
	Road Crossing 3																				
RCH_0_DEV_10	23.89	23.28	-0.61	23.87	23.22	-0.65	23.84	23.15	-0.69	23.82	23.08	-0.74	23.78	23.01	-0.77	23.72	22.93	-0.79	23.68	22.85	-0.83
RCH_0_DEV_11	22.27	23.09	0.82	22.25	23.03	0.78	22.21	22.97	0.76	22.18	22.90	0.72	22.15	22.84	0.69	22.10	22.76	0.66	22.07	22.67	0.60
RCH_0_DEV_12	20.23	22.76	2.53	20.19	22.71	2.52	20.13	22.65	2.52	20.08	22.59	2.51	20.03	22.55	2.52	19.95	22.47	2.52	19.89	22.39	2.50
RCH_1_DEV_01	19.41	20.28	0.87	19.37	20.22	0.85	19.32	20.15	0.83	19.28	20.08	0.80	19.24	20.01	0.77	19.18	19.92	0.74	19.14	19.85	0.71
RCH_1_DEV_02	18.65	19.61	0.96	18.59	19.54	0.95	18.52	19.45	0.93	18.46	19.36	0.90	18.41	19.28	0.87	18.32	19.15	0.83	18.26	19.05	0.79
RCH_1_DEV_03	17.42	16.27	-1.15	17.37	16.09	-1.28	17.30	15.87	-1.43	17.25	15.68	-1.57	17.19	15.55	-1.64	17.11	15.40	-1.71	17.05	15.27	-1.78
	Archer St																				
RCH_1_DEV_04	-	14.94	-	-	14.90	-	-	14.87	-	-	14.83	-	-	14.80	-	-	14.75	-	-	14.71	-
RCH_1_DEV_05	-	12.05	-	-	12.05	-	-	12.04	-	-	11.99	-	-	11.93	-	-	11.79	-	-	11.66	-
RCH_1_DEV_06	-	11.90	-	-	11.82	-	-	11.73	-	-	11.63	-	-	11.54	-	-	11.40	-	-	11.29	-
RCH_1_DEV_07	-	11.60	-	-	11.51	-	-	11.42	-	-	11.34	-	-	11.26	-	-	11.14	-	-	11.04	-
RCH_1_DEV_08	-	11.35	-	-	11.25	-	-	11.17	-	-	11.09	-	-	11.02	-	-	10.92	-	-	10.83	-
	Drop 1																				
RCH_1_DEV_09	-	11.04	-	-	10.72	-	-	10.38	-	-	10.28	-	-	10.20	-	-	10.06	-	-	9.95	-
RCH_1_DEV_10	-	10.64	-	-	10.33	-	-	10.09	-	-	9.99	-	-	9.90	-	-	9.75	-	-	9.63	-
RCH_1_DEV_11	-	10.26	-	-	10.02	-	-	9.85	-	-	9.74	-	-	9.64	-	-	9.48	-	-	9.36	-
RCH_1_DEV_12	-	9.91	-	-	9.76	-	-	9.61	-	-	9.49	-	-	9.36	-	-	9.18	-	-	9.04	-
RCH_1_DEV_13	-	9.90	-	-	9.72	-	-	9.55	-	-	9.40	-	-	9.27	-	-	9.06	-	-	8.90	-
PedXS	-	9.87	-	-	9.68	-	-	9.49	-	-	9.33	-	-	9.19	-	-	8.98	-	-	8.81	-
RCH_1_DEV_14	-	9.11	-	-	9.01	-	-	8.93	-	-	8.83	-	-	8.74	-	-	8.61	-	-	8.50	-
	Drop 2																				
RCH_1_DEV_15	-	8.11	-	-	7.93	-	-	7.76	-	-	7.59	-	-	7.44	-	-	7.23	-	-	7.06	-
RCH_1_DEV_16	-	7.77	-	-	7.54	-	-	7.31	-	-	7.07	-	-	6.87	-	-	6.68	-	-	6.51	-
RCH_1_DEV_17	-	6.92	-	-	6.82	-	-	6.72	-	-	6.60	-	-	6.50	-	-	6.32	-	-	6.16	-
RCH_1_DEV_18	-	6.16	-	-	6.06	-	-	5.97	-	-	5.86	-	-	5.77	-	-	5.62	-	-	5.50	-
	Drop 3																				
RCH_1_DEV_19	-	5.45	-	-	5.01	-	-	4.58	-	-	4.17	-	-	3.86	-	-	3.49	-	-	3.32	-
RCH_1_DEV_20	-	4.78	-	-	4.44	-	-	4.09	-	-	3.76	-	-	3.49	-	-	3.14	-	-	2.99	-
RCH_1_DEV_21	-	4.03	-	-	3.81	-	-	3.57	-	-	3.34	-	-	3.16	-	-	2.92	-	-	2.80	-
RCH_1_DEV_22	-	2.75	-	-	2.73	-	-	2.70	-	-	2.68	-	-	2.66	-	-	2.64	-	-	2.63	-
DS_Boundary	2.62	2.62		2.62	2.62		2.62	2.62		2.62	2.62		2.62	2.62		2.62	2.62		2.62	2.62	
	Reach 2 Western Tributary																				
RCH_2_DEV_01	-	29.72	-	-	29.68	-	-	29.65	-	-	29.60	-	-	29.56	-	-	29.48	-	-	29.42	-
RCH_2_DEV_02	-	22.50	-	-	22.24	-	-	22.03	-	-	21.78	-	-	21.62	-	-	21.38	-	-	21.20	-
	Bognuda St																				
RCH_2_DEV_03	-	21.29	-	-	21.23	-	-	21.18	-	-	21.12	-	-	21.05	-	-	20.94	-	-	20.84	-
RCH_2_DEV_04	-	19.85	-	-	19.77	-	-	19.69	-	-	19.60	-	-	19.53	-	-	19.41	-	-	19.31	-
	Reach 3 Western Tributary																				
RCH_3_DEV_01	-	12.46	-	-	12.39	-	-	12.34	-	-	12.26	-	-	12.20	-	-	12.09	-	-	11.99	-
RCH_3_DEV_02	-	11.22	-	-	11.16	-	-	11.11	-	-	11.04	-	-	10.99	-	-	10.89	-	-	10.80	-
RCH_3_DEV_03	-	11.10	-	-	11.00	-	-	10.95	-	-	10.88	-	-	10.82	-	-	10.72	-	-	10.64	-
RCH_3_DEV_04	-	11.05	-	-	10.75	-	-	10.57	-	-	10.49	-	-	10.43	-	-	10.32	-	-	10.23	-

Pre-Development Case: EX07a
Post-Development Case: DE23a

SOBEK Cross-ID	Peak Water Depth (m)																				
	100 Year ARI			50 Year ARI			20 Year ARI			10 Year ARI			5 Year ARI			2 Year ARI			1 Year ARI		
	Ex.	Dev.	Impact	Ex.	Dev.	Impact	Ex.	Dev.	Impact	Ex.	Dev.	Impact	Ex.	Dev.	Impact	Ex.	Dev.	Impact	Ex.	Dev.	Impact
Reach 1 Western Tributary																					
RCH_0_EX_01	0.28	0.28		0.27	0.27		0.25	0.25		0.23	0.23		0.21	0.21		0.18	0.18		0.15	0.15	
RCH_0_EX_02	0.89	0.89		0.86	0.86		0.83	0.82	-0.01	0.79	0.78	-0.01	0.74	0.73	-0.01	0.65	0.64	-0.01	0.42	0.42	
RCH_0_EX_03	0.40	0.39	-0.01	0.36	0.36		0.33	0.33		0.29	0.28	-0.01	0.24	0.24		0.16	0.16		0.09	0.00	-0.09
RCH_0_EX_04	0.42	0.41	-0.01	0.39	0.38	-0.01	0.36	0.35	-0.01	0.32	0.31	-0.01	0.27	0.26	-0.01	0.16	0.15	-0.01	0.06	0.00	-0.06
RCH_0_EX_05	0.29	0.23	-0.06	0.27	0.21	-0.06	0.25	0.18	-0.07	0.21	0.15	-0.06	0.18	0.12	-0.06	0.10	0.06	-0.04	0.04	0.00	-0.04
Site Boundary																					
RCH_0_DEV_01	0.24	0.21	-0.03	0.22	0.16	-0.06	0.20	0.13	-0.07	0.18	0.10	-0.08	0.15	0.07	-0.08	0.09	0.03	-0.06	0.04	0.00	-0.04
RCH_0_DEV_02	1.31	0.21	-1.10	1.25	0.17	-1.08	1.19	0.13	-1.06	1.11	0.10	-1.01	1.04	0.08	-0.96	0.92	0.02	-0.90	0.85	0.00	-0.85
Road Crossing 1																					
RCH_0_DEV_03	1.24	1.05	-0.19	1.18	0.99	-0.19	1.13	0.94	-0.19	1.06	0.88	-0.18	0.99	0.81	-0.18	0.87	0.71	-0.16	0.81	0.67	-0.14
RCH_0_DEV_03b	1.19	1.02	-0.17	1.14	0.97	-0.17	1.10	0.92	-0.18	1.05	0.87	-0.18	0.98	0.81	-0.17	0.87	0.71	-0.16	0.81	0.67	-0.14
RCH_0_DEV_04	0.85	1.03	0.18	0.81	0.97	0.16	0.76	0.91	0.15	0.71	0.84	0.13	0.66	0.77	0.11	0.59	0.67	0.08	0.55	0.62	0.07
Road Crossing 2																					
RCH_0_DEV_05	0.57	0.87	0.30	0.55	0.83	0.28	0.52	0.79	0.27	0.49	0.74	0.25	0.45	0.69	0.24	0.40	0.62	0.22	0.37	0.58	0.21
RCH_0_DEV_06	0.60	0.64	0.04	0.57	0.62	0.05	0.52	0.59	0.07	0.49	0.57	0.08	0.45	0.54	0.09	0.40	0.50	0.10	0.36	0.47	0.11
RCH_0_DEV_07	0.65	0.55	-0.10	0.62	0.53	-0.09	0.58	0.52	-0.06	0.53	0.50	-0.03	0.49	0.49		0.43	0.46	0.03	0.39	0.44	0.05
RCH_0_DEV_08	0.39	0.63	0.24	0.37	0.60	0.23	0.35	0.58	0.23	0.32	0.55	0.23	0.30	0.53	0.23	0.26	0.49	0.23	0.24	0.47	0.23
RCH_0_DEV_09	0.42	1.71	1.29	0.40	1.45	1.05	0.38	1.19	0.81	0.35	0.99	0.64	0.33	0.88	0.55	0.29	0.77	0.48	0.27	0.66	0.39
Road Crossing 3																					
RCH_0_DEV_10	0.61	1.13	0.52	0.59	1.08	0.49	0.56	1.00	0.44	0.54	0.94	0.40	0.50	0.87	0.37	0.44	0.79	0.35	0.40	0.71	0.31
RCH_0_DEV_11	0.45	1.16	0.71	0.42	1.10	0.68	0.39	1.03	0.64	0.35	0.96	0.61	0.32	0.90	0.58	0.28	0.82	0.54	0.24	0.73	0.49
RCH_0_DEV_12	0.80	1.05	0.25	0.76	1.00	0.24	0.70	0.94	0.24	0.65	0.88	0.23	0.60	0.83	0.23	0.52	0.76	0.24	0.46	0.68	0.22
RCH_1_DEV_01	1.09	0.78	-0.31	1.05	0.72	-0.33	1.01	0.65	-0.36	0.96	0.58	-0.38	0.92	0.51	-0.41	0.86	0.42	-0.44	0.82	0.35	-0.47
RCH_1_DEV_02	0.71	1.11	0.40	0.65	1.04	0.39	0.58	0.95	0.37	0.52	0.86	0.34	0.46	0.78	0.32	0.38	0.65	0.27	0.32	0.55	0.23
RCH_1_DEV_03	0.84	1.57	0.73	0.78	1.39	0.61	0.72	1.17	0.45	0.66	0.98	0.32	0.61	0.85	0.24	0.52	0.70	0.18	0.46	0.57	0.11
Archer St																					
RCH_1_DEV_04	-	0.44	-	-	0.40	-	-	0.37	-	-	0.33	-	-	0.30	-	-	0.25	-	-	0.21	-
RCH_1_DEV_05	-	1.45	-	-	1.45	-	-	1.44	-	-	1.39	-	-	1.33	-	-	1.19	-	-	1.06	-
RCH_1_DEV_06	-	1.58	-	-	1.50	-	-	1.41	-	-	1.31	-	-	1.22	-	-	1.09	-	-	0.97	-
RCH_1_DEV_07	-	1.43	-	-	1.35	-	-	1.26	-	-	1.17	-	-	1.09	-	-	0.97	-	-	0.87	-
RCH_1_DEV_08	-	1.27	-	-	1.18	-	-	1.09	-	-	1.01	-	-	0.94	-	-	0.84	-	-	0.75	-
Drop 1																					
RCH_1_DEV_09	-	1.98	-	-	1.65	-	-	1.31	-	-	1.22	-	-	1.13	-	-	1.00	-	-	0.88	-
RCH_1_DEV_10	-	1.92	-	-	1.61	-	-	1.38	-	-	1.27	-	-	1.18	-	-	1.03	-	-	0.91	-
RCH_1_DEV_11	-	1.81	-	-	1.57	-	-	1.40	-	-	1.29	-	-	1.19	-	-	1.04	-	-	0.91	-
RCH_1_DEV_12	-	1.83	-	-	1.68	-	-	1.54	-	-	1.41	-	-	1.29	-	-	1.11	-	-	0.96	-
RCH_1_DEV_13	-	2.09	-	-	1.91	-	-	1.74	-	-	1.59	-	-	1.46	-	-	1.25	-	-	1.09	-
PedXS	-	2.20	-	-	2.00	-	-	1.81	-	-	1.65	-	-	1.52	-	-	1.30	-	-	1.13	-
RCH_1_DEV_14	-	1.45	-	-	1.36	-	-	1.27	-	-	1.17	-	-	1.08	-	-	0.95	-	-	0.84	-
Drop 2																					
RCH_1_DEV_15	-	2.26	-	-	2.08	-	-	1.91	-	-	1.74	-	-	1.59	-	-	1.38	-	-	1.21	-
RCH_1_DEV_16	-	2.44	-	-	2.21	-	-	1.98	-	-	1.74	-	-	1.54	-	-	1.35	-	-	1.18	-
RCH_1_DEV_17	-	1.94	-	-	1.84	-	-	1.73	-	-	1.62	-	-	1.51	-	-	1.33	-	-	1.18	-
RCH_1_DEV_18	-	1.59	-	-	1.49	-	-	1.40	-	-	1.29	-	-	1.19	-	-	1.04	-	-	0.92	-
Drop 3																					
RCH_1_DEV_19	-	3.39	-	-	2.96	-	-	2.53	-	-	2.12	-	-	1.80	-	-	1.44	-	-	1.27	-
RCH_1_DEV_20	-	3.16	-	-	2.82	-	-	2.47	-	-	2.14	-	-	1.87	-	-	1.53	-	-	1.37	-
RCH_1_DEV_21	-	2.77	-	-	2.55	-	-	2.31	-	-	2.08	-	-	1.90	-	-	1.66	-	-	1.54	-
RCH_1_DEV_22	-	2.11	-	-	2.08	-	-	2.06	-	-	2.04	-	-	2.02	-	-	2.00	-	-	1.99	-
DS_Boundary	1.35	1.98	0.63	1.35	1.98	0.63	1.35	1.98	0.63	1.35	1.98	0.63	1.35	1.98	0.63	1.35	1.98	0.63	1.35	1.98	0.63
Reach 2 Western Tributary																					
RCH_2_DEV_01	-	0.72	-	-	0.68	-	-	0.65	-	-	0.60	-	-	0.56	-	-	0.48	-	-	0.42	-
RCH_2_DEV_02	-	2.10	-	-	1.84	-	-	1.63	-	-	1.38	-	-	1.22	-	-	0.98	-	-	0.80	-
Bognuda St																					
RCH_2_DEV_03	-	1.09	-	-	1.03	-	-	0.98	-	-	0.92	-	-	0.85	-	-	0.74	-	-	0.64	-
RCH_2_DEV_04	-	1.10	-	-	1.02	-	-	0.94	-	-	0.85	-	-	0.78	-	-	0.66	-	-	0.56	-
Reach 3 Western Tributary																					
RCH_3_DEV_01	-	1.11	-	-	1.05	-	-	1.00	-	-	0.92	-	-	0.86	-	-	0.75	-	-	0.65	-
RCH_3_DEV_02	-	1.03	-	-	0.97	-	-	0.92	-	-	0.85	-	-	0.79	-	-	0.70	-	-	0.61	-
RCH_3_DEV_03	-	1.06	-	-	0.96	-	-	0.91	-	-	0.84	-	-	0.79	-	-	0.69	-	-	0.60	-
RCH_3_DEV_04	-	1.43	-	-	1.13	-	-	0.95	-	-	0.87	-	-	0.81	-	-	0.70	-	-	0.61	-

Pre-Development Case: EX07a
Post-Development Case: DE23a

SOBEK Cross-ID	Peak Water Flow (m3/s)																				
	100 Year ARI			50 Year ARI			20 Year ARI			10 Year ARI			5 Year ARI			2 Year ARI			1 Year ARI		
	Ex.	Dev.	Impact	Ex.	Dev.	Impact	Ex.	Dev.	Impact	Ex.	Dev.	Impact	Ex.	Dev.	Impact	Ex.	Dev.	Impact	Ex.	Dev.	Impact
	Reach 1 Western Tributary																				
RCH_0_EX_01	9.82	9.82		8.64	8.65	0.01	7.72	7.73	0.01	6.54	6.54		5.51	5.51		4.10	4.10		3.07	3.07	
RCH_0_EX_02	9.78	9.78		8.61	8.61		7.69	7.69		6.51	6.51		5.49	5.49		4.08	4.08		3.05	3.05	
RCH_0_EX_03	6.29	6.30	0.01	5.12	5.07	-0.05	4.16	4.07	-0.09	2.96	2.89	-0.07	1.95	1.92	-0.03	0.62	0.60	-0.02	0.11	0.00	-0.11
RCH_0_EX_04	6.25	6.26	0.01	5.09	5.05	-0.04	4.13	4.05	-0.08	2.94	2.87	-0.07	1.85	1.84	-0.01	0.47	0.47		0.05	0.00	-0.05
RCH_0_EX_05	6.25	6.26	0.01	5.08	5.04	-0.04	4.10	4.04	-0.06	2.89	2.85	-0.04	1.82	1.80	-0.02	0.44	0.47	0.03	0.04	0.00	-0.04
Bird St Pipe	3.28	3.31	0.03	3.28	3.30	0.02	3.28	3.31	0.03	3.26	3.29	0.03	3.25	3.25		3.19	3.18	-0.01	2.96	2.96	
	Site Boundary																				
RCH_0_DEV_01	-	0.17	-	-	0.15	-	-	0.12	-	-	0.10	-	-	0.08	-	-	0.02	-	-	0.00	-
RCH_0_DEV_02	-	0.00	-	-	0.00	-	-	0.00	-	-	0.00	-	-	0.00	-	-	0.00	-	-	0.00	-
	Road Crossing 1																				
RCH_0_DEV_03	-	9.19	-	-	8.08	-	-	7.15	-	-	6.07	-	-	5.00	-	-	3.56	-	-	2.95	-
RCH_0_DEV_03b	-	9.16	-	-	8.04	-	-	7.09	-	-	5.94	-	-	4.93	-	-	3.53	-	-	2.87	-
RCH_0_DEV_04	-	9.06	-	-	7.96	-	-	7.03	-	-	5.92	-	-	4.86	-	-	3.52	-	-	2.87	-
	Road Crossing 2																				
RCH_0_DEV_05	-	9.05	-	-	7.94	-	-	6.99	-	-	5.86	-	-	4.86	-	-	3.51	-	-	2.82	-
RCH_0_DEV_06	-	8.99	-	-	7.90	-	-	6.97	-	-	5.88	-	-	4.82	-	-	3.51	-	-	2.83	-
RCH_0_DEV_07	-	9.01	-	-	7.92	-	-	6.98	-	-	5.87	-	-	4.84	-	-	3.49	-	-	2.81	-
RCH_0_DEV_08	-	9.03	-	-	7.93	-	-	6.98	-	-	5.84	-	-	4.84	-	-	3.50	-	-	2.82	-
RCH_0_DEV_09	-	19.99	-	-	17.52	-	-	14.84	-	-	12.36	-	-	10.21	-	-	7.91	-	-	5.89	-
	Road Crossing 3																				
RCH_0_DEV_10	-	19.96	-	-	17.50	-	-	14.80	-	-	12.38	-	-	10.20	-	-	7.93	-	-	5.87	-
RCH_0_DEV_11	-	19.97	-	-	17.50	-	-	14.82	-	-	12.38	-	-	10.24	-	-	7.92	-	-	5.87	-
RCH_0_DEV_12	-	24.43	-	-	21.45	-	-	18.19	-	-	15.34	-	-	13.04	-	-	9.95	-	-	7.28	-
RCH_1_DEV_01	-	24.04	-	-	21.04	-	-	17.70	-	-	14.75	-	-	12.14	-	-	8.82	-	-	6.51	-
RCH_1_DEV_02	-	44.79	-	-	39.42	-	-	33.61	-	-	28.07	-	-	23.46	-	-	17.25	-	-	12.64	-
RCH_1_DEV_03	-	55.99	-	-	49.20	-	-	41.88	-	-	35.06	-	-	29.32	-	-	21.47	-	-	15.68	-
	Archer St																				
RCH_1_DEV_04	-	55.92	-	-	49.15	-	-	41.84	-	-	35.01	-	-	29.29	-	-	21.45	-	-	15.68	-
RCH_1_DEV_05	-	55.89	-	-	49.13	-	-	41.84	-	-	34.99	-	-	29.27	-	-	21.44	-	-	15.68	-
RCH_1_DEV_06	-	55.92	-	-	49.14	-	-	41.81	-	-	34.97	-	-	29.23	-	-	21.36	-	-	15.62	-
RCH_1_DEV_07	-	55.88	-	-	49.13	-	-	41.78	-	-	34.95	-	-	29.18	-	-	21.33	-	-	15.62	-
RCH_1_DEV_08	-	55.87	-	-	49.12	-	-	41.77	-	-	34.94	-	-	29.17	-	-	21.31	-	-	15.62	-
	Drop 1																				
RCH_1_DEV_09	-	55.68	-	-	48.97	-	-	41.79	-	-	34.94	-	-	29.18	-	-	21.33	-	-	15.63	-
RCH_1_DEV_10	-	72.25	-	-	63.93	-	-	55.33	-	-	46.50	-	-	39.09	-	-	28.53	-	-	20.89	-
RCH_1_DEV_11	-	72.15	-	-	63.79	-	-	55.34	-	-	46.50	-	-	39.07	-	-	28.51	-	-	20.87	-
RCH_1_DEV_12	-	74.81	-	-	66.24	-	-	57.57	-	-	48.39	-	-	40.65	-	-	29.63	-	-	21.74	-
RCH_1_DEV_13	-	74.65	-	-	66.18	-	-	57.53	-	-	48.35	-	-	40.56	-	-	29.59	-	-	21.73	-
	Pedestrian Xing																				
RCH_1_DEV_14	-	74.65	-	-	66.11	-	-	57.48	-	-	48.28	-	-	40.57	-	-	29.60	-	-	21.71	-
	Drop 2																				
RCH_1_DEV_15	-	74.50	-	-	66.06	-	-	57.34	-	-	48.22	-	-	40.54	-	-	29.57	-	-	21.68	-
RCH_1_DEV_16	-	74.31	-	-	65.91	-	-	57.20	-	-	48.12	-	-	40.38	-	-	29.50	-	-	21.68	-
RCH_1_DEV_17	-	78.57	-	-	69.69	-	-	60.36	-	-	50.75	-	-	42.63	-	-	31.10	-	-	22.81	-
RCH_1_DEV_18	-	78.53	-	-	69.70	-	-	60.36	-	-	50.76	-	-	42.63	-	-	31.10	-	-	22.79	-
	Drop 3																				
RCH_1_DEV_19	-	78.51	-	-	69.67	-	-	60.32	-	-	50.73	-	-	42.58	-	-	31.08	-	-	22.78	-
RCH_1_DEV_20	-	78.56	-	-	69.73	-	-	60.24	-	-	50.63	-	-	42.54	-	-	31.04	-	-	22.81	-
RCH_1_DEV_21	-	99.86	-	-	89.01	-	-	77.47	-	-	65.38	-	-	55.19	-	-	40.41	-	-	29.83	-
RCH_1_DEV_22	-	99.83	-	-	89.05	-	-	77.45	-	-	65.35	-	-	55.16	-	-	40.39	-	-	29.81	-
DS_Boundary	74.03	99.84	25.81	64.36	89.05	24.69	52.82	77.45	24.63	43.62	65.35	21.73	34.62	55.17	20.55	22.96	40.39	17.43	15.96	29.81	13.85
	Reach 2 Western Tributary																				
RCH_2_DEV_01	-	11.38	-	-	10.09	-	-	9.24	-	-	7.91	-	-	6.87	-	-	5.25	-	-	4.05	-
RCH_2_DEV_02	-	21.63	-	-	19.28	-	-	17.36	-	-	14.90	-	-	12.71	-	-	9.55	-	-	7.21	-
	Bognuda St																				
RCH_2_DEV_03	-	21.60	-	-	19.26	-	-	17.35	-	-	14.92	-	-	12.71	-	-	9.54	-	-	7.19	-
RCH_2_DEV_04	-	21.35	-	-	19.01	-	-	17.08	-	-	14.63	-	-	12.48	-	-	9.35	-	-	7.06	-
	Reach 3 Western Tributary																				
RCH_3_DEV_01	-	23.23	-	-	20.58	-	-	18.79	-	-	16.08	-	-	14.00	-	-	10.72	-	-	8.28	-
RCH_3_DEV_02	-	22.63	-	-	20.04	-	-	18.23	-	-	15.58	-	-	13.54	-	-	10.33	-	-	7.98	-
RCH_3_DEV_03	-	22.48	-	-	19.90	-	-	18.08	-	-	15.45	-	-	13.47	-	-	10.34	-	-	8.02	-
RCH_3_DEV_04	-	22.11	-	-	19.89	-	-	18.10	-	-	15.52	-	-	13.52	-	-	10.41	-	-	8.07	-

Pre-Development Case: EX07a
Post-Development Case: DE23a

SOBEK Cross-ID	Peak Water Velocities (m/s)																				
	100 Year ARI			50 Year ARI			20 Year ARI			10 Year ARI			5 Year ARI			2 Year ARI			1 Year ARI		
	Ex.	Dev.	Impact	Ex.	Dev.	Impact	Ex.	Dev.	Impact	Ex.	Dev.	Impact	Ex.	Dev.	Impact	Ex.	Dev.	Impact	Ex.	Dev.	Impact
Reach 1 Western Tributary																					
RCH_0_EX_01	1.03	1.03		1.02	1.02		1.03	1.03		1.01	1.01		1.01	1.01		1.00	1.00		1.00	1.00	
RCH_0_EX_02	1.76	1.76		1.74	1.74		1.74	1.74		1.73	1.73		1.72	1.72		1.72	1.72		1.72	1.72	
RCH_0_EX_03	0.43	0.43		0.40	0.40		0.38	0.38		0.35	0.34	-0.01	0.31	0.30	-0.01	0.32	0.31	-0.01	0.18	0.00	-0.18
RCH_0_EX_04	0.39	0.40	0.01	0.36	0.38	0.02	0.34	0.35	0.01	0.30	0.31	0.01	0.26	0.27	0.01	0.17	0.18	0.01	0.10	0.00	-0.10
Bird St Pipe	3.84	3.87	0.03	3.82	3.87	0.05	3.81	3.86	0.05	3.80	3.86	0.06	3.80	3.82	0.02	3.75	3.74	-0.01	3.51	3.51	
Site Boundary																					
RCH_0_DEV_01	-	0.17	-	-	0.15	-	-	0.14	-	-	0.12	-	-	0.11	-	-	0.06	-	-	0.00	-
RCH_0_DEV_02	-	0.00	-	-	0.00	-	-	0.00	-	-	0.00	-	-	0.00	-	-	0.00	-	-	0.00	-
Road Crossing 1																					
RCH_0_DEV_03	-	1.40	-	-	1.35	-	-	1.30	-	-	1.23	-	-	1.16	-	-	1.04	-	-	1.09	-
RCH_0_DEV_03b	-	1.53	-	-	1.46	-	-	1.41	-	-	1.33	-	-	1.24	-	-	1.11	-	-	1.03	-
RCH_0_DEV_04	-	1.28	-	-	1.24	-	-	1.20	-	-	1.15	-	-	1.09	-	-	0.99	-	-	0.93	-
Road Crossing 2																					
RCH_0_DEV_05	-	1.33	-	-	1.27	-	-	1.21	-	-	1.13	-	-	1.05	-	-	0.93	-	-	0.86	-
RCH_0_DEV_06	-	2.07	-	-	1.98	-	-	1.90	-	-	1.79	-	-	1.66	-	-	1.49	-	-	1.39	-
RCH_0_DEV_07	-	1.87	-	-	1.78	-	-	1.70	-	-	1.59	-	-	1.49	-	-	1.47	-	-	1.44	-
RCH_0_DEV_08	-	1.89	-	-	1.80	-	-	1.72	-	-	1.61	-	-	1.50	-	-	1.33	-	-	1.23	-
RCH_0_DEV_09	-	1.86	-	-	1.85	-	-	1.83	-	-	1.83	-	-	1.78	-	-	1.68	-	-	1.55	-
Road Crossing 3																					
RCH_0_DEV_10	-	1.70	-	-	1.63	-	-	1.54	-	-	1.46	-	-	1.37	-	-	1.26	-	-	1.14	-
RCH_0_DEV_11	-	1.63	-	-	1.56	-	-	1.48	-	-	1.39	-	-	1.30	-	-	1.17	-	-	1.07	-
RCH_0_DEV_12	-	2.30	-	-	2.19	-	-	2.05	-	-	1.93	-	-	1.81	-	-	1.64	-	-	1.47	-
RCH_1_DEV_01	-	2.05	-	-	1.98	-	-	1.89	-	-	1.79	-	-	1.69	-	-	1.52	-	-	1.38	-
RCH_1_DEV_02	-	2.42	-	-	2.33	-	-	2.22	-	-	2.09	-	-	1.98	-	-	1.79	-	-	1.61	-
RCH_1_DEV_03	-	2.27	-	-	2.26	-	-	2.26	-	-	2.24	-	-	2.16	-	-	1.98	-	-	1.80	-
Archer St																					
RCH_1_DEV_04	-	6.41	-	-	6.19	-	-	5.73	-	-	5.28	-	-	4.89	-	-	4.25	-	-	3.68	-
RCH_1_DEV_05	-	2.03	-	-	1.74	-	-	1.46	-	-	1.26	-	-	1.11	-	-	0.90	-	-	0.74	-
RCH_1_DEV_06	-	2.17	-	-	2.06	-	-	1.93	-	-	1.81	-	-	1.69	-	-	1.49	-	-	1.32	-
RCH_1_DEV_07	-	2.10	-	-	2.04	-	-	1.93	-	-	1.82	-	-	1.69	-	-	1.50	-	-	1.32	-
RCH_1_DEV_08	-	2.19	-	-	2.16	-	-	2.05	-	-	1.93	-	-	1.81	-	-	1.60	-	-	1.42	-
Drop 1																					
RCH_1_DEV_09	-	1.89	-	-	1.87	-	-	1.81	-	-	1.70	-	-	1.59	-	-	1.43	-	-	1.28	-
RCH_1_DEV_10	-	2.32	-	-	2.29	-	-	2.21	-	-	2.09	-	-	1.97	-	-	1.78	-	-	1.60	-
RCH_1_DEV_11	-	2.26	-	-	2.25	-	-	2.18	-	-	2.07	-	-	1.97	-	-	1.78	-	-	1.61	-
RCH_1_DEV_12	-	2.02	-	-	1.99	-	-	1.94	-	-	1.86	-	-	1.80	-	-	1.67	-	-	1.53	-
RCH_1_DEV_13	-	1.62	-	-	1.60	-	-	1.57	-	-	1.52	-	-	1.47	-	-	1.36	-	-	1.24	-
Pedestrian Xing																					
RCH_1_DEV_14	-	2.49	-	-	2.43	-	-	2.34	-	-	2.21	-	-	2.09	-	-	1.86	-	-	1.65	-
Drop 2																					
RCH_1_DEV_15	-	1.42	-	-	1.41	-	-	1.37	-	-	1.33	-	-	1.28	-	-	1.17	-	-	1.05	-
RCH_1_DEV_16	-	2.49	-	-	2.21	-	-	1.91	-	-	1.61	-	-	1.35	-	-	1.18	-	-	1.06	-
RCH_1_DEV_17	-	1.75	-	-	1.67	-	-	1.57	-	-	1.47	-	-	1.37	-	-	1.22	-	-	1.10	-
RCH_1_DEV_18	-	2.15	-	-	2.07	-	-	1.96	-	-	1.84	-	-	1.73	-	-	1.54	-	-	1.37	-
Drop 3																					
RCH_1_DEV_19	-	1.24	-	-	1.24	-	-	1.24	-	-	1.24	-	-	1.22	-	-	1.16	-	-	1.02	-
RCH_1_DEV_20	-	1.14	-	-	1.14	-	-	1.13	-	-	1.13	-	-	1.12	-	-	1.08	-	-	0.95	-
RCH_1_DEV_21	-	1.43	-	-	1.42	-	-	1.39	-	-	1.34	-	-	1.28	-	-	1.13	-	-	0.96	-
RCH_1_DEV_22	-	1.74	-	-	1.59	-	-	1.42	-	-	1.23	-	-	1.06	-	-	0.79	-	-	0.59	-
DS_Boundary	1.94	1.74	-0.20	1.69	1.57	-0.12	1.38	1.39	0.01	1.13	1.19	0.06	0.90	1.01	0.11	0.57	0.75	0.18	0.39	0.56	0.17
Reach 2 Western Tributary																					
RCH_2_DEV_01	-	2.29	-	-	2.21	-	-	2.16	-	-	2.07	-	-	1.99	-	-	1.84	-	-	1.71	-
RCH_2_DEV_02	-	1.45	-	-	1.43	-	-	1.30	-	-	1.30	-	-	1.29	-	-	1.28	-	-	1.27	-
Bognuda St																					
RCH_2_DEV_03	-	2.28	-	-	2.21	-	-	2.14	-	-	2.04	-	-	1.95	-	-	1.78	-	-	1.63	-
RCH_2_DEV_04	-	1.23	-	-	1.20	-	-	1.17	-	-	1.11	-	-	1.07	-	-	1.00	-	-	0.92	-
Reach 3 Western Tributary																					
RCH_3_DEV_01	-	2.39	-	-	2.30	-	-	2.24	-	-	2.14	-	-	2.04	-	-	1.88	-	-	1.73	-
RCH_3_DEV_02	-	2.25	-	-	2.17	-	-	2.11	-	-	2.01	-	-	1.92	-	-	1.76	-	-	1.63	-
RCH_3_DEV_03	-	2.29	-	-	2.20	-	-	2.14	-	-	2.03	-	-	1.94	-	-	1.78	-	-	1.65	-
RCH_3_DEV_04	-	2.24	-	-	2.15	-	-	2.06	-	-	1.96	-	-	1.89	-	-	1.77	-	-	1.63	-

Appendix M.2

Western Tributary Detailed SOBEK1D Results

(Ultimate Development Scenario)

Ultimate Development Case:

SOBEK Cross-ID	Peak Water Velocities (m/s)						
	100 Year ARI	50 Year ARI	20 Year ARI	10 Year ARI	5 Year ARI	2 Year ARI	1 Year ARI
	Dev.	Dev.	Dev.	Dev.	Dev.	Dev.	Dev.
RCH_0_EX_01	1.03	1.02	1.03	1.01	1.01	1.00	1.00
RCH_0_EX_02	1.76	1.74	1.74	1.73	1.72	1.72	1.72
RCH_0_EX_03	0.43	0.40	0.38	0.34	0.30	0.31	0.00
RCH_0_EX_04	0.40	0.38	0.35	0.31	0.27	0.18	0.00
Bird St Pipe	3.87	3.87	3.86	3.86	3.82	3.74	3.51
Site Boundary							
RCH_0_DEV_01	0.17	0.15	0.14	0.12	0.11	0.06	0.00
RCH_0_DEV_02	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Road Crossing 1							
RCH_0_DEV_03	1.40	1.35	1.30	1.23	1.16	1.04	1.09
RCH_0_DEV_03b	1.53	1.46	1.41	1.33	1.24	1.11	1.03
RCH_0_DEV_04	1.28	1.24	1.20	1.15	1.09	0.99	0.93
Road Crossing 2							
RCH_0_DEV_05	1.33	1.27	1.21	1.13	1.05	0.93	0.86
RCH_0_DEV_06	2.07	1.98	1.90	1.79	1.66	1.49	1.39
RCH_0_DEV_07	1.87	1.78	1.70	1.59	1.49	1.47	1.44
RCH_0_DEV_08	1.89	1.80	1.72	1.61	1.50	1.33	1.23
RCH_0_DEV_09	1.86	1.85	1.83	1.83	1.78	1.68	1.55
Road Crossing 3							
RCH_0_DEV_10	1.70	1.63	1.54	1.46	1.37	1.26	1.14
RCH_0_DEV_11	1.63	1.56	1.48	1.39	1.30	1.17	1.07
RCH_0_DEV_12	2.30	2.19	2.05	1.93	1.81	1.64	1.47
RCH_1_DEV_01	2.05	1.98	1.89	1.79	1.69	1.52	1.38
RCH_1_DEV_02	2.42	2.33	2.22	2.09	1.98	1.79	1.61
RCH_1_DEV_03	2.27	2.26	2.26	2.24	2.16	1.98	1.80
Archer St							
RCH_1_DEV_04	6.41	6.19	5.73	5.28	4.89	4.25	3.68
RCH_1_DEV_05	2.03	1.74	1.46	1.26	1.11	0.90	0.74
RCH_1_DEV_06	2.17	2.06	1.93	1.81	1.69	1.49	1.32
RCH_1_DEV_07	2.10	2.04	1.93	1.82	1.69	1.50	1.32
RCH_1_DEV_08	2.19	2.16	2.05	1.93	1.81	1.60	1.42
Drop 1							
RCH_1_DEV_09	1.89	1.87	1.81	1.70	1.59	1.43	1.28
RCH_1_DEV_10	2.32	2.29	2.21	2.09	1.97	1.78	1.60
RCH_1_DEV_11	2.26	2.25	2.18	2.07	1.97	1.78	1.61
RCH_1_DEV_12	2.02	1.99	1.94	1.86	1.80	1.67	1.53
RCH_1_DEV_13	1.62	1.60	1.57	1.52	1.47	1.36	1.24
Pedestrian Xing							
RCH_1_DEV_14	2.49	2.43	2.34	2.21	2.09	1.86	1.65
Drop 2							
RCH_1_DEV_15	1.42	1.41	1.37	1.33	1.28	1.17	1.05
RCH_1_DEV_16	2.49	2.21	1.91	1.61	1.35	1.18	1.06
RCH_1_DEV_17	1.75	1.67	1.57	1.47	1.37	1.22	1.10
RCH_1_DEV_18	2.15	2.07	1.96	1.84	1.73	1.54	1.37
Drop 3							
RCH_1_DEV_19	1.24	1.24	1.24	1.24	1.22	1.16	1.02
RCH_1_DEV_20	1.14	1.14	1.13	1.13	1.12	1.08	0.95
RCH_1_DEV_21	1.43	1.42	1.39	1.34	1.28	1.13	0.96
RCH_1_DEV_22	1.74	1.59	1.42	1.23	1.06	0.79	0.59
DS_Boundary	1.74	1.57	1.39	1.19	1.01	0.75	0.56
RCH_2_DEV_01	2.29	2.21	2.16	2.07	1.99	1.84	1.71
RCH_2_DEV_02	1.45	1.43	1.30	1.30	1.29	1.28	1.27
Bognuda St							
RCH_2_DEV_03	2.28	2.21	2.14	2.04	1.95	1.78	1.63
RCH_2_DEV_04	1.23	1.20	1.17	1.11	1.07	1.00	0.92
RCH_3_DEV_01	2.39	2.30	2.24	2.14	2.04	1.88	1.73
RCH_3_DEV_02	2.25	2.17	2.11	2.01	1.92	1.76	1.63
RCH_3_DEV_03	2.29	2.20	2.14	2.03	1.94	1.78	1.65
RCH_3_DEV_04	2.24	2.15	2.06	1.96	1.89	1.77	1.63

Ultimate Development Case:

SOBEK Cross-ID	Peak Water Flow (m3/s)						
	100 Year ARI	50 Year ARI	20 Year ARI	10 Year ARI	5 Year ARI	2 Year ARI	1 Year ARI
	Dev.	Dev.	Dev.	Dev.	Dev.	Dev.	Dev.
RCH_0_EX_01	9.82	8.65	7.73	6.54	5.51	4.10	3.07
RCH_0_EX_02	9.78	8.61	7.69	6.51	5.49	4.08	3.05
RCH_0_EX_03	6.30	5.07	4.07	2.89	1.92	0.60	0.00
RCH_0_EX_04	6.26	5.05	4.05	2.87	1.84	0.47	0.00
RCH_0_EX_05	6.26	5.04	4.04	2.85	1.80	0.47	0.00
Bird St Pipe	3.31	3.30	3.31	3.29	3.25	3.18	2.96
RCH_0_DEV_01	0.17	0.15	0.12	0.10	0.08	0.02	0.00
RCH_0_DEV_02	0.00	0.00	0.00	0.00	0.00	0.00	0.00
RCH_0_DEV_03	9.19	8.08	7.15	6.07	5.00	3.56	2.95
RCH_0_DEV_03b	9.16	8.04	7.09	5.94	4.93	3.53	2.87
RCH_0_DEV_04	9.06	7.96	7.03	5.92	4.86	3.52	2.87
RCH_0_DEV_05	9.05	7.94	6.99	5.86	4.86	3.51	2.82
RCH_0_DEV_06	8.99	7.90	6.97	5.88	4.82	3.51	2.83
RCH_0_DEV_07	9.01	7.92	6.98	5.87	4.84	3.49	2.81
RCH_0_DEV_08	9.03	7.93	6.98	5.84	4.84	3.50	2.82
RCH_0_DEV_09	19.99	17.52	14.84	12.36	10.21	7.91	5.89
RCH_0_DEV_10	19.96	17.50	14.80	12.38	10.20	7.93	5.87
RCH_0_DEV_11	19.97	17.50	14.82	12.38	10.24	7.92	5.87
RCH_0_DEV_12	24.43	21.45	18.19	15.34	13.04	9.95	7.28
RCH_1_DEV_01	24.04	21.04	17.70	14.75	12.14	8.82	6.51
RCH_1_DEV_02	44.79	39.42	33.61	28.07	23.46	17.25	12.64
RCH_1_DEV_03	55.99	49.20	41.88	35.06	29.32	21.47	15.68
RCH_1_DEV_04	55.92	49.15	41.84	35.01	29.29	21.45	15.68
RCH_1_DEV_05	55.89	49.13	41.84	34.99	29.27	21.44	15.68
RCH_1_DEV_06	55.92	49.14	41.81	34.97	29.23	21.36	15.62
RCH_1_DEV_07	55.88	49.13	41.78	34.95	29.18	21.33	15.62
RCH_1_DEV_08	55.87	49.12	41.77	34.94	29.17	21.31	15.62
RCH_1_DEV_09	55.68	48.97	41.79	34.94	29.18	21.33	15.63
RCH_1_DEV_10	72.25	63.93	55.33	46.50	39.09	28.53	20.89
RCH_1_DEV_11	72.15	63.79	55.34	46.50	39.07	28.51	20.87
RCH_1_DEV_12	74.81	66.24	57.57	48.39	40.65	29.63	21.74
RCH_1_DEV_13	74.65	66.18	57.53	48.35	40.56	29.59	21.73
RCH_1_DEV_14	74.65	66.11	57.48	48.28	40.57	29.60	21.71
RCH_1_DEV_15	74.50	66.06	57.34	48.22	40.54	29.57	21.68
RCH_1_DEV_16	74.31	65.91	57.20	48.12	40.38	29.50	21.68
RCH_1_DEV_17	78.57	69.69	60.36	50.75	42.63	31.10	22.81
RCH_1_DEV_18	78.53	69.70	60.36	50.76	42.63	31.10	22.79
RCH_1_DEV_19	78.51	69.67	60.32	50.73	42.58	31.08	22.78
RCH_1_DEV_20	78.56	69.73	60.24	50.63	42.54	31.04	22.81
RCH_1_DEV_21	99.86	89.01	77.47	65.38	55.19	40.41	29.83
RCH_1_DEV_22	99.83	89.05	77.45	65.35	55.16	40.39	29.81
DS_Boundary	99.84	89.05	77.45	65.35	55.17	40.39	29.81
RCH_2_DEV_01	11.38	10.09	9.24	7.91	6.87	5.25	4.05
RCH_2_DEV_02	21.63	19.28	17.36	14.90	12.71	9.55	7.21
RCH_2_DEV_03	21.60	19.26	17.35	14.92	12.71	9.54	7.19
RCH_2_DEV_04	21.35	19.01	17.08	14.63	12.48	9.35	7.06
RCH_3_DEV_01	23.23	20.58	18.79	16.08	14.00	10.72	8.28
RCH_3_DEV_02	22.63	20.04	18.23	15.58	13.54	10.33	7.98
RCH_3_DEV_03	22.48	19.90	18.08	15.45	13.47	10.34	8.02
RCH_3_DEV_04	22.11	19.89	18.10	15.52	13.52	10.41	8.07

Ultimate Development Case: DU24a

SOBEK Cross-ID	Peak Water Level (mAHD)						
	100 Year ARI	50 Year ARI	20 Year ARI	10 Year ARI	5 Year ARI	2 Year ARI	1 Year ARI
	Dev.	Dev.	Dev.	Dev.	Dev.	Dev.	Dev.
RCH_0_EX_01	35.50	35.48	35.47	35.45	35.43	35.40	35.37
RCH_0_EX_02	35.23	35.20	35.17	35.12	35.08	34.98	34.76
RCH_0_EX_03	35.23	35.20	35.17	35.13	35.08	35.00	34.84
RCH_0_EX_04	34.59	34.56	34.53	34.49	34.44	34.34	34.18
RCH_0_EX_05	34.13	34.11	34.09	34.06	34.02	33.96	33.90
RCH_0_DEV_01	33.21	33.16	33.13	33.10	33.07	33.03	33.00
RCH_0_DEV_02	33.21	33.17	33.13	33.10	33.08	33.02	33.00
RCH_0_DEV_03	32.12	32.06	32.01	31.95	31.88	31.79	31.74
RCH_0_DEV_03b	31.42	31.36	31.31	31.26	31.20	31.11	31.06
RCH_0_DEV_04	30.73	30.67	30.61	30.54	30.47	30.37	30.32
RCH_0_DEV_05	30.41	30.37	30.33	30.29	30.24	30.17	30.13
RCH_0_DEV_06	29.72	29.70	29.67	29.65	29.62	29.58	29.55
RCH_0_DEV_07	27.76	27.75	27.73	27.72	27.70	27.67	27.65
RCH_0_DEV_08	25.72	25.70	25.67	25.65	25.62	25.58	25.56
RCH_0_DEV_09	24.12	23.85	23.59	23.40	23.28	23.17	23.07
RCH_0_DEV_10	23.28	23.22	23.15	23.08	23.01	22.93	22.85
RCH_0_DEV_11	23.09	23.03	22.97	22.90	22.84	22.76	22.67
RCH_0_DEV_12	22.76	22.71	22.65	22.59	22.55	22.47	22.39
RCH_1_DEV_01	20.28	20.22	20.15	20.08	20.01	19.92	19.85
RCH_1_DEV_02	19.61	19.54	19.45	19.36	19.28	19.15	19.05
RCH_1_DEV_03	16.27	16.09	15.87	15.68	15.55	15.40	15.27
RCH_1_DEV_04	14.94	14.90	14.87	14.83	14.80	14.75	14.71
RCH_1_DEV_05	12.05	12.05	12.04	11.99	11.93	11.79	11.66
RCH_1_DEV_06	11.90	11.82	11.73	11.63	11.54	11.40	11.29
RCH_1_DEV_07	11.60	11.51	11.42	11.34	11.26	11.14	11.04
RCH_1_DEV_08	11.35	11.25	11.17	11.09	11.02	10.92	10.83
RCH_1_DEV_09	11.04	10.72	10.38	10.28	10.20	10.06	9.95
RCH_1_DEV_10	10.64	10.33	10.09	9.99	9.90	9.75	9.63
RCH_1_DEV_11	10.26	10.02	9.85	9.74	9.64	9.48	9.36
RCH_1_DEV_12	9.91	9.76	9.61	9.49	9.36	9.18	9.04
RCH_1_DEV_13	9.90	9.72	9.55	9.40	9.27	9.06	8.90
PedXS	9.87	9.68	9.49	9.33	9.19	8.98	8.81
RCH_1_DEV_14	9.11	9.01	8.93	8.83	8.74	8.61	8.50
RCH_1_DEV_15	8.11	7.93	7.76	7.59	7.44	7.23	7.06
RCH_1_DEV_16	7.77	7.54	7.31	7.07	6.87	6.68	6.51
RCH_1_DEV_17	6.92	6.82	6.72	6.60	6.50	6.32	6.16
RCH_1_DEV_18	6.16	6.06	5.97	5.86	5.77	5.62	5.50
RCH_1_DEV_19	5.45	5.01	4.58	4.17	3.86	3.49	3.32
RCH_1_DEV_20	4.78	4.44	4.09	3.76	3.49	3.14	2.99
RCH_1_DEV_21	4.03	3.81	3.57	3.34	3.16	2.92	2.80
RCH_1_DEV_22	2.75	2.73	2.70	2.68	2.66	2.64	2.63
DS_Boundary	2.62	2.62	2.62	2.62	2.62	2.62	2.62
RCH_2_DEV_01	29.72	29.68	29.65	29.60	29.56	29.48	29.42
RCH_2_DEV_02	22.50	22.24	22.03	21.78	21.62	21.38	21.20
RCH_2_DEV_03	21.29	21.23	21.18	21.12	21.05	20.94	20.84
RCH_2_DEV_04	19.85	19.77	19.69	19.60	19.53	19.41	19.31
RCH_3_DEV_01	12.46	12.39	12.34	12.26	12.20	12.09	11.99
RCH_3_DEV_02	11.22	11.16	11.11	11.04	10.99	10.89	10.80
RCH_3_DEV_03	11.10	11.00	10.95	10.88	10.82	10.72	10.64
RCH_3_DEV_04	11.05	10.75	10.57	10.49	10.43	10.32	10.23

Ultimate Development Case:

SOBEK Cross-ID	Peak Water Velocities (m/s)						
	100 Year ARI	50 Year ARI	20 Year ARI	10 Year ARI	5 Year ARI	2 Year ARI	1 Year ARI
	Dev.	Dev.	Dev.	Dev.	Dev.	Dev.	Dev.
RCH_0_EX_01	1.03	1.02	1.03	1.01	1.01	1.00	1.00
RCH_0_EX_02	1.76	1.74	1.74	1.73	1.72	1.72	1.72
RCH_0_EX_03	0.43	0.40	0.38	0.34	0.30	0.31	0.00
RCH_0_EX_04	0.40	0.38	0.35	0.31	0.27	0.18	0.00
Bird St Pipe	3.87	3.87	3.86	3.86	3.82	3.74	3.51
Site Boundary							
RCH_0_DEV_01	0.17	0.15	0.14	0.12	0.11	0.06	0.00
RCH_0_DEV_02	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Road Crossing 1							
RCH_0_DEV_03	1.40	1.35	1.30	1.23	1.16	1.04	1.09
RCH_0_DEV_03b	1.53	1.46	1.41	1.33	1.24	1.11	1.03
RCH_0_DEV_04	1.28	1.24	1.20	1.15	1.09	0.99	0.93
Road Crossing 2							
RCH_0_DEV_05	1.33	1.27	1.21	1.13	1.05	0.93	0.86
RCH_0_DEV_06	2.07	1.98	1.90	1.79	1.66	1.49	1.39
RCH_0_DEV_07	1.87	1.78	1.70	1.59	1.49	1.47	1.44
RCH_0_DEV_08	1.89	1.80	1.72	1.61	1.50	1.33	1.23
RCH_0_DEV_09	1.86	1.85	1.83	1.83	1.78	1.68	1.55
Road Crossing 3							
RCH_0_DEV_10	1.70	1.63	1.54	1.46	1.37	1.26	1.14
RCH_0_DEV_11	1.63	1.56	1.48	1.39	1.30	1.17	1.07
RCH_0_DEV_12	2.30	2.19	2.05	1.93	1.81	1.64	1.47
RCH_1_DEV_01	2.05	1.98	1.89	1.79	1.69	1.52	1.38
RCH_1_DEV_02	2.42	2.33	2.22	2.09	1.98	1.79	1.61
RCH_1_DEV_03	2.27	2.26	2.26	2.24	2.16	1.98	1.80
Archer St							
RCH_1_DEV_04	6.41	6.19	5.73	5.28	4.89	4.25	3.68
RCH_1_DEV_05	2.03	1.74	1.46	1.26	1.11	0.90	0.74
RCH_1_DEV_06	2.17	2.06	1.93	1.81	1.69	1.49	1.32
RCH_1_DEV_07	2.10	2.04	1.93	1.82	1.69	1.50	1.32
RCH_1_DEV_08	2.19	2.16	2.05	1.93	1.81	1.60	1.42
Drop 1							
RCH_1_DEV_09	1.89	1.87	1.81	1.70	1.59	1.43	1.28
RCH_1_DEV_10	2.32	2.29	2.21	2.09	1.97	1.78	1.60
RCH_1_DEV_11	2.26	2.25	2.18	2.07	1.97	1.78	1.61
RCH_1_DEV_12	2.02	1.99	1.94	1.86	1.80	1.67	1.53
RCH_1_DEV_13	1.62	1.60	1.57	1.52	1.47	1.36	1.24
Pedestrian Xing							
RCH_1_DEV_14	2.49	2.43	2.34	2.21	2.09	1.86	1.65
Drop 2							
RCH_1_DEV_15	1.42	1.41	1.37	1.33	1.28	1.17	1.05
RCH_1_DEV_16	2.49	2.21	1.91	1.61	1.35	1.18	1.06
RCH_1_DEV_17	1.75	1.67	1.57	1.47	1.37	1.22	1.10
RCH_1_DEV_18	2.15	2.07	1.96	1.84	1.73	1.54	1.37
Drop 3							
RCH_1_DEV_19	1.24	1.24	1.24	1.24	1.22	1.16	1.02
RCH_1_DEV_20	1.14	1.14	1.13	1.13	1.12	1.08	0.95
RCH_1_DEV_21	1.43	1.42	1.39	1.34	1.28	1.13	0.96
RCH_1_DEV_22	1.74	1.59	1.42	1.23	1.06	0.79	0.59
DS_Boundary	1.74	1.57	1.39	1.19	1.01	0.75	0.56
RCH_2_DEV_01	2.29	2.21	2.16	2.07	1.99	1.84	1.71
RCH_2_DEV_02	1.45	1.43	1.30	1.30	1.29	1.28	1.27
Bognuda St							
RCH_2_DEV_03	2.28	2.21	2.14	2.04	1.95	1.78	1.63
RCH_2_DEV_04	1.23	1.20	1.17	1.11	1.07	1.00	0.92
RCH_3_DEV_01	2.39	2.30	2.24	2.14	2.04	1.88	1.73
RCH_3_DEV_02	2.25	2.17	2.11	2.01	1.92	1.76	1.63
RCH_3_DEV_03	2.29	2.20	2.14	2.03	1.94	1.78	1.65
RCH_3_DEV_04	2.24	2.15	2.06	1.96	1.89	1.77	1.63

Appendix N.1

Eastern Tributary Detailed SOBEK1D Results (Pre- & Post-Development Comparison)

Pre-Development Case: EX06a
Post-Development Case: DE15a

SOBEK Cross-section		Peak Flood Levels (m AHD)																				
Pre- ID	Post- ID	100 Year ARI			50 Year ARI			20 Year ARI			10 Year ARI			5 Year ARI			2 Year ARI			1 Year ARI		
		Ex	Dev	Impact	Ex	Dev	Impact	Ex	Dev	Impact	Ex	Dev	Impact	Ex	Dev	Impact	Ex	Dev	Impact	Ex	Dev	Impact
		Eastern Tributary 1 of Bremer River																				
sect1_259	sect1_259	41.31	41.31		41.26	41.26		41.19	41.19		41.12	41.12		41.06	41.06		40.96	40.96		40.89	40.89	
sect1_329	sect1_329	40.50	40.50		40.45	40.45		40.37	40.37		40.26	40.26		40.17	40.17		40.07	40.07		39.99	39.99	
sect1_409	sect1_409	40.38	40.38		40.34	40.34		40.22	40.21	-0.01	39.96	39.96		39.65	39.65		39.36	39.36		39.26	39.26	
		Brisbane Road																				
sect1_468	sect1_468	39.85	39.85		39.67	39.67		39.14	39.14		38.81	38.81		38.59	38.59		38.36	38.36		38.20	38.20	
		Railway																				
sect1_517	sect1_517	37.80	37.80		37.75	37.75		37.68	37.68		37.63	37.63		37.57	37.57		37.49	37.49		37.42	37.42	
sect1_581	sect1_581	36.53	36.53		36.47	36.47		36.38	36.38		36.32	36.32		36.25	36.25		36.14	36.14		36.05	36.05	
sect1_674	sect1_674	35.60	35.59	-0.01	35.53	35.53		35.46	35.46		35.40	35.40		35.33	35.33		35.19	35.19		35.03	35.04	0.01
sect1_784	sect1_784	35.38	35.38		35.33	35.33		35.27	35.27		35.22	35.22		35.16	35.16		35.02	35.02		34.87	34.88	0.01
sect1_897	sect1_897	33.94	33.93	-0.01	33.84	33.84		33.74	33.73	-0.01	33.67	33.67		33.60	33.60		33.49	33.49		33.41	33.41	
sect1_937	sect1_937	33.08	33.04	-0.04	32.91	32.85	-0.06	32.73	32.65	-0.08	32.62	32.53	-0.09	32.49	32.39	-0.10	32.31	32.19	-0.12	32.18	32.05	-0.13
		Hoepner Road																				
sect1_1045	sect1_1045	32.23	31.43	-0.80	32.18	31.30	-0.88	32.12	31.17	-0.95	32.08	31.11	-0.97	32.04	31.05	-0.99	31.97	30.98	-0.99	31.92	30.92	-1.00
sect1_1142	XS CC	31.32	31.21	-0.11	31.13	30.96	-0.17	30.75	30.59	-0.16	30.50	30.37	-0.13	30.30	30.19	-0.11	30.07	29.97	-0.10	29.91	29.85	-0.06
sect1_1271	XS BB	31.30	31.20	-0.10	31.10	30.95	-0.15	30.70	30.57	-0.13	30.43	30.32	-0.11	30.21	30.12	-0.09	29.93	29.83	-0.10	29.73	29.62	-0.11
USRail	USRail	31.29	31.20	-0.09	31.09	30.94	-0.15	30.68	30.56	-0.12	30.40	30.31	-0.09	30.15	30.11	-0.04	29.83	29.81	-0.02	29.58	29.58	
		Railway																				
sect1_1386	sect1_1386	28.34	28.29	-0.05	28.25	28.22	-0.03	28.18	28.16	-0.02	28.13	28.11	-0.02	28.06	28.05	-0.01	27.96	27.95	-0.01	27.87	27.87	
sect1_1443	sect1_1443	28.02	27.98	-0.04	27.94	27.91	-0.03	27.87	27.84	-0.03	27.81	27.80	-0.01	27.75	27.73	-0.02	27.64	27.63	-0.01	27.55	27.55	
sect1_1569	sect1_1569	27.05	27.03	-0.02	26.94	26.93	-0.01	26.83	26.82	-0.01	26.75	26.75		26.68	26.67	-0.01	26.56	26.56		26.47	26.47	
sect1_1659	sect1_1659	26.61	26.54	-0.07	26.22	26.18	-0.04	25.77	25.74	-0.03	25.46	25.43	-0.03	25.20	25.18	-0.02	24.89	24.89		24.68	24.69	0.01
sect1_1741	sect1_1741	26.58	26.51	-0.07	26.17	26.13	-0.04	25.69	25.66	-0.03	25.34	25.31	-0.03	25.02	25.00	-0.02	24.63	24.63		24.35	24.36	0.01
		Railway																				
sect1_1789	sect1_1789	25.01	24.99	-0.02	24.91	24.90	-0.01	24.77	24.76	-0.01	24.65	24.63	-0.02	24.51	24.50	-0.01	24.29	24.29		24.10	24.11	0.01
sect1_1851	sect1_1851	24.54	24.52	-0.02	24.45	24.44	-0.01	24.33	24.32	-0.01	24.23	24.22	-0.01	24.11	24.11		23.92	23.92		23.76	23.77	0.01
sect1_1927	sect1_1927	24.12	24.11	-0.01	24.04	24.03	-0.01	23.92	23.91	-0.01	23.82	23.80	-0.02	23.70	23.69	-0.01	23.49	23.49		23.32	23.32	
sect1_1996	sect1_1996	23.68	23.67	-0.01	23.61	23.60	-0.01	23.49	23.48	-0.01	23.39	23.38	-0.01	23.28	23.27	-0.01	23.06	23.06		22.86	22.87	0.01
sect1_2070	sect1_2070	22.88	22.86	-0.02	22.79	22.78	-0.01	22.66	22.65	-0.01	22.55	22.54	-0.01	22.44	22.43	-0.01	22.26	22.26		22.11	22.11	
sect1_2098	sect1_2098	22.03	22.03		21.96	21.96		21.86	21.87	0.01	21.79	21.79		21.71	21.71		21.59	21.59		21.49	21.50	0.01
sect1_2116	sect1_2116	21.99	22.01	0.02	21.92	21.94	0.02	21.83	21.84	0.01	21.76	21.76		21.68	21.68		21.55	21.56	0.01	21.46	21.46	
sect1_2134	sect1_2134	21.59	21.66	0.07	21.51	21.58	0.07	21.39	21.44	0.05	21.30	21.33	0.03	21.20	21.21	0.01	21.04	21.05	0.01	20.91	20.92	0.01
sect1_2152	sect1_2152	21.42	21.53	0.11	21.33	21.44	0.11	21.21	21.30	0.09	21.10	21.17	0.07	20.99	21.03	0.04	20.81	20.84	0.03	20.66	20.68	0.02
sect1_2189	sect1_2189	21.32	21.47	0.15	21.23	21.38	0.15	21.11	21.23	0.12	21.01	21.09	0.08	20.89	20.95	0.06	20.72	20.75	0.03	20.56	20.59	0.03
sect1_2222	sect1_2222	20.89	20.84	-0.05	20.81	20.77	-0.04	20.70	20.67	-0.03	20.61	20.58	-0.03	20.51	20.49	-0.02	20.36	20.34	-0.02	20.22	20.22	
sect1_2236	sect1_2236	20.41	20.40	-0.01	20.35	20.34	-0.01	20.26	20.25	-0.01	20.19	20.18	-0.01	20.10	20.10		19.97	19.97		19.87	19.87	
sect1_2281	sect1_2281	20.13	20.12	-0.01	20.06	20.06		19.96	19.96		19.87	19.87		19.78	19.78		19.64	19.64		19.51	19.52	0.01
sect1_2348	sect1_2348	19.88	19.88		19.83	19.82	-0.01	19.74	19.74		19.67	19.66	-0.01	19.59	19.59		19.47	19.47		19.36	19.37	0.01
sect1_2410	sect1_2410	19.46	19.45	-0.01	19.40	19.39	-0.01	19.31	19.30	-0.01	19.24	19.23	-0.01	19.17	19.16	-0.01	19.06	19.06		18.97	18.97	
sect1_2422	sect1_2422	19.46	19.45	-0.01	19.40	19.39	-0.01	19.31	19.31		19.24	19.23	-0.01	19.17	19.17		19.06	19.06		18.97	18.98	0.01

Pre-Development Case: EX06a
Post-Development Case: DE15a

SOBEK Cross-section		Peak Flood Levels (m AHD)																				
Pre- ID	Post- ID	100 Year ARI			50 Year ARI			20 Year ARI			10 Year ARI			5 Year ARI			2 Year ARI			1 Year ARI		
		Ex	Dev	Impact	Ex	Dev	Impact	Ex	Dev	Impact	Ex	Dev	Impact	Ex	Dev	Impact	Ex	Dev	Impact	Ex	Dev	Impact
sect1_2437	sect1_2437	19.36	19.35	-0.01	19.30	19.29	-0.01	19.21	19.20	-0.01	19.14	19.13	-0.01	19.07	19.06	-0.01	18.96	18.95	-0.01	18.86	18.87	0.01
sect1_2459	sect1_2459	19.09	19.07	-0.02	19.03	19.01	-0.02	18.95	18.94	-0.01	18.88	18.87	-0.01	18.82	18.81	-0.01	18.73	18.72	-0.01	18.65	18.65	
sect1_2474	sect1_2474	18.92	18.89	-0.03	18.84	18.81	-0.03	18.73	18.71	-0.02	18.66	18.64	-0.02	18.59	18.57	-0.02	18.48	18.47	-0.01	18.38	18.38	
sect1_2507	sect1_2507	18.64	18.59	-0.05	18.53	18.47	-0.06	18.39	18.34	-0.05	18.31	18.25	-0.06	18.23	18.18	-0.05	18.11	18.07	-0.04	18.01	17.99	-0.02
sect1_2534	sect1_2534	18.49	18.41	-0.08	18.34	18.24	-0.10	18.14	18.01	-0.13	18.03	17.88	-0.15	17.94	17.78	-0.16	17.79	17.65	-0.14	17.67	17.55	-0.12
sect1_2576	sect1_2576	18.47	18.38	-0.09	18.31	18.20	-0.11	18.09	17.92	-0.17	17.97	17.75	-0.22	17.88	17.63	-0.25	17.74	17.48	-0.26	17.61	17.37	-0.24
sect1_2629	sect1_2629	18.42	18.32	-0.10	18.25	18.12	-0.13	18.00	17.78	-0.22	17.87	17.55	-0.32	17.77	17.38	-0.39	17.64	17.19	-0.45	17.52	17.05	-0.47
sect1_2687	sect1_2687	18.35	18.29	-0.06	18.16	18.07	-0.09	17.82	17.68	-0.14	17.62	17.38	-0.24	17.48	17.15	-0.33	17.32	16.85	-0.47	17.20	16.59	-0.61
sect1_2725	sect1_2725	18.32	18.29	-0.03	18.12	18.07	-0.05	17.72	17.68	-0.04	17.39	17.38	-0.01	17.12	17.14	0.02	16.78	16.83	0.05	16.48	16.55	0.07
		Warrego Highway																				
sect1_2804	sect1_2804	16.76	16.74	-0.02	16.69	16.68	-0.01	16.61	16.60	-0.01	16.54	16.53	-0.01	16.45	16.44	-0.01	16.28	16.28		16.13	16.14	0.01
sect1_2871	sect1_2871	15.87	15.85	-0.02	15.78	15.76	-0.02	15.66	15.65	-0.01	15.56	15.55	-0.01	15.45	15.45		15.27	15.27		15.12	15.13	0.01
sect1_2958	sect1_2958	14.87	14.86	-0.01	14.80	14.79	-0.01	14.71	14.71		14.64	14.63	-0.01	14.56	14.55	-0.01	14.41	14.42	0.01	14.29	14.30	0.01
sect1_3014	sect1_3014	14.56	14.55	-0.01	14.49	14.48	-0.01	14.40	14.39	-0.01	14.32	14.31	-0.01	14.23	14.23		14.07	14.08	0.01	13.93	13.94	0.01
sect1_3092	sect1_3092	14.26	14.26		14.18	14.18		14.08	14.08		13.98	13.99	0.01	13.87	13.88	0.01	13.69	13.70	0.01	13.52	13.54	0.02
sect1_3164	sect1_3164	14.08	14.09	0.01	14.00	14.01	0.01	13.89	13.91	0.02	13.80	13.81	0.01	13.68	13.70	0.02	13.46	13.49	0.03	13.28	13.31	0.03
sect1_3220	sect1_3220	13.96	13.97	0.01	13.88	13.90	0.02	13.78	13.80	0.02	13.68	13.71	0.03	13.57	13.60	0.03	13.35	13.39	0.04	13.14	13.19	0.05
sect1_3269	sect1_3269	13.66	13.69	0.03	13.58	13.61	0.03	13.48	13.51	0.03	13.38	13.42	0.04	13.26	13.31	0.05	13.05	13.10	0.05	12.85	12.91	0.06
sect1_3336	sect1_3336	13.08	13.10	0.02	12.99	13.02	0.03	12.88	12.91	0.03	12.78	12.81	0.03	12.67	12.71	0.04	12.48	12.53	0.05	12.32	12.37	0.05
sect1_3417	sect1_3417	12.80	12.82	0.02	12.71	12.74	0.03	12.60	12.63	0.03	12.50	12.53	0.03	12.39	12.43	0.04	12.20	12.25	0.05	12.04	12.08	0.04
sect1_3475	sect1_3475	12.53	12.54	0.01	12.45	12.47	0.02	12.34	12.36	0.02	12.25	12.27	0.02	12.15	12.18	0.03	11.97	12.01	0.04	11.82	11.86	0.04
sect1_3517	sect1_3517	12.25	12.23	-0.02	12.17	12.16	-0.01	12.06	12.06		11.97	11.97		11.87	11.88	0.01	11.70	11.72	0.02	11.55	11.58	0.03
sect1_3592	sect1_3592	11.86	11.80	-0.06	11.77	11.72	-0.05	11.66	11.61	-0.05	11.56	11.52	-0.04	11.45	11.42	-0.03	11.26	11.23	-0.03	11.07	11.05	-0.02
sect1_3633	sect1_3633	11.60	11.55	-0.05	11.52	11.47	-0.05	11.41	11.36	-0.05	11.31	11.27	-0.04	11.20	11.16	-0.04	11.00	10.97	-0.03	10.82	10.80	-0.02
sect1_3676	sect1_3676	11.33	11.29	-0.04	11.25	11.21	-0.04	11.13	11.10	-0.03	11.03	11.00	-0.03	10.92	10.90	-0.02	10.71	10.69	-0.02	10.51	10.50	-0.01
sect1_3733	sect1_3733	11.01	10.96	-0.05	10.92	10.87	-0.05	10.80	10.76	-0.04	10.69	10.66	-0.03	10.57	10.54	-0.03	10.36	10.34	-0.02	10.19	10.18	-0.01
sect1_4132	sect1_4132	9.29	9.22	-0.07	9.17	9.11	-0.06	9.00	8.95	-0.05	8.85	8.81	-0.04	8.69	8.66	-0.03	8.42	8.39	-0.03	8.18	8.17	-0.01
sect1_4180	sect1_4180	9.14	9.08	-0.06	9.03	8.97	-0.06	8.86	8.81	-0.05	8.72	8.67	-0.05	8.56	8.52	-0.04	8.28	8.26	-0.02	8.05	8.04	-0.01
sect1_4257	sect1_4257	8.85	8.80	-0.05	8.74	8.69	-0.05	8.58	8.54	-0.04	8.44	8.40	-0.04	8.29	8.26	-0.03	8.03	8.01	-0.02	7.81	7.80	-0.01
sect1_4302	sect1_4302	8.53	8.48	-0.05	8.42	8.38	-0.04	8.27	8.24	-0.03	8.14	8.12	-0.02	8.00	7.99	-0.01	7.77	7.76	-0.01	7.57	7.57	
sect1_4353	sect1_4353	8.17	8.14	-0.03	8.07	8.04	-0.03	7.93	7.91	-0.02	7.80	7.79	-0.01	7.67	7.66	-0.01	7.45	7.45		7.27	7.27	
sect1_4420	sect1_4420	7.84	7.81	-0.03	7.74	7.71	-0.03	7.59	7.57	-0.02	7.47	7.45	-0.02	7.34	7.33	-0.01	7.12	7.12		6.93	6.93	
sect1_4508	sect1_4508	7.47	7.44	-0.03	7.37	7.34	-0.03	7.22	7.20	-0.02	7.09	7.07	-0.02	6.95	6.94	-0.01	6.72	6.72		6.51	6.52	0.01
sect1_4650	sect1_4650	6.53	6.49	-0.04	6.42	6.39	-0.03	6.26	6.24	-0.02	6.13	6.11	-0.02	5.98	5.97	-0.01	5.74	5.74		5.53	5.54	0.01
sect1_4744	sect1_4744	5.96	5.90	-0.06	5.81	5.76	-0.05	5.60	5.56	-0.04	5.42	5.39	-0.03	5.22	5.20	-0.02	4.90	4.89	-0.01	4.61	4.62	0.01
sect1_4789	sect1_4789	5.83	5.78	-0.05	5.69	5.64	-0.05	5.49	5.45	-0.04	5.31	5.28	-0.03	5.11	5.09	-0.02	4.78	4.77	-0.01	4.48	4.49	0.01
sect1_4845	sect1_4845	5.48	5.42	-0.06	5.34	5.29	-0.05	5.15	5.10	-0.05	4.98	4.94	-0.04	4.79	4.77	-0.02	4.48	4.47	-0.01	4.21	4.22	0.01
sect1_4899	sect1_4899	5.14	5.09	-0.05	5.01	4.96	-0.05	4.82	4.78	-0.04	4.66	4.62	-0.04	4.48	4.46	-0.02	4.20	4.19	-0.01	3.95	3.95	
sect1_4966	sect1_4966	4.60	4.55	-0.05	4.48	4.43	-0.05	4.29	4.25	-0.04	4.14	4.10	-0.04	3.97	3.94	-0.03	3.68	3.67	-0.01	3.44	3.44	
sect1_5014	sect1_5014	4.46	4.41	-0.05	4.33	4.29	-0.04	4.15	4.11	-0.04	3.99	3.95	-0.04	3.82	3.79	-0.03	3.53	3.52	-0.01	3.28	3.29	0.01
sect1_5063	sect1_5063	4.31	4.26	-0.05	4.19	4.15	-0.04	4.02	3.98	-0.04	3.86	3.83	-0.03	3.70	3.68	-0.02	3.43	3.42	-0.01	3.20	3.20	

Pre-Development Case: EX06a
Post-Development Case: DE15a

SOBEK Cross-section		Peak Flood Levels (m AHD)																				
Pre- ID	Post- ID	100 Year ARI			50 Year ARI			20 Year ARI			10 Year ARI			5 Year ARI			2 Year ARI			1 Year ARI		
		Ex	Dev	Impact	Ex	Dev	Impact	Ex	Dev	Impact	Ex	Dev	Impact	Ex	Dev	Impact	Ex	Dev	Impact	Ex	Dev	Impact
sect1_5118	sect1_5118	4.06	4.02	-0.04	3.95	3.91	-0.04	3.79	3.76	-0.03	3.65	3.62	-0.03	3.51	3.49	-0.02	3.27	3.26	-0.01	3.06	3.06	
sect1_5136	sect1_5136	3.93	3.89	-0.04	3.83	3.79	-0.04	3.68	3.64	-0.04	3.55	3.53	-0.02	3.42	3.40	-0.02	3.20	3.19	-0.01	3.01	3.01	
sect1_5169	sect1_5169	3.00	2.99	-0.01	2.93	2.92	-0.01	2.81	2.81		2.73	2.73		2.65	2.65		2.53	2.53		2.43	2.43	
		Eastern Tributary 2 of Bremer River																				
sect2_13	sect2_13	13.03	13.06	0.03	13.00	13.03	0.03	12.96	13.01	0.05	12.92	12.97	0.05	12.89	12.94	0.05	12.83	12.89	0.06	12.79	12.84	0.05
sect2_84	sect2_84	12.40	12.44	0.04	12.35	12.40	0.05	12.30	12.35	0.05	12.25	12.30	0.05	12.19	12.26	0.07	12.12	12.18	0.06	12.05	12.12	0.07
sect2_123	sect2_123	12.03	12.08	0.05	11.99	12.03	0.04	11.93	11.98	0.05	11.87	11.93	0.06	11.82	11.88	0.06	11.73	11.80	0.07	11.66	11.74	0.08
sect2_173	sect2_173	11.73	11.76	0.03	11.69	11.73	0.04	11.65	11.69	0.04	11.60	11.65	0.05	11.56	11.61	0.05	11.50	11.55	0.05	11.46	11.51	0.05
sect2_238	sect2_238	10.50	10.55	0.05	10.45	10.50	0.05	10.39	10.44	0.05	10.33	10.39	0.06	10.27	10.34	0.07	10.17	10.25	0.08	10.10	10.18	0.08
sect2_301	sect2_301	9.36	9.41	0.05	9.29	9.35	0.06	9.21	9.28	0.07	9.14	9.21	0.07	9.07	9.15	0.08	8.96	9.05	0.09	8.87	8.96	0.09
sect2_369	sect2_369	8.80	8.84	0.04	8.75	8.78	0.03	8.68	8.73	0.05	8.62	8.67	0.05	8.56	8.62	0.06	8.47	8.53	0.06	8.39	8.46	0.07
sect2_415	sect2_415	8.23	8.21	-0.02	8.16	8.15	-0.01	8.08	8.08		8.00	8.00		7.92	7.94	0.02	7.79	7.82	0.03	7.68	7.72	0.04
sect2_469	sect2_469	7.50	7.56	0.06	7.44	7.50	0.06	7.36	7.43	0.07	7.28	7.35	0.07	7.21	7.29	0.08	7.08	7.17	0.09	6.98	7.08	0.10
sect2_514	sect2_514	6.87	6.93	0.06	6.82	6.87	0.05	6.74	6.81	0.07	6.68	6.74	0.06	6.61	6.68	0.07	6.52	6.59	0.07	6.43	6.51	0.08
sect2_556	sect2_556	6.06	6.11	0.05	6.01	6.06	0.05	5.94	6.00	0.06	5.87	5.93	0.06	5.82	5.88	0.06	5.73	5.79	0.06	5.66	5.72	0.06
sect2_607	sect2_607	5.27	5.33	0.06	5.21	5.27	0.06	5.13	5.20	0.07	5.07	5.13	0.06	5.00	5.07	0.07	4.91	4.98	0.07	4.83	4.90	0.07
sect2_645	sect2_645	4.77	4.84	0.07	4.71	4.77	0.06	4.63	4.70	0.07	4.56	4.63	0.07	4.49	4.56	0.07	4.39	4.46	0.07	4.30	4.38	0.08
sect2_693	sect2_693	4.18	4.14	-0.04	4.08	4.03	-0.05	3.91	3.94	0.03	3.78	3.86	0.08	3.70	3.79	0.09	3.59	3.67	0.08	3.50	3.59	0.09
sect2_733	sect2_733	4.17	4.12	-0.05	4.06	4.02	-0.04	3.89	3.85	-0.04	3.75	3.71	-0.04	3.60	3.57	-0.03	3.37	3.38	0.01	3.19	3.29	0.10
sect2_777	sect2_777	4.16	4.12	-0.04	4.05	4.01	-0.04	3.88	3.84	-0.04	3.74	3.70	-0.04	3.58	3.56	-0.02	3.33	3.32	-0.01	3.11	3.11	
sect2_805	sect2_805	4.16	4.11	-0.05	4.05	4.01	-0.04	3.88	3.84	-0.04	3.73	3.70	-0.03	3.58	3.56	-0.02	3.33	3.31	-0.02	3.11	3.11	
		Eastern Tributary 3 of Bremer River																				
sect3_15	sect3_15	11.20	11.25	0.05	11.19	11.24	0.05	11.18	11.23	0.05	11.17	11.21	0.04	11.15	11.20	0.05	11.14	11.17	0.03	11.12	11.15	0.03
sect3_49	sect3_49	8.99	9.11	0.12	8.96	9.08	0.12	8.93	9.05	0.12	8.90	9.01	0.11	8.86	8.97	0.11	8.81	8.91	0.10	8.77	8.86	0.09
sect3_64	sect3_64	8.15	8.28	0.13	8.12	8.24	0.12	8.08	8.21	0.13	8.04	8.16	0.12	8.00	8.12	0.12	7.94	8.05	0.11	7.89	7.99	0.10
sect3_84	sect3_84	7.18	7.32	0.14	7.15	7.28	0.13	7.11	7.24	0.13	7.07	7.20	0.13	7.03	7.15	0.12	6.96	7.08	0.12	6.91	7.02	0.11
sect3_109	sect3_109	6.47	6.52	0.05	6.46	6.51	0.05	6.45	6.49	0.04	6.43	6.48	0.05	6.42	6.46	0.04	6.39	6.44	0.05	6.37	6.41	0.04
sect3_125	sect3_125	6.52	6.59	0.07	6.50	6.57	0.07	6.48	6.55	0.07	6.46	6.53	0.07	6.44	6.50	0.06	6.41	6.47	0.06	6.38	6.44	0.06
sect3_141	sect3_141	5.42	5.49	0.07	5.41	5.47	0.06	5.39	5.45	0.06	5.37	5.43	0.06	5.35	5.41	0.06	5.31	5.37	0.06	5.29	5.34	0.05
sect3_148	sect3_148	5.47	5.55	0.08	5.44	5.53	0.09	5.42	5.51	0.09	5.39	5.48	0.09	5.37	5.45	0.08	5.33	5.40	0.07	5.30	5.36	0.06
sect3_174	sect3_174	4.16	4.11	-0.05	4.05	4.01	-0.04	3.88	3.84	-0.04	3.74	3.71	-0.03	3.59	3.63	0.04	3.46	3.56	0.10	3.41	3.50	0.09

Pre-Development Case: EX06a
Post-Development Case: DE15a

SOBEK Cross-section		Peak Flood Depths (m)																				
Pre- ID	Post- ID	100 Year ARI			50 Year ARI			20 Year ARI			10 Year ARI			5 Year ARI			2 Year ARI			1 Year ARI		
		Ex	Dev	Impact	Ex	Dev	Impact	Ex	Dev	Impact	Ex	Dev	Impact	Ex	Dev	Impact	Ex	Dev	Impact	Ex	Dev	Impact
		Eastern Tributary 1 of Bremer River																				
sect1_259	sect1_259	1.05	1.05		1.00	1.00		0.93	0.93		0.87	0.87		0.80	0.80		0.71	0.71		0.63	0.63	
sect1_329	sect1_329	1.12	1.12		1.08	1.08		0.99	0.99		0.89	0.89		0.80	0.80		0.69	0.69		0.61	0.61	
sect1_409	sect1_409	1.38	1.38		1.34	1.34		1.22	1.21	-0.01	0.96	0.96		0.65	0.65		0.36	0.36		0.26	0.26	
		Brisbane Road																				
sect1_468	sect1_468	2.15	2.15		1.97	1.97		1.44	1.44		1.11	1.11		0.89	0.89		0.66	0.66		0.50	0.50	
		Railway																				
sect1_517	sect1_517	0.95	0.95		0.90	0.90		0.83	0.83		0.78	0.78		0.72	0.72		0.64	0.64		0.57	0.57	
sect1_581	sect1_581	1.50	1.50		1.44	1.44		1.35	1.35		1.29	1.29		1.22	1.22		1.11	1.11		1.02	1.02	
sect1_674	sect1_674	1.60	1.59	-0.01	1.53	1.53		1.46	1.46		1.40	1.40		1.33	1.33		1.19	1.19		1.03	1.04	0.01
sect1_784	sect1_784	1.38	1.38		1.33	1.33		1.27	1.27		1.22	1.22		1.16	1.16		1.02	1.02		0.87	0.88	0.01
sect1_897	sect1_897	0.94	0.93	-0.01	0.84	0.84		0.74	0.73	-0.01	0.67	0.67		0.60	0.60		0.49	0.49		0.41	0.41	
sect1_937	sect1_937	1.68	1.64	-0.04	1.51	1.45	-0.06	1.33	1.25	-0.08	1.22	1.13	-0.09	1.09	0.99	-0.10	0.91	0.79	-0.12	0.78	0.65	-0.13
		Hoepner Road																				
sect1_1045	sect1_1045	0.67	0.88	0.21	0.61	0.75	0.14	0.55	0.62	0.07	0.52	0.56	0.04	0.47	0.50	0.03	0.41	0.43	0.02	0.35	0.37	0.02
sect1_1142	XS CC	2.43	1.86	-0.57	2.23	1.61	-0.62	1.85	1.25	-0.60	1.60	1.02	-0.58	1.41	0.84	-0.57	1.17	0.62	-0.55	1.01	0.50	-0.51
sect1_1271	XS BB	2.30	2.32	0.02	2.10	2.07	-0.03	1.70	1.69	-0.01	1.43	1.44	0.01	1.21	1.24	0.03	0.93	0.95	0.02	0.73	0.73	
USRail	USRail	2.55	2.46	-0.09	2.36	2.21	-0.15	1.95	1.83	-0.12	1.67	1.58	-0.09	1.42	1.37	-0.05	1.10	1.08	-0.02	0.85	0.85	
		Railway																				
sect1_1386	sect1_1386	1.07	1.03	-0.04	0.99	0.96	-0.03	0.91	0.89	-0.02	0.86	0.84	-0.02	0.80	0.78	-0.02	0.69	0.68	-0.01	0.60	0.60	
sect1_1443	sect1_1443	1.02	0.98	-0.04	0.94	0.91	-0.03	0.87	0.84	-0.03	0.81	0.80	-0.01	0.75	0.73	-0.02	0.64	0.63	-0.01	0.55	0.55	
sect1_1569	sect1_1569	1.45	1.43	-0.02	1.34	1.33	-0.01	1.23	1.22	-0.01	1.15	1.14	-0.01	1.07	1.07		0.96	0.96		0.86	0.86	
sect1_1659	sect1_1659	3.14	3.07	-0.07	2.75	2.71	-0.04	2.29	2.26	-0.03	1.98	1.96	-0.02	1.72	1.70	-0.02	1.42	1.41	-0.01	1.20	1.21	0.01
sect1_1741	sect1_1741	3.58	3.51	-0.07	3.17	3.13	-0.04	2.69	2.66	-0.03	2.34	2.31	-0.03	2.02	2.00	-0.02	1.63	1.63		1.35	1.36	0.01
		Railway																				
sect1_1789	sect1_1789	2.55	2.53	-0.02	2.45	2.44	-0.01	2.31	2.30	-0.01	2.19	2.17	-0.02	2.05	2.04	-0.01	1.83	1.83		1.64	1.65	0.01
sect1_1851	sect1_1851	2.08	2.06	-0.02	1.99	1.98	-0.01	1.87	1.86	-0.01	1.77	1.76	-0.01	1.65	1.64	-0.01	1.46	1.46		1.30	1.31	0.01
sect1_1927	sect1_1927	1.86	1.85	-0.01	1.78	1.77	-0.01	1.66	1.65	-0.01	1.56	1.55	-0.01	1.44	1.43	-0.01	1.24	1.23	-0.01	1.06	1.07	0.01
sect1_1996	sect1_1996	2.60	2.59	-0.01	2.53	2.52	-0.01	2.41	2.40	-0.01	2.31	2.30	-0.01	2.20	2.19	-0.01	1.98	1.98		1.78	1.79	0.01
sect1_2070	sect1_2070	2.12	2.11	-0.01	2.04	2.03	-0.01	1.91	1.90	-0.01	1.80	1.79	-0.01	1.69	1.68	-0.01	1.51	1.51		1.35	1.36	0.01
sect1_2098	sect1_2098	1.37	1.38	0.01	1.30	1.31	0.01	1.21	1.21		1.13	1.13		1.06	1.05	-0.01	0.94	0.94		0.84	0.84	
sect1_2116	sect1_2116	1.01	1.03	0.02	0.95	0.97	0.02	0.85	0.87	0.02	0.78	0.78		0.70	0.70		0.58	0.58		0.48	0.49	0.01
sect1_2134	sect1_2134	1.67	1.74	0.07	1.59	1.65	0.06	1.47	1.52	0.05	1.38	1.40	0.02	1.27	1.29	0.02	1.12	1.13	0.01	0.98	0.99	0.01
sect1_2152	sect1_2152	1.80	1.92	0.12	1.72	1.83	0.11	1.60	1.69	0.09	1.49	1.55	0.06	1.38	1.42	0.04	1.20	1.22	0.02	1.04	1.07	0.03
sect1_2189	sect1_2189	1.91	2.06	0.15	1.82	1.97	0.15	1.70	1.82	0.12	1.60	1.68	0.08	1.48	1.54	0.06	1.31	1.34	0.03	1.15	1.18	0.03
sect1_2222	sect1_2222	1.54	1.49	-0.05	1.46	1.42	-0.04	1.35	1.32	-0.03	1.26	1.23	-0.03	1.16	1.14	-0.02	1.00	0.99	-0.01	0.87	0.87	
sect1_2236	sect1_2236	1.16	1.15	-0.01	1.10	1.09	-0.01	1.01	1.00	-0.01	0.93	0.92	-0.01	0.85	0.85		0.72	0.72		0.61	0.62	0.01
sect1_2281	sect1_2281	1.62	1.61	-0.01	1.55	1.55		1.45	1.45		1.37	1.36	-0.01	1.27	1.27		1.13	1.13		1.00	1.01	0.01
sect1_2348	sect1_2348	1.35	1.34	-0.01	1.29	1.29		1.21	1.20	-0.01	1.13	1.13		1.06	1.05	-0.01	0.93	0.93		0.83	0.83	
sect1_2410	sect1_2410	1.95	1.94	-0.01	1.89	1.88	-0.01	1.80	1.79	-0.01	1.73	1.72	-0.01	1.66	1.65	-0.01	1.55	1.55		1.46	1.46	
sect1_2422	sect1_2422	1.04	1.03	-0.01	0.98	0.97	-0.01	0.90	0.89	-0.01	0.83	0.82	-0.01	0.76	0.75	-0.01	0.65	0.65		0.56	0.56	

Pre-Development Case: EX06a
Post-Development Case: DE15a

SOBEK Cross-section		Peak Flood Depths (m)																				
Pre- ID	Post- ID	100 Year ARI			50 Year ARI			20 Year ARI			10 Year ARI			5 Year ARI			2 Year ARI			1 Year ARI		
		Ex	Dev	Impact	Ex	Dev	Impact	Ex	Dev	Impact	Ex	Dev	Impact	Ex	Dev	Impact	Ex	Dev	Impact	Ex	Dev	Impact
sect1_2437	sect1_2437	1.15	1.14	-0.01	1.09	1.08	-0.01	1.00	1.00		0.93	0.92	-0.01	0.86	0.85	-0.01	0.75	0.75		0.65	0.66	0.01
sect1_2459	sect1_2459	1.02	1.01	-0.01	0.96	0.95	-0.01	0.88	0.87	-0.01	0.82	0.81	-0.01	0.76	0.75	-0.01	0.66	0.66		0.59	0.59	
sect1_2474	sect1_2474	1.03	1.00	-0.03	0.95	0.93	-0.02	0.85	0.83	-0.02	0.78	0.76	-0.02	0.70	0.69	-0.01	0.59	0.58	-0.01	0.50	0.50	
sect1_2507	sect1_2507	1.33	1.28	-0.05	1.22	1.16	-0.06	1.08	1.02	-0.06	1.00	0.94	-0.06	0.92	0.87	-0.05	0.80	0.76	-0.04	0.70	0.67	-0.03
sect1_2534	sect1_2534	1.62	1.54	-0.08	1.47	1.37	-0.10	1.27	1.14	-0.13	1.17	1.01	-0.16	1.07	0.92	-0.15	0.93	0.78	-0.15	0.80	0.68	-0.12
sect1_2576	sect1_2576	1.79	1.70	-0.09	1.63	1.52	-0.11	1.41	1.24	-0.17	1.29	1.07	-0.22	1.20	0.95	-0.25	1.06	0.80	-0.26	0.93	0.69	-0.24
sect1_2629	sect1_2629	1.72	1.82	0.10	1.55	1.62	0.07	1.30	1.28	-0.02	1.17	1.05	-0.12	1.08	0.88	-0.20	0.94	0.69	-0.25	0.82	0.55	-0.27
sect1_2687	sect1_2687	1.90	2.29	0.39	1.71	2.07	0.36	1.37	1.68	0.31	1.16	1.38	0.22	1.03	1.15	0.12	0.87	0.85	-0.02	0.75	0.59	-0.16
sect1_2725	sect1_2725	3.27	3.24	-0.03	3.07	3.02	-0.05	2.67	2.63	-0.04	2.34	2.33	-0.01	2.07	2.09	0.02	1.73	1.78	0.05	1.43	1.50	0.07
		Warrego Highway																				
sect1_2804	sect1_2804	1.39	1.37	-0.02	1.32	1.31	-0.01	1.24	1.23	-0.01	1.17	1.16	-0.01	1.08	1.07	-0.01	0.91	0.91		0.75	0.76	0.01
sect1_2871	sect1_2871	1.89	1.87	-0.02	1.79	1.78	-0.01	1.68	1.66	-0.02	1.58	1.57	-0.01	1.47	1.46	-0.01	1.28	1.29	0.01	1.13	1.14	0.01
#REF!	#REF!	Eastern Tributary 1 of Bremer River																				
sect1_2958	sect1_2958	1.570	1.560	-0.010	1.500	1.490	-0.010	1.410	1.410		1.340	1.330	-0.010	1.260	1.250	-0.010	1.110	1.120	0.010	0.990	1.000	0.010
sect1_3014	sect1_3014	1.490	1.480	-0.010	1.420	1.410	-0.010	1.330	1.330		1.250	1.250		1.170	1.170		1.010	1.010		0.870	0.880	0.010
sect1_3092	sect1_3092	2.100	2.100		2.020	2.020		1.920	1.920		1.820	1.830	0.010	1.710	1.720	0.010	1.530	1.540	0.010	1.360	1.380	0.020
sect1_3164	sect1_3164	1.970	1.980	0.010	1.890	1.900	0.010	1.780	1.800	0.020	1.690	1.700	0.010	1.570	1.590	0.020	1.350	1.380	0.030	1.170	1.200	0.030
sect1_3220	sect1_3220	2.320	2.340	0.020	2.240	2.260	0.020	2.140	2.170	0.030	2.050	2.070	0.020	1.930	1.960	0.030	1.710	1.750	0.040	1.510	1.550	0.040
sect1_3269	sect1_3269	2.430	2.450	0.020	2.350	2.380	0.030	2.240	2.280	0.040	2.150	2.190	0.040	2.030	2.070	0.040	1.810	1.860	0.050	1.620	1.670	0.050
sect1_3336	sect1_3336	1.930	1.950	0.020	1.840	1.870	0.030	1.730	1.760	0.030	1.630	1.660	0.030	1.520	1.560	0.040	1.330	1.380	0.050	1.170	1.220	0.050
sect1_3417	sect1_3417	2.400	2.420	0.020	2.310	2.340	0.030	2.200	2.230	0.030	2.100	2.130	0.030	1.990	2.030	0.040	1.800	1.850	0.050	1.640	1.680	0.040
sect1_3475	sect1_3475	2.130	2.140	0.010	2.050	2.070	0.020	1.940	1.960	0.020	1.850	1.870	0.020	1.750	1.780	0.030	1.570	1.610	0.040	1.420	1.460	0.040
sect1_3517	sect1_3517	1.850	1.830	-0.020	1.770	1.760	-0.010	1.660	1.660		1.570	1.570		1.470	1.480	0.010	1.300	1.320	0.020	1.150	1.180	0.030
sect1_3592	sect1_3592	2.440	2.380	-0.060	2.360	2.300	-0.060	2.250	2.200	-0.050	2.150	2.110	-0.040	2.040	2.000	-0.040	1.850	1.820	-0.030	1.660	1.640	-0.020
sect1_3633	sect1_3633	2.280	2.230	-0.050	2.200	2.150	-0.050	2.090	2.040	-0.050	1.990	1.950	-0.040	1.880	1.840	-0.040	1.680	1.650	-0.030	1.500	1.480	-0.020
sect1_3676	sect1_3676	2.550	2.500	-0.050	2.460	2.420	-0.040	2.350	2.310	-0.040	2.250	2.220	-0.030	2.130	2.110	-0.020	1.930	1.910	-0.020	1.730	1.720	-0.010
sect1_3733	sect1_3733	2.210	2.160	-0.050	2.120	2.070	-0.050	2.000	1.960	-0.040	1.890	1.860	-0.030	1.770	1.740	-0.030	1.560	1.540	-0.020	1.390	1.380	-0.010
sect1_4132	sect1_4132	2.840	2.770	-0.070	2.720	2.660	-0.060	2.550	2.500	-0.050	2.400	2.360	-0.040	2.240	2.210	-0.030	1.970	1.940	-0.030	1.730	1.720	-0.010
sect1_4180	sect1_4180	2.870	2.810	-0.060	2.760	2.700	-0.060	2.590	2.540	-0.050	2.450	2.400	-0.050	2.290	2.250	-0.040	2.010	1.990	-0.020	1.780	1.770	-0.010
sect1_4257	sect1_4257	2.900	2.840	-0.060	2.780	2.730	-0.050	2.630	2.580	-0.050	2.490	2.450	-0.040	2.340	2.310	-0.030	2.080	2.060	-0.020	1.850	1.850	
sect1_4302	sect1_4302	2.730	2.690	-0.040	2.620	2.590	-0.030	2.470	2.440	-0.030	2.350	2.320	-0.030	2.200	2.190	-0.010	1.970	1.970		1.770	1.770	
sect1_4353	sect1_4353	2.420	2.380	-0.040	2.310	2.290	-0.020	2.170	2.150	-0.020	2.050	2.030	-0.020	1.920	1.910	-0.010	1.700	1.700		1.510	1.520	0.010
sect1_4420	sect1_4420	2.130	2.090	-0.040	2.020	1.990	-0.030	1.880	1.860	-0.020	1.750	1.740	-0.010	1.620	1.610	-0.010	1.400	1.400		1.210	1.220	0.010
sect1_4508	sect1_4508	2.390	2.360	-0.030	2.280	2.260	-0.020	2.140	2.110	-0.030	2.010	1.990	-0.020	1.870	1.860	-0.010	1.640	1.630	-0.010	1.430	1.440	0.010
sect1_4650	sect1_4650	2.870	2.830	-0.040	2.760	2.730	-0.030	2.600	2.580	-0.020	2.470	2.450	-0.020	2.320	2.310	-0.010	2.080	2.080		1.870	1.880	0.010
sect1_4744	sect1_4744	3.260	3.210	-0.050	3.110	3.070	-0.040	2.910	2.870	-0.040	2.730	2.690	-0.040	2.530	2.510	-0.020	2.200	2.190	-0.010	1.910	1.920	0.010
sect1_4789	sect1_4789	3.680	3.620	-0.060	3.540	3.490	-0.050	3.330	3.290	-0.040	3.150	3.120	-0.030	2.960	2.930	-0.030	2.620	2.610	-0.010	2.330	2.330	
sect1_4845	sect1_4845	3.620	3.560	-0.060	3.480	3.430	-0.050	3.290	3.240	-0.050	3.120	3.080	-0.040	2.930	2.910	-0.020	2.620	2.610	-0.010	2.350	2.360	0.010
sect1_4899	sect1_4899	3.280	3.230	-0.050	3.150	3.100	-0.050	2.960	2.920	-0.040	2.800	2.760	-0.040	2.620	2.600	-0.020	2.340	2.330	-0.010	2.090	2.090	
sect1_4966	sect1_4966	3.440	3.390	-0.050	3.320	3.270	-0.050	3.130	3.090	-0.040	2.980	2.940	-0.040	2.810	2.780	-0.030	2.520	2.510	-0.010	2.280	2.280	
sect1_5014	sect1_5014	3.530	3.480	-0.050	3.400	3.360	-0.040	3.220	3.180	-0.040	3.060	3.020	-0.040	2.890	2.860	-0.030	2.600	2.590	-0.010	2.350	2.360	0.010

Pre-Development Case: EX06a
Post-Development Case: DE15a

SOBEK Cross-section		Peak Flood Depths (m)																				
Pre- ID	Post- ID	100 Year ARI			50 Year ARI			20 Year ARI			10 Year ARI			5 Year ARI			2 Year ARI			1 Year ARI		
		Ex	Dev	Impact	Ex	Dev	Impact	Ex	Dev	Impact	Ex	Dev	Impact	Ex	Dev	Impact	Ex	Dev	Impact	Ex	Dev	Impact
sect1_5063	sect1_5063	3.380	3.330	-0.050	3.260	3.220	-0.040	3.090	3.050	-0.040	2.930	2.900	-0.030	2.770	2.750	-0.020	2.500	2.490	-0.010	2.270	2.270	
sect1_5118	sect1_5118	3.130	3.090	-0.040	3.020	2.980	-0.040	2.860	2.830	-0.030	2.720	2.690	-0.030	2.580	2.560	-0.020	2.340	2.330	-0.010	2.130	2.130	
sect1_5136	sect1_5136	2.560	2.520	-0.040	2.460	2.420	-0.040	2.310	2.280	-0.030	2.180	2.160	-0.020	2.050	2.040	-0.010	1.840	1.830	-0.010	1.650	1.650	
sect1_5169	sect1_5169	2.140	2.120	-0.020	2.070	2.050	-0.020	1.950	1.940	-0.010	1.870	1.860	-0.010	1.780	1.780		1.660	1.660		1.570	1.570	
		Eastern Tributary 2 of Bremer River																				
sect2_13	sect2_13	0.640	0.680	0.040	0.610	0.640	0.030	0.570	0.620	0.050	0.540	0.580	0.040	0.500	0.550	0.050	0.440	0.500	0.060	0.400	0.450	0.050
sect2_84	sect2_84	0.850	0.890	0.040	0.800	0.840	0.040	0.740	0.800	0.060	0.690	0.750	0.060	0.640	0.710	0.070	0.560	0.630	0.070	0.500	0.570	0.070
sect2_123	sect2_123	1.080	1.120	0.040	1.030	1.070	0.040	0.970	1.030	0.060	0.920	0.980	0.060	0.860	0.930	0.070	0.780	0.850	0.070	0.710	0.780	0.070
sect2_173	sect2_173	0.560	0.600	0.040	0.530	0.560	0.030	0.480	0.520	0.040	0.440	0.480	0.040	0.400	0.450	0.050	0.340	0.390	0.050	0.290	0.340	0.050
sect2_238	sect2_238	1.060	1.110	0.050	1.010	1.060	0.050	0.950	1.010	0.060	0.890	0.950	0.060	0.830	0.900	0.070	0.740	0.810	0.070	0.660	0.740	0.080
sect2_301	sect2_301	1.030	1.080	0.050	0.960	1.020	0.060	0.880	0.950	0.070	0.810	0.880	0.070	0.740	0.820	0.080	0.630	0.720	0.090	0.540	0.630	0.090
sect2_369	sect2_369	1.010	1.040	0.030	0.950	0.990	0.040	0.880	0.930	0.050	0.820	0.870	0.050	0.760	0.820	0.060	0.670	0.730	0.060	0.600	0.660	0.060
sect2_415	sect2_415	1.460	1.440	-0.020	1.390	1.370	-0.020	1.300	1.300		1.220	1.230	0.010	1.140	1.160	0.020	1.010	1.050	0.040	0.910	0.950	0.040
sect2_469	sect2_469	1.370	1.430	0.060	1.310	1.370	0.060	1.230	1.300	0.070	1.150	1.220	0.070	1.080	1.160	0.080	0.950	1.040	0.090	0.850	0.950	0.100
sect2_514	sect2_514	1.140	1.200	0.060	1.080	1.140	0.060	1.010	1.070	0.060	0.950	1.010	0.060	0.880	0.950	0.070	0.780	0.860	0.080	0.700	0.780	0.080
sect2_556	sect2_556	0.860	0.920	0.060	0.810	0.860	0.050	0.740	0.800	0.060	0.680	0.740	0.060	0.620	0.680	0.060	0.530	0.590	0.060	0.460	0.520	0.060
sect2_607	sect2_607	0.980	1.040	0.060	0.920	0.980	0.060	0.850	0.910	0.060	0.780	0.840	0.060	0.720	0.790	0.070	0.620	0.690	0.070	0.540	0.610	0.070
sect2_645	sect2_645	1.010	1.080	0.070	0.950	1.010	0.060	0.870	0.940	0.070	0.800	0.870	0.070	0.730	0.800	0.070	0.630	0.700	0.070	0.540	0.620	0.080
sect2_693	sect2_693	1.280	1.230	-0.050	1.170	1.130	-0.040	1.010	1.030	0.020	0.880	0.950	0.070	0.800	0.880	0.080	0.690	0.770	0.080	0.600	0.680	0.080
sect2_733	sect2_733	1.770	1.720	-0.050	1.660	1.610	-0.050	1.490	1.450	-0.040	1.340	1.310	-0.030	1.200	1.170	-0.030	0.960	0.980	0.020	0.790	0.880	0.090
sect2_777	sect2_777	2.790	2.740	-0.050	2.670	2.630	-0.040	2.500	2.460	-0.040	2.360	2.330	-0.030	2.200	2.180	-0.020	1.950	1.940	-0.010	1.730	1.730	
sect2_805	sect2_805	2.950	2.900	-0.050	2.840	2.790	-0.050	2.670	2.630	-0.040	2.520	2.490	-0.030	2.370	2.350	-0.020	2.110	2.100	-0.010	1.900	1.900	
		Eastern Tributary 3 of Bremer River																				
sect3_15	sect3_15	0.190	0.240	0.050	0.180	0.230	0.050	0.170	0.220	0.050	0.160	0.200	0.040	0.140	0.190	0.050	0.120	0.160	0.040	0.110	0.140	0.030
sect3_49	sect3_49	0.560	0.680	0.120	0.530	0.640	0.110	0.490	0.610	0.120	0.460	0.570	0.110	0.430	0.530	0.100	0.380	0.470	0.090	0.330	0.420	0.090
sect3_64	sect3_64	0.660	0.790	0.130	0.620	0.750	0.130	0.590	0.720	0.130	0.550	0.670	0.120	0.510	0.630	0.120	0.450	0.560	0.110	0.400	0.500	0.100
sect3_84	sect3_84	0.750	0.880	0.130	0.720	0.850	0.130	0.680	0.810	0.130	0.640	0.770	0.130	0.600	0.720	0.120	0.530	0.650	0.120	0.480	0.590	0.110
sect3_109	sect3_109	1.250	1.300	0.050	1.230	1.280	0.050	1.220	1.270	0.050	1.200	1.250	0.050	1.190	1.240	0.050	1.160	1.210	0.050	1.140	1.190	0.050
sect3_125	sect3_125	0.320	0.390	0.070	0.300	0.370	0.070	0.280	0.350	0.070	0.260	0.330	0.070	0.240	0.310	0.070	0.210	0.270	0.060	0.180	0.240	0.060
sect3_141	sect3_141	1.060	1.130	0.070	1.050	1.110	0.060	1.030	1.090	0.060	1.010	1.070	0.060	0.990	1.050	0.060	0.950	1.010	0.060	0.930	0.980	0.050
sect3_148	sect3_148	0.430	0.520	0.090	0.410	0.500	0.090	0.380	0.470	0.090	0.360	0.440	0.080	0.330	0.410	0.080	0.300	0.370	0.070	0.260	0.330	0.070
sect3_174	sect3_174	1.080	1.030	-0.050	0.970	0.920	-0.050	0.800	0.760	-0.040	0.660	0.630	-0.030	0.510	0.550	0.040	0.370	0.480	0.110	0.330	0.420	0.090

Pre-Development Case: EX06a
Post-Development Case: DE15a

SOBEK Cross-section		Peak Discharge (m^3/s)																				
Pre- ID	Post- ID	100 Year ARI			50 Year ARI			20 Year ARI			10 Year ARI			5 Year ARI			2 Year ARI			1 Year ARI		
		Ex	Dev	Impact	Ex	Dev	Impact	Ex	Dev	Impact	Ex	Dev	Impact	Ex	Dev	Impact	Ex	Dev	Impact	Ex	Dev	Impact
		Eastern Tributary 1 of Bremer River																				
sect1_259	sect1_259	20.44	20.44		17.60	17.60		13.97	13.97		11.42	11.42		9.10	9.10		6.29	6.29		4.44	4.44	
sect1_329	sect1_329	20.35	20.35		17.51	17.51		13.87	13.87		11.38	11.38		9.08	9.08		6.28	6.28		4.43	4.43	
sect1_409	sect1_409	20.22	20.22		17.26	17.26		13.67	13.67		11.28	11.28		9.07	9.06	-0.01	6.28	6.28		4.42	4.43	0.01
		Brisbane Road																				
sect1_468	sect1_468	20.21	20.20	-0.01	17.08	17.07	-0.01	13.64	13.64		11.28	11.28		9.06	9.06		6.28	6.28		4.43	4.43	
		Railway																				
sect1_517	sect1_517	20.20	20.20		17.06	17.06		13.64	13.64		11.27	11.27		9.06	9.06		6.28	6.27	-0.01	4.43	4.43	
sect1_581	sect1_581	20.19	20.19		17.05	17.05		13.64	13.64		11.27	11.27		9.06	9.06		6.28	6.28		4.43	4.43	
sect1_674	sect1_674	20.17	20.17		17.07	17.08	0.01	13.65	13.66	0.01	11.29	11.30	0.01	9.08	9.09	0.01	6.31	6.32	0.01	4.46	4.47	0.01
sect1_784	sect1_784	24.60	24.45	-0.15	20.68	20.53	-0.15	16.62	16.50	-0.12	14.10	14.10		11.49	11.54	0.05	8.10	8.17	0.07	5.83	5.94	0.11
sect1_897	sect1_897	24.57	24.41	-0.16	20.66	20.52	-0.14	16.61	16.49	-0.12	14.09	14.10	0.01	11.49	11.53	0.04	8.10	8.17	0.07	5.83	5.94	0.11
sect1_937	sect1_937	24.56	24.40	-0.16	20.66	20.52	-0.14	16.60	16.49	-0.11	14.09	14.10	0.01	11.49	11.53	0.04	8.10	8.17	0.07	5.83	5.94	0.11
		Hoepner Road																				
sect1_1045	sect1_1045	24.54	24.13	-0.41	20.65	20.40	-0.25	16.60	16.46	-0.14	14.09	14.08	-0.01	11.49	11.53	0.04	8.09	8.17	0.08	5.82	5.94	0.12
sect1_1142	XS CC	27.03	25.22	-1.81	23.09	21.89	-1.20	19.05	18.69	-0.36	16.49	16.21	-0.28	13.61	13.68	0.07	9.74	10.15	0.41	7.06	7.58	0.52
sect1_1271	XS BB	26.07	23.72	-2.35	21.68	20.30	-1.38	18.01	17.03	-0.98	15.65	14.96	-0.69	13.13	12.53	-0.60	9.46	9.21	-0.25	6.89	6.88	-0.01
USRail	USRail	26.03	23.60	-2.43	21.61	20.09	-1.52	17.94	16.90	-1.04	15.60	14.88	-0.72	13.10	12.46	-0.64	9.44	9.15	-0.29	6.87	6.83	-0.04
		Railway																				
sect1_1386	sect1_1386	26.00	23.59	-2.41	21.60	20.09	-1.51	17.93	16.89	-1.04	15.59	14.87	-0.72	13.10	12.45	-0.65	9.43	9.14	-0.29	6.86	6.82	-0.04
sect1_1443	sect1_1443	25.98	23.58	-2.40	21.60	20.09	-1.51	17.93	16.89	-1.04	15.59	14.87	-0.72	13.09	12.45	-0.64	9.42	9.14	-0.28	6.86	6.82	-0.04
sect1_1569	sect1_1569	57.89	57.08	-0.81	51.31	50.53	-0.78	42.77	42.17	-0.60	36.30	35.58	-0.72	30.16	29.62	-0.54	21.71	21.55	-0.16	15.81	15.95	0.14
sect1_1659	sect1_1659	57.05	56.01	-1.04	50.79	50.00	-0.79	42.49	41.91	-0.58	36.22	35.50	-0.72	30.10	29.60	-0.50	21.70	21.54	-0.16	15.79	15.95	0.16
sect1_1741	sect1_1741	56.67	55.40	-1.27	50.37	49.59	-0.78	42.27	41.66	-0.61	36.10	35.40	-0.70	29.99	29.55	-0.44	21.65	21.52	-0.13	15.75	15.92	0.17
		Railway																				
sect1_1789	sect1_1789	56.66	55.39	-1.27	50.36	49.58	-0.78	42.26	41.65	-0.61	36.08	35.39	-0.69	29.99	29.55	-0.44	21.64	21.51	-0.13	15.73	15.91	0.18
sect1_1851	sect1_1851	56.66	55.38	-1.28	50.35	49.57	-0.78	42.25	41.63	-0.62	36.06	35.38	-0.68	29.96	29.53	-0.43	21.61	21.50	-0.11	15.71	15.89	0.18
sect1_1927	sect1_1927	56.64	55.36	-1.28	50.32	49.54	-0.78	42.22	41.61	-0.61	36.03	35.35	-0.68	29.93	29.52	-0.41	21.58	21.47	-0.11	15.68	15.87	0.19
sect1_1996	sect1_1996	56.63	55.34	-1.29	50.30	49.52	-0.78	42.19	41.58	-0.61	36.00	35.33	-0.67	29.91	29.49	-0.42	21.55	21.45	-0.10	15.66	15.85	0.19
sect1_2070	sect1_2070	56.62	55.33	-1.29	50.29	49.52	-0.77	42.18	41.57	-0.61	35.99	35.32	-0.67	29.90	29.48	-0.42	21.55	21.45	-0.10	15.65	15.85	0.20
sect1_2098	sect1_2098	56.62	55.33	-1.29	50.29	49.51	-0.78	42.18	41.57	-0.61	35.99	35.32	-0.67	29.90	29.48	-0.42	21.55	21.45	-0.10	15.65	15.85	0.20
sect1_2116	sect1_2116	56.62	55.33	-1.29	50.28	49.51	-0.77	42.18	41.57	-0.61	35.99	35.31	-0.68	29.90	29.48	-0.42	21.54	21.45	-0.09	15.65	15.84	0.19
sect1_2134	sect1_2134	56.62	55.32	-1.30	50.29	49.50	-0.79	42.17	41.56	-0.61	35.98	35.31	-0.67	29.89	29.48	-0.41	21.54	21.44	-0.10	15.65	15.84	0.19
sect1_2152	sect1_2152	56.62	55.32	-1.30	50.28	49.50	-0.78	42.16	41.55	-0.61	35.98	35.30	-0.68	29.88	29.47	-0.41	21.53	21.44	-0.09	15.64	15.83	0.19
sect1_2189	sect1_2189	56.62	55.32	-1.30	50.28	49.49	-0.79	42.16	41.54	-0.62	35.97	35.29	-0.68	29.88	29.46	-0.42	21.52	21.43	-0.09	15.63	15.82	0.19
sect1_2222	sect1_2222	56.62	55.32	-1.30	50.28	49.49	-0.79	42.17	41.54	-0.63	35.97	35.29	-0.68	29.88	29.46	-0.42	21.52	21.43	-0.09	15.63	15.83	0.20
sect1_2236	sect1_2236	56.64	55.34	-1.30	50.29	49.51	-0.78	42.18	41.55	-0.63	35.98	35.30	-0.68	29.89	29.47	-0.42	21.51	21.43	-0.08	15.63	15.83	0.20
sect1_2281	sect1_2281	67.35	66.75	-0.60	60.38	59.79	-0.59	50.38	49.88	-0.50	42.64	42.11	-0.53	35.36	35.14	-0.22	25.38	25.44	0.06	18.34	18.65	0.31
sect1_2348	sect1_2348	67.30	66.69	-0.61	60.35	59.74	-0.61	50.35	49.85	-0.50	42.62	42.08	-0.54	35.34	35.12	-0.22	25.36	25.42	0.06	18.32	18.64	0.32
sect1_2410	sect1_2410	67.24	66.62	-0.62	60.31	59.68	-0.63	50.32	49.80	-0.52	42.60	42.05	-0.55	35.33	35.10	-0.23	25.34	25.40	0.06	18.30	18.62	0.32
sect1_2422	sect1_2422	67.23	66.59	-0.64	60.30	59.67	-0.63	50.31	49.80	-0.51	42.59	42.05	-0.54	35.32	35.09	-0.23	25.34	25.40	0.06	18.29	18.62	0.33

Pre-Development Case: EX06a
Post-Development Case: DE15a

SOBEK Cross-section		Peak Discharge (m^3/s)																				
Pre- ID	Post- ID	100 Year ARI			50 Year ARI			20 Year ARI			10 Year ARI			5 Year ARI			2 Year ARI			1 Year ARI		
		Ex	Dev	Impact	Ex	Dev	Impact	Ex	Dev	Impact	Ex	Dev	Impact	Ex	Dev	Impact	Ex	Dev	Impact	Ex	Dev	Impact
sect1_2437	sect1_2437	67.21	66.58	-0.63	60.29	59.66	-0.63	50.31	49.79	-0.52	42.59	42.04	-0.55	35.31	35.09	-0.22	25.33	25.40	0.07	18.29	18.61	0.32
sect1_2459	sect1_2459	67.16	66.54	-0.62	60.26	59.63	-0.63	50.30	49.77	-0.53	42.58	42.04	-0.54	35.31	35.09	-0.22	25.33	25.40	0.07	18.28	18.61	0.33
sect1_2474	sect1_2474	67.06	66.44	-0.62	60.20	59.58	-0.62	50.28	49.75	-0.53	42.58	42.02	-0.56	35.30	35.08	-0.22	25.32	25.40	0.08	18.28	18.61	0.33
sect1_2507	sect1_2507	66.80	66.15	-0.65	60.02	59.39	-0.63	50.20	49.69	-0.51	42.55	42.00	-0.55	35.28	35.06	-0.22	25.30	25.39	0.09	18.26	18.61	0.35
sect1_2534	sect1_2534	66.47	65.67	-0.80	59.72	59.04	-0.68	50.08	49.52	-0.56	42.48	41.93	-0.55	35.23	35.03	-0.20	25.25	25.37	0.12	18.21	18.59	0.38
sect1_2576	sect1_2576	65.86	64.55	-1.31	58.99	58.03	-0.96	49.73	48.99	-0.74	42.34	41.71	-0.63	35.13	34.92	-0.21	25.16	25.32	0.16	18.13	18.57	0.44
sect1_2629	sect1_2629	65.38	63.57	-1.81	58.00	56.66	-1.34	49.18	48.24	-0.94	42.12	41.37	-0.75	35.04	34.76	-0.28	25.10	25.25	0.15	18.07	18.53	0.46
sect1_2687	sect1_2687	65.23	63.17	-2.06	57.39	55.86	-1.53	48.55	47.40	-1.15	41.84	40.87	-0.97	34.94	34.48	-0.46	25.06	25.09	0.03	18.05	18.44	0.39
sect1_2725	sect1_2725	66.65	64.72	-1.93	58.73	57.19	-1.54	49.63	48.52	-1.11	42.80	41.92	-0.88	35.84	35.45	-0.39	25.71	25.79	0.08	18.49	18.94	0.45
		Warrego Highway																				
sect1_2804	sect1_2804	66.60	64.68	-1.92	58.69	57.16	-1.53	49.61	48.51	-1.10	42.79	41.91	-0.88	35.82	35.44	-0.38	25.71	25.79	0.08	18.47	18.93	0.46
sect1_2871	sect1_2871	66.59	64.67	-1.92	58.68	57.15	-1.53	49.61	48.50	-1.11	42.77	41.90	-0.87	35.81	35.43	-0.38	25.69	25.78	0.09	18.47	18.93	0.46
sect1_2958	sect1_2958	66.56	64.64	-1.92	58.65	57.13	-1.52	49.58	48.48	-1.10	42.74	41.88	-0.86	35.78	35.40	-0.38	25.66	25.76	0.10	18.43	18.91	0.48
sect1_3014	sect1_3014	66.49	64.59	-1.90	58.60	57.10	-1.50	49.52	48.44	-1.08	42.67	41.83	-0.84	35.70	35.34	-0.36	25.62	25.72	0.10	18.40	18.88	0.48
sect1_3092	sect1_3092	66.34	64.54	-1.80	58.48	57.09	-1.39	49.38	48.39	-0.99	42.50	41.74	-0.76	35.52	35.22	-0.30	25.48	25.61	0.13	18.30	18.81	0.51
sect1_3164	sect1_3164	66.25	64.59	-1.66	58.40	57.15	-1.25	49.29	48.43	-0.86	42.39	41.77	-0.62	35.38	35.21	-0.17	25.34	25.59	0.25	18.20	18.78	0.58
sect1_3220	sect1_3220	66.22	64.67	-1.55	58.37	57.23	-1.14	49.26	48.51	-0.75	42.36	41.83	-0.53	35.35	35.27	-0.08	25.31	25.62	0.31	18.17	18.79	0.62
sect1_3269	sect1_3269	66.18	69.28	3.10	58.35	61.50	3.15	49.24	52.20	2.96	42.34	45.02	2.68	35.34	37.99	2.65	25.30	27.53	2.23	18.16	20.09	1.93
sect1_3336	sect1_3336	66.15	69.22	3.07	58.33	61.44	3.11	49.21	52.15	2.94	42.30	44.97	2.67	35.30	37.94	2.64	25.26	27.49	2.23	18.13	20.06	1.93
sect1_3417	sect1_3417	66.14	69.16	3.02	58.31	61.38	3.07	49.18	52.09	2.91	42.26	44.91	2.65	35.26	37.88	2.62	25.22	27.45	2.23	18.09	20.02	1.93
sect1_3475	sect1_3475	66.15	69.13	2.98	58.32	61.36	3.04	49.18	52.07	2.89	42.27	44.89	2.62	35.26	37.85	2.59	25.21	27.43	2.22	18.07	20.01	1.94
sect1_3517	sect1_3517	66.20	69.12	2.92	58.37	61.35	2.98	49.22	52.04	2.82	42.29	44.86	2.57	35.27	37.83	2.56	25.21	27.40	2.19	18.07	19.99	1.92
sect1_3592	sect1_3592	75.52	69.09	-6.43	66.99	61.32	-5.67	56.43	52.01	-4.42	48.22	44.83	-3.39	40.26	37.79	-2.47	28.89	27.37	-1.52	20.85	19.97	-0.88
sect1_3633	sect1_3633	75.50	69.09	-6.41	66.95	61.32	-5.63	56.41	52.01	-4.40	48.21	44.82	-3.39	40.24	37.77	-2.47	28.87	27.37	-1.50	20.83	19.96	-0.87
sect1_3676	sect1_3676	75.47	70.59	-4.88	66.92	62.78	-4.14	56.40	53.18	-3.22	48.18	45.81	-2.37	40.21	38.61	-1.60	28.85	27.96	-0.89	20.82	20.40	-0.42
sect1_3733	sect1_3733	75.44	70.57	-4.87	66.89	62.75	-4.14	56.38	53.15	-3.23	48.17	45.78	-2.39	40.19	38.59	-1.60	28.85	27.94	-0.91	20.82	20.39	-0.43
sect1_4132	sect1_4132	74.79	70.05	-4.74	66.28	62.30	-3.98	55.96	52.72	-3.24	47.81	45.37	-2.44	39.81	38.12	-1.69	28.52	27.55	-0.97	20.56	20.18	-0.38
sect1_4180	sect1_4180	74.76	70.02	-4.74	66.25	62.28	-3.97	55.94	52.69	-3.25	47.78	45.35	-2.43	39.78	38.09	-1.69	28.49	27.52	-0.97	20.54	20.16	-0.38
sect1_4257	sect1_4257	74.72	70.01	-4.71	66.22	62.27	-3.95	55.92	52.68	-3.24	47.76	45.33	-2.43	39.75	38.07	-1.68	28.46	27.50	-0.96	20.52	20.15	-0.37
sect1_4302	sect1_4302	74.71	70.02	-4.69	66.21	62.28	-3.93	55.90	52.68	-3.22	47.75	45.33	-2.42	39.74	38.06	-1.68	28.46	27.49	-0.97	20.51	20.15	-0.36
sect1_4353	sect1_4353	74.69	71.90	-2.79	66.20	64.22	-1.98	55.89	54.45	-1.44	47.73	46.68	-1.05	39.73	39.18	-0.55	28.44	28.42	-0.02	20.50	20.81	0.31
sect1_4420	sect1_4420	74.67	71.89	-2.78	66.18	64.21	-1.97	55.86	54.42	-1.44	47.71	46.66	-1.05	39.70	39.16	-0.54	28.42	28.39	-0.03	20.48	20.79	0.31
sect1_4508	sect1_4508	74.64	71.87	-2.77	66.16	64.19	-1.97	55.85	54.41	-1.44	47.69	46.64	-1.05	39.69	39.15	-0.54	28.41	28.38	-0.03	20.47	20.78	0.31
sect1_4650	sect1_4650	74.60	71.84	-2.76	66.13	64.17	-1.96	55.82	54.38	-1.44	47.66	46.62	-1.04	39.67	39.13	-0.54	28.39	28.37	-0.02	20.46	20.77	0.31
sect1_4744	sect1_4744	74.56	71.80	-2.76	66.11	64.14	-1.97	55.79	54.34	-1.45	47.63	46.58	-1.05	39.64	39.09	-0.55	28.37	28.34	-0.03	20.44	20.74	0.30
sect1_4789	sect1_4789	74.56	71.80	-2.76	66.11	64.13	-1.98	55.78	54.34	-1.44	47.63	46.58	-1.05	39.63	39.09	-0.54	28.36	28.33	-0.03	20.43	20.73	0.30
sect1_4845	sect1_4845	75.19	71.79	-3.40	66.95	64.13	-2.82	56.45	54.33	-2.12	48.19	46.56	-1.63	40.08	39.08	-1.00	28.66	28.32	-0.34	20.61	20.73	0.12
sect1_4899	sect1_4899	75.20	71.79	-3.41	66.95	64.13	-2.82	56.45	54.33	-2.12	48.18	46.56	-1.62	40.08	39.07	-1.01	28.66	28.32	-0.34	20.60	20.72	0.12
sect1_4966	sect1_4966	75.21	71.81	-3.40	66.96	64.14	-2.82	56.45	54.33	-2.12	48.18	46.56	-1.62	40.07	39.07	-1.00	28.64	28.31	-0.33	20.60	20.71	0.11
sect1_5014	sect1_5014	75.23	71.84	-3.39	66.98	64.17	-2.81	56.46	54.34	-2.12	48.19	46.57	-1.62	40.08	39.07	-1.01	28.64	28.31	-0.33	20.59	20.71	0.12
sect1_5063	sect1_5063	75.28	71.90	-3.38	67.02	64.22	-2.80	56.49	54.37	-2.12	48.20	46.59	-1.61	40.09	39.09	-1.00	28.65	28.32	-0.33	20.60	20.72	0.12

Pre-Development Case: EX06a
Post-Development Case: DE15a

SOBEK Cross-section		Peak Discharge (m^3/s)																			
Pre- ID	Post- ID	100 Year ARI			50 Year ARI			20 Year ARI			10 Year ARI			5 Year ARI			2 Year ARI			1 Year ARI		
		Ex	Dev	Impact	Ex	Dev	Impact	Ex	Dev	Impact	Ex	Dev	Impact	Ex	Dev	Impact	Ex	Dev	Impact	Ex	Dev	Impact
sect1_5118	sect1_5118	83.77	79.59	-4.18	74.77	71.26	-3.51	62.59	59.83	-2.76	53.38	51.23	-2.15	44.44	43.00	-1.44	31.73	31.14	-0.59	22.71	22.69	-0.02
sect1_5136	sect1_5136	83.77	79.60	-4.17	74.77	71.26	-3.51	62.60	59.83	-2.77	53.39	51.24	-2.15	44.44	43.00	-1.44	31.73	31.14	-0.59	22.71	22.69	-0.02
sect1_5169	sect1_5169	83.77	79.60	-4.17	74.77	71.26	-3.51	62.60	59.83	-2.77	53.39	51.24	-2.15	44.44	43.00	-1.44	31.73	31.14	-0.59	22.71	22.69	-0.02
		Eastern Tributary 2 of Bremer River																				
sect2_13	sect2_13	16.93	19.54	2.61	14.71	17.13	2.42	12.23	15.30	3.07	10.15	12.97	2.82	8.33	11.11	2.78	5.94	8.38	2.44	4.33	6.39	2.06
sect2_84	sect2_84	16.77	19.05	2.28	14.57	16.71	2.14	12.10	14.62	2.52	10.04	12.37	2.33	8.27	10.58	2.31	5.91	7.99	2.08	4.32	6.09	1.77
sect2_123	sect2_123	16.74	18.97	2.23	14.55	16.62	2.07	12.08	14.50	2.42	10.03	12.30	2.27	8.27	10.53	2.26	5.91	7.92	2.01	4.31	6.02	1.71
sect2_173	sect2_173	16.74	18.89	2.15	14.54	16.56	2.02	12.07	14.36	2.29	10.03	12.16	2.13	8.26	10.42	2.16	5.90	7.85	1.95	4.31	5.97	1.66
sect2_238	sect2_238	16.72	18.79	2.07	14.53	16.49	1.96	12.07	14.32	2.25	10.02	12.13	2.11	8.26	10.36	2.10	5.90	7.79	1.89	4.31	5.93	1.62
sect2_301	sect2_301	16.70	18.75	2.05	14.52	16.42	1.90	12.06	14.21	2.15	10.01	12.05	2.04	8.25	10.31	2.06	5.90	7.73	1.83	4.31	5.86	1.55
sect2_369	sect2_369	16.69	18.69	2.00	14.51	16.37	1.86	12.05	14.08	2.03	10.00	11.95	1.95	8.24	10.23	1.99	5.89	7.67	1.78	4.31	5.81	1.50
sect2_415	sect2_415	21.42	18.65	-2.77	18.62	16.36	-2.26	15.45	14.11	-1.34	12.84	11.94	-0.90	10.59	10.18	-0.41	7.58	7.68	0.10	5.52	5.81	0.29
sect2_469	sect2_469	21.39	24.28	2.89	18.61	21.28	2.67	15.44	18.20	2.76	12.83	15.33	2.50	10.58	13.09	2.51	7.57	9.72	2.15	5.51	7.40	1.89
sect2_514	sect2_514	21.40	24.23	2.83	18.61	21.23	2.62	15.43	18.19	2.76	12.83	15.34	2.51	10.58	13.07	2.49	7.57	9.71	2.14	5.51	7.39	1.88
sect2_556	sect2_556	21.39	24.23	2.84	18.60	21.24	2.64	15.43	18.18	2.75	12.82	15.30	2.48	10.58	13.05	2.47	7.56	9.70	2.14	5.51	7.38	1.87
sect2_607	sect2_607	21.37	24.22	2.85	18.60	21.23	2.63	15.43	18.16	2.73	12.82	15.29	2.47	10.58	13.05	2.47	7.56	9.68	2.12	5.50	7.38	1.88
sect2_645	sect2_645	21.37	24.20	2.83	18.59	21.20	2.61	15.42	18.12	2.70	12.82	15.30	2.48	10.58	13.04	2.46	7.56	9.68	2.12	5.50	7.37	1.87
sect2_693	sect2_693	21.26	24.03	2.77	18.50	21.10	2.60	15.37	18.09	2.72	12.78	15.24	2.46	10.55	12.99	2.44	7.55	9.65	2.10	5.49	7.35	1.86
sect2_733	sect2_733	21.09	23.91	2.82	18.37	20.99	2.62	15.28	18.00	2.72	12.72	15.16	2.44	10.53	12.96	2.43	7.54	9.62	2.08	5.49	7.33	1.84
sect2_777	sect2_777	23.02	27.52	4.50	20.03	24.15	4.12	16.75	20.68	3.93	14.04	17.41	3.37	11.72	14.87	3.15	8.43	11.02	2.59	6.14	8.35	2.21
sect2_805	sect2_805	22.60	27.18	4.58	19.62	23.84	4.22	16.45	20.43	3.98	13.86	17.23	3.37	11.60	14.71	3.11	8.38	10.91	2.53	6.10	8.28	2.18
		Eastern Tributary 3 of Bremer River																				
sect3_15	sect3_15	3.24	5.39	2.15	2.82	4.73	1.91	2.37	4.19	1.82	1.97	3.52	1.55	1.60	2.92	1.32	1.14	2.13	0.99	0.81	1.56	0.75
sect3_49	sect3_49	3.22	5.33	2.11	2.81	4.68	1.87	2.37	4.13	1.76	1.97	3.47	1.50	1.61	2.87	1.26	1.14	2.09	0.95	0.82	1.53	0.71
sect3_64	sect3_64	3.24	5.29	2.05	2.82	4.64	1.82	2.37	4.10	1.73	1.98	3.44	1.46	1.62	2.85	1.23	1.14	2.09	0.95	0.81	1.53	0.72
sect3_84	sect3_84	3.24	5.29	2.05	2.83	4.65	1.82	2.38	4.11	1.73	1.98	3.46	1.48	1.61	2.88	1.27	1.13	2.11	0.98	0.81	1.55	0.74
sect3_109	sect3_109	3.24	5.32	2.08	2.82	4.68	1.86	2.38	4.13	1.75	1.97	3.48	1.51	1.60	2.89	1.29	1.13	2.12	0.99	0.81	1.55	0.74
sect3_125	sect3_125	3.24	5.34	2.10	2.82	4.69	1.87	2.37	4.15	1.78	1.96	3.50	1.54	1.60	2.90	1.30	1.13	2.12	0.99	0.81	1.54	0.73
sect3_141	sect3_141	3.23	5.35	2.12	2.81	4.70	1.89	2.36	4.15	1.79	1.95	3.50	1.55	1.61	2.89	1.28	1.13	2.10	0.97	0.80	1.53	0.73
sect3_148	sect3_148	3.21	5.35	2.14	2.79	4.70	1.91	2.35	4.15	1.80	1.96	3.49	1.53	1.61	2.88	1.27	1.13	2.09	0.96	0.80	1.51	0.71
sect3_174	sect3_174	3.19	5.32	2.13	2.79	4.66	1.87	2.35	4.12	1.77	1.96	3.46	1.50	1.61	2.86	1.25	1.12	2.06	0.94	0.80	1.52	0.72

Pre-Development Case: EX06a
Post-Development Case: DE15a

SOBEK Cross-section		Peak Velocity (m/s)																				
Pre- ID	Post- ID	100 Year ARI			50 Year ARI			20 Year ARI			10 Year ARI			5 Year ARI			2 Year ARI			1 Year ARI		
		Ex	Dev	Impact	Ex	Dev	Impact	Ex	Dev	Impact	Ex	Dev	Impact	Ex	Dev	Impact	Ex	Dev	Impact	Ex	Dev	Impact
		Eastern Tributary 1 of Bremer River																				
sect1_259	sect1_259	2.05	2.05		1.99	1.99		1.90	1.90		1.82	1.82		1.74	1.74		1.58	1.58		1.47	1.47	
sect1_329	sect1_329	1.72	1.72		1.71	1.71		1.70	1.70		1.66	1.66		1.60	1.60		1.50	1.50		1.37	1.37	
sect1_409	sect1_409	2.01	2.01		2.02	2.02		2.01	2.01		2.01	2.01		2.01	2.01		2.01	2.01		2.01	2.01	
		Brisbane Road																				
sect1_468	sect1_468	1.87	1.87		1.86	1.86		1.86	1.86		1.86	1.86		1.86	1.86		1.85	1.85		1.82	1.82	
		Railway																				
sect1_517	sect1_517	1.31	1.31		1.27	1.27		1.22	1.22		1.17	1.17		1.11	1.11		1.02	1.02		0.94	0.94	
sect1_581	sect1_581	1.39	1.39		1.34	1.34		1.28	1.28		1.26	1.26		1.24	1.24		1.23	1.23		1.22	1.22	
sect1_674	sect1_674	0.59	0.59		0.54	0.54		0.48	0.48		0.42	0.43	0.01	0.37	0.38	0.01	0.31	0.31		0.27	0.27	
sect1_784	sect1_784	1.36	1.36		1.35	1.35		1.35	1.35		1.34	1.34		1.34	1.34		1.33	1.33		1.21	1.22	0.01
sect1_897	sect1_897	1.89	1.90	0.01	1.84	1.85	0.01	1.76	1.77	0.01	1.69	1.71	0.02	1.60	1.62	0.02	1.45	1.47	0.02	1.31	1.33	0.02
sect1_937	sect1_937	1.26	1.29	0.03	1.21	1.27	0.06	1.15	1.23	0.08	1.09	1.20	0.11	1.02	1.15	0.13	0.89	1.07	0.18	0.77	0.98	0.21
		Hoepner Road																				
sect1_1045	sect1_1045	1.37	1.16	-0.21	1.31	1.14	-0.17	1.24	1.12	-0.12	1.18	1.08	-0.10	1.11	1.03	-0.08	1.00	0.93	-0.07	0.90	0.83	-0.07
sect1_1142	XS CC	0.48	0.38	-0.10	0.46	0.38	-0.08	0.44	0.37	-0.07	0.41	0.36	-0.05	0.40	0.35	-0.05	0.36	0.34	-0.02	0.32	0.33	0.01
sect1_1271	XS BB	0.68	0.38	-0.30	0.66	0.38	-0.28	0.65	0.37	-0.28	0.63	0.36	-0.27	0.61	0.35	-0.26	0.58	0.34	-0.24	0.55	0.33	-0.22
USRail	USRail	1.09	0.70	-0.39	1.10	0.68	-0.42	1.10	0.65	-0.45	1.10	0.62	-0.48	1.09	0.59	-0.50	1.10	0.54	-0.56	1.11	0.50	-0.61
		Railway																				
sect1_1386	sect1_1386	0.96	0.93	-0.03	0.91	0.89	-0.02	0.85	0.84	-0.01	0.82	0.81	-0.01	0.78	0.77	-0.01	0.70	0.70		0.64	0.64	
sect1_1443	sect1_1443	0.91	0.89	-0.02	0.87	0.85	-0.02	0.83	0.81	-0.02	0.80	0.78	-0.02	0.76	0.75	-0.01	0.70	0.69	-0.01	0.64	0.64	
sect1_1569	sect1_1569	1.94	1.94		1.92	1.91	-0.01	1.88	1.88		1.83	1.82	-0.01	1.76	1.76		1.64	1.64		**1.52**	**1.53**	0.01
sect1_1659	sect1_1659	1.35	1.36	0.01	1.35	1.35		1.33	1.34	0.01	1.30	1.31	0.01	1.27	1.27		1.22	1.22		1.16	1.16	
sect1_1741	sect1_1741	1.24	1.30	0.06	1.12	1.11	-0.01	1.11	1.10	-0.01	1.17	1.14	-0.03	1.01	0.99	-0.02	1.05	1.04	-0.01	0.95	0.93	-0.02
		Railway																				
sect1_1789	sect1_1789	1.94	1.93	-0.01	1.86	1.84	-0.02	1.73	1.72	-0.01	1.63	1.62	-0.01	1.52	1.51	-0.01	1.34	1.34		1.19	1.20	0.01
sect1_1851	sect1_1851	1.41	1.40	-0.01	1.36	1.35	-0.01	1.29	1.28	-0.01	1.23	1.22	-0.01	1.17	1.16	-0.01	1.07	1.07		0.99	0.99	
sect1_1927	sect1_1927	1.32	1.31	-0.01	1.29	1.28	-0.01	1.22	1.21	-0.01	1.17	1.16	-0.01	1.11	1.11		1.04	1.04		0.99	0.99	
sect1_1996	sect1_1996	1.35	1.35		1.33	1.34	0.01	1.33	1.33		1.32	1.32		1.32	1.31	-0.01	1.27	1.27		1.17	1.17	
sect1_2070	sect1_2070	2.55	2.53	-0.02	2.53	2.51	-0.02	2.42	2.40	-0.02	2.31	2.29	-0.02	2.18	2.17	-0.01	1.95	1.95		**1.75**	**1.76**	0.01
sect1_2098	sect1_2098	1.63	1.59	-0.04	1.57	1.53	-0.04	1.45	1.42	-0.03	1.36	1.33	-0.03	1.25	1.23	-0.02	1.07	1.06	-0.01	0.91	0.91	
sect1_2116	sect1_2116	1.86	1.77	-0.09	1.85	1.76	-0.09	1.78	1.72	-0.06	1.70	1.66	-0.04	1.62	1.60	-0.02	1.48	1.47	-0.01	1.35	1.35	
sect1_2134	sect1_2134	1.66	1.52	-0.14	1.61	1.48	-0.13	1.53	1.43	-0.10	1.47	1.39	-0.08	1.40	1.35	-0.05	1.31	1.28	-0.03	1.24	1.22	-0.02
sect1_2152	sect1_2152	1.09	0.98	-0.11	1.04	0.94	-0.10	0.97	0.88	-0.09	0.91	0.84	-0.07	0.84	0.80	-0.04	0.75	0.72	-0.03	0.67	0.66	-0.01
sect1_2189	sect1_2189	1.39	1.17	-0.22	1.34	1.14	-0.20	1.28	1.11	-0.17	1.23	1.09	-0.14	1.16	1.07	-0.09	1.06	1.00	-0.06	0.97	0.93	-0.04
sect1_2222	sect1_2222	2.52	2.60	0.08	2.43	2.50	0.07	2.30	2.35	0.05	2.18	2.22	0.04	2.05	2.09	0.04	1.82	1.86	0.04	**1.63**	**1.66**	0.03
sect1_2236	sect1_2236	1.50	1.49	-0.01	1.43	1.43		1.34	1.34		1.27	1.26	-0.01	1.19	1.19		1.06	1.06		0.95	0.96	0.01
sect1_2281	sect1_2281	1.02	1.02		0.97	0.96	-0.01	0.88	0.88		0.81	0.81		0.74	0.74		0.62	0.62		0.53	0.53	
sect1_2348	sect1_2348	1.24	1.24		1.21	1.21		1.16	1.16		1.12	1.12		1.07	1.07		0.97	0.98	0.01	0.88	0.88	
sect1_2410	sect1_2410	0.77	0.77		0.73	0.73		0.66	0.66		0.61	0.60	-0.01	0.54	0.54		0.45	0.45		0.36	0.37	0.01
sect1_2422	sect1_2422	0.90	0.90		0.87	0.87		0.82	0.82		0.77	0.77		0.72	0.72		0.64	0.65	0.01	0.58	0.58	

Pre-Development Case: EX06a
Post-Development Case: DE15a

SOBEK Cross-section		Peak Velocity (m/s)																			
Pre- ID	Post- ID	100 Year ARI			50 Year ARI			20 Year ARI			10 Year ARI			5 Year ARI			2 Year ARI			1 Year ARI		
		Ex	Dev	Impact	Ex	Dev	Impact	Ex	Dev	Impact	Ex	Dev	Impact	Ex	Dev	Impact	Ex	Dev	Impact	Ex	Dev	Impact
sect1_2437	sect1_2437	1.37	1.37		1.32	1.32		1.23	1.23		1.15	1.15		1.07	1.07		0.94	0.94		0.82	0.83	0.01
sect1_2459	sect1_2459	1.31	1.33	0.02	1.28	1.29	0.01	1.22	1.24	0.02	1.17	1.18	0.01	1.11	1.12	0.01	1.01	1.02	0.01	0.92	0.93	0.01
sect1_2474	sect1_2474	1.29	1.32	0.03	1.26	1.29	0.03	1.20	1.22	0.02	1.13	1.16	0.03	1.07	1.09	0.02	0.96	0.98	0.02	0.86	0.88	0.02
sect1_2507	sect1_2507	1.32	1.42	0.10	1.29	1.39	0.10	1.24	1.35	0.11	1.19	1.30	0.11	1.14	1.25	0.11	1.05	1.15	0.10	0.98	1.07	0.09
sect1_2534	sect1_2534	0.83	0.95	0.12	0.80	0.93	0.13	0.75	0.89	0.14	0.70	0.85	0.15	0.65	0.80	0.15	0.57	0.72	0.15	0.50	0.65	0.15
sect1_2576	sect1_2576	0.64	0.80	0.16	0.62	0.79	0.17	0.59	0.77	0.18	0.55	0.74	0.19	0.51	0.72	0.21	0.44	0.67	0.23	0.38	0.61	0.23
sect1_2629	sect1_2629	0.78	1.04	0.26	0.77	1.03	0.26	0.76	1.01	0.25	0.74	0.99	0.25	0.73	0.97	0.24	0.69	0.93	0.24	0.63	0.88	0.25
sect1_2687	sect1_2687	1.09	0.43	-0.66	1.09	0.43	-0.66	1.09	0.44	-0.65	1.08	0.45	-0.63	1.08	0.45	-0.63	1.07	0.44	-0.63	1.07	0.44	-0.63
sect1_2725	sect1_2725	0.95	0.90	-0.05	0.96	0.90	-0.06	0.95	0.89	-0.06	0.94	0.89	-0.05	0.93	0.88	-0.05	0.92	0.87	-0.05	0.86	0.82	-0.04
		Warrego Highway																				
sect1_2804	sect1_2804	1.72	1.72		1.72	1.71	-0.01	1.71	1.71		1.70	1.70		1.70	1.70		1.61	1.61		1.43	1.44	0.01
sect1_2871	sect1_2871	1.97	1.95	-0.02	1.89	1.87	-0.02	1.79	1.78	-0.01	1.71	1.69	-0.02	1.61	1.61		1.45	1.45		1.31	1.32	0.01
sect1_2958	sect1_2958	1.22	1.21	-0.01	1.17	1.16	-0.01	1.11	1.09	-0.02	1.05	1.04	-0.01	0.99	0.99		0.90	0.90		0.82	0.83	0.01
sect1_3014	sect1_3014	1.03	1.01	-0.02	1.02	1.00	-0.02	1.01	0.99	-0.02	0.99	0.98	-0.01	0.97	0.96	-0.01	0.91	0.91		0.83	0.84	0.01
sect1_3092	sect1_3092	0.90	0.82	-0.08	0.89	0.82	-0.07	0.88	0.81	-0.07	0.87	0.81	-0.06	0.85	0.80	-0.05	0.81	0.78	-0.03	0.77	0.76	-0.01
sect1_3164	sect1_3164	0.78	0.75	-0.03	0.74	0.72	-0.02	0.70	0.68	-0.02	0.67	0.64	-0.03	0.64	0.62	-0.02	0.64	0.60	-0.04	0.63	0.60	-0.03
sect1_3220	sect1_3220	1.07	1.03	-0.04	1.07	1.02	-0.05	1.05	1.01	-0.04	1.04	0.99	-0.05	1.00	0.96	-0.04	0.96	0.92	-0.04	0.90	0.87	-0.03
sect1_3269	sect1_3269	1.72	1.72		1.72	1.71	-0.01	1.71	1.71		1.70	1.70		1.68	1.69	0.01	1.56	1.60	0.04	1.41	1.45	0.04
sect1_3336	sect1_3336	1.04	1.06	0.02	1.02	1.04	0.02	1.01	1.02	0.01	0.98	1.00	0.02	0.92	0.95	0.03	0.83	0.85	0.02	0.76	0.78	0.02
sect1_3417	sect1_3417	1.10	1.13	0.03	1.06	1.09	0.03	1.01	1.04	0.03	0.97	1.00	0.03	0.93	0.95	0.02	0.85	0.87	0.02	0.77	0.80	0.03
sect1_3475	sect1_3475	1.34	1.39	0.05	1.31	1.35	0.04	1.26	1.30	0.04	1.21	1.26	0.05	1.15	1.19	0.04	1.05	1.09	0.04	0.96	0.99	0.03
sect1_3517	sect1_3517	1.13	1.19	0.06	1.10	1.16	0.06	1.06	1.13	0.07	1.03	1.10	0.07	1.01	1.07	0.06	0.99	1.05	0.06	0.99	1.04	0.05
sect1_3592	sect1_3592	1.24	1.21	-0.03	1.21	1.18	-0.03	1.17	1.16	-0.01	1.16	1.14	-0.02	1.15	1.13	-0.02	1.12	1.10	-0.02	1.04	1.02	-0.02
sect1_3633	sect1_3633	1.31	1.27	-0.04	1.28	1.25	-0.03	1.24	1.20	-0.04	1.20	1.17	-0.03	1.17	1.14	-0.03	1.16	1.13	-0.03	1.13	1.12	-0.01
sect1_3676	sect1_3676	1.27	1.25	-0.02	1.27	1.25	-0.02	1.27	1.25	-0.02	1.26	1.25	-0.01	1.25	1.24	-0.01	1.23	1.22	-0.01	1.11	1.10	-0.01
sect1_3733	sect1_3733	1.45	1.44	-0.01	1.43	1.43		1.42	1.42		1.41	1.41		1.39	1.38	-0.01	1.29	1.28	-0.01	1.19	1.19	
sect1_4132	sect1_4132	1.23	1.20	-0.03	1.18	1.16	-0.02	1.12	1.10	-0.02	1.07	1.05	-0.02	1.02	1.00	-0.02	0.94	0.93	-0.01	0.86	0.85	-0.01
sect1_4180	sect1_4180	1.15	1.13	-0.02	1.13	1.10	-0.03	1.08	1.06	-0.02	1.04	1.02	-0.02	0.99	0.97	-0.02	0.90	0.89	-0.01	0.82	0.82	
sect1_4257	sect1_4257	1.54	1.51	-0.03	1.50	1.46	-0.04	1.43	1.40	-0.03	1.37	1.34	-0.03	1.29	1.26	-0.03	1.15	1.13	-0.02	1.03	1.02	-0.01
sect1_4302	sect1_4302	1.68	1.64	-0.04	1.63	1.59	-0.04	1.56	1.52	-0.04	1.49	1.46	-0.03	1.41	1.38	-0.03	1.26	1.24	-0.02	1.13	1.11	-0.02
sect1_4353	sect1_4353	1.55	1.53	-0.02	1.50	1.49	-0.01	1.43	1.42	-0.01	1.37	1.36	-0.01	1.30	1.30		1.18	1.18		1.07	1.07	
sect1_4420	sect1_4420	1.25	1.24	-0.01	1.21	1.20	-0.01	1.17	1.16	-0.01	1.12	1.12		1.08	1.07	-0.01	1.00	1.00		0.93	0.93	
sect1_4508	sect1_4508	1.65	1.63	-0.02	1.60	1.59	-0.01	1.53	1.52	-0.01	1.48	1.47	-0.01	1.41	1.41		1.29	1.29		1.19	1.19	
sect1_4650	sect1_4650	1.69	1.69		1.68	1.68		1.67	1.67		1.65	1.65		1.61	1.61		1.52	1.52		1.43	1.44	0.01
sect1_4744	sect1_4744	1.40	1.39	-0.01	1.36	1.36		1.31	1.31		1.26	1.26		1.21	1.22	0.01	1.14	1.14		1.07	1.07	
sect1_4789	sect1_4789	1.72	1.71	-0.01	1.67	1.66	-0.01	1.59	1.58	-0.01	1.52	1.52		1.44	1.44		1.30	1.31	0.01	1.18	1.20	0.02
sect1_4845	sect1_4845	1.54	1.52	-0.02	1.49	1.48	-0.01	1.44	1.42	-0.02	1.38	1.37	-0.01	1.33	1.32	-0.01	1.18	1.18		1.05	1.05	
sect1_4899	sect1_4899	2.21	2.18	-0.03	2.14	2.11	-0.03	2.04	2.02	-0.02	1.96	1.94	-0.02	1.86	1.85	-0.01	1.69	1.68	-0.01	1.53	1.53	
sect1_4966	sect1_4966	1.59	1.57	-0.02	1.53	1.52	-0.01	1.46	1.45	-0.01	1.40	1.40		1.34	1.33	-0.01	1.24	1.24		1.16	1.17	0.01
sect1_5014	sect1_5014	1.30	1.28	-0.02	1.24	1.22	-0.02	1.16	1.14	-0.02	1.09	1.08	-0.01	1.01	1.00	-0.01	0.88	0.88		0.77	0.78	0.01
sect1_5063	sect1_5063	1.51	1.48	-0.03	1.44	1.42	-0.02	1.35	1.33	-0.02	1.27	1.26	-0.01	1.18	1.17	-0.01	1.02	1.02		0.88	0.89	0.01

Pre-Development Case: EX06a
Post-Development Case: DE15a

SOBEK Cross-section		Peak Velocity (m/s)																				
Pre- ID	Post- ID	100 Year ARI			50 Year ARI			20 Year ARI			10 Year ARI			5 Year ARI			2 Year ARI			1 Year ARI		
		Ex	Dev	Impact	Ex	Dev	Impact	Ex	Dev	Impact	Ex	Dev	Impact	Ex	Dev	Impact	Ex	Dev	Impact	Ex	Dev	Impact
sect1_5118	sect1_5118	1.75	1.71	-0.04	1.67	1.64	-0.03	1.57	1.53	-0.04	1.47	1.43	-0.04	1.34	1.31	-0.03	1.11	1.10	-0.01	0.92	0.92	
sect1_5136	sect1_5136	2.75	2.70	-0.05	2.66	2.61	-0.05	2.52	2.47	-0.05	2.40	2.35	-0.05	2.24	2.21	-0.03	1.98	1.96	-0.02	1.73	1.72	-0.01
sect1_5169	sect1_5169	3.95	3.79	-0.16	3.77	3.62	-0.15	3.50	3.36	-0.14	3.24	3.12	-0.12	2.92	2.83	-0.09	2.38	2.33	-0.05	1.89	1.89	
		Eastern Tributary 2 of Bremer River																				
sect2_13	sect2_13	0.71	0.73	0.02	0.69	0.71	0.02	0.66	0.69	0.03	0.63	0.67	0.04	0.61	0.65	0.04	0.55	0.61	0.06	0.51	0.57	0.06
sect2_84	sect2_84	0.93	0.96	0.03	0.90	0.94	0.04	0.87	0.91	0.04	0.83	0.88	0.05	0.79	0.85	0.06	0.73	0.79	0.06	0.68	0.74	0.06
sect2_123	sect2_123	0.84	0.87	0.03	0.80	0.84	0.04	0.75	0.80	0.05	0.71	0.76	0.05	0.66	0.72	0.06	0.59	0.65	0.06	0.52	0.59	0.07
sect2_173	sect2_173	1.16	1.20	0.04	1.12	1.16	0.04	1.06	1.12	0.06	1.01	1.06	0.05	0.95	1.02	0.07	0.86	0.94	0.08	0.78	0.86	0.08
sect2_238	sect2_238	1.43	1.46	0.03	1.39	1.43	0.04	1.35	1.39	0.04	1.30	1.35	0.05	1.26	1.32	0.06	1.17	1.25	0.08	1.08	1.17	0.09
sect2_301	sect2_301	1.10	1.15	0.05	1.05	1.10	0.05	0.98	1.05	0.07	0.92	0.99	0.07	0.86	0.94	0.08	0.77	0.85	0.08	0.68	0.77	0.09
sect2_369	sect2_369	1.24	1.29	0.05	1.20	1.26	0.06	1.15	1.22	0.07	1.10	1.17	0.07	1.06	1.13	0.07	0.97	1.06	0.09	0.89	0.98	0.09
sect2_415	sect2_415	1.41	1.27	-0.14	1.36	1.23	-0.13	1.30	1.20	-0.10	1.23	1.15	-0.08	1.18	1.10	-0.08	1.09	1.04	-0.05	1.00	0.97	-0.03
sect2_469	sect2_469	1.44	1.49	0.05	1.37	1.43	0.06	1.28	1.36	0.08	1.21	1.28	0.07	1.14	1.22	0.08	1.04	1.11	0.07	0.94	1.03	0.09
sect2_514	sect2_514	1.53	1.58	0.05	1.47	1.53	0.06	1.39	1.46	0.07	1.32	1.39	0.07	1.25	1.33	0.08	1.12	1.21	0.09	1.02	1.11	0.09
sect2_556	sect2_556	1.60	1.66	0.06	1.53	1.59	0.06	1.45	1.52	0.07	1.36	1.44	0.08	1.28	1.37	0.09	1.15	1.25	0.10	1.04	1.14	0.10
sect2_607	sect2_607	1.78	1.83	0.05	1.72	1.77	0.05	1.64	1.71	0.07	1.56	1.63	0.07	1.48	1.56	0.08	1.35	1.44	0.09	1.24	1.34	0.10
sect2_645	sect2_645	1.50	1.56	0.06	1.44	1.50	0.06	1.35	1.43	0.08	1.27	1.35	0.08	1.19	1.28	0.09	1.06	1.16	0.10	0.95	1.06	0.11
sect2_693	sect2_693	1.32	1.35	0.03	1.27	1.30	0.03	1.22	1.26	0.04	1.15	1.20	0.05	1.09	1.15	0.06	0.99	1.06	0.07	0.90	0.98	0.08
sect2_733	sect2_733	1.37	1.39	0.02	1.34	1.36	0.02	1.30	1.33	0.03	1.26	1.29	0.03	1.21	1.25	0.04	1.15	1.19	0.04	1.12	1.15	0.03
sect2_777	sect2_777	0.78	0.87	0.09	0.74	0.83	0.09	0.71	0.80	0.09	0.66	0.76	0.10	0.62	0.71	0.09	0.53	0.61	0.08	0.46	0.52	0.06
sect2_805	sect2_805	0.94	1.02	0.08	0.88	0.97	0.09	0.84	0.94	0.10	0.78	0.87	0.09	0.71	0.80	0.09	0.60	0.68	0.08	0.51	0.57	0.06
		Eastern Tributary 3 of Bremer River																				
sect3_15	sect3_15	0.97	1.10	0.13	0.93	1.07	0.14	0.89	1.04	0.15	0.84	0.99	0.15	0.79	0.94	0.15	0.71	0.86	0.15	0.63	0.78	0.15
sect3_49	sect3_49	1.43	1.59	0.16	1.40	1.55	0.15	1.35	1.51	0.16	1.30	1.46	0.16	1.25	1.40	0.15	1.16	1.32	0.16	1.08	1.23	0.15
sect3_64	sect3_64	1.60	1.80	0.20	1.55	1.74	0.19	1.49	1.70	0.21	1.42	1.63	0.21	1.34	1.55	0.21	1.23	1.44	0.21	1.13	1.32	0.19
sect3_84	sect3_84	1.34	1.59	0.25	1.27	1.52	0.25	1.20	1.45	0.25	1.12	1.37	0.25	1.04	1.28	0.24	0.92	1.15	0.23	0.84	1.03	0.19
sect3_109	sect3_109	0.32	0.49	0.17	0.28	0.44	0.16	0.24	0.39	0.15	0.20	0.34	0.14	0.17	0.29	0.12	0.12	0.22	0.10	0.09	0.16	0.07
sect3_125	sect3_125	1.38	1.59	0.21	1.33	1.53	0.20	1.28	1.48	0.20	1.23	1.41	0.18	1.18	1.34	0.16	1.09	1.25	0.16	1.00	1.17	0.17
sect3_141	sect3_141	0.33	0.50	0.17	0.29	0.45	0.16	0.25	0.41	0.16	0.22	0.35	0.13	0.18	0.30	0.12	0.14	0.23	0.09	0.10	0.18	0.08
sect3_148	sect3_148	1.44	1.60	0.16	1.40	1.56	0.16	1.35	1.52	0.17	1.30	1.47	0.17	1.24	1.41	0.17	1.14	1.32	0.18	1.05	1.22	0.17
sect3_174	sect3_174	1.81	2.03	0.22	1.76	1.99	0.23	1.73	1.92	0.19	1.66	1.86	0.20	1.59	1.79	0.20	1.46	1.69	0.23	1.36	1.58	0.22

Appendix N.2

Eastern Tributary Detailed SOBEK1D Results (Ultimate Development Scenario)

Ultimate Development Case: DU17a

SOBEK Cross-section	Peak Flood Levels (m AHD)						
Post- ID	100 Year ARI	50 Year ARI	20 Year ARI	10 Year ARI	5 Year ARI	2 Year ARI	1 Year ARI
	Dev	Dev	Dev	Dev	Dev	Dev	Dev
	Eastern Tributary 1 of Bremer River						
sect1_259	41.45	41.34	41.27	41.21	41.12	41.01	40.93
sect1_329	40.58	40.54	40.47	40.37	40.22	40.12	40.03
sect1_409	40.39	40.35	40.22	39.96	39.65	39.37	39.27
	Brisbane Road						
sect1_468	39.86	39.67	39.15	38.83	38.62	38.39	38.22
	Railway						
sect1_517	37.87	37.80	37.73	37.67	37.61	37.51	37.44
sect1_581	36.61	36.54	36.46	36.39	36.33	36.22	36.12
sect1_674	35.71	35.65	35.58	35.53	35.47	35.36	35.15
sect1_784	35.46	35.42	35.37	35.34	35.29	35.19	34.91
sect1_897	34.00	33.89	33.76	33.69	33.62	33.49	33.41
sect1_937	33.05	32.86	32.65	32.53	32.39	32.18	32.03
	Hoepner Road						
sect1_1045	31.43	31.30	31.18	31.12	31.06	30.98	30.92
XS CC	31.19	30.93	30.55	30.34	30.16	29.95	29.85
XS BB	31.17	30.91	30.52	30.29	30.08	29.78	29.59
USRail	31.17	30.90	30.51	30.27	30.07	29.76	29.56
	Railway						
sect1_1386	28.34	28.27	28.19	28.14	28.07	27.96	27.88
sect1_1443	28.03	27.96	27.88	27.82	27.75	27.64	27.56
sect1_1569	27.13	27.00	26.87	26.78	26.70	26.58	26.50
sect1_1659	26.68	26.31	25.84	25.53	25.28	24.95	24.75
sect1_1741	26.62	26.23	25.74	25.38	25.07	24.68	24.43
	Railway						
sect1_1789	25.17	25.05	24.88	24.73	24.59	24.36	24.19
sect1_1851	24.69	24.59	24.45	24.31	24.18	23.98	23.83
sect1_1927	24.28	24.20	24.06	23.93	23.78	23.53	23.36
sect1_1996	23.83	23.76	23.63	23.54	23.41	23.11	22.89
sect1_2070	23.09	23.01	22.72	22.60	22.47	22.29	22.15
sect1_2098	22.18	22.10	21.91	21.82	21.73	21.61	21.52
sect1_2116	22.10	22.03	21.86	21.77	21.68	21.56	21.48
sect1_2134	21.75	21.64	21.49	21.37	21.24	21.08	20.97
sect1_2152	21.62	21.51	21.36	21.22	21.06	20.86	20.72
sect1_2189	21.54	21.44	21.28	21.14	20.97	20.77	20.62
sect1_2222	20.91	20.81	20.70	20.61	20.51	20.36	20.24
sect1_2236	20.45	20.38	20.28	20.20	20.12	19.99	19.88
sect1_2281	20.16	20.09	19.99	19.90	19.81	19.66	19.54
sect1_2348	19.91	19.85	19.77	19.71	19.62	19.50	19.38
sect1_2410	19.45	19.39	19.31	19.23	19.16	19.06	18.98

Ultimate Development Case: DU17a

SOBEK Cross-section	Peak Flood Levels (m AHD)						
Post- ID	100 Year ARI	50 Year ARI	20 Year ARI	10 Year ARI	5 Year ARI	2 Year ARI	1 Year ARI
	Dev	Dev	Dev	Dev	Dev	Dev	Dev
sect1_2422	19.45	19.39	19.30	19.23	19.16	19.06	18.98
sect1_2437	19.36	19.29	19.20	19.13	19.06	18.96	18.88
sect1_2459	19.09	19.03	18.94	18.88	18.82	18.73	18.66
sect1_2474	18.91	18.83	18.73	18.65	18.58	18.48	18.40
sect1_2507	18.62	18.51	18.37	18.27	18.20	18.09	18.01
sect1_2534	18.44	18.30	18.06	17.90	17.80	17.66	17.57
sect1_2576	18.41	18.26	17.98	17.79	17.66	17.50	17.39
sect1_2629	18.35	18.18	17.87	17.61	17.43	17.21	17.06
sect1_2687	18.31	18.12	17.78	17.47	17.24	16.94	16.60
sect1_2725	18.30	18.12	17.78	17.47	17.23	16.93	16.56
	Warrego Highway						
sect1_2804	16.86	16.81	16.72	16.67	16.61	16.46	16.17
sect1_2871	15.94	15.84	15.70	15.60	15.50	15.32	15.19
sect1_2958	14.98	14.89	14.77	14.70	14.62	14.47	14.34
sect1_3014	14.66	14.58	14.49	14.42	14.34	14.18	14.01
sect1_3092	14.38	14.30	14.20	14.11	14.00	13.76	13.62
sect1_3164	14.22	14.14	14.04	13.96	13.85	13.53	13.35
sect1_3220	14.10	14.04	13.95	13.88	13.77	13.43	13.23
sect1_3269	13.82	13.75	13.65	13.58	13.48	13.12	12.93
sect1_3336	13.22	13.13	13.01	12.92	12.78	12.56	12.42
sect1_3417	12.93	12.83	12.72	12.62	12.49	12.30	12.17
sect1_3475	12.64	12.56	12.46	12.36	12.23	12.07	11.94
sect1_3517	12.33	12.25	12.15	12.06	11.95	11.79	11.67
sect1_3592	11.93	11.84	11.73	11.64	11.54	11.36	11.15
sect1_3633	11.70	11.60	11.48	11.39	11.29	11.10	10.90
sect1_3676	11.44	11.33	11.23	11.14	11.04	10.86	10.58
sect1_3733	11.16	11.00	10.88	10.78	10.64	10.39	10.24
sect1_4132	9.43	9.27	9.05	8.89	8.71	8.45	8.23
sect1_4180	9.25	9.11	8.92	8.75	8.56	8.30	8.09
sect1_4257	8.93	8.80	8.63	8.47	8.29	8.04	7.85
sect1_4302	8.61	8.49	8.33	8.19	8.03	7.79	7.62
sect1_4353	8.25	8.13	7.99	7.85	7.71	7.49	7.32
sect1_4420	7.92	7.80	7.65	7.51	7.36	7.14	6.98
sect1_4508	7.58	7.45	7.29	7.14	6.98	6.74	6.56
sect1_4650	6.70	6.57	6.39	6.24	6.01	5.78	5.59
sect1_4744	6.00	5.85	5.64	5.46	5.24	4.92	4.67
sect1_4789	5.87	5.72	5.52	5.33	5.12	4.78	4.53
sect1_4845	5.50	5.36	5.18	5.01	4.81	4.49	4.26
sect1_4899	5.16	5.03	4.86	4.69	4.50	4.23	4.02
sect1_4966	4.63	4.51	4.34	4.17	3.98	3.73	3.52

Ultimate Development Case: DU17a

SOBEK Cross-section	Peak Flood Levels (m AHD)						
Post- ID	100 Year ARI	50 Year ARI	20 Year ARI	10 Year ARI	5 Year ARI	2 Year ARI	1 Year ARI
	Dev	Dev	Dev	Dev	Dev	Dev	Dev
sect1_5014	4.46	4.35	4.17	4.00	3.80	3.54	3.32
sect1_5063	4.31	4.21	4.04	3.87	3.67	3.43	3.22
sect1_5118	4.04	3.96	3.80	3.63	3.48	3.26	3.08
sect1_5136	3.89	3.81	3.66	3.52	3.39	3.19	3.02
sect1_5169	2.97	2.91	2.80	2.71	2.63	2.52	2.44
	Eastern Tributary 2 of Bremer River						
sect2_13	13.10	13.06	13.04	13.00	12.97	12.92	12.86
sect2_84	12.49	12.45	12.40	12.35	12.30	12.22	12.15
sect2_123	12.13	12.08	12.03	11.98	11.93	11.84	11.76
sect2_173	11.80	11.76	11.71	11.67	11.63	11.57	11.51
sect2_238	10.62	10.56	10.51	10.45	10.39	10.30	10.21
sect2_301	9.47	9.40	9.32	9.25	9.18	9.07	8.98
sect2_369	8.89	8.83	8.77	8.70	8.65	8.55	8.47
sect2_415	8.28	8.21	8.13	8.05	7.98	7.85	7.74
sect2_469	7.61	7.54	7.46	7.38	7.31	7.19	7.09
sect2_514	6.97	6.91	6.84	6.77	6.71	6.61	6.52
sect2_556	6.14	6.09	6.02	5.96	5.90	5.80	5.73
sect2_607	5.37	5.31	5.24	5.16	5.10	5.00	4.92
sect2_645	4.87	4.80	4.72	4.65	4.58	4.47	4.39
sect2_693	4.17	4.09	3.98	3.89	3.82	3.71	3.62
sect2_733	4.16	4.07	3.91	3.74	3.57	3.41	3.32
sect2_777	4.16	4.07	3.90	3.74	3.55	3.32	3.13
sect2_805	4.16	4.07	3.90	3.74	3.55	3.32	3.13
	Eastern Tributary 3 of Bremer River						
sect3_15	11.27	11.25	11.24	11.22	11.21	11.18	11.16
sect3_49	9.13	9.10	9.07	9.03	8.99	8.93	8.87
sect3_64	8.31	8.27	8.24	8.19	8.14	8.07	8.01
sect3_84	7.34	7.30	7.27	7.22	7.17	7.10	7.03
sect3_109	6.54	6.52	6.51	6.49	6.48	6.45	6.42
sect3_125	6.60	6.58	6.56	6.53	6.51	6.47	6.44
sect3_141	5.52	5.50	5.48	5.46	5.43	5.39	5.36
sect3_148	5.58	5.55	5.53	5.50	5.47	5.42	5.38
sect3_174	4.16	4.07	3.90	3.74	3.63	3.56	3.50

Ultimate Development Case: DU17a

SOBEK Cross-section	Peak Flood Depths (m)						
Post- ID	100 Year ARI	50 Year ARI	20 Year ARI	10 Year ARI	5 Year ARI	2 Year ARI	1 Year ARI
	Dev	Dev	Dev	Dev	Dev	Dev	Dev
	Eastern Tributary 1 of Bremer River						
sect1_259	1.19	1.08	1.01	0.95	0.86	0.75	0.67
sect1_329	1.21	1.17	1.10	1.00	0.85	0.74	0.66
sect1_409	1.39	1.35	1.22	0.96	0.65	0.37	0.27
	Brisbane Road						
sect1_468	2.16	1.97	1.45	1.13	0.92	0.69	0.52
	Railway						
sect1_517	1.02	0.95	0.89	0.82	0.76	0.66	0.59
sect1_581	1.58	1.51	1.43	1.36	1.30	1.19	1.09
sect1_674	1.71	1.65	1.58	1.53	1.47	1.36	1.15
sect1_784	1.46	1.42	1.37	1.34	1.29	1.19	0.91
sect1_897	1.00	0.89	0.76	0.69	0.62	0.49	0.41
sect1_937	1.65	1.46	1.25	1.13	0.99	0.78	0.63
	Hoepner Road						
sect1_1045	0.88	0.76	0.63	0.57	0.51	0.43	0.37
XS CC	1.84	1.58	1.20	0.99	0.81	0.60	0.50
XS BB	2.29	2.03	1.64	1.40	1.20	0.90	0.71
USRail	2.44	2.17	1.78	1.54	1.33	1.03	0.83
	Railway						
sect1_1386	1.07	1.00	0.93	0.87	0.81	0.70	0.62
sect1_1443	1.03	0.96	0.88	0.82	0.75	0.64	0.56
sect1_1569	1.53	1.39	1.26	1.17	1.10	0.98	0.89
sect1_1659	3.20	2.84	2.37	2.06	1.80	1.47	1.28
sect1_1741	3.62	3.23	2.74	2.38	2.07	1.68	1.43
	Railway						
sect1_1789	2.71	2.59	2.42	2.28	2.13	1.90	1.73
sect1_1851	2.23	2.13	1.99	1.85	1.72	1.51	1.37
sect1_1927	2.02	1.94	1.80	1.67	1.53	1.27	1.10
sect1_1996	2.75	2.68	2.55	2.46	2.33	2.03	1.81
sect1_2070	2.34	2.25	1.97	1.85	1.72	1.54	1.40
sect1_2098	1.52	1.44	1.25	1.16	1.07	0.95	0.86
sect1_2116	1.12	1.05	0.89	0.79	0.70	0.58	0.50
sect1_2134	1.83	1.72	1.57	1.45	1.32	1.16	1.04
sect1_2152	2.01	1.90	1.74	1.60	1.45	1.25	1.11
sect1_2189	2.13	2.03	1.87	1.73	1.56	1.36	1.21
sect1_2222	1.56	1.46	1.35	1.26	1.16	1.00	0.89
sect1_2236	1.19	1.13	1.03	0.95	0.86	0.73	0.63
sect1_2281	1.65	1.58	1.48	1.39	1.30	1.16	1.03
sect1_2348	1.37	1.32	1.24	1.17	1.09	0.96	0.85
sect1_2410	1.94	1.88	1.80	1.72	1.65	1.55	1.47
sect1_2422	1.03	0.97	0.89	0.82	0.75	0.65	0.57

Ultimate Development Case: DU17a

SOBEK Cross-section	Peak Flood Depths (m)						
Post- ID	100 Year ARI	50 Year ARI	20 Year ARI	10 Year ARI	5 Year ARI	2 Year ARI	1 Year ARI
	Dev	Dev	Dev	Dev	Dev	Dev	Dev
sect1_2437	1.15	1.09	1.00	0.92	0.85	0.75	0.67
sect1_2459	1.02	0.96	0.88	0.82	0.76	0.67	0.60
sect1_2474	1.03	0.95	0.84	0.77	0.70	0.59	0.51
sect1_2507	1.31	1.20	1.05	0.96	0.88	0.78	0.70
sect1_2534	1.58	1.43	1.20	1.04	0.93	0.80	0.70
sect1_2576	1.73	1.58	1.31	1.11	0.98	0.82	0.71
sect1_2629	1.85	1.68	1.37	1.11	0.93	0.71	0.56
sect1_2687	2.31	2.12	1.78	1.47	1.24	0.94	0.60
sect1_2725	3.25	3.07	2.73	2.42	2.18	1.88	1.51
	Warrego Highway						
sect1_2804	1.49	1.44	1.35	1.29	1.24	1.09	0.80
sect1_2871	1.95	1.86	1.71	1.61	1.51	1.33	1.20
sect1_2958	1.680	1.590	1.470	1.400	1.320	1.170	1.040
sect1_3014	1.590	1.520	1.420	1.360	1.270	1.110	0.950
sect1_3092	2.220	2.140	2.040	1.950	1.840	1.600	1.460
sect1_3164	2.110	2.030	1.930	1.850	1.740	1.420	1.240
sect1_3220	2.460	2.400	2.310	2.250	2.130	1.790	1.590
sect1_3269	2.580	2.520	2.420	2.350	2.250	1.890	1.700
sect1_3336	2.070	1.980	1.860	1.770	1.630	1.410	1.270
sect1_3417	2.530	2.430	2.320	2.220	2.090	1.900	1.770
sect1_3475	2.240	2.160	2.060	1.960	1.830	1.670	1.540
sect1_3517	1.930	1.850	1.750	1.660	1.550	1.390	1.270
sect1_3592	2.520	2.430	2.320	2.230	2.120	1.950	1.730
sect1_3633	2.380	2.280	2.160	2.070	1.970	1.780	1.580
sect1_3676	2.660	2.550	2.440	2.360	2.260	2.070	1.790
sect1_3733	2.360	2.200	2.080	1.980	1.840	1.590	1.440
sect1_4132	2.980	2.820	2.600	2.440	2.260	2.000	1.780
sect1_4180	2.980	2.840	2.650	2.480	2.290	2.030	1.820
sect1_4257	2.970	2.850	2.680	2.520	2.340	2.090	1.890
sect1_4302	2.810	2.690	2.540	2.390	2.230	2.000	1.820
sect1_4353	2.500	2.380	2.230	2.100	1.950	1.730	1.570
sect1_4420	2.200	2.080	1.930	1.790	1.640	1.420	1.260
sect1_4508	2.490	2.370	2.210	2.060	1.890	1.660	1.480
sect1_4650	3.040	2.910	2.730	2.580	2.350	2.120	1.930
sect1_4744	3.300	3.150	2.950	2.760	2.550	2.220	1.980
sect1_4789	3.710	3.560	3.360	3.180	2.960	2.620	2.380
sect1_4845	3.640	3.500	3.320	3.150	2.950	2.630	2.400
sect1_4899	3.300	3.170	3.000	2.830	2.640	2.370	2.160
sect1_4966	3.470	3.350	3.180	3.010	2.820	2.570	2.360
sect1_5014	3.530	3.420	3.240	3.070	2.870	2.610	2.390

Ultimate Development Case: DU17a

SOBEK Cross-section	Peak Flood Depths (m)						
Post- ID	100 Year ARI	50 Year ARI	20 Year ARI	10 Year ARI	5 Year ARI	2 Year ARI	1 Year ARI
	Dev	Dev	Dev	Dev	Dev	Dev	Dev
sect1_5063	3.380	3.280	3.110	2.940	2.740	2.500	2.290
sect1_5118	3.110	3.030	2.870	2.700	2.550	2.330	2.150
sect1_5136	2.520	2.440	2.290	2.160	2.020	1.820	1.660
sect1_5169	2.100	2.040	1.940	1.850	1.770	1.650	1.570
sect2_13	0.710	0.680	0.650	0.610	0.580	0.530	0.470
sect2_84	0.940	0.890	0.850	0.790	0.750	0.670	0.600
sect2_123	1.180	1.130	1.080	1.020	0.970	0.880	0.810
sect2_173	0.640	0.590	0.550	0.500	0.460	0.400	0.350
sect2_238	1.180	1.120	1.070	1.010	0.950	0.860	0.770
sect2_301	1.140	1.070	0.990	0.920	0.850	0.740	0.650
sect2_369	1.100	1.040	0.970	0.910	0.850	0.760	0.680
sect2_415	1.510	1.440	1.360	1.270	1.200	1.070	0.970
sect2_469	1.480	1.410	1.330	1.250	1.180	1.060	0.960
sect2_514	1.240	1.180	1.110	1.040	0.980	0.870	0.790
sect2_556	0.950	0.890	0.820	0.760	0.700	0.610	0.530
sect2_607	1.080	1.020	0.950	0.880	0.820	0.720	0.640
sect2_645	1.110	1.040	0.960	0.890	0.820	0.710	0.630
sect2_693	1.260	1.180	1.070	0.990	0.920	0.800	0.720
sect2_733	1.760	1.670	1.510	1.340	1.160	1.010	0.920
sect2_777	2.780	2.690	2.530	2.360	2.170	1.940	1.750
sect2_805	2.950	2.850	2.690	2.520	2.340	2.110	1.920
sect3_15	0.260	0.240	0.230	0.210	0.190	0.170	0.150
sect3_49	0.700	0.660	0.630	0.590	0.550	0.490	0.440
sect3_64	0.820	0.780	0.740	0.700	0.650	0.580	0.520
sect3_84	0.910	0.870	0.840	0.790	0.740	0.670	0.600
sect3_109	1.310	1.300	1.280	1.260	1.250	1.220	1.190
sect3_125	0.400	0.380	0.360	0.330	0.310	0.280	0.240
sect3_141	1.160	1.140	1.120	1.100	1.070	1.030	1.000
sect3_148	0.550	0.520	0.500	0.470	0.440	0.390	0.340
sect3_174	1.080	0.980	0.820	0.660	0.550	0.480	0.420

Ultimate Development Case: DU17a

SOBEK Cross-section	Peak Discharge (m^3/s)						
Post- ID	100 Year ARI	50 Year ARI	20 Year ARI	10 Year ARI	5 Year ARI	2 Year ARI	1 Year ARI
	Dev	Dev	Dev	Dev	Dev	Dev	Dev
	Eastern Tributary 1 of Bremer River						
sect1_259	20.42	17.59	13.97	11.42	9.09	6.29	4.44
sect1_329	20.33	17.49	13.86	11.34	9.08	6.28	4.43
sect1_409	20.21	17.27	13.63	11.25	9.06	6.28	4.43
	Brisbane Road						
sect1_468	20.19	17.09	13.60	11.25	9.06	6.28	4.43
	Railway						
sect1_517	20.19	17.07	13.60	11.25	9.06	6.28	4.43
sect1_581	20.18	17.07	13.59	11.25	9.06	6.27	4.43
sect1_674	20.13	17.08	13.60	11.27	9.08	6.29	4.46
sect1_784	24.26	20.45	16.20	13.87	11.35	7.80	5.69
sect1_897	24.21	20.42	16.18	13.85	11.34	7.80	5.64
sect1_937	24.20	20.41	16.18	13.84	11.34	7.80	5.65
	Hoepner Road						
sect1_1045	23.96	20.29	16.15	13.83	11.33	7.80	5.63
XS CC	24.81	21.57	18.05	15.50	12.98	9.10	7.31
XS BB	23.10	19.95	16.62	14.48	12.08	8.66	6.60
USRail	22.98	19.75	16.49	14.41	12.01	8.62	6.57
	Railway						
sect1_1386	22.96	19.74	16.48	14.40	12.00	8.61	6.56
sect1_1443	22.96	19.74	16.49	14.40	12.00	8.60	6.56
sect1_1569	55.84	49.32	40.79	34.29	28.44	20.66	15.65
sect1_1659	54.68	48.70	40.58	34.22	28.41	20.64	15.65
sect1_1741	53.91	48.17	40.34	34.11	28.33	20.62	15.62
	Railway						
sect1_1789	53.89	48.15	40.32	34.10	28.32	20.61	15.60
sect1_1851	53.86	48.12	40.26	34.07	28.29	20.59	15.59
sect1_1927	53.83	48.08	40.20	34.03	28.23	20.56	15.56
sect1_1996	53.82	48.05	40.16	34.00	28.17	20.53	15.54
sect1_2070	53.81	48.02	40.15	33.98	28.15	20.53	15.53
sect1_2098	53.80	48.02	40.14	33.98	28.15	20.53	15.53
sect1_2116	53.80	48.01	40.13	33.98	28.15	20.52	15.53
sect1_2134	53.79	48.01	40.13	33.97	28.15	20.52	15.52
sect1_2152	53.79	48.01	40.12	33.96	28.14	20.52	15.51
sect1_2189	53.79	48.00	40.09	33.95	28.14	20.51	15.51
sect1_2222	53.79	48.00	40.10	33.95	28.14	20.51	15.50
sect1_2236	53.81	48.02	40.11	33.96	28.15	20.52	15.51
sect1_2281	63.89	57.07	47.50	40.15	33.44	24.46	18.25
sect1_2348	63.86	57.05	47.49	40.12	33.41	24.44	18.23

Ultimate Development Case: DU17a

SOBEK Cross-section	Peak Discharge (m^3/s)						
Post- ID	100 Year ARI	50 Year ARI	20 Year ARI	10 Year ARI	5 Year ARI	2 Year ARI	1 Year ARI
	Dev	Dev	Dev	Dev	Dev	Dev	Dev
sect1_2410	63.82	57.02	47.47	40.11	33.39	24.42	18.21
sect1_2422	63.81	57.01	47.46	40.10	33.39	24.41	18.21
sect1_2437	63.79	57.00	47.46	40.10	33.39	24.41	18.21
sect1_2459	63.75	56.97	47.45	40.09	33.39	24.41	18.21
sect1_2474	63.66	56.91	47.42	40.08	33.38	24.41	18.20
sect1_2507	63.44	56.73	47.33	40.05	33.36	24.40	18.20
sect1_2534	63.11	56.41	47.13	39.97	33.31	24.37	18.19
sect1_2576	62.39	55.62	46.49	39.73	33.17	24.28	18.16
sect1_2629	61.63	54.62	45.71	39.36	32.96	24.09	18.12
sect1_2687	61.37	54.12	45.01	38.84	32.73	23.55	17.98
sect1_2725	62.64	55.12	45.90	39.68	33.54	24.08	18.43
	Warrego Highway						
sect1_2804	62.60	55.07	45.89	39.67	33.53	24.04	18.42
sect1_2871	62.57	55.05	45.87	39.66	33.52	24.03	18.41
sect1_2958	62.50	54.97	45.85	39.62	33.49	23.97	18.37
sect1_3014	62.43	54.90	45.80	39.56	33.38	23.87	18.31
sect1_3092	62.34	54.83	45.75	39.46	33.02	23.77	18.21
sect1_3164	62.35	54.83	45.76	39.44	32.77	23.73	18.15
sect1_3220	62.41	54.87	45.80	39.47	32.73	23.75	18.15
sect1_3269	66.32	58.11	48.75	41.94	34.59	25.26	19.38
sect1_3336	66.26	58.08	48.71	41.85	34.55	25.25	19.35
sect1_3417	66.20	58.05	48.68	41.79	34.51	25.22	19.33
sect1_3475	66.19	58.04	48.67	41.77	34.50	25.21	19.32
sect1_3517	66.16	58.02	48.65	41.75	34.49	25.20	19.30
sect1_3592	66.10	58.00	48.63	41.73	34.46	25.16	19.28
sect1_3633	66.02	58.00	48.62	41.72	34.45	25.15	19.27
sect1_3676	67.29	59.54	49.99	42.85	35.31	25.80	19.79
sect1_3733	67.06	59.50	49.96	42.83	35.26	25.78	19.78
sect1_4132	65.80	58.26	49.42	42.28	35.01	25.53	19.52
sect1_4180	65.77	58.26	49.40	42.24	35.00	25.52	19.51
sect1_4257	65.76	58.27	49.38	42.22	34.99	25.52	19.50
sect1_4302	65.77	58.29	49.38	42.23	35.00	25.52	19.50
sect1_4353	67.10	59.70	50.83	43.40	35.80	26.09	19.94
sect1_4420	67.05	59.68	50.80	43.35	35.78	26.07	19.92
sect1_4508	67.02	59.65	50.77	43.31	35.76	26.06	19.91
sect1_4650	66.98	59.60	50.72	43.23	35.74	26.04	19.89
sect1_4744	66.92	59.58	50.66	43.17	35.63	26.02	19.87
sect1_4789	66.91	59.57	50.66	43.16	35.60	26.02	19.86
sect1_4845	66.91	59.58	50.64	43.14	35.53	26.01	19.85

Ultimate Development Case: DU17a

SOBEK Cross-section	Peak Discharge (m^3/s)						
Post- ID	100 Year ARI	50 Year ARI	20 Year ARI	10 Year ARI	5 Year ARI	2 Year ARI	1 Year ARI
	Dev	Dev	Dev	Dev	Dev	Dev	Dev
sect1_4899	66.91	59.58	50.64	43.13	35.54	26.01	19.85
sect1_4966	66.92	59.61	50.64	43.12	35.54	26.01	19.84
sect1_5014	66.95	59.66	50.66	43.11	35.56	26.02	19.84
sect1_5063	66.98	59.72	50.70	43.13	35.59	26.04	19.84
sect1_5118	71.73	65.25	54.87	46.29	38.52	28.53	21.49
sect1_5136	71.74	65.25	54.87	46.29	38.52	28.54	21.49
sect1_5169	71.74	65.25	54.87	46.29	38.52	28.54	21.49
	Eastern Tributary 2 of Bremer River						
sect2_13	19.52	17.11	15.26	12.93	11.09	8.33	6.37
sect2_84	18.96	16.64	14.48	12.29	10.54	7.91	6.01
sect2_123	18.81	16.49	14.39	12.19	10.41	7.75	5.88
sect2_173	18.75	16.44	14.23	12.07	10.33	7.71	5.83
sect2_238	18.67	16.37	14.10	11.96	10.24	7.66	5.78
sect2_301	18.58	16.30	13.99	11.83	10.13	7.59	5.73
sect2_369	18.49	16.22	13.90	11.72	10.03	7.51	5.68
sect2_415	18.49	16.20	13.88	11.75	10.03	7.51	5.68
sect2_469	23.85	20.92	17.89	15.05	12.83	9.47	7.22
sect2_514	23.83	20.89	17.84	15.04	12.82	9.47	7.20
sect2_556	23.78	20.87	17.85	15.02	12.80	9.45	7.20
sect2_607	23.79	20.87	17.83	15.00	12.80	9.45	7.20
sect2_645	23.77	20.85	17.80	15.00	12.79	9.45	7.19
sect2_693	23.62	20.74	17.75	14.95	12.74	9.41	7.17
sect2_733	23.48	20.64	17.66	14.88	12.70	9.40	7.15
sect2_777	26.99	23.76	20.27	17.09	14.56	10.75	8.16
sect2_805	26.68	23.47	20.02	16.92	14.40	10.64	8.08
	Eastern Tributary 3 of Bremer River						
sect3_15	5.38	4.72	4.17	3.50	2.91	2.13	1.55
sect3_49	5.31	4.66	4.11	3.45	2.85	2.08	1.52
sect3_64	5.27	4.62	4.07	3.43	2.86	2.10	1.54
sect3_84	5.31	4.66	4.12	3.47	2.89	2.12	1.55
sect3_109	5.33	4.68	4.14	3.49	2.90	2.11	1.54
sect3_125	5.34	4.69	4.15	3.49	2.90	2.11	1.53
sect3_141	5.35	4.69	4.15	3.49	2.88	2.09	1.51
sect3_148	5.34	4.68	4.13	3.47	2.85	2.07	1.52
sect3_174	5.29	4.64	4.10	3.44	2.82	2.08	1.53

Ultimate Development Case: DU17a

SOBEK Cross-section	Peak Velocity (m/s)						
Post- ID	100 Year ARI	50 Year ARI	20 Year ARI	10 Year ARI	5 Year ARI	2 Year ARI	1 Year ARI
	Dev	Dev	Dev	Dev	Dev	Dev	Dev
	Eastern Tributary 1 of Bremer River						
sect1_259	1.67	1.64	1.53	1.52	1.48	1.40	1.26
sect1_329	1.44	1.44	1.43	1.43	1.39	1.29	1.20
sect1_409	1.84	1.84	1.85	1.85	1.87	1.86	1.86
	Brisbane Road						
sect1_468	1.78	1.78	1.77	1.77	1.77	1.76	1.75
	Railway						
sect1_517	1.14	1.11	1.05	1.03	1.00	0.93	0.87
sect1_581	1.21	1.16	1.15	1.18	1.16	1.14	1.15
sect1_674	0.52	0.47	0.41	0.36	0.31	0.25	0.25
sect1_784	1.18	1.18	1.17	1.17	1.17	1.16	1.11
sect1_897	1.72	1.70	1.65	1.60	1.53	1.38	1.26
sect1_937	1.27	1.25	1.21	1.18	1.13	1.04	0.95
	Hoepner Road						
sect1_1045	1.11	1.09	1.07	1.03	0.98	0.88	0.79
XS CC	0.37	0.36	0.36	0.35	0.33	0.32	0.31
XS BB	0.37	0.36	0.36	0.35	0.33	0.32	0.31
USRail	0.64	0.62	0.60	0.57	0.55	0.51	0.47
	Railway						
sect1_1386	0.85	0.81	0.77	0.74	0.70	0.64	0.59
sect1_1443	0.80	0.77	0.75	0.73	0.69	0.64	0.59
sect1_1569	1.75	1.73	1.70	1.66	1.60	1.49	1.39
sect1_1659	1.23	1.20	1.19	1.18	1.14	1.09	1.04
sect1_1741	1.10	1.15	1.13	1.04	1.00	0.89	0.94
	Railway						
sect1_1789	1.65	1.61	1.52	1.44	1.34	1.20	1.07
sect1_1851	1.16	1.14	1.10	1.06	1.02	0.96	0.89
sect1_1927	1.05	1.04	1.03	1.01	0.99	0.95	0.92
sect1_1996	1.20	1.19	1.18	1.18	1.17	1.15	1.11
sect1_2070	2.19	2.18	2.16	2.07	1.98	1.79	1.63
sect1_2098	1.35	1.33	1.32	1.24	1.15	0.99	0.86
sect1_2116	1.65	1.64	1.62	1.57	1.51	1.39	1.28
sect1_2134	1.37	1.34	1.31	1.28	1.24	1.16	1.09
sect1_2152	0.89	0.86	0.81	0.77	0.74	0.67	0.61
sect1_2189	1.07	1.05	1.02	1.00	1.00	0.94	0.88
sect1_2222	2.35	2.31	2.18	2.06	1.94	1.74	1.58
sect1_2236	1.38	1.32	1.24	1.17	1.10	0.99	0.91
sect1_2281	0.94	0.89	0.81	0.74	0.68	0.58	0.51
sect1_2348	1.14	1.10	1.04	0.99	0.96	0.89	0.83

Ultimate Development Case: DU17a

SOBEK Cross-section	Peak Velocity (m/s)						
Post- ID	100 Year ARI	50 Year ARI	20 Year ARI	10 Year ARI	5 Year ARI	2 Year ARI	1 Year ARI
	Dev	Dev	Dev	Dev	Dev	Dev	Dev
sect1_2410	0.74	0.69	0.63	0.57	0.52	0.43	0.35
sect1_2422	0.87	0.83	0.78	0.74	0.69	0.62	0.56
sect1_2437	1.31	1.26	1.17	1.10	1.02	0.90	0.79
sect1_2459	1.24	1.21	1.16	1.11	1.05	0.96	0.87
sect1_2474	1.23	1.20	1.15	1.09	1.03	0.92	0.83
sect1_2507	1.31	1.28	1.24	1.20	1.15	1.06	0.97
sect1_2534	0.88	0.86	0.82	0.78	0.75	0.68	0.61
sect1_2576	0.74	0.72	0.71	0.69	0.67	0.63	0.58
sect1_2629	0.98	0.97	0.96	0.95	0.93	0.90	0.85
sect1_2687	0.42	0.42	0.43	0.44	0.44	0.44	0.43
sect1_2725	0.87	0.86	0.85	0.85	0.84	0.83	0.80
	Warrego Highway						
sect1_2804	1.43	1.43	1.42	1.41	1.40	1.38	1.34
sect1_2871	1.75	1.67	1.60	1.52	1.44	1.28	1.17
sect1_2958	1.01	1.00	0.96	0.90	0.85	0.78	0.74
sect1_3014	0.81	0.81	0.80	0.79	0.78	0.77	0.74
sect1_3092	0.68	0.68	0.68	0.68	0.68	0.67	0.65
sect1_3164	0.65	0.61	0.56	0.53	0.53	0.51	0.51
sect1_3220	0.83	0.81	0.81	0.81	0.81	0.81	0.80
sect1_3269	1.48	1.48	1.47	1.47	1.46	1.43	1.36
sect1_3336	0.89	0.86	0.84	0.83	0.81	0.74	0.69
sect1_3417	0.97	0.93	0.88	0.85	0.81	0.74	0.68
sect1_3475	1.19	1.14	1.08	1.06	1.01	0.92	0.84
sect1_3517	1.01	0.98	0.93	0.91	0.87	0.85	0.85
sect1_3592	0.99	0.96	0.93	0.91	0.90	0.90	0.87
sect1_3633	1.03	1.01	0.97	0.94	0.94	0.94	0.93
sect1_3676	1.06	1.05	1.05	1.05	1.04	1.04	0.99
sect1_3733	1.17	1.16	1.16	1.16	1.15	1.12	1.05
sect1_4132	1.00	0.99	0.96	0.93	0.88	0.82	0.77
sect1_4180	0.94	0.93	0.92	0.90	0.86	0.80	0.74
sect1_4257	1.28	1.25	1.22	1.19	1.13	1.02	0.94
sect1_4302	1.39	1.36	1.32	1.27	1.21	1.10	1.01
sect1_4353	1.30	1.28	1.24	1.19	1.14	1.04	0.96
sect1_4420	1.06	1.04	1.01	0.98	0.95	0.89	0.84
sect1_4508	1.37	1.34	1.31	1.28	1.24	1.15	1.09
sect1_4650	1.44	1.44	1.43	1.42	1.40	1.33	1.29
sect1_4744	1.22	1.19	1.16	1.12	1.09	1.02	0.98
sect1_4789	1.51	1.47	1.42	1.35	1.31	1.19	1.10
sect1_4845	1.35	1.31	1.26	1.21	1.19	1.07	0.97

Ultimate Development Case: DU17a

SOBEK Cross-section	Peak Velocity (m/s)						
Post- ID	100 Year ARI	50 Year ARI	20 Year ARI	10 Year ARI	5 Year ARI	2 Year ARI	1 Year ARI
	Dev	Dev	Dev	Dev	Dev	Dev	Dev
sect1_4899	1.93	1.87	1.79	1.72	1.63	1.49	1.37
sect1_4966	1.38	1.33	1.27	1.23	1.17	1.08	1.01
sect1_5014	1.15	1.09	1.02	0.97	0.91	0.80	0.72
sect1_5063	1.33	1.27	1.18	1.14	1.06	0.93	0.83
sect1_5118	1.51	1.46	1.36	1.29	1.18	1.01	0.86
sect1_5136	2.43	2.36	2.24	2.13	2.00	1.80	1.61
sect1_5169	3.50	3.36	3.10	2.86	2.58	2.15	1.78
	Eastern Tributary 2 of Bremer River						
sect2_13	0.66	0.64	0.62	0.59	0.57	0.53	0.52
sect2_84	0.85	0.83	0.81	0.78	0.75	0.70	0.66
sect2_123	0.79	0.75	0.72	0.68	0.65	0.59	0.54
sect2_173	1.09	1.06	1.03	0.99	0.95	0.88	0.81
sect2_238	1.26	1.23	1.20	1.16	1.13	1.08	1.03
sect2_301	1.06	1.02	0.97	0.92	0.87	0.79	0.72
sect2_369	1.16	1.13	1.10	1.07	1.03	0.97	0.92
sect2_415	1.13	1.10	1.08	1.05	1.01	0.96	0.91
sect2_469	1.37	1.32	1.27	1.21	1.15	1.06	0.98
sect2_514	1.45	1.40	1.35	1.29	1.24	1.14	1.06
sect2_556	1.55	1.49	1.43	1.36	1.29	1.18	1.08
sect2_607	1.69	1.63	1.57	1.50	1.44	1.33	1.23
sect2_645	1.46	1.41	1.35	1.28	1.21	1.10	1.01
sect2_693	1.24	1.20	1.16	1.11	1.06	0.96	0.88
sect2_733	1.29	1.25	1.22	1.18	1.15	1.08	1.01
sect2_777	0.82	0.78	0.75	0.70	0.66	0.57	0.50
sect2_805	0.97	0.92	0.88	0.81	0.75	0.63	0.55
	Eastern Tributary 3 of Bremer River						
sect3_15	0.98	0.96	0.93	0.90	0.86	0.80	0.73
sect3_49	1.48	1.44	1.40	1.35	1.30	1.21	1.13
sect3_64	1.65	1.60	1.55	1.49	1.43	1.33	1.24
sect3_84	1.50	1.44	1.38	1.30	1.22	1.10	0.99
sect3_109	0.48	0.43	0.39	0.33	0.28	0.21	0.16
sect3_125	1.54	1.48	1.43	1.36	1.28	1.19	1.11
sect3_141	0.48	0.43	0.39	0.34	0.29	0.22	0.17
sect3_148	1.44	1.40	1.36	1.31	1.26	1.17	1.10
sect3_174	2.02	1.95	1.90	1.84	1.77	1.67	1.57

Our Ref LJ8714/Lt88 MPG:la

Contact Daniel Niven

05 August 2013

Cardno (Qld) Pty Ltd
Trading as Cardno Lawson Treloar
ABN 57 051 074 992

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Australia

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Fortitude Valley QLD 4006
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Walker Corporation Pty Ltd
PO Box 122
BOOVAL SHOPPING CENTRE QLD 4304

Attention: Mr Adam Heather

Dear Adam

CITISWICH – STAGE 7 FILL IN THE VICINITY OF THE MINOR TRIBUTARY DOWNSTREAM OF THE WARREGO HIGHWAY – FLOODING ASSESSMENT

1.0 Introduction

Walker Corporation Pty Ltd (WCL) proposes to fill parts of the Stage 7 area north of the Warrego Highway. Currently, there are culverts below the Warrego Highway that discharge stormwater from developments south of the Warrego Highway, specifically the Capral Aluminium and Humes sites, north through a minor unnamed tributary and ultimately to the Bremer River.

Typically, the existing minor tributary downstream of the Warrego Highway will be unaffected by the proposed Stage 7 fill, with small sections of batters from the fill pad situated within the 1 in 100 Year ARI flood extents.

Parts of the Warrego Highway road reserve areas have been identified by the Department of Transport and Main Roads (DTMR) as prone to adverse flood impacts due to development within the upstream areas, as detailed in their report *'Draft Report – Ashburn Road Drainage – Investigation into Storm Damage to DMR Infrastructure'* dated October 2007.

Cardno Lawson Treloar (CLT) responded to DTMR's specific concerns if our letter *'Citiswich – Stage 2 Capral Basin – Response to Queensland Department of Transport and Main Roads Concurrence Agency Conditions TMR12-001675 – Including Verification of Hilton Reid Report 'Capral Aluminium, 71 Ashburn Road, Bundamba – Hydraulic Investigation and Report' dated 23 August 2012'* dated 30 July 2013 (ref LJ8714/Lt70/v7).

CLT have conducted a flood impact assessment of the proposed Stage 7 fill extent, to ensure the fill has no adverse impacts on the upstream Warrego Highway. The flood assessment was conducted in accordance with the details contained within the Masterplan Flood Study. Details of this assessment are contained herein.

2.0 General

CLT previously prepared a detailed masterplan flooding investigation for the Citiswich development as detailed in CLT's *'Citiswich Masterplan – Flooding Investigation (Including Local Flooding Assessment) Incorporating Amendment No.1'* (ref LJ8714/R3/v5/A1) dated August 2012. A subsequent addendum to this masterplan flooding report *'Riparian Zone Hydraulic Impact Assessment'* (ref LJ8714/Lt65) dated 29 June 2012 was prepared to address Ipswich City Council's (Council) development conditions.

The Masterplan flooding report was prepared for WCL for the overall masterplan of the proposed Citiswich industrial development located off the Warrego Highway at Bundamba in Ipswich City. The report provides advice in relation to flood management; including identification and management of key constraints for the masterplan development and also details the masterplan flood assessment of the proposed Citiswich industrial development in accordance with Council's *'Ipswich Planning Scheme'* (2006) in support of the overall proposed development.

The *'Riparian Zone Hydraulic Impact Assessment'* addendum to the masterplan flood study provides advice in relation to the proposed riparian zone vegetation around the southern bank of the Bremer River along the northern-most boundary of the Citiswich site.

In their letter dated 8 October 2012 Council formally approved the masterplan flood study with the riparian zone hydraulic impact assessment addendum as demonstrating no adverse flooding related impacts and satisfactorily addresses Council's *'Implementation Guideline No. 24'*. Council's approval is subject to all future detailed design or planning applications to be accompanied by a certification that the design complies with the approved masterplan flood study LJ8714/R3/v5/A1 and the riparian hydraulic assessment LJ8714/Lt65.

3.0 Flooding Assessment

The hydrology for this assessment was based on the ultimate developed hydrology reported in the Masterplan Flood Study (ref LJ8714/R3/v5/A1 dated August 2012) and considered the modified Capral Aluminium and Humes catchments as detailed in the recent DTMR response (ref LJ8714/Lt70/v7 dated 30 July 2013).

A steady-state one-dimensional HEC-RAS (Version 4.1) submodel of the minor tributary downstream of the Warrego Highway was prepared to conduct the hydraulic flood assessment. The model extends from downstream of the Warrego Highway low point to approximately 100 metres downstream of the Stage 7 development pads and includes the existing small dam, as shown on Figure 1.

As shown on the attached civil drawings, the existing tributary is proposed to remain in its existing situation, the fill batters encroaches slightly into the existing Q100 inundation extents between chainage 170 and 300. The additional fill has a minor impact on the 1 in 100 year ARI flood levels, however does not cause any adverse hydraulic impacts upstream within the Warrego Highway road reserve. Results of the hydraulic modelling are attached to this letter.

4.0 Qualifications and Limitations

This report has been prepared by Cardno Lawson Treloar (CLT) specifically for Walker Corporation Pty Ltd and specifically to show the proposed fill within Stage 7 of the Citiswich development will have no adverse hydraulic impacts on the Warrego Highway.

Our analysis and overall approach has been specifically catered to the particular requirements of Walker Corporation Pty Ltd, and may not be applicable beyond this scope. For this reason any other third parties are not authorised to utilise this report without further input and advice from CLT.

Previous reports that CLT have utilised as background information in preparing this certification letter include;

- Cardno Lawson Treloar, July 2013, *'Citiswich – Stage 2 Capral Basin – Response to Queensland Department of Transport and Main Roads Concurrence Agency Conditions TMR12-001675 – Including Verification of Hilton Reid Report 'Capral Aluminium, 71 Ashburn Road, Bundamba – Hydraulic Investigation and Report' dated 23 August 2012'* (ref LJ8714/Lt70/v7);

- Cardno Lawson Treloar, February 2012, *'Citiswich Estate - Stage 2 - Stormwater Management Strategy to Support Reconfiguration of Lot & Bulk Earthworks Applications including Preliminary Approval to Vary the Effect of a Planning Scheme - Response to Decision Notice'* (ref LJ8714/R17/v5);

- Cardno Lawson Treloar, August 2012, *'Citiswich Masterplan – Flooding Investigation (Including Local Flooding Assessment) Incorporating Amendment No.1'* (ref LJ8714/R3/v5/A1);

- Cardno Lawson Treloar, June 2012, *'Citiswich– Riparian Zone Hydraulic Impact Assessment – Addendum to 'Citiswich Masterplan – Flooding Investigation (Including Local Flooding assessment) dated May 2012;* (ref LJ8714/Lt65);

- Department of Main Roads, October 2007, *'Draft Report – Ashburn Road Drainage – Investigation into Storm Damage to DMR Infrastructure'*; and

- Hilton Reid Consulting, August 2012, *'Capral Aluminium, 71 Ashburn Road, Bundamba – Hydraulic Investigation and Report'.*

Yours faithfully

Martin Giles
Business Unit Manager, Water Resources & Coastal
for **Cardno**

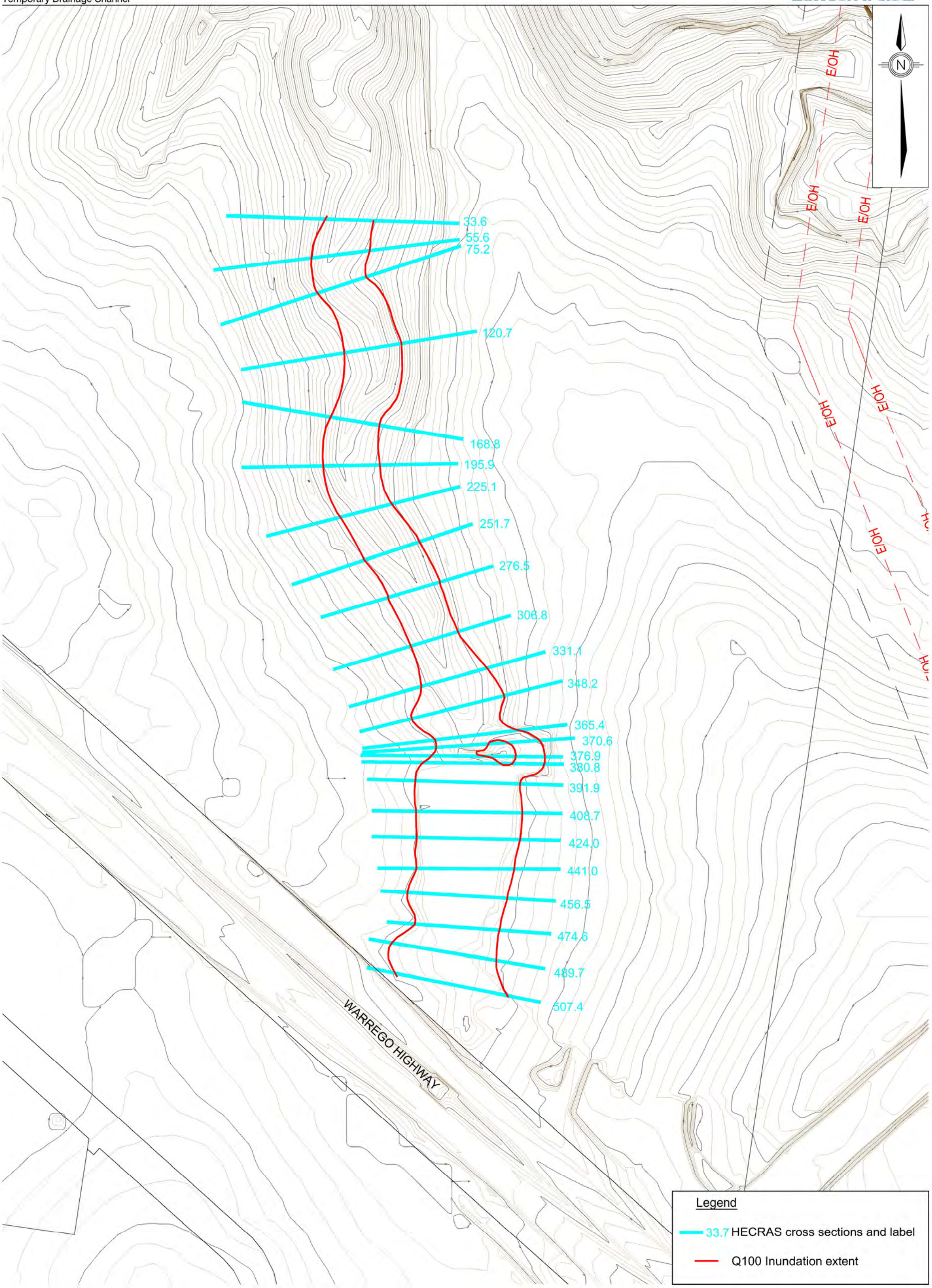
Figures:
Figure 1 – HECRAS Model Layout

Reference Drawings:
Cardno Drawing Set 7902-44-014-100 Walker Corporation Pty Ltd – Citiswich Stage 7 – Preliminary Bulk Earthworks

Appendices:
Appendix A – HEC-RAS Hydraulic Model Results

Citiswich Stage 7
Temporary Drainage Channel

Cardno Lawson Treloar



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20 0 20 40 60 80 100m
1:2000

Scale 1:2,000 (A3)

FIGURE 1
HEC-RAS MODEL EXTENT

August 2013

Project No.: LJ8714

Walker Corporation Pty Ltd

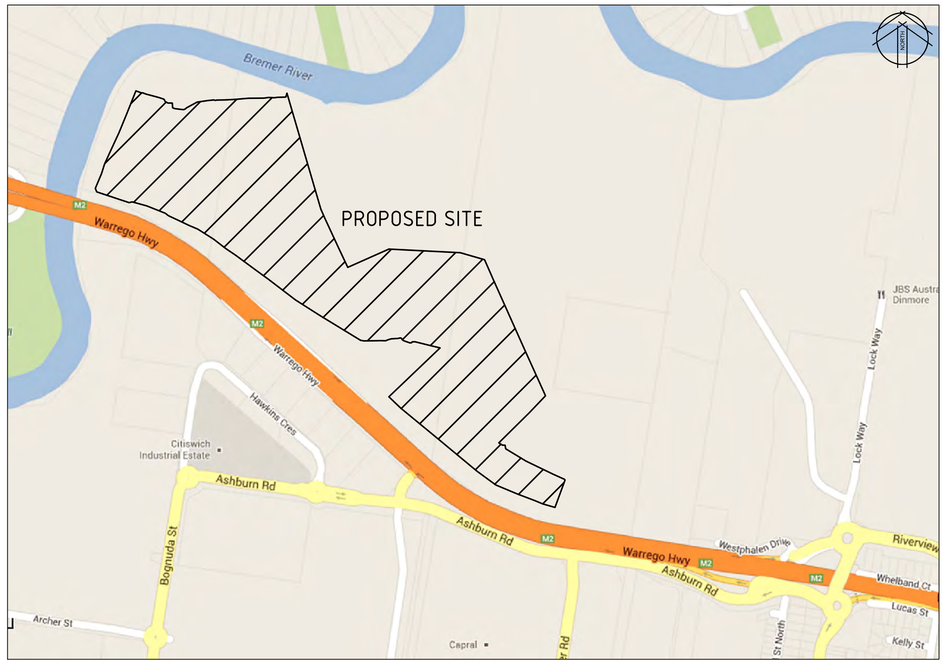
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XREF's: Ipswich_DCDB_MGA_trimmed; Contours 250mm (DERM 2009 ALS); Exist Cont BP 13-06-20

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WALKER CORPORATION PTY LTD
CITISWICH STAGE 7
PRELIMINARY BULK EARTHWORKS



LOCALITY
N.T.S.

SCHEDULE OF DRAWINGS	
SHEET NUMBER	SHEET TITLE
BULK EARTHWORKS	
7902/44/014-100	COVER SHEET
7902/44/014-101	EXISTING CONDITIONS PLAN & GENERAL NOTES
7902/44/014-102	OVERALL EARTHWORKS PLAN
7902/44/014-105	SETOUT PLAN - SHEET 1 OF 2
7902/44/014-106	SETOUT PLAN - SHEET 2 OF 2
7902/44/014-107	SETOUT TABLES
7902/44/014-110	SITE CROSS SECTIONS - SHEET 1 OF 2
7902/44/014-111	SITE CROSS SECTIONS - SHEET 2 OF 2
EROSION & SEDIMENT CONTROL	
7902/44/014-200	EROSION & SEDIMENT CONTROL NOTES & DETIALS
7902/44/014-201	EROSION & SEDIMENT CONTROL PLAN

walker

Drawing No.: 7902-44-014-100
Date: 05/07/2013
Client Ref No:

DATE PLOTTED: 2 August 2013 9:14 AM BY: BRENDAN SMITH (BRISBANE)

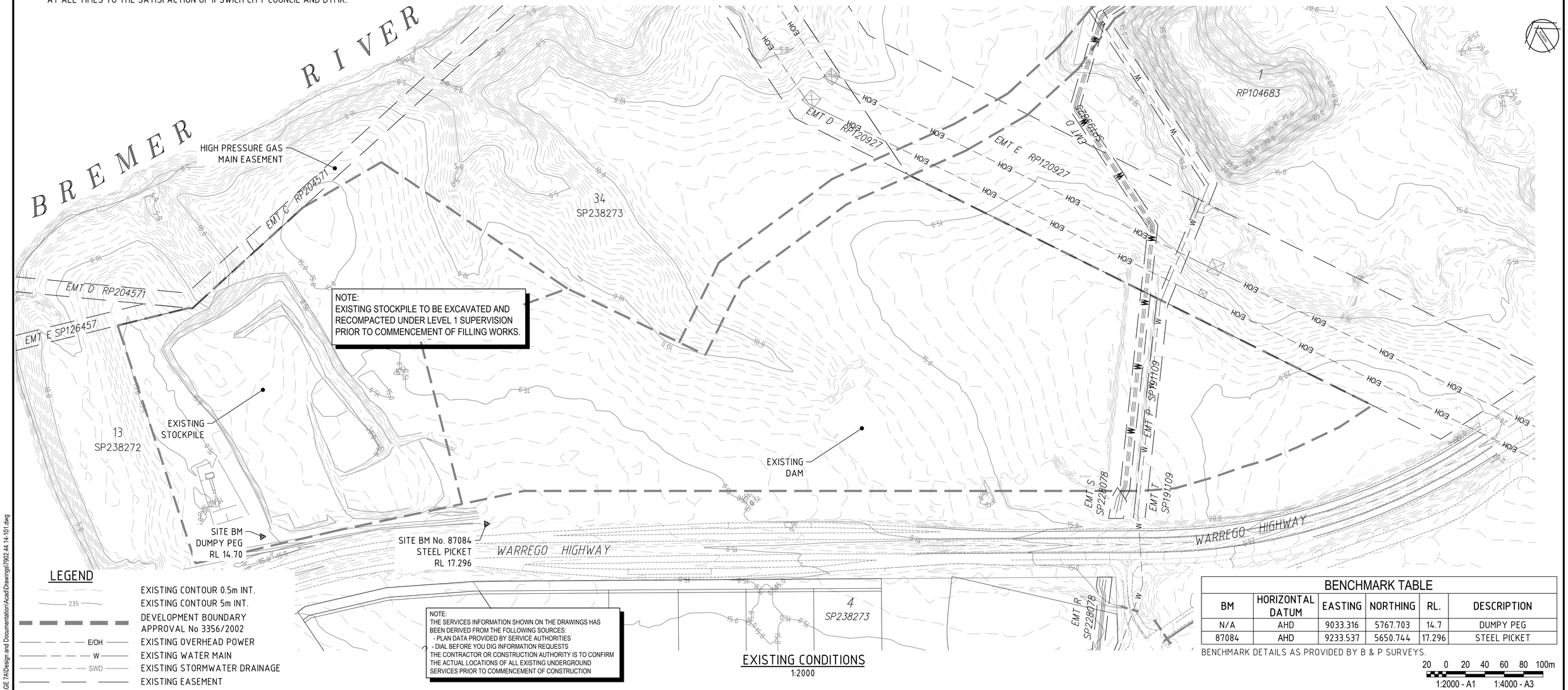
NOTES:

1. LEVELS AND GRADIENTS AT JUNCTIONS WITH EXISTING WORKS MAY BE VARIED AS REQUIRED TO ACHIEVE SATISFACTORY CONNECTIONS AND THE COSTS DEEMED INCLUDED IN THE RELEVANT SCHEDULE ITEMS.
2. ALL EXISTING SERVICES AND STRUCTURES ARE TO BE MAINTAINED IN GOOD ORDER FOR THE DURATION OF THE CONTRACT AND WHERE RELOCATION IS REQUIRED REFER SPECIFICATION.
3. NOT WITHSTANDING THE LIMITS OF EARTHWORKS SHOWN ON THE DRAWINGS, THE ACTUAL LIMITS SHALL BE DETERMINED ON SITE BY THE SUPERINTENDENT.
4. FILLING ON ALLOTMENTS TO BE COMPACTED TO 98% STANDARD DRY DENSITY AS1289 5.1.1 AND TRIMMED TO BE FREE DRAINING. ALL ALLOTMENT FILL SHALL BE SUPERVISED BY A GEOTECHNICAL TESTING AUTHORITY TO LEVEL 1 REQUIREMENTS IN ACCORDANCE WITH AS 3798. FOOTINGS SYSTEMS PROPOSED FOR INDIVIDUAL STRUCTURES SHALL BE DESIGNED BY A REGISTERED PROFESSIONAL ENGINEER WITH EXPERIENCE IN STRUCTURAL DESIGN.
5. NO FILLING TO BE UNDERTAKEN UNTIL APPROVAL OF SUBGRADE BY GEOTECHNICAL ENGINEER, INCLUDING UNDER EXISTING STOCKPILES.
6. THE CONTRACTOR IS TO PROVIDE EROSION AND SEDIMENT DEPOSITION CONTROL DEVICES DURING THE CONSTRUCTION PERIOD. GENERALLY IN ACCORDANCE WITH THE SEDIMENT AND EROSION CONTROL PLANS.
7. CONTRACTOR TO CONDUCT FIELD DENSITY TESTING, PROVIDE RESULTS AND CERTIFICATION IN ACCORDANCE WITH IPSWICH CITY COUNCIL PLANNING SCHEME POLICY 6. MINIMUM FREQUENCY OF TESTING FOR LARGE SCALE OPERATIONS TO BE GREATEST OF:
   (A) 1 TEST PER 500M3 DISTRIBUTED REASONABLY EVENLY THROUGHOUT FULL DEPTH AND AREA; OR
   (B) 1 TEST PER LAYER PER MATERIAL TYPE PER 2500M^2; OR
   (C) 1 TEST PER 200MM THICKNESS PER MATERIAL TYPE PER 2500M^2;
   (D) 1 TEST PER LOT
8. ALL BATTERS WITHIN LOTS TO BE 1:2 MAX GRADE OR AS DIRECTED BY THE GEOTECHNICAL ENGINEER.
9. THE CONTRACTOR SHALL SETOUT THE WORKS FROM THE PEGS, SURVEY BENCHMARKS AND OTHER NOMINATED DESIGN REFERENCE LINES. THE CONTRACTOR SHALL MAINTAIN AND PROTECT THE PEGS AND SURVEY MARKS FOR THE DURATION OF THE CONTRACT.
10. ANY WORKS UNDERTAKEN IN THE VICINITY OF PUBLIC ROADS MUST BE APPROPRIATELY SIGNED, LIT AND BARRICADED TO ENSURE THE SAFETY OF THE PEDESTRIAN AND VEHICULAR TRAFFIC IN THEIR VICINITY. WORKS WILL BE SO ORDERED TO ENSURE THAT PUBLIC ACCESS ALONG THE ROADS IS MAINTAINED AT ALL TIMES TO THE SATISFACTION OF IPSWICH CITY COUNCIL AND DTMR.
11. WHERE REQUIRED, BEFORE COMMENCEMENT OF THE WORKS THE CONTRACTOR SHALL OBTAIN THE REGULATORY AUTHORITIES APPROVAL AND OPERATING REQUIREMENT FOR THE TRUCK ROUTES TO BE USED BY ALL VEHICLES ASSOCIATED WITH THE CIVIL WORKS. APPROPRIATE CLEANSING DEVICES SHALL BE INSTALLED ON SITE TO ENSURE THERE IS NO ADVERSE IMPACT FROM VEHICLES ALONG THESE ROUTES.
12. THE LOCATION OF EXISTING SERVICES HAS BEEN OBTAINED FROM THE AVAILABLE AUTHORITY RECORDS. NO GUARANTEE IS GIVEN THAT ALL EXISTING SERVICES ARE SHOWN ON THE PLANS. THE CONTRACTOR SHALL ASCERTAIN THE LOCATION OF ALL EXISTING SERVICES PRIOR TO COMMENCEMENT OF WORKS. ANY DISCREPANCIES SHALL BE IMMEDIATELY REPORTED TO THE SUPERINTENDENT.
13. WHERE A CONNECTION IS TO BE MADE TO EXISTING CONSTRUCTION THE CONTRACTOR SHALL CONFIRM THE LOCATION AND LEVEL OF THIS CONSTRUCTION PRIOR TO THE COMMENCEMENT OF WORK ON ANY CRITICAL SECTION. ANY DISCREPANCIES ARE TO BE IMMEDIATELY REPORTED TO THE SUPERINTENDENT. CARDNO MAY VARY THE LEVELS AND GRADIENTS AT NEW WORKS TO ACHIEVE A SATISFACTORY CONNECTION.
14. THE CONTRACTOR SHALL ENSURE THAT THE SITE IS FREE DRAINING AT ALL TIMES. THE CONTRACTOR SHALL BE RESPONSIBLE FOR THE PROTECTION OF ALL SURFACES FOR THE DURATION OF THE CONTRACT AND WILL BE REQUIRED TO UNDERTAKE REMEDIAL WORKS AS DEEMED NECESSARY BY THE SUPERINTENDENT.
15. THE CONTRACTOR SHALL ALLOW FOR THE CONTROL OF WATER FLOWS OVER THE SITE DURING THE CONTRACT PERIOD WHICH MAY INCLUDE THE CONSTRUCTION OF TEMPORARY CUTOFF DRAINS IF DEEMED NECESSARY BY THE SUPERINTENDENT. FINAL ALIGNMENT AND CROSS SECTION TO BE AGREED ON SITE WITH THE SUPERINTENDENT PRIOR TO SETOUT AND EXCAVATION. THE CONTRACTOR IS RESPONSIBLE FOR MAINTAINING THE EXISTING DRAINAGE SYSTEM WITHIN THE VICINITY OF THE SITE AND SHALL TAKE ALL MEASURES NECESSARY TO CONTROL SOIL EROSION AND AVOID POLLUTION OF COUNCIL'S DRAINAGE SYSTEMS.
16. STRIP ALL TOPSOIL TO EXTENT OF WORKS TO ENSURE COMPLETE REMOVAL OF ALL ORGANIC MATTER PRIOR TO EARTHWORKS COMMENCING. MATERIAL TO BE STOCKPILED FOR REUSE AS DIRECTED BY THE SUPERINTENDENT. ALL EXCESS TOPSOIL TO BE REMOVED FROM SITE ON COMPLETION OF THE WORKS.

FIRE ANT TREATMENT ZONE

FIRE ANT TREATMENT ZONE – DISPOSAL OF MATERIAL SHALL BE IN ACCORDANCE WITH THE DEPARTMENT OF PRIMARY INDUSTRIES REGULATIONS.
REFER TO WEBSITE: WWW.DPI.QLD.GOV.AU FOR MOVEMENT CONTROL DETAILS.

2



EXISTING CONDITIONS
1:2000

LEGEND

- EXISTING CONTOUR 0.5m INT.
- 235 EXISTING CONTOUR 5m INT.
- DEVELOPMENT BOUNDARY APPROVAL No 3356/2002
- E/OH EXISTING OVERHEAD POWER
- W EXISTING WATER MAIN
- SWD EXISTING STORMWATER DRAINAGE
- EXISTING EASEMENT

BENCHMARK TABLE

BM	HORIZONTAL DATUM	EASTING	NORTHING	RL.	DESCRIPTION
N/A	AHD	9033.316	5767.703	14.7	DUMPY PEG
87084	AHD	9233.537	5650.744	17.296	STEEL PICKET

BENCHMARK DETAILS AS PROVIDED BY B & P SURVEYS.

20 0 20 40 60 80 100m
1:2000 - A1 1:4000 - A3

Rev	Date	Description	Drawn	Appr.
2	02/08/2013	FIRE ANT TREATMENT ZONE	BRS	EC
1	05/07/2013	ORIGINAL ISSUE	BRS	EC

Verified — Date 05-08-2013
Approved — Date 05-08-2013
RPEQ No. 13143

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Quality System — Quality Endorsed Company — AS 9001 Lic. 5960 Standards Australia

		Date
Drawn	BRS	05/07/2013
Checked	FV	05/07/2013
Designed	BRS	05/07/2013

Client: WALKER CORPORATION PTY LTD

CITISWICH STAGE 7
PRELIMINARY BULK EARTHWORKS

EXISTING CONDITIONS PLAN & GENERAL NOTES

Status: FOR APPROVAL
NOT TO BE USED FOR CONSTRUCTION PURPOSES

Datum	Grid	Scale	Size
A.H.D.		1:2000	A1

Drawing Number: 7902-44-014-101
Revision: 2

0 10 20 30 40 50 60 70 80 90 100 110 120 130 140 150mm ON A1 ORIGINAL

XREFs: X-GRP-A1.SHT; X-BNE-LOGO; X-7902.44.014 CONT-PROP; X:7902.44.014 EARTHWORKS; X:7902.44.014-CONT-EXIST; X-7902.44.014-SURVEY
CAD FILE: L:\7902-44 Citiswich\014-STAGE 7A\Design and Documentation\Acad\Drawings\7902.44.14-101.dwg

DATE PLOTTED: 5 August 2013 11:13 AM BY : BRENDAN SMITH (BRISBANE)

WARNING
HIGH PRESSURE GAS MAIN EASEMENT. NO WORKS ARE TO BE UNDERTAKEN WITHIN 12.5m OF THE EASEMENT. CONTRACTOR TO ENSURE NO CONSTRUCTION VEHICLES TO ENTER THE ZONE OF INFLUENCE ON THE PIPE.

13
SP238272

34
SP238273

1
RP104683

1
RP10_

4
SP238273

23
SP222633

MAINTAIN EXISTING TRACK FOR ACCESS TO EASTERN FILLING PAD

WARREGO HIGHWAY

HAWKINS CRES

WARNING
TRUNK RECYCLED AND POTABLE WATER MAINS. CONTRACTOR TO ENSURE ADEQUATE PROTECTION PROVIDED PRIOR TO CROSSING WITH CONSTRUCTION VEHICLES.

LEGEND

- DESIGN CONTOUR MAJOR (1.0m INT.)
- DESIGN CONTOUR MINOR (0.2m INT.)
- DEVELOPMENT BOUNDARY APPROVAL No 3356/2002
- PROPOSED TABLE DRAIN REFER TO DRG 7902/44/014-111
- Q100 LINE REFER TO NOTE 1.
- EARTHWORKS FILL SHADING
- EARTHWORKS CUT SHADING
- EXISTING CONTOUR 0.5m INT.
- EXISTING CONTOUR 5m INT.
- E/OH — EXISTING OVERHEAD POWER
- W — EXISTING WATER MAIN
- SWD — EXISTING STORMWATER DRAINAGE
- EXISTING EASEMENT

OVERALL BULK EARTHWORKS
1:2000

NOTES:
1. THE Q100 LINE IS AS PER CARDNO LAWSON TRELOAR HYDRAULIC ASSESSMENT DATED 2 AUGUST 2013.

20 0 20 40 60 80 100m
1:2000 - A1 1:4000 - A3

Rev	Date	Description	Drawn	Appr.
2	02/08/2013	Q100 LINE ADDED	BRS	EC
1	05/07/2013	ORIGINAL ISSUE	BRS	EC

Verified — Date 05-08-2013
Approved — Date 05-08-2013
RPEQ No. 13143

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Drawn	BRS	05/07/2013
Checked	FV	05/07/2013
Designed	BRS	05/07/2013

Client: WALKER CORPORATION PTY LTD

CITISWICH STAGE 7
PRELIMINARY BULK EARTHWORKS

OVERALL EARTHWORKS PLAN

Status: FOR APPROVAL
NOT TO BE USED FOR CONSTRUCTION PURPOSES

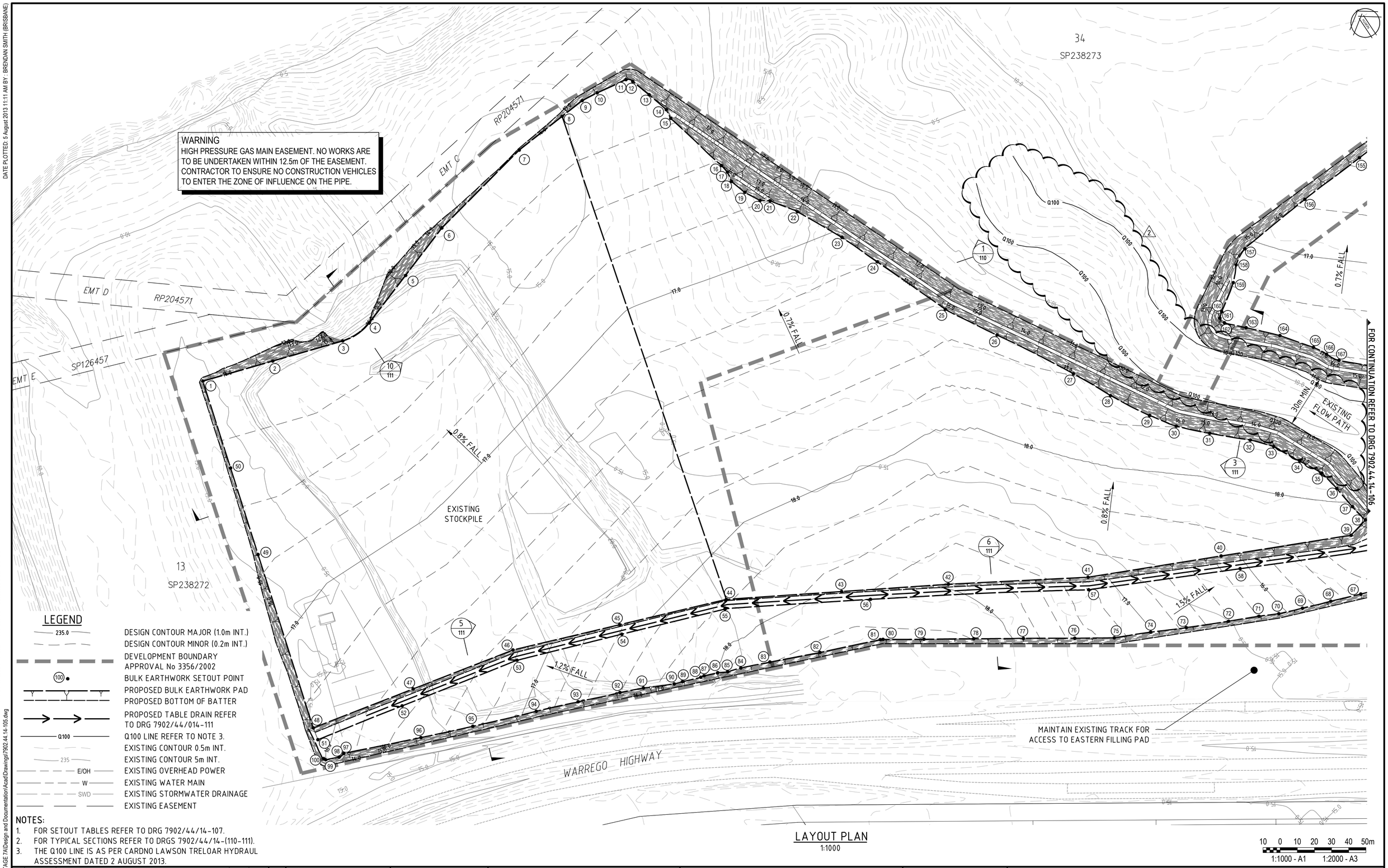
Datum	Grid	Scale	Size
A.H.D.		1:2000	A1

Drawing Number: 7902-44-014-102
Revision: 2

0 10 20 30 40 50 60 70 80 90 100 110 120 130 140 150mm ON A1 ORIGINAL

XREFs: X-GRP-A1-SHT; X-BNE-LOGO; X-7902.44.014 CONT-PROP; X-7902.44.014-CUT-FILL; X-7902.44.014-SURVEY; X-7902.44.014-CONT-EXIST; X-7902.44.014 EARTHWORKS
CAD FILE: L:\7902-44 Ciswich\014-STAGE 7A\Design and Documentation\Acad\Drawings\7902.44.14-102.dwg

DATE PLOTTED: 5 August 2013 11:11 AM BY: BRENDAN SMITH (BRISBANE)



LEGEND

- DESIGN CONTOUR MAJOR (1.0m INT.)
- DESIGN CONTOUR MINOR (0.2m INT.)
- DEVELOPMENT BOUNDARY APPROVAL No 3356/2002
- BULK EARTHWORK SETOUT POINT
- PROPOSED BULK EARTHWORK PAD
- PROPOSED BOTTOM OF BATTER
- PROPOSED TABLE DRAIN REFER TO DRG 7902/44/014-111
- Q100 LINE REFER TO NOTE 3.
- EXISTING CONTOUR 0.5m INT.
- EXISTING CONTOUR 5m INT.
- EXISTING OVERHEAD POWER
- EXISTING WATER MAIN
- EXISTING STORMWATER DRAINAGE
- EXISTING EASEMENT

NOTES:
1. FOR SETOUT TABLES REFER TO DRG 7902/44/14-107.
2. FOR TYPICAL SECTIONS REFER TO DRGS 7902/44/14-(110-111).
3. THE Q100 LINE IS AS PER CARDNO LAWSON TRELOAR HYDRAUL ASSESSMENT DATED 2 AUGUST 2013.

LAYOUT PLAN
1:1000

10 0 10 20 30 40 50m
1:1000 - A1 1:2000 - A3

Rev	Date	Description	Drawn	Appr.
2	02/08/2013	Q100 LINE ADDED	BRS	EC
1	05/07/2013	ORIGINAL ISSUE	BRS	EC

Verified
Date 05-08-2013
Approved
Date 05-08-2013
RPEQ No. 13143

walker

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Drawn	BRS	05/07/2013
Checked	FV	05/07/2013
Designed	BRS	05/07/2013

Client: WALKER CORPORATION PTY LTD

CITISWICH STAGE 7
PRELIMINARY BULK EARTHWORKS

SETOUT PLAN
SHEET 1 OF 2

Status: FOR APPROVAL
NOT TO BE USED FOR CONSTRUCTION PURPOSES

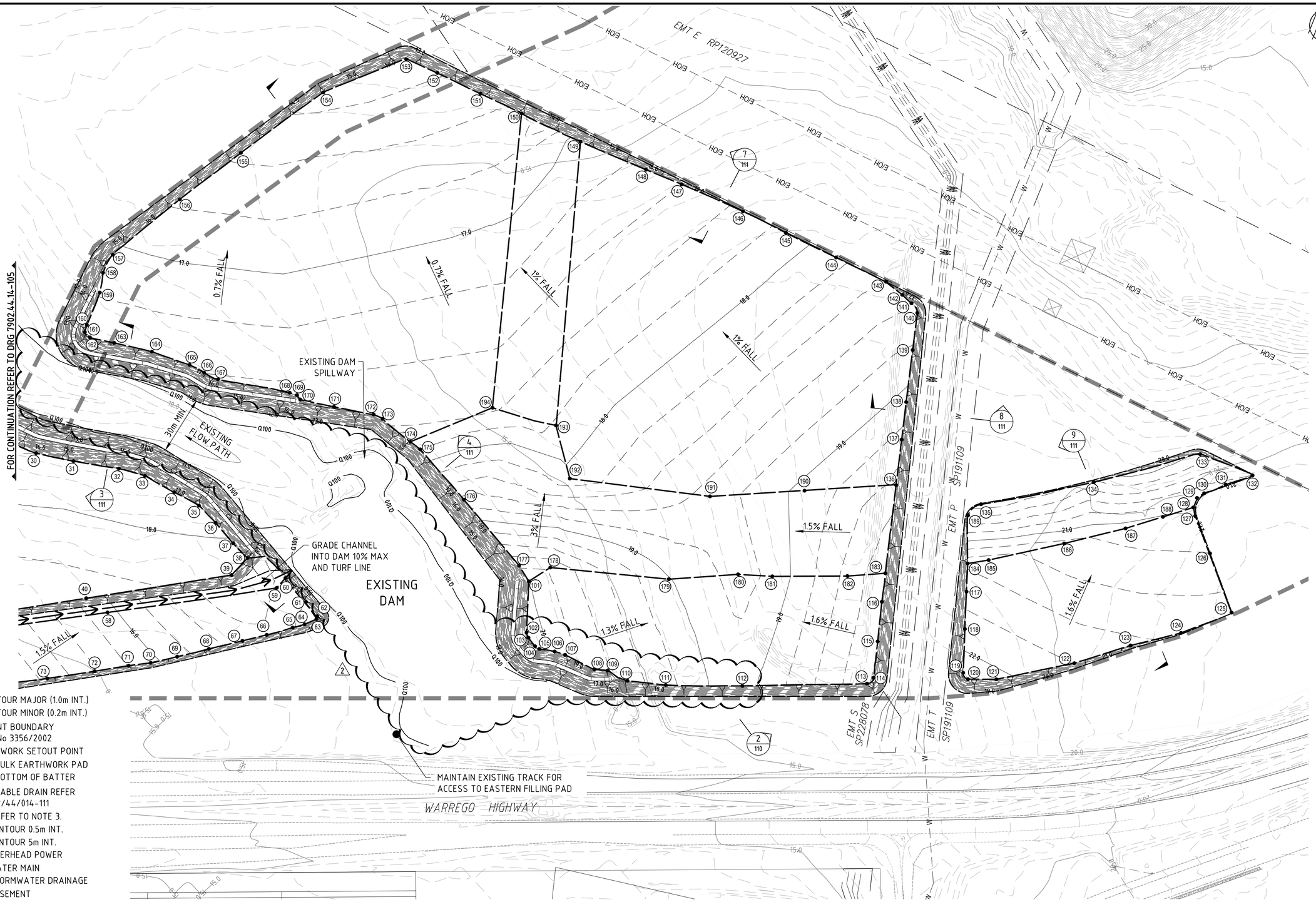
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A.H.D.		1:1000	A1

Drawing Number: 7902-44-014-105
Revision: 2

0 10 20 30 40 50 60 70 80 90 100 110 120 130 140 150mm ON A1 ORIGINAL

XREFs: X-GRP-A1-SHT; X-BNE-LOGO; X-7902.44.014 CONT-PROP; X-7902.44.014 EARTHWORKS; X-7902.44.014-CONT-EXIST; X-7902.44.014-SURVEY; 20130805 BULK SETOUT
CAD FILE L:\7902-44 Citiswich\014-STAGE 7A\Design and Documentation\Acad\Drawings\7902.44.14-105.dwg

DATE PLOTTED: 5 August 2013 11:34 AM BY : BRENDAN SMITH (BRISBANE)



LEGEND

- DESIGN CONTOUR MAJOR (1.0m INT.)
- DESIGN CONTOUR MINOR (0.2m INT.)
- DEVELOPMENT BOUNDARY APPROVAL No 3356/2002
- BULK EARTHWORK SETOUT POINT
- PROPOSED BULK EARTHWORK PAD
- PROPOSED BOTTOM OF BATTER
- PROPOSED TABLE DRAIN REFER TO DRG 7902/44/014-111
- Q100 LINE REFER TO NOTE 3.
- EXISTING CONTOUR 0.5m INT.
- EXISTING CONTOUR 5m INT.
- EXISTING OVERHEAD POWER
- EXISTING WATER MAIN
- EXISTING STORMWATER DRAINAGE
- EXISTING EASEMENT

NOTES:

1. FOR SETOUT TABLES REFER TO DRG 7902/44/14-107.
2. FOR TYPICAL SECTIONS REFER TO DRGS 7902/44/14-(110-111).
3. THE Q100 LINE IS AS PER CARDNO LAWSON TRELOAR HYDRAULIC ASSESSMENT DATED 2 AUGUST 2013.

LAYOUT PLAN

1:1000

10 0 10 20 30 40 50m

1:1000 - A1 1:2000 - A3

Rev	Date	Description	Drawn	Appr.
2	02/08/2013	Q100 LINE ADDED	BRS	EC
1	05/07/2013	ORIGINAL ISSUE	BRS	EC

Verified — Date 05-08-2013

Approved — Date 05-08-2013

RPEQ No. 13143

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		Date
Drawn	BRS	05/07/2013
Checked	FV	05/07/2013
Designed	BRS	05/07/2013

Client: WALKER CORPORATION PTY LTD

CITISWICH STAGE 7
PRELIMINARY BULK EARTHWORKS

SETOUT PLAN
SHEET 2 OF 2

Status: FOR APPROVAL
NOT TO BE USED FOR CONSTRUCTION PURPOSES

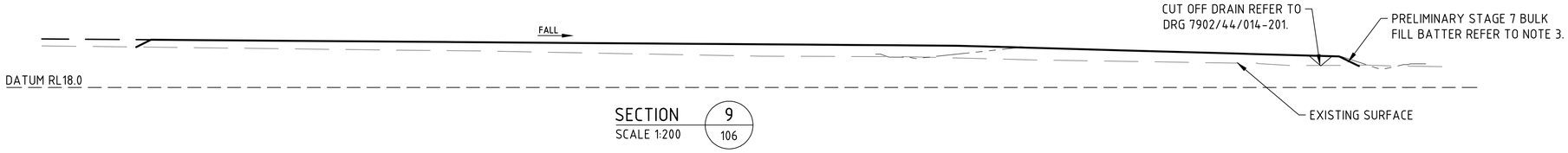
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A.H.D.		1:1000	A1

Drawing Number: 7902-44-014-106 Revision: 2

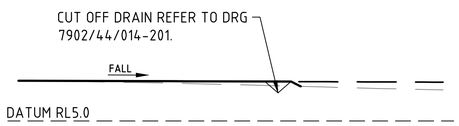
0 10 20 30 40 50 60 70 80 90 100 110 120 130 140 150mm ON A1 ORIGINAL

XREF's: X-GRP-A1.SHT; X-BNELOGO; X:7902.44.014 CONT-PROP; X:7902.44.014 EARTHWORKS; X:7902.44.014-CONT-EXIST; X:7902.44.014-SURVEY; 20130805 BULK SETOUT
CAD FILE: L:\7902-44 Citiswich\014-STAGE 7\Design and Documentation\Acad\Drawings\7902.44.14-105.dwg

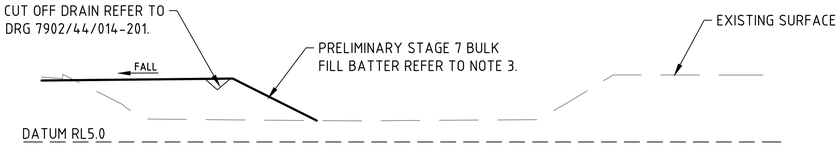
DATE PLOTTED: 5 July 2013 5:22 PM BY: BRENDAN SMITH (BRISBANE)



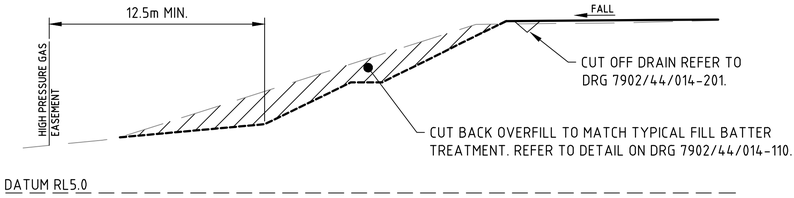
SECTION 9 / 106
SCALE 1:200



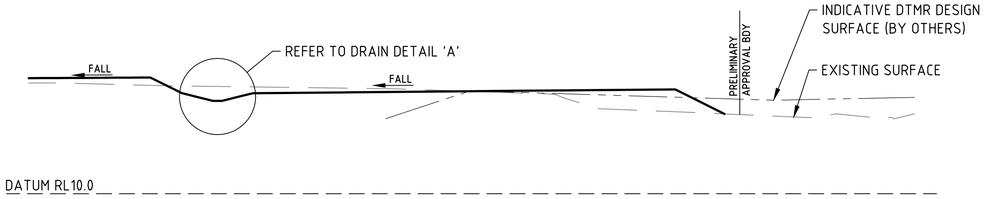
SECTION 7 / 106
SCALE 1:200



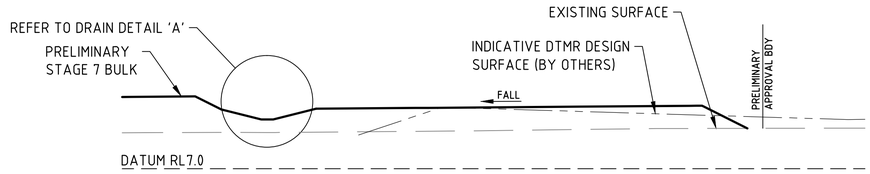
SECTION 8 / 106
SCALE 1:200



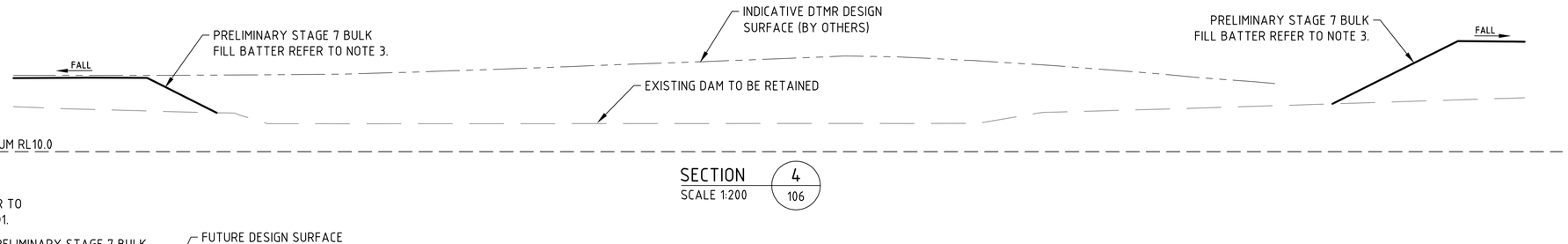
SECTION 10 / 105
SCALE 1:200



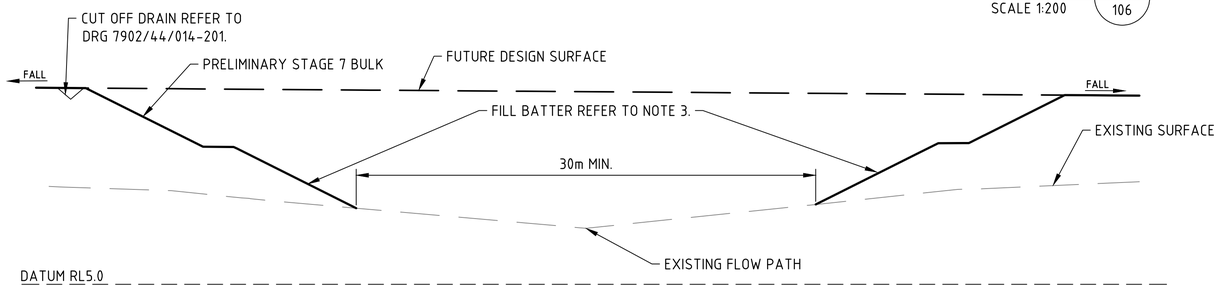
SECTION 5 / 105
SCALE 1:200



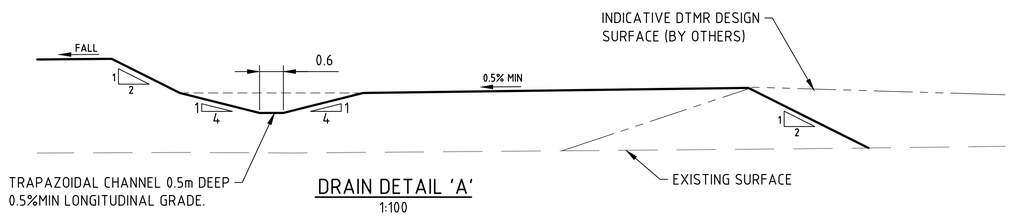
SECTION 6 / 105
SCALE 1:200



SECTION 4 / 106
SCALE 1:200



SECTION 3 / 105/106
SCALE 1:200



DRAIN DETAIL 'A'
1:100

NOTES:

1. FOR BULK EARTHWORKS NOTES REFER TO DRG 7902/44/014-101.
2. FOR SETOUT PLANS REFER TO DRGS 7902/44/014-(105-106).
3. FOR TYPICAL FILL BATTER TREATMENT REFER TO DETAIL ON DRG 7902/44/014-110.

1 0 1 2 3 4 5m
1:100 - A1 1:200 - A3

2.0 0 2.0 4.0 6.0 8.0 10.0m
1:200 - A1 1:400 - A3

Rev	Date	Description	Drawn	Appr.
1	05/07/2013	ORIGINAL ISSUE	BRS	

Verified — Date 05-07-2013
Approved — Date 05-07-2013
RPEQ No. 13143

walker

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		Date
Drawn	BRS	05/07/2013
Checked	FV	05/07/2013
Designed	BRS	05/07/2013

Client: WALKER CORPORATION PTY LTD

CITISWICH STAGE 7
PRELIMINARY BULK EARTHWORKS

SITE CROSS SECTIONS
SHEET 2 OF 2

Status: FOR APPROVAL
NOT TO BE USED FOR CONSTRUCTION PURPOSES

Datum	Grid	Scale	Size
A.H.D.		AS SHOWN	A1

Drawing Number: 7902-44-014-111
Revision: 1

0 10 20 30 40 50 60 70 80 90 100 110 120 130 140 150mm ON A1 ORIGINAL

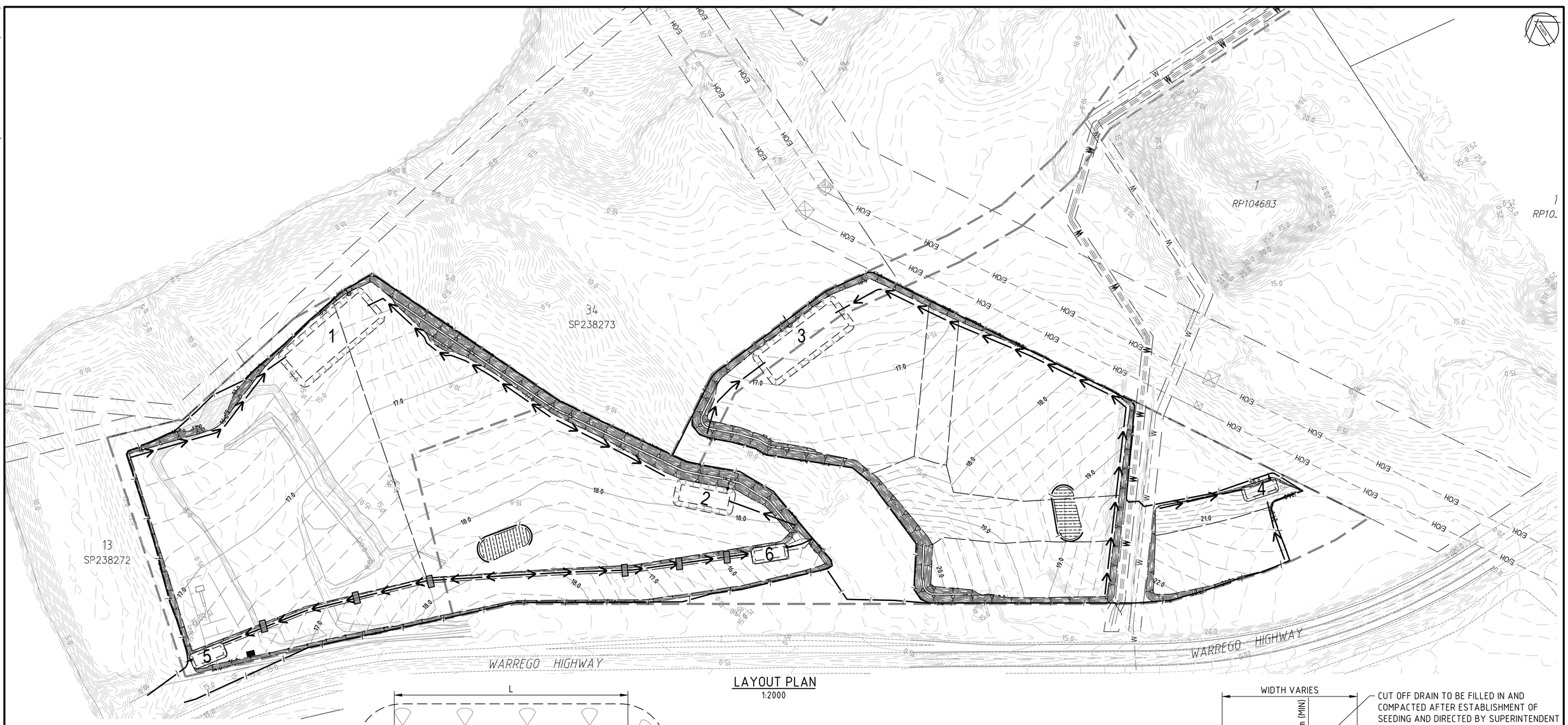
XREFs: X-GRP-A1-SHT; X-BNE-LOGO; X-7902.44.014-SECTIONS
CAD FILE: L:\7902-44 Citiswich\014-STAGE 7A\Design and Documentation\Acad\Drawings\7902.44.14-110.dwg

Job Number:	LJ8714
Job Name:	Citiswich Stage 7
Case ID:	EX01 vs D04a

Branch Name	Cross Section ID	Pre -	Post -	Impact	Pre -	Post -	Impact	Pre -	Post -	Impact	Pre -	Post -	Impact	Pre -	Post -	Impact
		100 Discharge			100 Peak Flood Level			100 Peak Depth			100 Velocity			100 Hazard		
		m^3/s	m^3/s	m^3/s	mAHD	mAHD	mm	m	m	mm	m/s	m/s	m/s	m^2/s	m^2/s	m^2/s
Stage 7	507.4	6.9	6.9		12.913	12.912	-1	0.693	0.692	-1	0.2	0.2	0.0	0.2	0.2	0.0
Stage 7	489.7	6.9	6.9		12.876	12.875	-1	0.696	0.695	-1	0.3	0.3	0.0	0.2	0.2	0.0
Stage 7	474.6	6.9	6.9		12.841	12.841		0.711	0.711		0.3	0.3		0.2	0.2	
Stage 7	456.5	6.9	6.9		12.815	12.815		0.725	0.725		0.2	0.2		0.2	0.2	
Stage 7	441.0	6.9	6.9		12.800	12.800		0.700	0.700		0.2	0.2		0.2	0.2	
Stage 7	424.0	6.9	6.9		12.787	12.787		0.717	0.717		0.2	0.2		0.1	0.1	
Stage 7	408.7	6.9	6.9		12.779	12.779		0.769	0.769		0.2	0.2		0.1	0.1	
Stage 7	391.9	22.2	22.2		12.743	12.743		0.653	0.653		0.6	0.6		0.4	0.4	
Stage 7	380.8	22.2	22.2		12.622	12.622		0.782	0.782		0.7	0.7		0.6	0.6	
Stage 7	376.9	22.2	22.2		12.447	12.447		0.937	0.937		1.4	1.4		1.3	1.3	
Stage 7	370.6	22.2	22.2		12.070	12.070		1.220	1.220		1.3	1.3	0.0	1.6	1.6	0.0
Stage 7	365.4	22.2	22.2		11.881	11.880	-1	1.001	1.000	-1	1.0	1.0	0.0	1.0	1.0	0.0
Stage 7	348.2	22.2	22.2		11.506	11.504	-2	1.256	1.254	-2	1.0	1.0	0.0	1.3	1.3	0.0
Stage 7	331.1	22.2	22.2		11.269	11.262	-7	1.229	1.222	-7	0.9	0.9	0.0	1.1	1.1	0.0
Stage 7	306.8	22.2	22.2		10.913	10.904	-9	1.403	1.394	-9	1.1	1.1	0.0	1.5	1.5	0.0
Stage 7	276.5	22.2	22.2		10.415	10.401	-14	1.395	1.381	-14	1.0	1.1	0.0	1.5	1.5	0.0
Stage 7	251.7	22.2	22.2		10.098	10.092	-6	1.518	1.512	-6	0.9	0.9	0.0	1.4	1.4	0.0
Stage 7	225.1	22.2	22.2		9.730	9.732	2	1.370	1.372	2	1.1	1.1	0.0	1.5	1.5	0.0
Stage 7	195.9	22.2	22.2		9.201	9.200	-1	1.321	1.320	-1	1.0	1.0	0.0	1.3	1.3	0.0
Stage 7	168.8	22.2	22.2		8.746	8.745	-1	1.436	1.435	-1	1.1	1.1		1.6	1.6	0.0
Stage 7	120.7	22.2	22.2		8.062	8.063	1	1.772	1.773	1	0.8	0.8		1.4	1.4	0.0
Stage 7	75.2	22.2	22.2		7.538	7.540	2	1.378	1.380	2	1.2	1.2	0.0	1.6	1.6	0.0
Stage 7	55.6	22.2	22.2		7.169	7.168	-1	1.359	1.358	-1	1.0	1.0	0.0	1.3	1.3	0.0
Stage 7	33.6	22.2	22.2		6.777	6.777		1.397	1.397		1.1	1.1		1.6	1.6	

APPENDIX 3 – EROSION AND SEDIMENT CONTROL PLAN

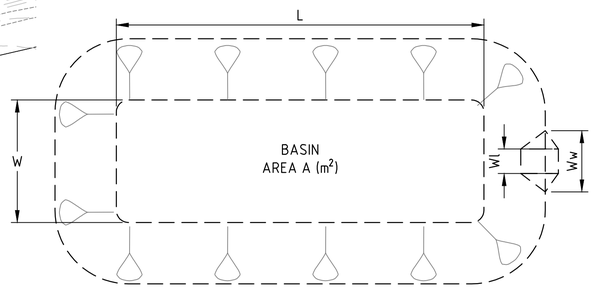
DATE PLOTTED: 5 July 2013 5:23 PM BY : BRENDAN SMITH (BRISBANE)
XREFs: X-GRP-A1-SHT; X-BNE-LOGO; X-7902.44.014 CONT-PROP; X-7902.44.014 EARTHWORKS; 7902.44.006 STAGE 7 Analysis; X-7902.44.014 TMR DESIGN CONTOUR; X-7902.44.014-SURVEY; X-7902.44.014-CONT-EXIST; X-7902.44.014-CONT-EXIST; X-7902.44.014-CUT-FILL
CAD FILE: L:\7902-44 Citiswich\014-STAGE 7\ADesign and Documentation\Acad\Drawings\7902.44.14-201.dwg



LAYOUT PLAN
1:2000

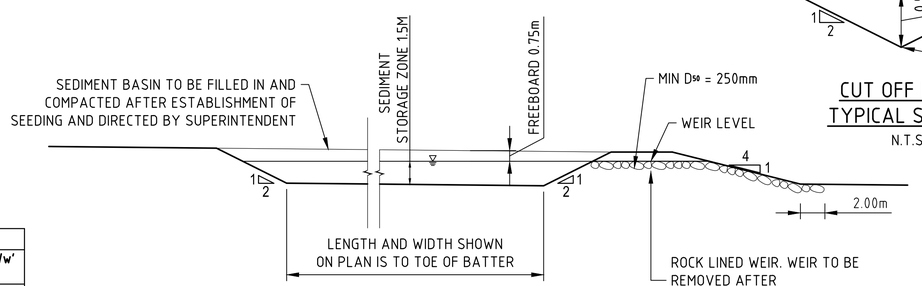
LEGEND

- EXISTING CONTOUR 0.5m INT.
- EXISTING CONTOUR 5m INT.
- CUT-OFF DRAIN (REFER TYPICAL SECTION)
- SILT FENCE TYPE 2 CONTROL DEVICE
- TRUCK SHAKE DOWN FACILITY
- PROPOSED TYPE 1 DEVICE ROCK CHECK DAM
- SEDIMENT BASIN (INDICATIVE SIZE & LOCATION SEE TABLE FOR DETAILS)
- PROPOSED BULK EARTHWORK PAD
- PROPOSED BOTTOM OF BATTER
- E/OH — EXISTING OVERHEAD POWER
- W — EXISTING WATER MAIN
- SWD — EXISTING STORMWATER DRAINAGE
- EXISTING EASEMENT

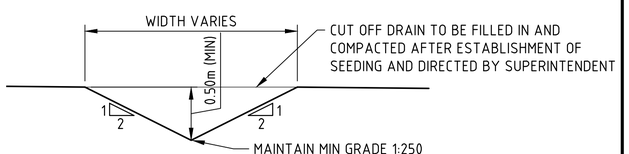


BASIN DIMENSIONS

BASIN ID	BASIN AREA 'A' (m^2)	BASIN LENGTH 'L' (m)	BASIN WIDTH 'W' (m)	WEIR LENGTH 'Wl' (m)	WIER TOP WIDTH 'Ww' (m)
1	3383	101	34	3	6
2	862	51	17	1	4
3	3015	95	32	3	6
4	400	35	12	1	4
5	323	31	10	1	4
6	400	35	12	1	4



TYPICAL SEDIMENT BASIN SECTION
N.T.S



CUT OFF DRAIN TYPICAL SECTION
N.T.S

NOTES:
1. FOR NOTES AND DETAILS REFER TO DRG 7902/44/14-200.

20 0 20 40 60 80 100m
1:2000 - A1 1:4000 - A3

Rev	Date	Description	Drawn	Appr.
1	05/07/2013	ORIGINAL ISSUE	BRS	

Verified — Date 05-07-2013
Approved — Date 05-07-2013
RPEQ No. 13143

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Drawn	BRS 05/07/2013
Checked	FV 05/07/2013
Designed	BRS 05/07/2013

Client: WALKER CORPORATION PTY LTD

CITISWICH STAGE 7
PRELIMINARY BULK EARTHWORKS

EROSION & SEDIMENT CONTROL PLAN

Status: FOR APPROVAL
NOT TO BE USED FOR CONSTRUCTION PURPOSES

Datum	Grid	Scale	Size
A.H.D.		1:2000	A1

Drawing Number: 7902-44-014-201
Revision: 1

0 10 20 30 40 50 60 70 80 90 100 110 120 130 140 150mm ON A1 ORIGINAL

APPENDIX 4 – PERSONNEL REGISTER

To be signed by all personnel entering or active on the site.

Signature confirms that the person (named) has reviewed and will comply with the requirements of the Construction Environment Management Plan.

Name	Organisation and address	Signature	Date

APPENDIX 5 – ENVIRONMENTAL INSPECTION CHECKLIST

Recorder Details	
Name of recorder:	Date:
Location:	

1.0 Documents and records

Question	Response Y/N	Details
1.1 - Required documents, permits and/or approvals in place?		
1.2 - Relevant inductions completed?		
Comments:		
Photo record numbers:		

2.0 - Site Office and Amenities

Question	Response Y/N	Details
2.1 - Are offices and amenities correctly located?		
2.2 - Appropriate pedestrian/road access and signage?		

Comments:		
Photo record numbers:		

3.0 Vegetation Management

Are the below management actions being adhered to	Response Y/N	Details
Approved clearing areas are identified and demarcated using GPS coordinates and flagged star pickets.		
Vegetation conservation areas are identified, demarcated, and where applicable tree protection fencing is erected.		
Tree protection zones (TPZs) are to be established around all trees to be conserved which are near proposed working areas (i.e. adjacent to the confirmed working areas extents).		
Tree protection zones (TPZs) are to be established around all trees to be conserved which are in close proximity to proposed working areas (i.e. adjacent to the confirmed working areas extents).		
TPZs are to be established in accordance with Australian Standard 4970 – Protection of trees on development sites. TPZs include the assembly of mesh tree barriers/guards to protect 'at risk' retained trees from encroachment / accidental damage.		
TPZs are to be established prior to the commencement of any clearing or site works. Within the tree protection zone, the following activities are not permitted: • Storage and mixing of materials; • Vehicle parking; • Liquid disposal; • Machinery repairs and/or refuelling; • Construction of site office or shed; • Combustion of any material;		

• Stockpiling of soil, rubble or debris; • Any filling or excavation including trenching, topsoil skimming and/or surface excavation, unless otherwise approved by the Chief Executive Officer; and, • Unauthorized application of pesticides, herbicides or chemicals.		
Restrict access to all areas outside of the approved clearing and construction areas.		
Ensure vegetation clearing, including tree felling, does not impact areas outside of approved clearing areas.		
Ensure all vehicle and personnel movement is limited to the approved clearing and construction areas.		
Ensure that all fauna management measures are strictly followed prior to, and during vegetation clearing and management.		
All vegetation that is cleared on the site shall be mulched on-site and used for onsite landscaping works.		
Vegetation cleared and not suitable for mulching shall be removed and disposed of in an approved disposal facility.		
Land clearing debris must not be pushed into gullies, watercourses, other drainage line or waterlogged areas, or any areas outside of the approved clearing extent.		
Vegetation clearing must not occur outside of the approved clearing areas and must not exceed 18.38 hectares of vegetation within the project site.		
An approved koala exclusion fence is in place on the southern boundary of the property, and the manual vehicle access gate is closed.		
Approved fencing are in place along the eastern, western and northern boundaries of the property		
Any exposed or damaged tree roots are identified and treated in accordance with AS 4373—2007 – Pruning of amenity trees.		

Arborist / contractor to treat any damaged tress Works are to be undertaken by a qualified minimum Level 5 Arborist or suitably qualified person.		
Site briefings for all staff must occur prior to any major works and before commencement of works daily to discuss approved clearing processes and provide clear understanding of areas to be protected from construction		
All rehabilitation and landscaping works are to be undertaken in accordance with the updated Landscaping and Revegetation Plan (Appendix 11).		

4.0 – Fauna Management

Are the below management actions being adhered to	Response Y/N	Details
A suitably qualified fauna spotter/catcher must also be present on-site during all vegetation clearance works of trees greater than 15cm diameter at breast height.		
The approval holder must not clear any vegetation supporting any fauna until such time that any present fauna vacates the vegetation or are relocated by a suitably qualified person.		
Veterinary care, or assistance from a wildlife refuge, must be sought if any fauna are found injured within the project site while clearing and/or construction occurs within the project site.		
To reduce risk of injury to fauna, all vehicles and plant machinery must stay on pre-determined routes and roads, and must adhere to site speed limits at all times.		
The approval holder must ensure a pre-clearance survey is undertaken by a suitably qualified person within 24 hours before any clearing of vegetation within the project site, to identify any fauna present.		
Immediately prior to the commencement of clearing and on each day that vegetation clearing is to take place, a licensed Wildlife Spotter Catcher should be		

on-site in the event that fauna are observed which require protection, relocation or in case of fauna injury.		
Licensed Wildlife Spotter Catcher to inspect trees to be trimmed / removed and identify hollows for retention / salvage, respectively.		
Non-itinerant fauna (other than Koalas) are, where practicable, relocated / ushered to nearby patches of vegetation or nearby bushland – refer to licensed wildlife spotter/catcher for advice.		
Vegetation containing Koala(s) is to be demarcated with high visibility flagging tape and no further clearing is take place within 20m of the vegetation until such time as Koala(s) has completely vacated the vegetation and the site – refer to licensed wildlife spotter/catcher for advice.		
An approved Koala exclusion fence is in place on the southern boundary of the property, and the manual vehicle access gate is closed.		
Approved fencing is in place along the eastern, western and northern boundaries of the property.		
All domesticated animals are prohibited from site.		
Personnel are prohibited from interacting with and/or feeding native or non-native fauna on-site.		
All vehicles will stay on pre-determined routes and adhere to site speed limits. Speed limits to be clearly signposted to minimise potential for fauna impact.		

5.0 – Pest Management

Are the below management actions being adhered to	Response Y/N	Details
Conduct baseline surveys of the site to determine the current level of weed and pest infestations.		
Conduct weed control for target species on a seasonal basis as per optimal control for each target species (refer to Landscaping and Revegetation plan (Appendix 10) for weed control methods).		

Conduct follow up weed and pest surveys following the completion of all clearing activities to compare with the original baseline survey.		
Ensure all vehicles, equipment and plant undergo a thorough inspection prior to access to site and are free of plant material and soil.		
Ensure soil and mulch used on site is uncontaminated, and free of weeds and pests.		
Conduct herbicide spraying of weeds along the clearing line and the site boundary prior to weeds setting seed.		
Control any infestation of weeds or pests on site.		
Locate cleared vegetation and mulch stockpiles away from areas where runoff from rainfall may occur.		

6.0 – Water Quality Management

Are the below management actions being adhered to	Response Y/N	Details
Erosion and sediment control measures installed in accordance with: • Erosion Management Plan (Appendix 12); • Soil Erosion and Sediment Control Engineering Guidelines for Queensland Construction Sites (The Institution of Engineers, Australia Queensland Division June 1996); • Best Practice Erosion and Sediment Control (International Erosion Control Association 2008); and, • Any relevant development permits.		
Stormwater control measures installed in accordance with: • Erosion Management Plan (Appendix 12); • Stormwater Management Plan (Appendix 17); • Water by Design Bioretention Technical Design Guidelines Version 1.1, October 2014; • Healthy Waterways Water Sensitive Urban Design Technical Design Guidelines for South East Queensland Version 1, June 2006; and,		

• Water by Design Construction and Establishment Guidelines: Swales, Bioretention Systems and Wetlands Version 1.1, April 2010.		
Where required, construct earth bunds around the perimeter of the site (see Appendix 5), as detailed in the Erosion Management Plan (Appendix 2), Stormwater Management Plan (Appendix 17).		
Stormwater drainage structures shall be designed so that there is 'no worsening' of runoff beyond that which occurs on the existing undeveloped site.		
All complaints regarding erosion and water stormwater run-off are to be recorded within a Complaints Register immediately.		
All complaints regarding erosion and stormwater run-off are to be addressed within 24 hours if severe, or within one week for minor complaints.		
There shall be no deposition of sediment from the project site on to neighbouring properties.		
There shall be no nuisance impacts as a result of erosion, stormwater runoff, or sedimentation on to neighbouring properties.		
There shall be no channelling and/or deposition as a result of erosion, stormwater runoff, or sedimentation within the site.		

7.0 - Indigenous and Non-Indigenous Cultural Heritage

Are the below management actions being adhered to	Response Y/N	Details
7.1 - Are appropriate barriers, protection and signage in place for all Cultural heritage items?		
7.2 - Are appropriate clearances in place?		

Comments:		
Photo record numbers:		

8.0 – Air Quality Management

Are the below management actions being adhered to	Response Y/N	Details
Where required, install wind fencing around the perimeter of the site, taking into consideration the use of natural wind fencing (remnant vegetation) as a natural wind barrier.		
Water trucks are to water down unsealed roads and working surfaces during operation to reduce dust lift.		
All complaints regarding dust are to be recorded within a Complaints Register immediately.		
All complaints regarding dust are to be addressed within 24 hours if severe, or within one week for minor complaints.		
All trucks removing materials from site will be loaded inside site perimeter.		
All loads shall be securely covered prior to exiting site perimeter.		
Minimise stockpiling of material.		
Maintain stabilised access roads and driveways.		
Maintain clean roadways wherever possible, particularly at entry / exit points.		
Dust and particulate matter must not exceed the allowable following levels when measured at any nuisance sensitive place or downwind of the project site (see Monitoring section below for further details.		

9.0 – Noise Quality Management

Are the below management actions being adhered to	Response Y/N	Details
Where required, install noise abatement barriers or fencing around the perimeter of the site.		
Make use of noise attenuating controls at the source, such as mufflers or acoustic screens.		
All complaints regarding noise are to be recorded within the Corrective Actions Register.		
All complaints regarding noise are to be addressed within 24 hours if severe, or within one week for minor complaints.		
Locate static sources of noise such as the generators as remotely as possible from noise sensitive receivers.		
Modification of work activities where noise or vibration is found to cause unacceptable impact.		
Hours of construction must be in accordance with: • The provisions of any relevant local law; or, • In the absence of any relevant local law or condition, the hours of construction must be limited to 0630–1830 Monday to Saturday and not at all on Sunday and public holidays.		

10.0 – Waste Management

Are the below management actions being adhered to	Response Y/N	Details
All waste should be placed in appropriate disposal containers and areas during construction.		
All waste should be removed from site and disposed of appropriately.		
Where possible ensure that waste onsite is appropriately covered.		
Covered bins are provided to collect waste and prevent fauna being attracted to the work site.		

An adequate number of an appropriate type of commercial and bulk waste containers shall be provided at a central location to accommodate all waste produced on the site.		
All waste collected on the site to be removed not less than once per week.		
Appropriate spill kits, personal protective equipment, operator instructions and emergency procedure guides for the management of wastes and chemicals must be in a place accessible to all employees.		
All fuels and chemicals must be stored in an onsite containment system of a type suitable to prevent the spillage of the material and its discharge to the environment.		
All general and regulated waste records, including transfer station dockets and waste tracking certificates, are to be retained.		
Waste must be stored, pending its lawful disposal to landfill or to a recycling facility, or another place with the written approval of the administering authority, in a location at the authorised place where it is not visible to a person outside the authorised place.		
Waste (other than wastewater or sludges in the evaporation pond) must be removed from the authorised place within the timeframe specified for the waste as follows: o If the waste is surplus from the construction of the power station — within three (3) months after the power station is commissioned; or, o Otherwise — within three (3) months of the waste being generated.		
Waste storage areas are to be signed and located away from environmentally sensitive areas.		
Burning of waste is prohibited.		
Adequately sized refuse bins will be made available on-site, and will have suitable lids to prevent access by animals.		
Construction site is to be kept in an orderly and hygienic standard, free of litter and waste.		

APPENDIX 6 – CONTACTS LIST

Internal Contacts	Name / Company	Phone Number
Wildlife Spotter Catcher	Litoria Consulting	07 3852 4855
Site Environmental Manager	Litoria Consulting	07 3852 4855
Project Manager	TBA	TBA
External Contacts	Name / Company	Phone Number
Ambulance/Police/Fire Brigade	N/A	000
RSPCA Animal Emergency Hotline	N/A	1300 264 625

APPENDIX 7 – INCIDENT REPORT FORM

Name of person(s) completing this form:
Signature of person(s) completing this form:
Date:

INCIDENT DETAILS

Date and time of incident:
Name of person(s) involved:
Description of incident:
Witnesses of incident (include contact details):

INJURY DETAILS (if applicable)

Description of injuring (include parts of body affected):

REPORTING OF THE INCIDENT

Incident reported to:
Date:
Reporting method (in person, email ,phone etc):

FOLLOW UP ACTION

Description of action(s) to be taken:

APPENDIX 8 – CORRECTIVE ACTIONS REGISTER

Reference number	Date & location of incident, complaint, or non-conformance	Details of incident, complaint, or non-conformance	Actions taken to control the incident, complaint, or non-conformance	Date by which the corrective action will be completed (unless ongoing)	Appropriate sign-off indicating that the incident/complaint/non-conformance was investigated

APPENDIX 9 – NOISE MEASUREMENT MANUAL

Noise Measurement Manual

Queensland Government

Prepared by: Department of Environment and Science

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Version	Date	Description of changes
2	1 March 1995	Major revision
3	1 March 2000	Major revision
4	22 August 2013	Major revision
4.01	10 March 2020	Minor revision

March 2020

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Purpose

This document prescribes the processes required to measure noise in accordance with the Environmental Protection Regulation 2019 (EP Reg) under section 59 and 60.

Noise measurements taken using these procedures can be used by Authorised Persons to make assessments under the *Environmental Protection Act 1994* (EP Act) and subordinate polices and guidelines. These laws are enforced by the Queensland Government, local governments and other administering authorities.

Information included in this document is applied by administering authorities to assist in the decision making process for applying enforcement provisions under the EP Act.

Guidance material in the appendices should be used in conjunction with other relevant legislation and standards referenced within this document.

Scope

This manual explains how to:

- Plan a noise measurement
- Take on-site source and background noise measurements.
- Determine component levels by removing ambient noise
- Make adjustments to account for tonal and impulsive characteristics
- Report noise measurements.

Activities listed in schedule 1 of the EP Act (and as cross-referenced in Section 7, subsection (6)(a) and (b) of the Environmental Protection Policy, EPP (Noise)) are not within the scope of this manual. Exclusions in the scope also cover any licensed or unlicensed activities and operations of facilities considered to be ancillary to those listed in Schedule 1 of the EP Act (e.g. maintenance depots that support transport infrastructure).

Limitations

This document does not include guidance for all situations. Noise measurement methodologies outside the scope of this manual may be required. In those circumstances, detailed assessment notes should be taken which specify why the measurements were taken in a different manner. This manual is intended for use by Authorised Persons and those with a basic understanding of acoustics.

Legislation

Relevant legislation and subordinate policies include, but are not limited to, the following:

- *Environmental Protection Act 1994*
- Environmental Protection Regulation 2019
- Environmental Protection (Noise) Policy 2019 (EPP Noise)

Responsibilities of “Authorised Persons”

All ‘authorised persons’ as defined under the EP Act who conduct noise measurements are responsible for performing their work in accordance with the procedures described in this manual. Authorised persons must prove that no deviation from the procedures has occurred during noise measurement, except in special circumstances. Where deviation has occurred, the authorised person must provide details including a statement of reasons.

Acronyms and terms

Some frequently used acronyms and terms are detailed in Table 1.

Table 1. Acronyms and Terms

Acronym/term	Meaning
AS	Australian Standard
CASA	Civil Aviation Safety Authority
DA	Development Approval
dB	Decibel
DES	Department of Environment and Science
DTMR	Department of Transport and Main Roads
EA	Environmental Authority
EP Act	*Environmental Protection Act 1994*
EP Reg	Environmental Protection Regulation 2019
EPP Noise	Environmental Protection (Noise) Policy 2019
EPO	Environmental Protection Order
ERA	Environmentally Relevant Activity
Hz	Hertz
L_p	Sound pressure level
NATA	National Australian Testing Authority
OLGR	Office of Liquor and Gaming Regulation
Pa	Pascal
Registered Operator	A person or company who is currently on the Register to operate an ERA under an Authority
SLM	Sound level meter
TEP	Transitional Environmental Program

Purpose of measurement

Authorised Persons assess noise levels to establish a level of compliance with the EP Act. The noise measurements collected during site inspections may be used as evidence for enforcement.

Confirm jurisdiction

The officer investigating the noise nuisance must confirm what jurisdiction the complaint falls within. Table 2 indicates the distribution of responsibility between government bodies for controlling common noisy activities at the time of publishing this document.

Table 2. Responsible authorities

Activity	Local Government	OLGR	DES	DTMR	Police	Water Police	Airservices Australia	Commonwealth
Residential noise, ie air-conditioning units, pool pumps, animals.	■							
Devolved activities as listed in section 133 of the EP Reg 2019 *1	■							
Premises with liquor licence		■						
Activities described in Schedule 2 and not devolved to Local Government as listed in section 133 of the EP Reg 2019			■					
State owned or operated activities			■					
On road noisy vehicles and trail bikes				■				
Off road noisy vehicles and trail bikes					■			
Music, loud stereos, parties and rowdy behaviour and burglar alarms					■			
Boat noise, canals, rivers and creeks	■					■		
Aircraft in flight							■	
Helicopters							■	
Noise from Defence Force								■

Exceptions to devolution

An activity is not devolved to the relevant local government if:

a) the activity includes an environmentally relevant activity administered by the State at the same place (see r. 142 of the EP Reg)

b) the activity is carried out by a local government or the State (see r. 140 of the EP Reg)

c) the activity is carried out as a mobile and temporary activity in more than one local government area (see r. 141 of the EP Reg).

Complaint details and noise emission diary sheets

Prior to commencing a noise investigation it is suggested that the investigating officer request the complainant to complete noise emission diary sheets.

Refer Example Template **–** Noise Emission Diary Sheet (Appendix 1).

Investigation details and emission criteria

A noise assessment involves the examination of the nature and characteristic of a noise. The investigating officer must gather basic information relating to the complaint and noise source including, but not limited to:

- the type of noise
- the time the noise happens (noise may be a nuisance at any time of day or night)
- a subjective assessment of the source noise i.e. is the noise audibl**e within the complainant's backyard** and/or house; is the noise at a level that would preclude sleep or prevent the complainant from enjoying the confines of their own home; **or impact upon the complainant's ability to watch television etc.**
- the duration of the noise
- the frequency of the noise (both the tone/pitch and how often it occurs)
- notes of any other noise that can be heard, i.e. extraneous noises and any observation as to their relations in sound level (e.g. traffic noise is much louder than the noise under investigation, or the noise under investigation can be heard clearly over other noises etc.)

Before an Authorised Person can decide to issue a direction notice in relation to a contravention of section 440 of the EP Act involving an emission of noise, the Authorised Person must consider the general emission criteria as stated within section 363 of the EP Act.

Refer Appendix 5**—**Officer Checklist 1**—**Investigation Details/Emission Criteria.

Weather

A noise measurement should be taken on a day with a calm to gentle breeze and without rain. Some conditions to avoid are high wind (generally, do not conduct the assessment if the wind is higher than 5 meters/second (m/s)), or rain.

If it is necessary to measure in a wind-affected position, check the manufacturer's specification for the microphone and confirm that the windshield can be used in these conditions.

It may assist to check the Bureau of Meteorology website: http://www.bom.gov.au/ prior to conducting a site visit for the local weather forecast and wind conditions for the area.

The investigating officer must note the approximate wind speed using the Beaufort Scale as shown in Table 3.

Table 3. Beaufort Scale (Source AS 2221.1)

Wind force number	Explanatory notes	Specification of Beaufort scale for use on land	Mean wind speed m/s
0	Calm	Calm, smoke rises vertically	Less than 0.5
1	Light Air	Direction of wind indicated by smoke drift, but not by wind vanes	0.5-1.5
2	Slight Breeze	Wind felt on face, leaves rustle, ordinary vane moved by wind	1.5 - 3
3	Gentle Breeze	Leaves and small twigs in constant motion; wind extends light flag	3 to 5
4	Moderate Breeze	Raises dust and loose paper; small branches moved	5 to 8
5	Fresh Breeze	Small trees in leaf begin to sway; wavelets from the inland waters	8 to 11
6	Strong Breeze	Large branches in motion; whistling heard in telegraph wires; umbrellas used with difficulty	11 to 14

Safety

If there are hazards in the general location of where the ideal measurement position is, find an alternative location or time with similar conditions, but without the hazard.

Refer Appendix 2—Personal Safety / Risk Reduction Measures.

Noise descriptors

A noise assessment may be completed for the following reasons:

- to determine if an environmental nuisance has been caused
- to verify if a noise standard has been contravened by emission of noise.

It is important to ensure the correct noise descriptor is assessed:

Time varying noise: $L_{Aeq,T}$ is used to quantify the noise where the L_p varies over time. In most situations, the $L_{Aeq,T}$ is the most appropriate descriptor used to investigate environmental noise complaints.

Steady noise: In cases where constant noise is present e.g. constant machine noise, the $L_{A90,T}$ can be used as an equivalent to $L_{Aeq,T}$. This generally has the advantage of removing extraneous ambient effects from the measurement. For example, noise from occasional traffic and birds won't be captured by the $L_{A90,T}$. The $L_{A90,T}$ descriptor is commonly used to assess noise emissions from sources including fan noise, domestic air-conditioners and pool pumps.

Short duration/non-steady noise: Impact, impulse and transient noise is measured with L_{Amax}. This noise descriptor is also used to assess sleep disturbance and awakening criteria as per WHO, 1999 and 2009

Frequency weighting

The frequency weighting, A, C and Z will be specified by the noise standard, guideline or licence condition. A-weighting is most common and should be used unless specified otherwise.

Time weighting

The Time Weighting (Fast, Slow or Impulse) will be specified by the noise standard, guideline or licence condition. Fast is the default unless otherwise specified.

Measurement time

The noise under investigation should be measured for sufficient time to establish that the measured value adequately represents the subject source noise. The source noise is measured over a time interval of at least 15 minutes or, if the noise continues for less than 15 minutes, the duration of the source noise.

Refer Appendix 3—Basic Acoustic Principles.

Measurement location

When an investigating officer is undertaking a noise assessment it is essential to make note of the following on a site map:

- location of noise source
- background noise measurement location
- source noise measurement location
- topography between noise source and sensitive receivers.

When assessing environmental nuisance or noise standards under the EP Act:

When assessing under the EP Act, select the location that is considered to best represent the most affected location. These measurements are typically conducted in or near buildings and are not required to be in a free field.

When assessing a licence condition under the EP Act:

The appropriate measurement location and descriptor should be referenced in the DA, licence conditions or notice/order i.e. at the nearest sensitive receiver, nearest commercial premises, nearest nuisance sensitive premises or boundary. These measurements are not required to be in a free field unless specified.

Measurement method

Handheld Quick Assessment

The handheld assessment method is useful to get an idea of noise levels, however a tripod should be used for a compliance inspection or to take enforcement action.

To obtain the most accurate data using this method, hold out the SLM at arm's length and hold it out to your side with the microphone pointed towards the source of the noise, to minimise sound reflecting off your body.



Figure 1. SLM handheld assessment method

Source Bruel & Kjaer

SLM (including microphone) mounted on tripod

SLM mounted on a tripod is the method used most commonly and is the standard methodology for most noise measurements where compliance/enforcement action may be taken as a result of the investigation.

Care should be taken not to make noises whilst observing the meter in this method and ensuring the least amount of reflective surface from your body is exposed to the meter.



Figure 2. SLM mounted on tripod *Source Bruel & Kjaer*

Affected height of the receptor

A noise reading should always be taken at the height of the receptor. If the receptor is at the ground level, take a measurement at the ground level (1.2–1.5m off the ground).

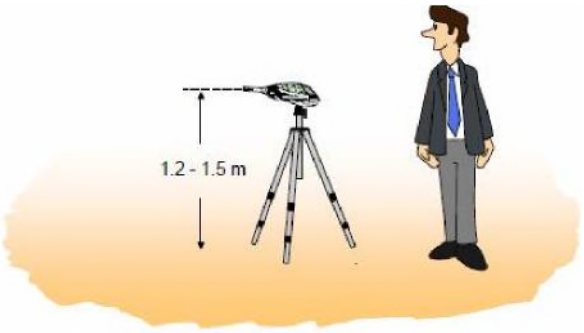


Figure 3. SLM measurement

Source Bruel & Kjaer

Microphone mounted on a tripod remotely from SLM

Sometimes situations and locations require setting up a microphone away from the location of the SLM mounted separately on a tripod. If the receptor is higher off the ground, raise the microphone to the level that is approximately at the middle of the window (or other opening to the dwelling) using an extendable tripod or position the meter in the plane of the window using an extension pole. The distance of the microphone from the façade of the building should be 3.5m.

Outside premises – free field measurements

Free field measurements are generally used to assess noise conditions set at property boundary or to assess a noise model calibration/validation point. Free field measurements are not required for measurements under the EP Act unless specified on the licence or approval conditions.

Any hard surface will reflect sound. If the microphone/SLM is placed too close to a reflective surface, the noise level will show up higher than the actual noise level. To avoid the reflection, take a reading more than 3.5m away from a reflective surface.

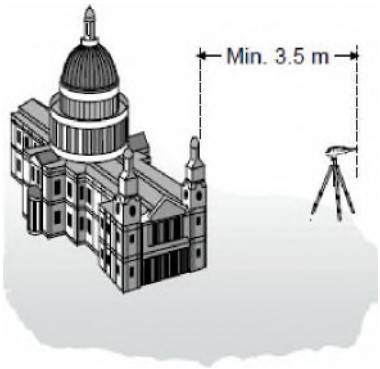


Figure 4. Minimum distance to nearest reflective surface outside premises

Source Bruel & Kjaer

Inside a room

Measurements inside buildings shall be carried out in those locations at which the noise of interest dominates. When investigating a sleep disturbance issue a noise assessment will be necessary in a bedroom, reference WHO 1999 & 2009. The preferred positions are at least 1m from walls or other major reflecting surfaces, 1.2m to 1.5m above the floor, and 1.5m from windows. The presence of furnishings or other reflective surfaces, which may result in shielding or scattering of the noise, should also be considered.

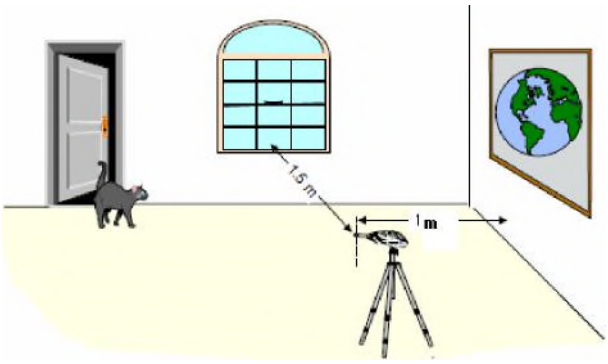


Figure 5. Minimum distance from nearest reflective surface inside room
Source Bruel & Kjaer

An outdoor location that is part of a building

(For example: under a veranda, porch, on a deck, balcony)

As per **Inside a room**. The same distances and considerations should be applied

Inside, at the façade of the building, in the plane or open window or open doorway

In many cases the intrusive noise will be most noticeable at the building opening most exposed to the source noise. In these cases, the part of the building of interest will be the open window or doorway.

The window or door should be open as wide as possible, with the microphone being located in the middle of that opening. For example see Figure 6 below:

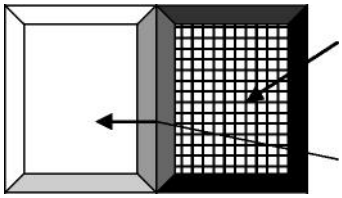


Figure 6. Measurement location with an open window

Where it is not possible to sufficiently open the window (e.g. awning window with limited opening as shown in Figure 7 below) then the measurement may be taken inside the room as discussed above.

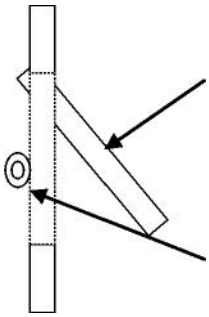


Figure 7. Measurement location with a window - limited opening

Measuring source noise and extrapolating back to the complainant's property.

An alternative method for measuring the noise under investigation is to move the sound level meter closer to the noise source to a point where the source clearly dominates, note this new position, and take a new reading. Measured levels may then need to be extrapolated back to the position of the affected resident.

Refer Appendix 4—Distance Attenuation.

Multiple noise sources

Many noise measurement situations require calculating the combined sound pressure level of multiple noise sources.

Refer Appendix 4—Multiple noise sources.

Long-term logging (unattended)

Noise logging can be useful in the following situations:

- When measuring irregular and infrequent noises, it is not always practical to measure the noise with an attended measurement.
- When it is difficult to determine the background noise during the attended period (e.g. the source doesn't stop during the attended period, or the background is known to be variable), noise logging can determine the background noise over a longer period of unattended measurement.

In these cases, the investigating officer may be able to conduct a 'logging', which allows monitoring of the noise for a longer period of time. In order to conduct outdoor logging of various durations, the SLM should be housed in an all-weather case and an outdoor all-weather microphone kit used to ensure damage to the meter/microphone does not occur. It is also important to ensure the security of the SLM, as the equipment is often very sensitive and expensive. The logger should be located using the same instructions indicated in the Measurement method section. Where an officer does perform unattended logging, it is suggested that attended measurements are also completed to calibrate the results of the unattended logging.

Calibration

There are two types of calibration necessary for noise monitoring equipment–laboratory calibration and field calibration.

Laboratory calibration

It is essential to ensure that the SLM and calibrator have been calibrated in a National Australian Testing Authority (NATA) certified calibration laboratory. The calibrators are required to be calibrated every year and the SLM must be calibrated as per the manufacturer's specifications. A sticker on the SLM and calibrator indicates the last recorded date of laboratory calibration

Field calibration

Calibration of the SLM is to be carried out before and after each set of noise measurements in accordance with AS IEC 61672.1-2004 (Standards Australia 2004a). The investigator should also recalibrate each time the SLM is moved to different locations.

The L_p shown on the meter should match the stated L_p for the calibrator being used. Standard calibration is generally 94 dB(A) but can vary slightly due to the microphone sensitivity e.g. 93.8 dB(A). The calibration level should be confirmed with the SLM manufacturer's specifications. The variation before and after the calibrations should be no more or less than 1 dB(A). If the deviation of the calibration is greater than 1 dB(A) then the results obtained during the assessment are invalid.

The background noise assessment

The background Lp is commonly referred to as the background noise level or LA90 in the absence of the source noise. Accurate measurement of the background level is important, as it is often one of the criteria used when assessing the impact or potential impact of intrusive noise.

Short term background measurements

For noise assessment purposes the short-term background noise level is generally taken as the L_{A90} level measured by the SLM, excluding all distinct extraneous noises. A minimum measurement time of 10 minutes is required to determine the background noise level under AS 1055.1. One of the most common extraneous noises encountered in Queensland whilst conducting a noise assessment is constant cicada noise. Cicadas only occur during certain periods of the day and it is advisable to postpone measurements until the insect noise stops, or return at another time. Extraneous noises which may contaminate a background noise measurement include insects, machinery and other long-duration noise sources that are not typical of the area and which can be easily distinguished and clearly identified during the measurement period. Most short-term extraneous noises will not be captured by the L_{A90}, however where this cannot be circumvented these must be reported. Ensure the background is representative of the worst-case scenario and the background noise level should be ideally measured immediately before or after the assessment of the source noise at the same location. If more than one background noise assessment is completed it is advisable to use the lowest result.

Long term background measurements

For more complex situations it may be necessary to complete long-term background monitoring. This involves measuring the L_{A90} for 8 hours or more using a SLM and is generally used for complex noise investigations.

The following time periods are generally used for background noise measurements:

- Day: 7am to 6 pm
- Evening: 6pm to 10pm
- Night: 10pm to 7am.

Comprehensive long term background noise methodology is described in the DES Planning for Noise Control Guideline.

Remote background assessment

When the noise source cannot reasonably be turned off, a background noise level can be measured at a location which has the same background noise characteristics, but away from the impact of the source noise (i.e. in a remote location).

When selecting a site to conduct remote background noise measurement, care should be taken to note the noise characteristics of the affected premises, then ensure similar distances are maintained from the major sound sources such as main roads, railway lines, forest and industrial zones (other than the one under investigation), to ensure the site has the same background noise characteristics as the affected premises.

Taking a remote background noise assessment is a less preferred method, however, in the event that this method is the only option, Record detailed notes and complete a site sketch showing the location of assessment in relation to the sensitive receiver and location of source noise.

Calculation of component noise levels

The influence of ambient noise must always be removed from the source noise level measurements for the purposes of comparison with noise limits. The source noise level with ambient noise removed is referred to as the component level. The simplest method to ensure the ambient noise is removed from the source noise is to measure at a time when the ambient noise is sufficiently low [more than 10dB(A) below the source noise level] The noise assessment

may require a measurement during periods of low ambient noise, even if that does not correspond to the time of complaint, to get a definitive result. In this case the measured noise level and component level are effectively equal.

It is also possible to mathematically remove the influence of the ambient noise from the source noise by logarithmic subtraction. Care should be exercised using mathematical adjustment, which is generally only applicable where the ambient noise environment is reasonably steady.

Table 4 provides a method for mathematical subtraction, where:

A = the measured result on site of the noise source plus ambient noise (continuous)

B = the result of the ambient noise level (continuous) only measurement

C = the noise source component level (continuous) only with the influence of the ambient noise level (continuous) removed

Table 4. Calculation of component noise levels

NOTES: * Such a result indicates that it is unlikely that noise from the noise source is an issue due to the masking effect of the ambient noise.

*,† Care should be exercised with such results as it indicates a difficult measurement. The measurement should be repeated over a number of periods to give confidence in the result. It may require measurement during periods of low ambient, even if that does not correspond to the time of complaint, to get a definitive result.

A minus B	**C**
0	At least A minus 10*
1	At least A minus 5*
2	A minus 4†
3	A minus 3†
4	A minus 2
5	A minus 2
6	A minus 1
7	A minus 1
8	A minus 1
9	A minus 1
10 or more	A

Where both the ambient noise and the source noise are reasonably steady, the L_{A90} descriptor can be used for the A minus B calculation above. This will often be the case for mechanical plant noise, such as air conditioning, refrigeration equipment and pump noise. In situations where the source noise varies with time, the L_{eq} descriptor should be used for the A minus B calculation.

Alternatively, the A-B calculation can be performed directly with the following formula:

Component Level $= 10 \times \log(10^{A/10} - 10^{B/10})$

This can be done in a spreadsheet, e.g. In MS Excel ®: (to subtract cell A1-B1)

=10*LOG(10^(A1/10)-10^(B1/10))

Corrections are then applied to the ***component level*** in recognition of the annoyance generally associated with a noise which is dominated by tonal or impulsive characteristics. This is discussed in later sections.

Adjustments made to noise levels with annoying characteristics

If a noise has tonal characteristics (especially at high frequencies) or impulsive characteristics, it is generally perceived more annoying than a noise heard without these characteristics. Examples of tonal noise include, reversing beepers, alarms, bells, buzzers, the screeching of mechanical plant, grinding metal. Examples of impulse noises include, a metal press and hammering.

Tonality adjustments

Tonal noise can be defined as having a prominent frequency and characterised by a defined pitch. A tonal characteristic can be identified objectively in accordance with the method in Australian Standard AS1055.2018

Acoustics - Description and measurement of environmental noise. The method involves comparing noise levels in adjacent one-third octave bands.

The standard states:

> *If tonal components are clearly audible and they can be detected by a one third octave analysis the adjustment may be 5dB. If the components are only just detectable by the observer and demonstrated by narrow band analysis, an adjustment of 2-3dB may be appropriate.*

If the A-weighted 1/3rd octave analysis confirms that the tonal band exceeds both neighbouring bands by 5dB the user is permitted to subjectively adjust the level. The adjustment can be 0 to 5dB to the ***component level*** depending on the audibility of the tone.

Alternatively, this analysis and correction can be performed quantitatively by performing the following check.

- Confirm the A-weighted 1/3rd octave band exceeds the neighbouring bands by 5dB
- Add 5dB to the tonal 1/3rd octave band
- Logarithmically sum all A-weighted 1/3rd octave bands, including the adjusted band
- The arithmetic difference between the log sum determined in (3) and the original overall A-weighted level becomes the tonal correction

Example: An officer measures noise from a machine and notices an audible low frequency tone at 50Hz. The total level of the measurement was 58dB(A). In this case the ambient level was more than 10dB below the measured level, so the component level is 58dB(A). Subjectively the tone was just audible as it was masked somewhat by the overall machine noise. The 1/3rd octave band component level data was entered into a spreadsheet as shown below. A 5dB correction was added to the 50 Hz 1/3rd octave band level.

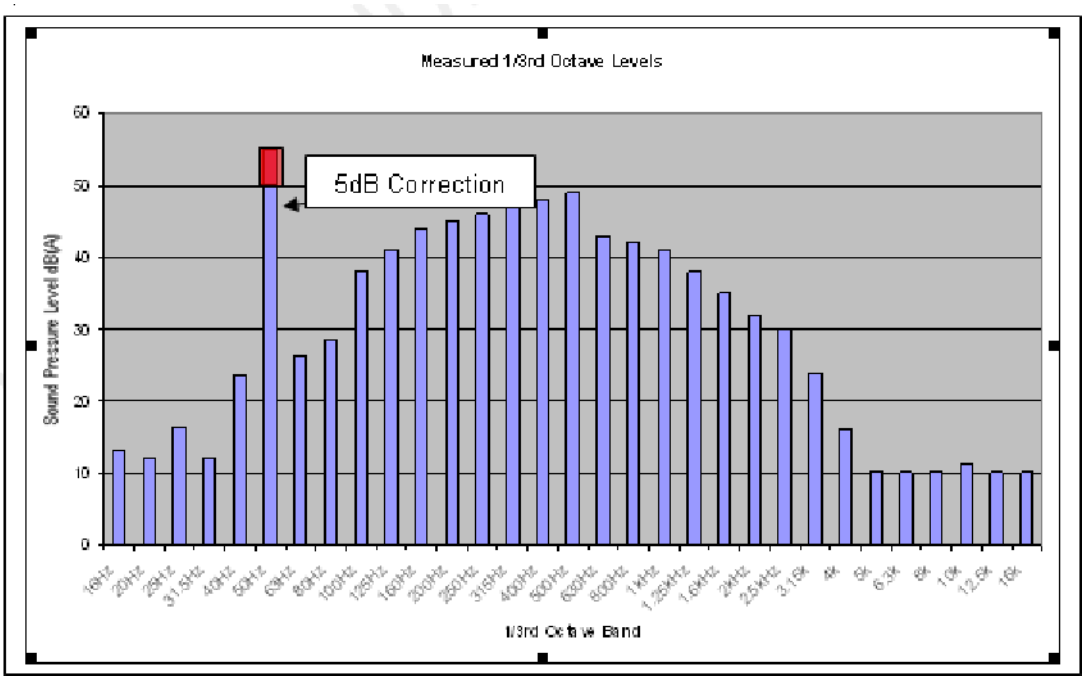


Figure 8. one-third octave band analysis

Logarithmically summing the one-third octave bands, including the corrected band gives a new total of 61dB(A). This is 3dB higher than the component level. The new corrected component level becomes 61dB(A), (i.e. a 3dB tonal correction).

Impulsive adjustments

Impulse noise can be defined as having a high peak of short duration or a sequence of such peaks (bangs, clicks, clatters, or thumps). To determine if an adjustment is necessary the investigating officer must measure the source noise using both A-weighted Fast response and Impulse response. If the difference in A-weighted maximum noise levels between Fast response and Impulse response is greater than 2dB then apply difference in measured levels as the correction up to a maximum of 5dB. The impulse adjustment should then be added to the component level (L_{Aeq} or $L_{Amax)}$ and should not exceed 5dB. Combined adjustments for tonality and impulsive noise in total should not exceed 10dB.

Low frequency noise

Low frequency noise can be defined as noise that has a dominant content less than 200Hz. Noises below 20Hz are known as infrasound and are usually not audible but rather felt as a vibration, pulsating sensation or pressure on the ears or chest. Types or activities that may produce low frequency noise include pumps, fans, boilers, ventilation plant, electrical installations and wind turbines.

Refer Appendix 3—Basic Acoustic Principles.

Saving information and record keeping

To ensure data collected conforms to rules of evidence, detailed records of the investigation and methodology must be kept. The noise assessment must be completed in accordance with this manual however where special circumstances have lead to deviations, detailed notes and records must be provided explaining the reasons for deviation.

- Refer Appendix 5—Officer Checklists:
- Investigation Details / Emission Criteria
- Noise Assessment Equipment Checklist
- Noise Assessment Procedure
- Noise Assessment Field Notes.

Controls

First review to be made in 12 months and then every 3 years thereafter by Operational Support Branch.

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Standards Australia AS 1055:2018 Acoustics – Description and measurement of environmental noise.

Part 1: General procedures

Part 2: Application to specific situation

Part 3: Acquisition of data pertinent to land use

Standards Australia AS/NZS IEC61672.1:2019 Electroacoustics – Sound Level Meters – Specifications.

Standards Australia AS IEC 61672.2:2019 Electroacoustics - Sound level meters - Pattern evaluation tests.

Standards Australia AS 1633-1985 Acoustics – Glossary of terms and related symbols.

Standards Australia AS 2659 – Guide to the use of sound measuring equipment.

Part 1: Portable sound level meters

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WHO 1999 - Guidelines for community noise, World Health Organisation 1999

WHO 2009 - Night noise guidelines for Europe. World Health Organisation 2009

Appendix 1

Noise emission diary sheets template

Day and time	Time started	Time finished	Description of noise	How did the noise affect you?

Appendix 2

Personal safety

Before embarking on any site inspection it is essential that officers are aware of their legislative responsibilities for *WorkPlace Health and Safety Act 2011*.

Some of the common risks encountered whilst conducting a noise assessment include

- vehicles on the road
- machinery on site
- people (especially when conducting noise assessment at night)
- overhead wires (especially if you are raising a microphone using an extendable tripod)
- animals (dogs, stinging insects and snakes are common in some places); and
- weather including cold, heat, humidity and the sun.

Officers should be aware of their surroundings and assess any potential dangers associated with conducting a site visit and noise assessment. Hearing protection may be required when conducting environmental noise assessments.

The primary criterion for selecting a hearing protector is that the level of noise entering ears must be reduced to below the legal limits of the Workplace Health and Safety Regulation 2008, which are:

a) an 8-hour equivalent continuous A-weighted sound pressure level of 85 dB(A), referenced to 20 μPa; or

b) a C-weighted peak sound pressure level of 140 dB(C), referenced to 20 μPa.

Risk reduction measures

Once the risks are identified, the officer should consider how to reduce the risks. In most cases, the risks to personal safety while conducting noise assessment can be eliminated altogether or reduced significantly by moving to an alternative location or wearing personal protective equipment (PPE).

Personal safety comes first. No task is so important that safety can be compromised.

Appendix 3

Basis acoustic principles

Sound and noise

Sound is the mechanical vibration of a gaseous, liquid or elastic medium through which energy is transferred away from the source by progressive sound waves. Hearing is simply fluctuations in air pressure detected by the ear. ***Noise*** has a subjective quality and is often defined as unwanted sound.

Measuring sound

Air or sound pressure is measured in Pascals (Pa) but is expressed as a sound pressure level (L_p) in decibels (dB), which is a logarithmic scale used to compress the range of audible sound pressure. The relationship between sound pressure and L_p is as follows:

$$L_p\ (dB) = 10 \log(p^2 / p_{ref}^2) = 10 \log(p / p_{ref})^2 = 20 \log (p / p_{ref})$$

Where ***Lp = sound pressure level (dB)***

p = sound pressure (Pa)

$p_{ref} = 2 \times 10^{-5}$ ***- reference sound pressure (Pa)***

Some useful rules of thumb:

- Some typical sound pressure levels of common noise sources are detailed in Figure 8.
- Table 5 shows the subjective effect of changes in noise levels.

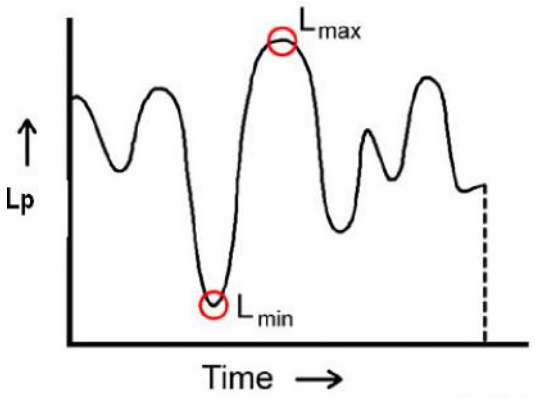
Noise descriptors used in impact assessment

The parameters frequently used for measuring noise include L_{Amin}, L_{Amax}, and L_{Aeq} and L_{A90}. Most contemporary SLMs record multiple noise parameters at the same time.

L_{Amin} and **L_{Amax}** refer to the equivalent minimum and maximum values recorded by the SLM during an assessment, see Graph 2. L_{max} is often compared to the L_{A90} (background) to describe the likely impact of non–steady noise such as fluctuating or impulsive noise.

L_{AmaxT} is the A-weighted L_p **obtained by using 'fast' time response and arithmetically averaging the visual maximum** levels of the noise under investigation, unaffected by extraneous noise, during the measurement period. This parameter is usually used for impact and/or intermittent noises, as this parameter does not account for a more constant noise.

L_{AmaxT} is generally only used where noise assessment is carried out using a non-integrating (analogue or digital) SLM and where the SLM does not have the capacity to calculate the statistical (i.e. **L%** sound pressure levels).

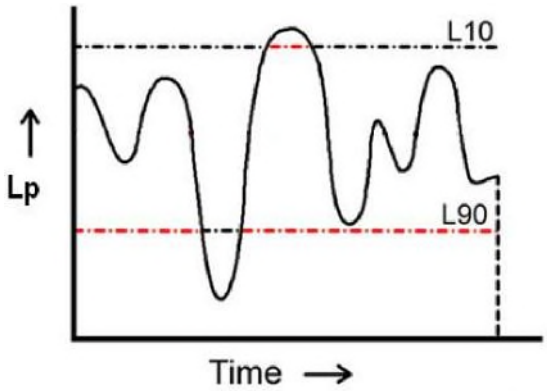


Graph 1. L_{Amin} and L_{Amax}

L_{AeqT} is the A-weighted equivalent continuous L_p of the sample time T. The **$L_{Aeq,T}$** is also known as the 'time average sound pressure level' or the 'level of noise equivalent to the energy average of noise levels occurring over a measurement period'. This is the current default descriptor for environmental noise measurement. It is used widely throughout the world for measuring noise sources and it is an extremely versatile parameter.

L_{peak} is not the same as the Maximum Sound Level. The Peak, referred to as the **L_{peak}** or sometimes $L_{pk,}$ is the maximum value reached by the sound pressure. There is no time-constant applied. This is the true peak of the sound pressure wave. This parameter is commonly seen within the development conditions of mines and used to regulate blasting operations.

Percentile levels are commonly used when measuring environmental noise. This is represented by L_n, where n may be a value from 1 to 99. L_n represents that noise level exceeded for n% of the measurement time. Common percentiles used are shown in Graph 2.



Graph 2. Common percentiles

L_{A90} is the sound pressure level that has been exceeded for 90% of the time. This level is taken to be the background sound pressure level.

$L_{Abg,T}$ is also known as the 'background sound pressure level', (also known as the average minimum sound pressure level) and is the A-weighted L_p obtained using 'fast' time response and arithmetically averaging the visual minimum levels of the noise under investigation, unaffected by extraneous noise, during the measurement period.

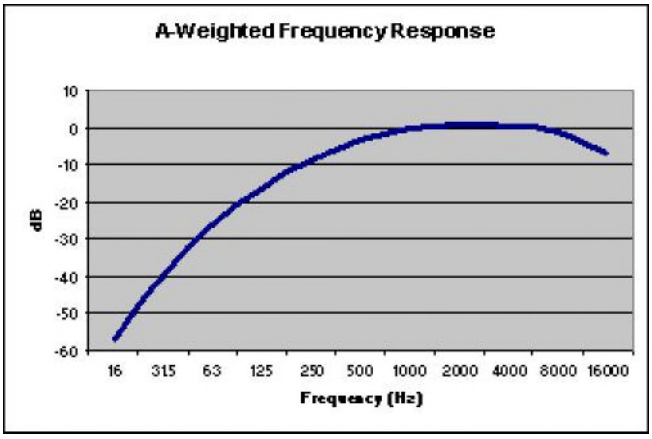
In cases where **$L_{Abg,T}$** has been referenced in development approvals or legislation, it is to be taken as **$L_{A90,T}$**. (**$L_{Abg,T}$** = **$L_{A90,T}$** (unaffected by extraneous noise)).

L_{A10} is the sound pressure level exceeded for 10 % of the time of the measurement duration.

Setting up of SLM and frequency weightings

A- weighting

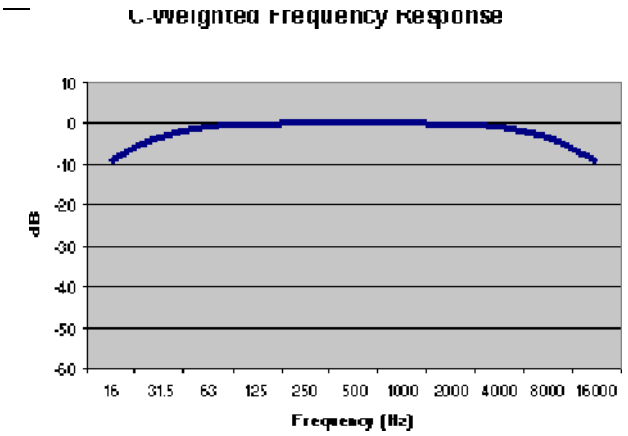
The most common weighting used in environmental noise measurement is A-weighting. The A-weighting represents the way the human ear is more sensitive to mid-range frequencies and less sensitive to high and low frequencies. Defined in the sound level meter standards (IEC 60651, IEC 60804, IEC 61672, ANSI S1.4), a graph of the frequency response can be seen to the right. A-weighted measurements are expressed as **dB(A)**, see Graph 3.



Graph 3. A-weighted Frequency Response

C-Weighting

The response of the human ear varies with the sound level. At higher sound pressure levels, the ear's response is flatter, as shown in the C-Weighted Response to the right. Although the A-Weighted response is used for most applications, C-weighting is also available on many SLMs. C-weighting can be used for Peak measurements and low frequency noise. It is often used in entertainment noise measurement, where high pressure low frequency noise is common. The C-weighting is also commonly used for sounds with impulsive characteristics such as fire-arms; shooting ranges; pile driving. C-weighted measurements are expressed as dB(C), see Graph 4.



Graph 4. C-weighted Frequency Response

Z-Weighting

Z-weighting is a flat frequency response of 0.5Hz to 20kHz ±1.5dB. This response replaces the older "Linear" or "Unweighted" responses. Z-weighted measurements are expressed as **dB(Z)**. Z-weighting has recently been used to measure explosive sounds and in the assessment of low frequency noise.

For most environmental assessments A-weighting will be used.

Time weighting

Sound level measurements using any grade of SLM can be **Fast**, **Slow**, or **Impulse** time weighted. The **Impulse** time weighting is about four times faster than **Fast**, with a short rising time constant but a slow falling one. **Fast** corresponds to a 125 ms time constant. **Slow** corresponds to a 1 second time constant. **Impulse** has a time constant of 35ms.

Ambient noise level

The ambient noise level is defined as the totally encompassing sound in a given situation at a given time, composed of sound from all sources near and far, measured using the equivalent continuous sound pressure level $_{(LAeq)}$ noise descriptor.

Rating level

The rating level can be defined as a specific noise level plus any adjustment for the character of the noise (tonal and/or impulsive) determined over the reference time interval.

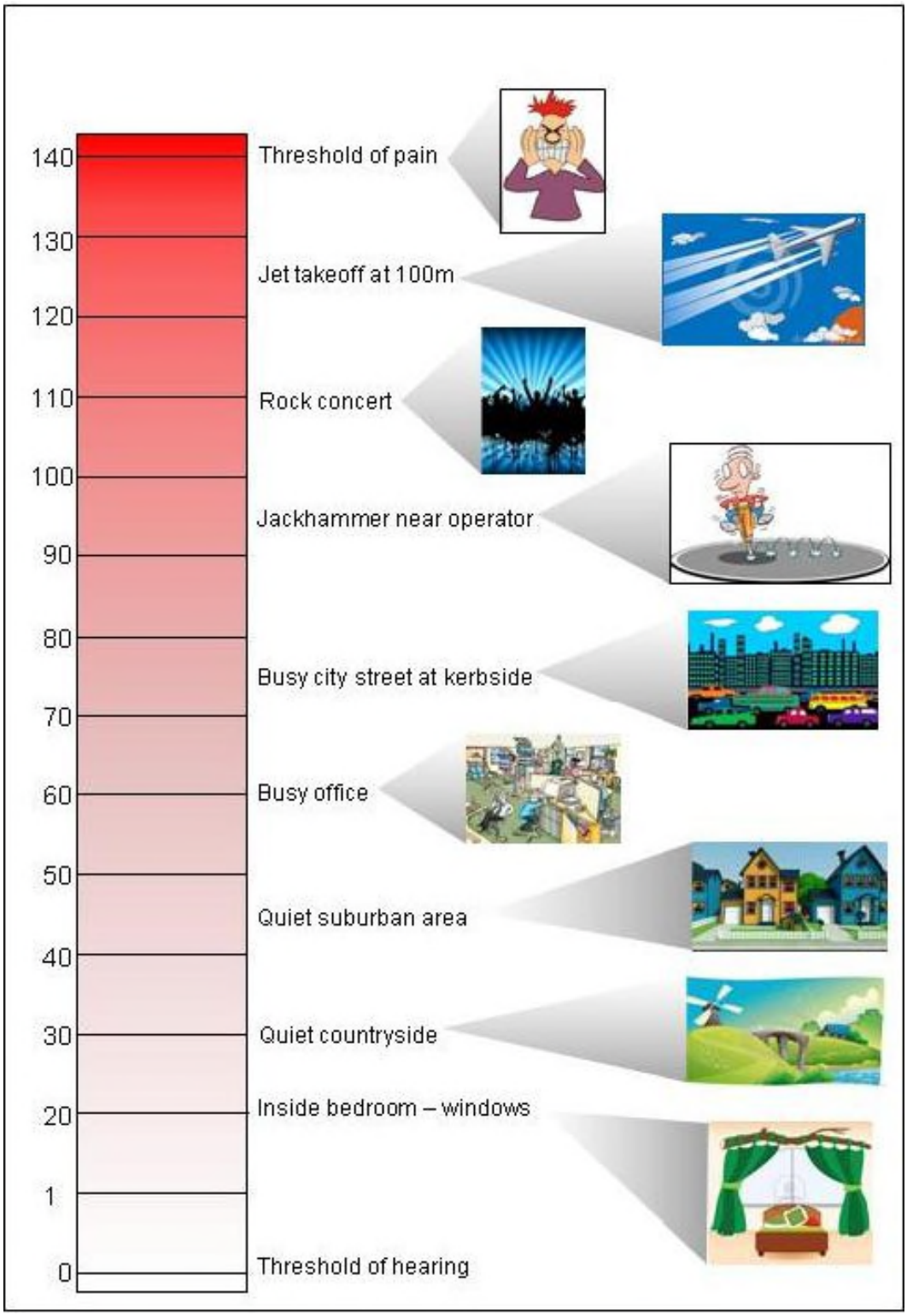


Figure 9. Common sound pressure levels dB(A)

The following tables are useful references when providing a qualitative description to related changes in sound pressure levels dB (A).

Table 5. Subjective effect of changes in noise levels

Change in level of dB	Subjective effect
3	just perceptible
5	clearly perceptible
10	twice as loud

Source Bruel & Kjaer

Table 6. Estimated community response

Amount in dB(A) by which the rating level exceeds the noise criterion	Estimated community response	
	Category	**Description**
0	None	No observed reaction
5	Little	Sporadic complaints
10	Medium	Widespread complaints
15	Strong	Threats of community action
20	Very strong	Vigorous community action

Source Bruel & Kjaer

Appendix 4

Distance attenuation

If the source noise is affected by extraneous noises another method to address this is to conduct a measurement where the SLM is moved closer to the source and measured levels need to be extrapolated back to the sensitive receiver/boundary. The new location must be selected where the source noise clearly dominates the area and clear notes must be taken regarding the new monitoring location. Once noise levels have been determined at this location it is possible to predict the noise level at the affected premises by extrapolating to the desired measuring location using the formulas relevant to distance attenuation.

Do not to measure too close to the source in the 'near field'. As a general rule, being at least one-third the length of the longest dimension of the source away will be outside the near field.

This method is only appropriate when terrain between source and receiver is flat and unobstructed, because effects of topography on attenuation are much reduced.

Distance attenuation is the reduction of L_p as a function of distance. As a general rule the L_p will decrease by 6 dB with a doubling of distance from a point source in the free field.

The following relationships can be used to quantify distance attenuation, reference Figure 9:

- **SPLx = SPLy – 20log(Dx/Dy) for a point source (e.g mechanical fan)**
- **SPLx = SPLy – 10log(Dx/Dy) for a line source (e.g heavy traffic along a road)**

  Where

  > SPLx = L_p at distance x from the source in metres (predicted)

  > SPLy = L_p at distance y from the source in metres (measured)

  > Dx = distance in metres to location x from the source

  > Dy = distance in metres to location y from the source

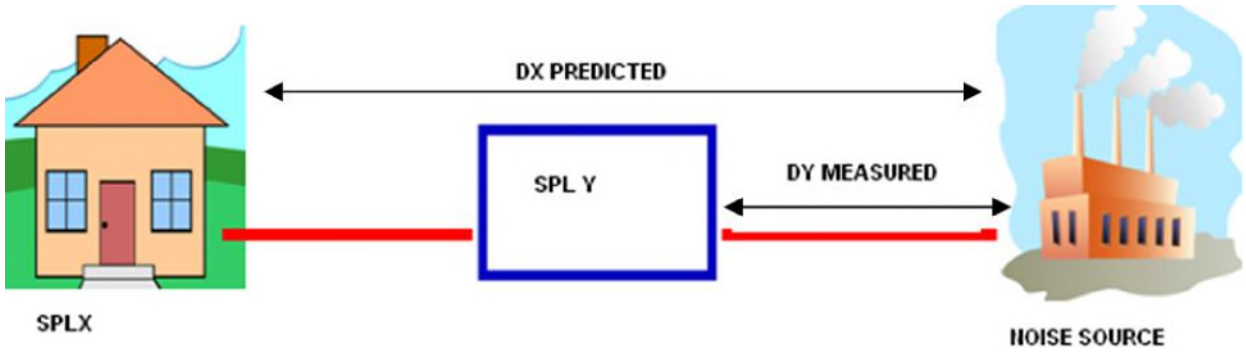


Figure 10. Pictorial representation of equation used for calculating distance attenuation

Note that the geometric distance attenuation method described above does not include several factors. Noise attenuation can often be affected by barriers, buildings, ground absorption, reflection from hard surfaces, air absorption and other atmospheric effects. These are beyond the scope of this document.

Further information is available in:

- ISO 9613:1996 Acoustics -- Attenuation of sound during propagation outdoors
- Engineering noise control : theory and practice / David A. Bies and Colin H. Hansen

Multiple noise sources

Many noise measurement situations require calculating the combined sound pressure level of multiple noise sources. As previously discussed sound pressure levels are expressed in a logarithmic scale and can therefore not be arithmetically added. For example, 40dB plus 40dB does not equal 80dB,

To add two or more noise levels reference Table 7.

Hence, 40 dB + 40 dB = 43 dB.

Sound power level difference between two Sound Sources (dB)	**Added decibel to the highest sound power level (dB)**
0	3
1	3
2	2
3	2
4	1
5	1
6	1
7	1
8	1
9	1
10 or more	0

Table 7. Multiple noise sources - addition of dB

Alternatively, an A+B calculation can be performed directly with the following formula:

Total Level $=10 \times LOG(10^{A/10} + 10^{B/10})$

This can be done is a spread sheet, e.g. In MS Excel ®: (to add cell A1+B1)

=10*LOG(10^(A1/10)+10^(B1/10))

Appendix 5

Officer Checklist 1 – Investigation details / Emission criteria

Before conducting a noise assessment, contact the complainant to gather basic information required to start an investigation.

The information should include:

a) the emission**'s characteristics or qualities**

b) **the emission's amount or rate**

c) the duration and time of the emission

d) whether the emission is continuous or fluctuating

e) the characteristics and qualities of the receiving environment, including the types of emissions that could reasonably be expected in the receiving environment

f) **the emission's impa**ct on the receiving environment

g) in relation to each affected person for the emission:

(i) any views of the affected person about the emission of which the authorised person is aware, including views about the degree of interference caused, or likely to be caused, by the emission to lawful activities at the place occupied by the affected person

(ii) the order of occupancy between the person causing the emission and the affected person

(iii) for the period during which the person causing the emission has occupied the place from which the emission is generated and the affected person has occupied the place affected by the emission**—**

- any structural or other changes to either of those places
- any change to the activities conducted at either of those places by the person causing the emission or affected person

h) any mitigating measures that have been taken or could reasonably have been taken by the person causing the emission.

The noise emission criteria are as follows**—**

a. if the authorised person has measured a sound pressure level for the noise**—**that level

b. the audibility of the noise

c. whether the noise is continuous at a steady level or whether it has a fluctuating, intermittent, tonal or impulsive nature

d. whether the noise has vibration components.

Officer Checklist 2–Noise assessment equipment checklist

Table 1 Equipment checklist

Equipment	Checked
SLM and Calibrator - Calibrated	
Protective case for SLM	
SLM Battery Life / Charged	
Wind Shield	
Tripod	
Outdoor Weather Equipment	
Outdoor battery pack charged	
Memory Cards for SLM	
Camera	
Paper / Record Sheet / Pen	
Personal Protective Equipment	

Officer Checklist 3–Noise assessment procedure

1. Select time when source noise is representative of the maximum level of noise from the activity.
2. Check settings of SLM:
    i. 'Fast' time weighting
    ii. 'A' frequency weighting
    iii. Audio recording on SLM – this can provide additional evidence.
    iv. Frontal incidence for microphone
3. Note the approximate wind speed using the Beaufort scale as shown in Table 3 of the NMM. Do not take measurements if raining or wind speed greater than 5 meters/second – (Leaves and small twigs in constant motion; wind extends light flag)
4. Calibrate the noise monitoring equipment before and after each set of noise measurements.
5. Set up the SLM up on the tripod.
6. Complete a background noise assessment-
    i. This is the $L_{A90, T}$
    ii. Ensure measurement taken in the absence of source noise
    iii. Measure continuously for a minimum time of 10 minutes
    iv. Ensure all extraneous noises are excluded – investigating officer to make detailed notes during the assessment.
7. Complete an assessment of the source noise –
    i. For time varying noise use the descriptor $L_{Aeq,T}$
    ii. The $L_{A90,T}$ descriptor is commonly used to assess noise emissions from sources including fan noise, domestic air-conditioners and pool pumps
    iii. Where source noise is affected by extraneous noises, move SLM closer to the source where it clearly dominates the area, note the new monitoring position and then these readings can be extrapolated back to the position of the complainant – see Appendix 3 'Distance Attenuation' for further information.
8. Make notes of any audible tonal and impulsive characteristics of the noise and ensure use of appropriate correction factors.
9. Take photos of both background and source noise measurement locations.
10. Save data.
11. Re-calibrate the SLM. In the event that the deviation from the first calibration is greater than 1 dB(A) then the results obtained will not be valid and the assessment will have to be repeated.

Officer Checklist 4–Noise assessment field notes

Investigating officer: _____ Address:

Noise source: _____ Date: _

Site Sketch:

- Location of nearest sensitive receiver
- Location of noise source
- Background noise measurement location
- Source noise measurement location
- Note of topography between source and sensitive receivers.

Notes

Weather, wind speed, audibility of noise, characteristic of noise, continuous or fluctuating, tonal, impulsive, extraneous noises in area, detail methodology of noise assessment and state where any deviations from procedures have occurred and why:

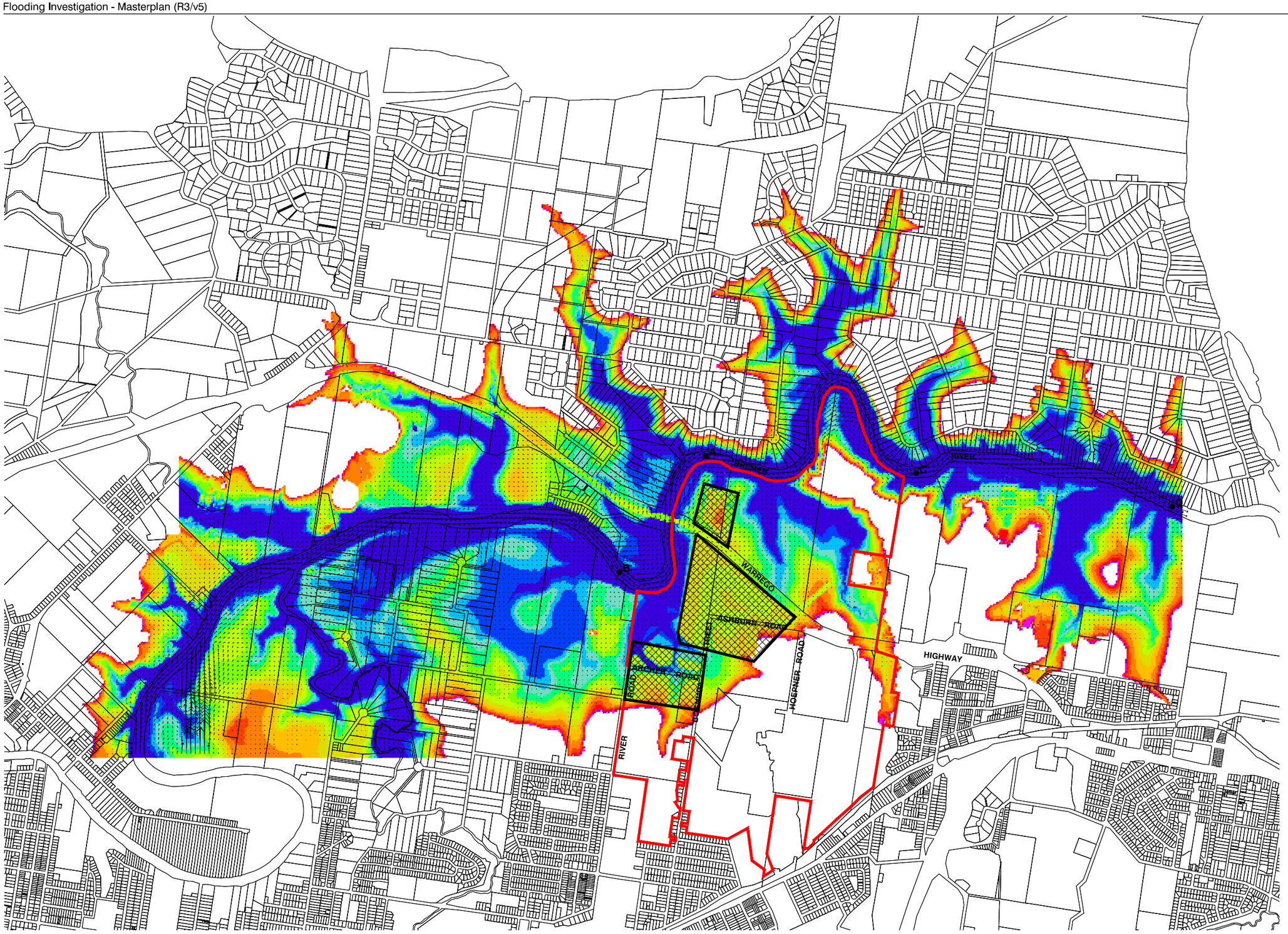
I _____ (print name) certify that the noise assessment has been completed in accordance with the Noise Measurement Manual. Signature _____

Investigating officer: _____ Address:

Noise source: Date:

Measurement: background / source	Calibration start	Calibration end	Time started	Time finished	Notes: subjective assessment, extraneous noises, noise characteristics i.e high pitched / droning, impulsive, tonal.

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250 0 250 500 750 1000 1250m
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Scale 1:25000 (A3)

FIGURE B.2.7

EXISTING CURRENT - DEPTH - SKM ULTIMATE 500 YEAR EVENT (Bris_E08d)

Rev: 0 Date: May 2012

Project No.: LJ8714

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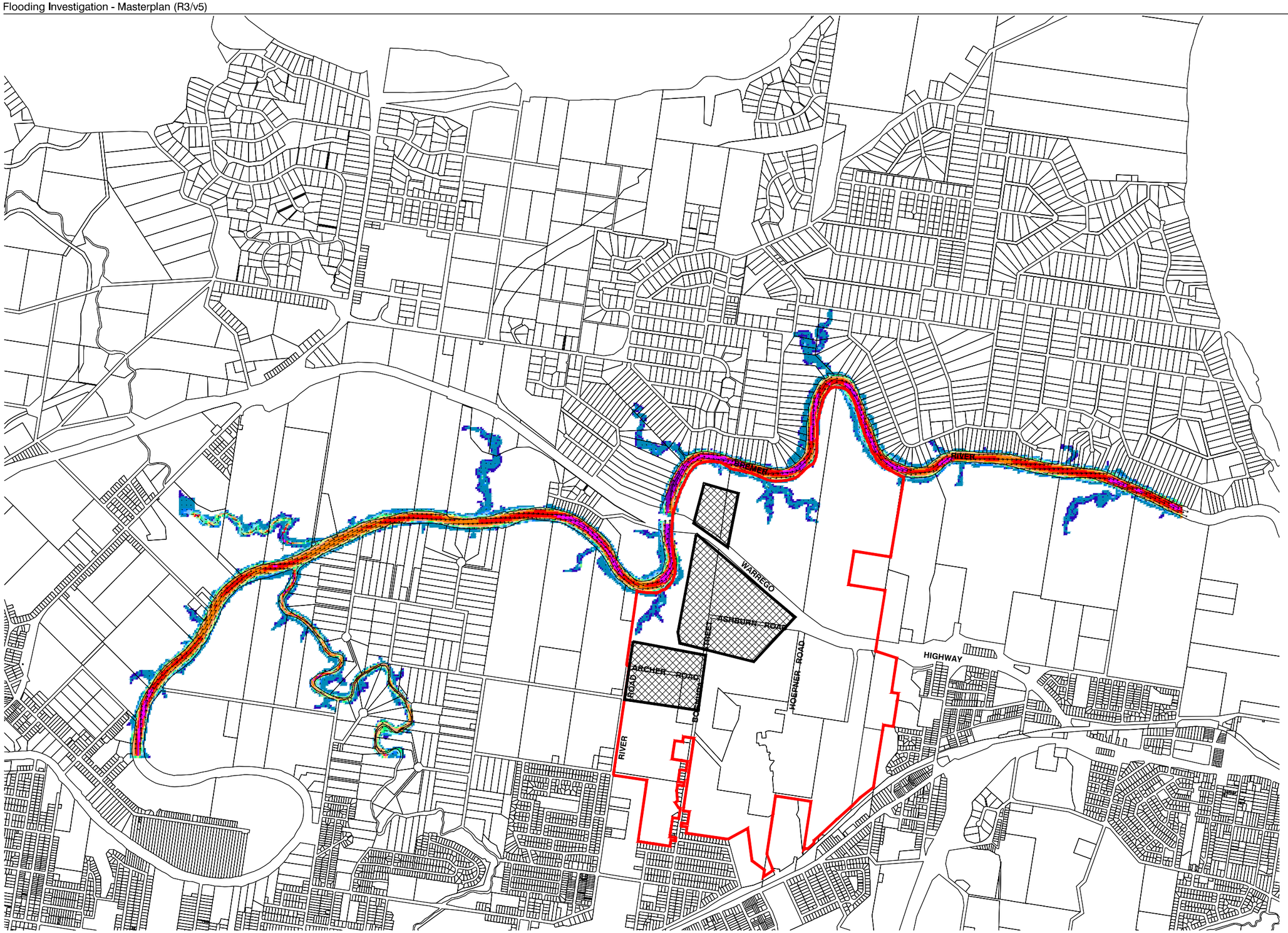
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Appendix B.3

Brisbane River Flood SOBEK 2D Existing Current Case

Results – Speed

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Scale 1:25000 (A3)

FIGURE B.3.1

EXISTING CURRENT - SPEED - SKM ULTIMATE 5 YEAR EVENT (Bris_E08c)

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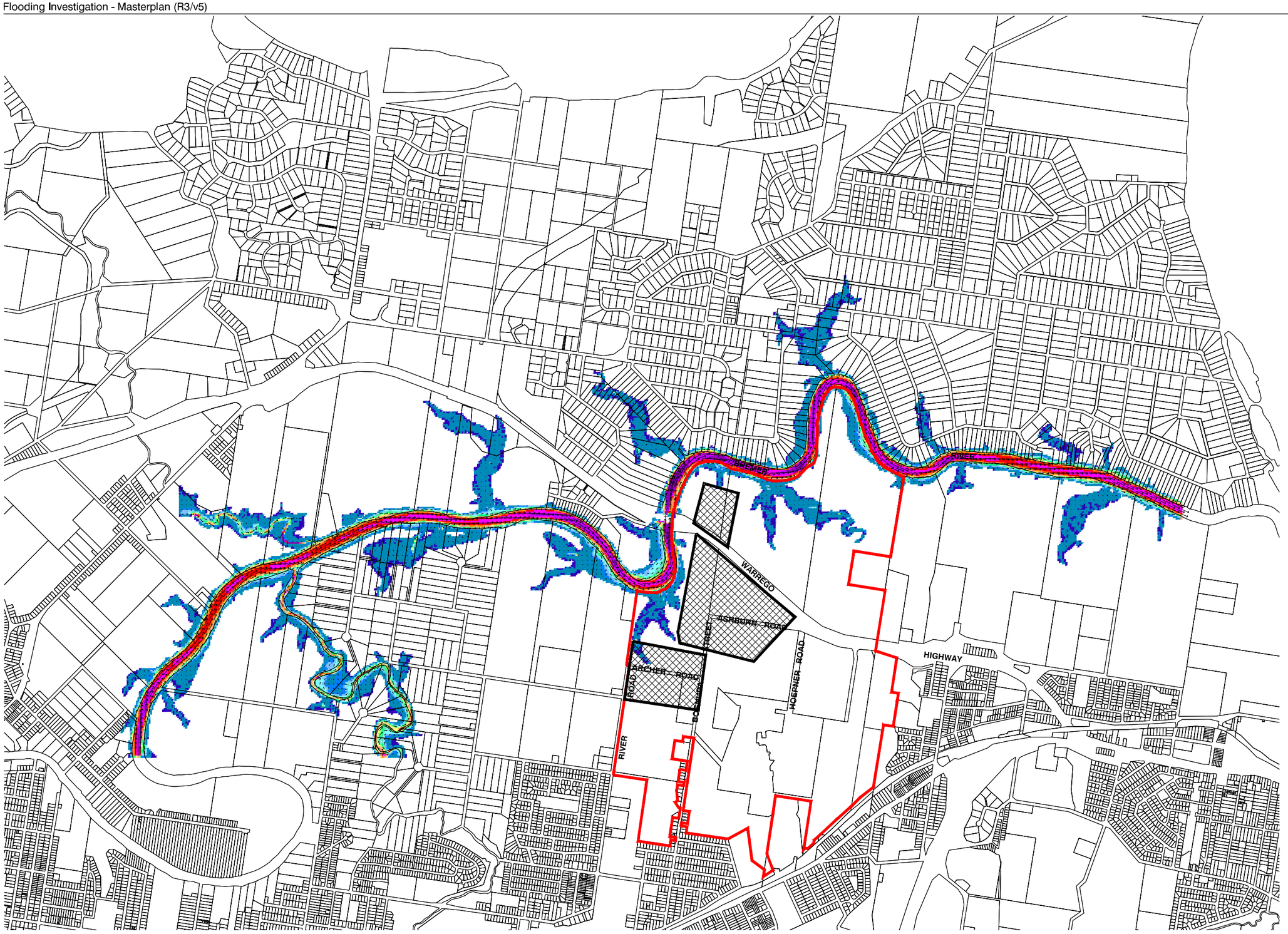
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FIGURE B.3.2

EXISTING CURRENT - SPEED - SKM ULTIMATE 10 YEAR EVENT (Bris_E08c)

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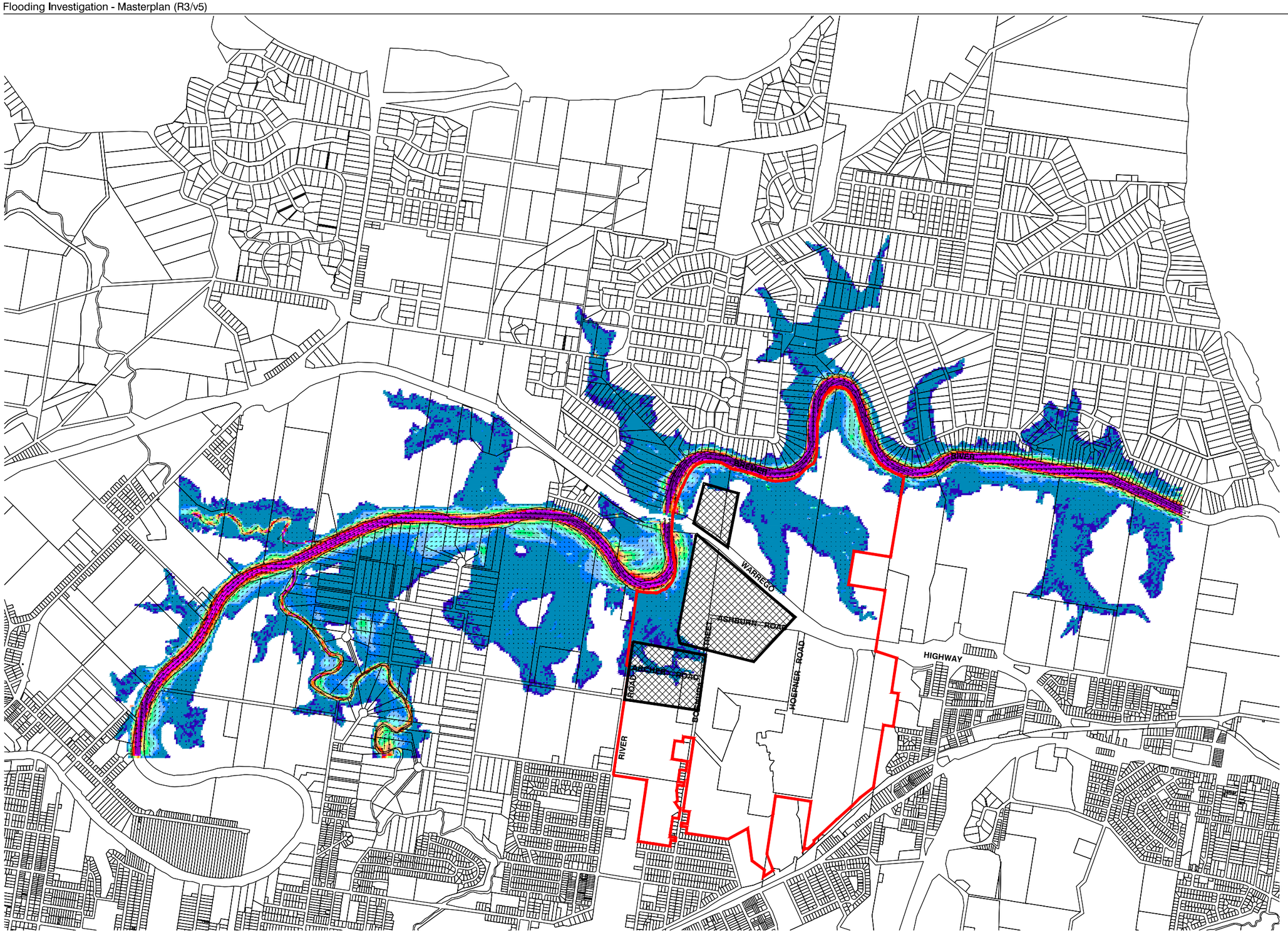
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250 0 250 500 750 1000 1250m
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FIGURE B.3.3

EXISTING CURRENT - SPEED - SKM ULTIMATE 20 YEAR EVENT (Bris_E08c)

Rev: 0 Date: May 2012

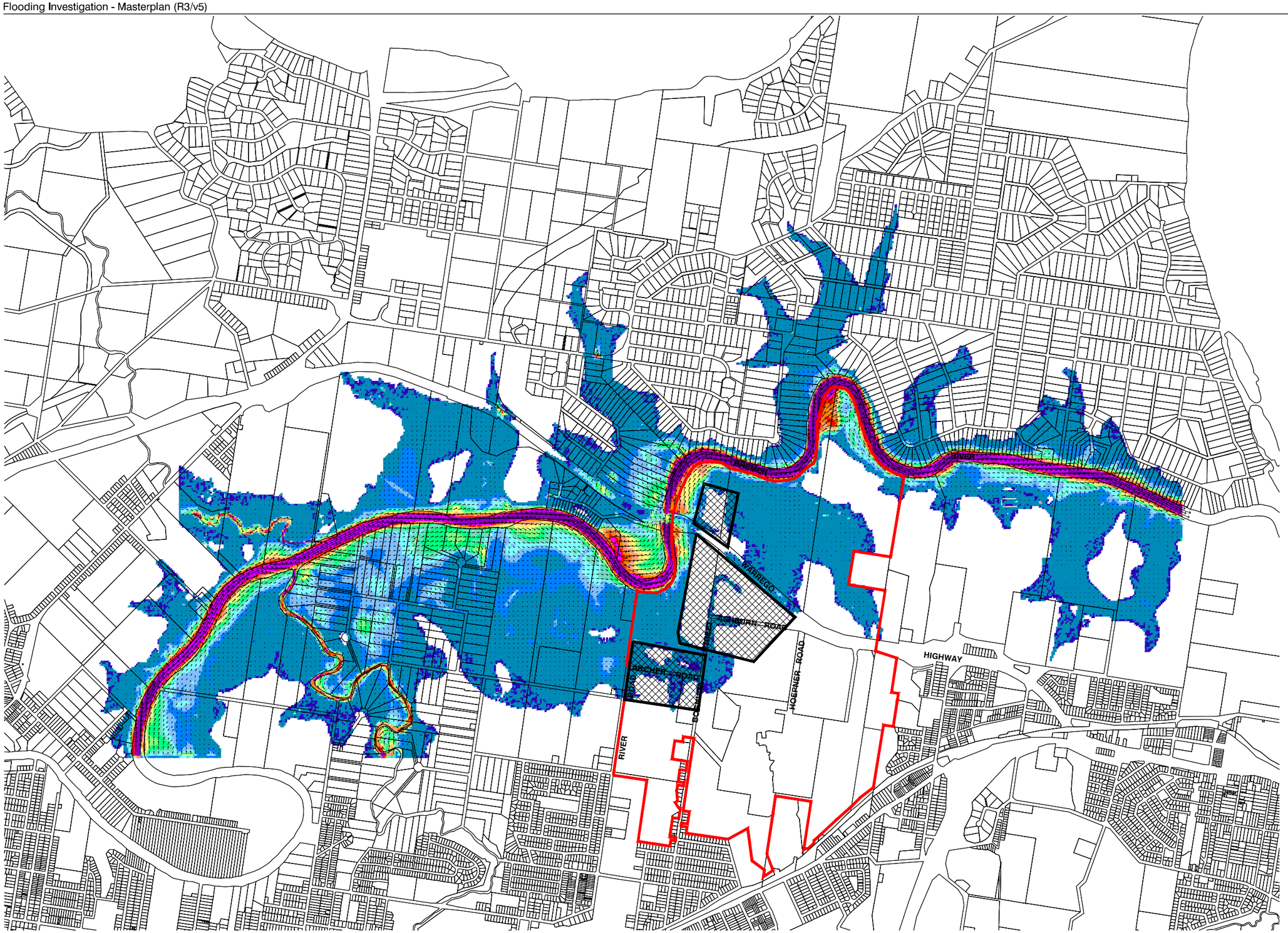
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FIGURE B.3.4

EXISTING CURRENT - SPEED - SKM ULTIMATE 50 YEAR EVENT (Bris_E08c)

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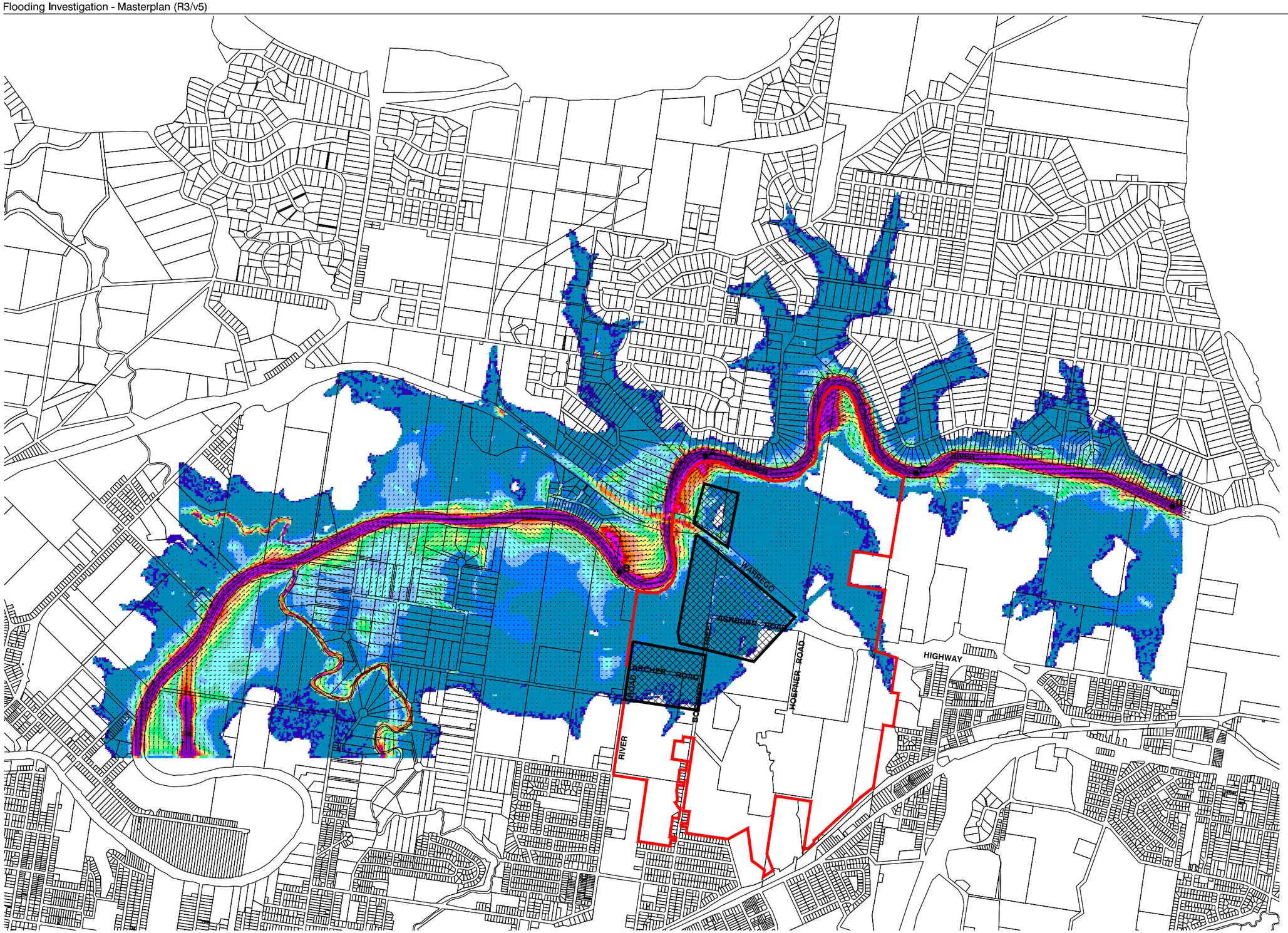
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FIGURE B.3.5

EXISTING CURRENT - SPEED - SKM ULTIMATE 100 YEAR EVENT (Bris_E08d)

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