

KING GEORGES ROAD INTERCHANGE UPGRADE

**FLOODING AND DRAINAGE
INVESTIGATION**

VOLUME 2 – FIGURES AND APPENDICES

JULY 2014

FINAL REPORT

LIST OF FIGURES

- 1.1 Location Plan
- 2.1 Wollli Creek Catchment Plan and RAFTS Model Layout
- 2.2 Design Discharge Hydrographs – Wollli Creek
- 2.3 TUFLOW Model Layout (2 Sheets)
- 2.4 Design Water Surface Profiles – Kooemba Road to Kingsgrove Road - Present Day Conditions
- 2.5 Pre-Upgrade Flooding Patterns - 100 year ARI
- 2.6 Pre-Upgrade Flooding Patterns – PMF (BoM, 1994)
- 2.7 Pre-Upgrade Flooding Patterns - PMF (BoM, 2003)
- 2.8 Impact of Updated Methodology on Flooding Patterns - PMF

- 3.1 Layout of Existing Motorway Drainage System in Vicinity of KGRIU Project (2 Sheets)

- 4.1 KGRIU Pavement and Transverse Drainage Strategy (2 Sheets)

- 6.1 Key Features of Water Quality Pond 1

- 7.1 Extent of Disturbed Areas (2 Sheets)

APPENDICES

- A. As-Built Drawings Showing Layout of M5 East Motorway Transverse Drainage
- B. As-Built Drawings Showing Layout of M5 East Motorway Pavement Drainage
- C. Detailed Design Drawings Showing Layout of M5 South West Motorway Drainage
- D. As-Built Drawings Showing Plan Layout and Typical Sections of Water Quality Pond 1

FIGURES




50 0 50 100 150 m
 Scale: 1:5,000



NOTE:
 CONTOURS ARE SHOWN AT 1m INTERVALS

LEGEND

-  King Georges Road Interchange Upgrade
-  Existing Transverse Drainage Structure and Identifier

**KING GEORGES ROAD INTERCHANGE UPGRADE
 FLOODING AND DRAINAGE INVESTIGATION**

Figure 1.1

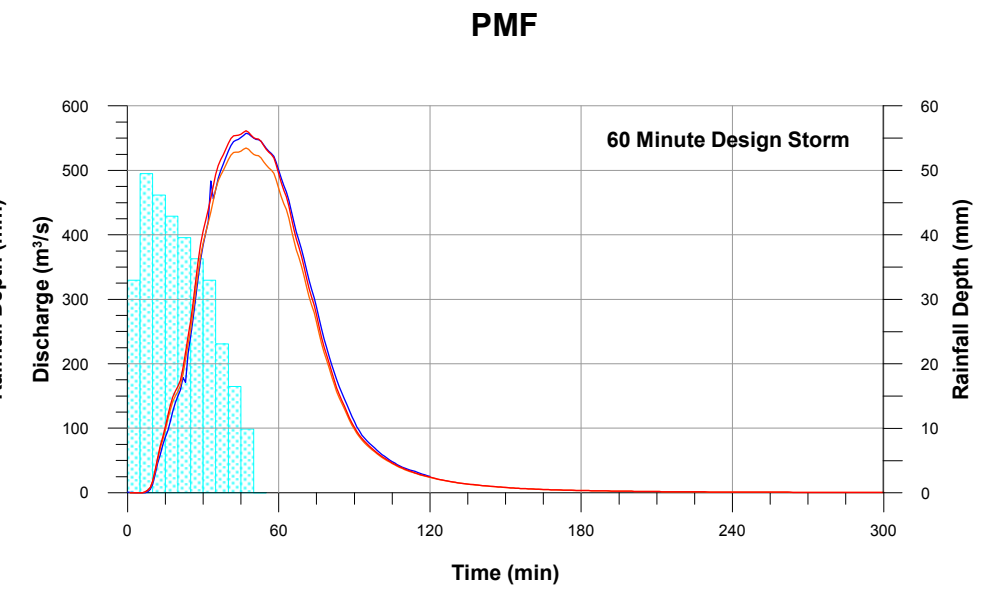
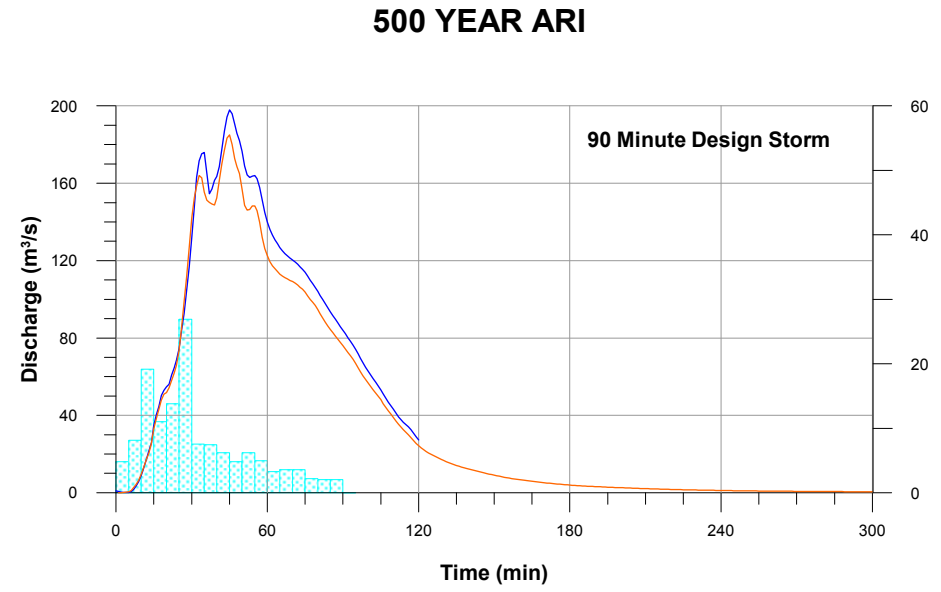
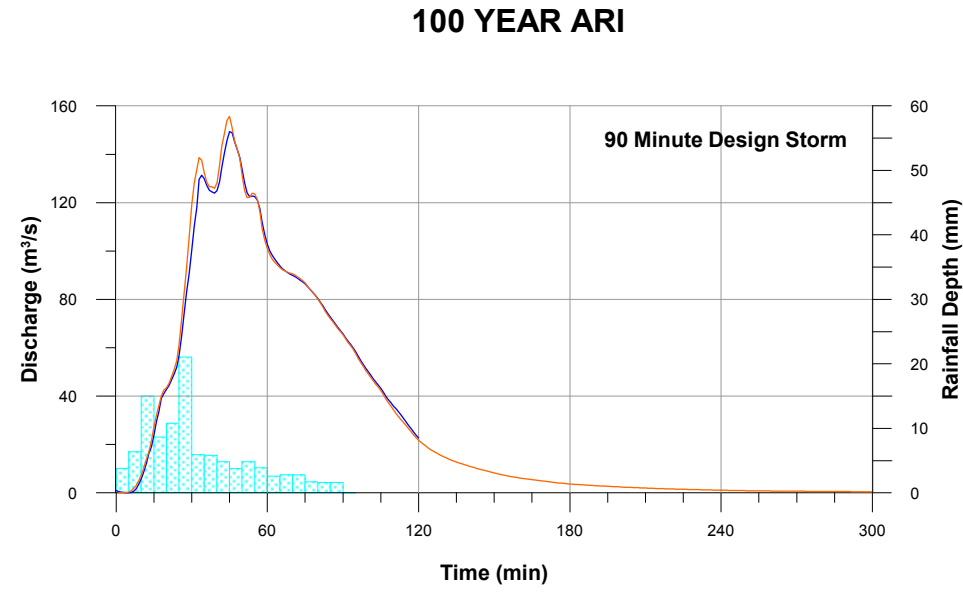


SOURCE: WILLING & PARTNERS 2000

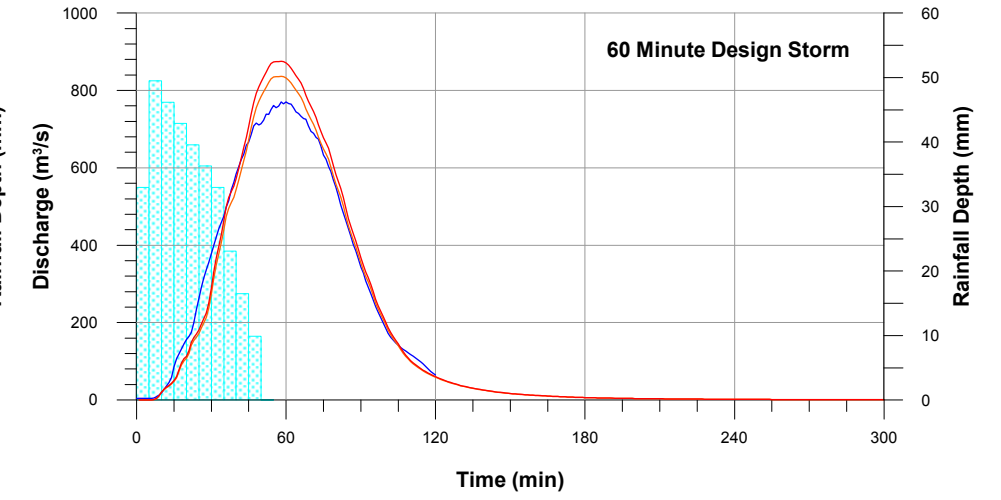
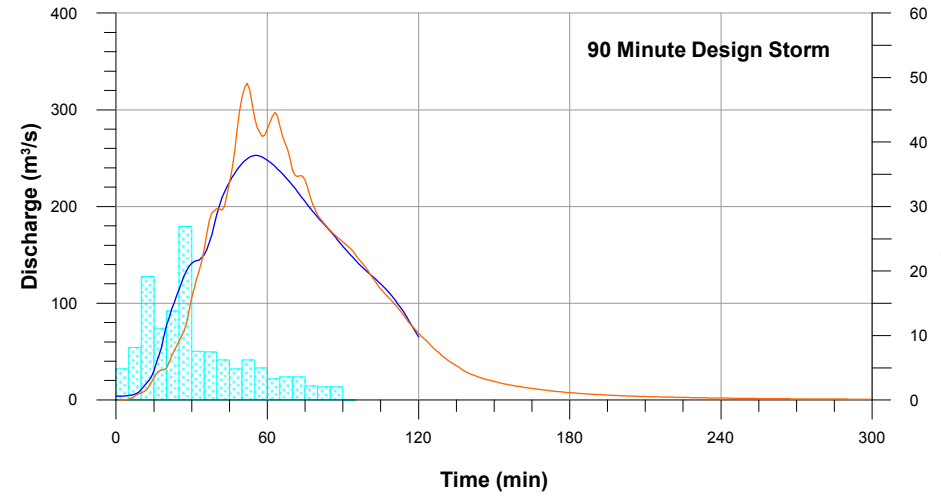
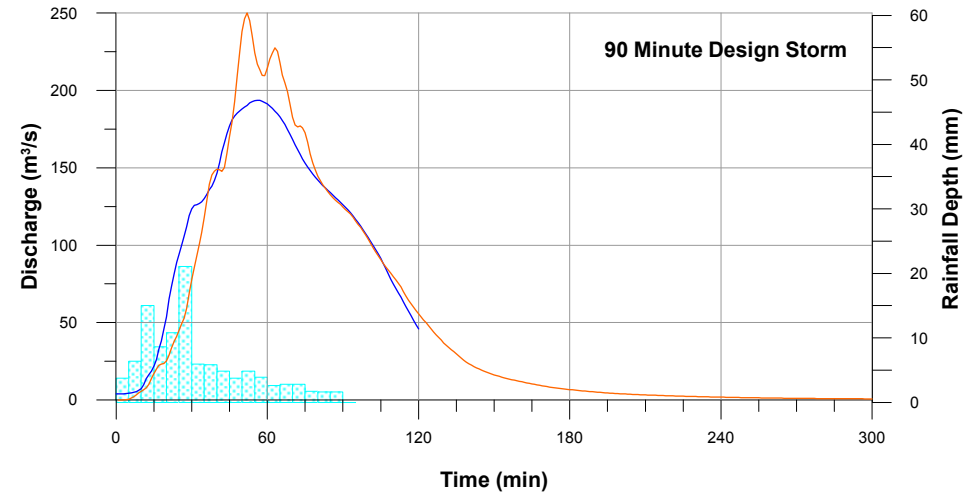
**KING GEORGES ROAD INTERCHANGE UPGRADE
FLOODING AND DRAINAGE INVESTIGATION**

Figure 2.1

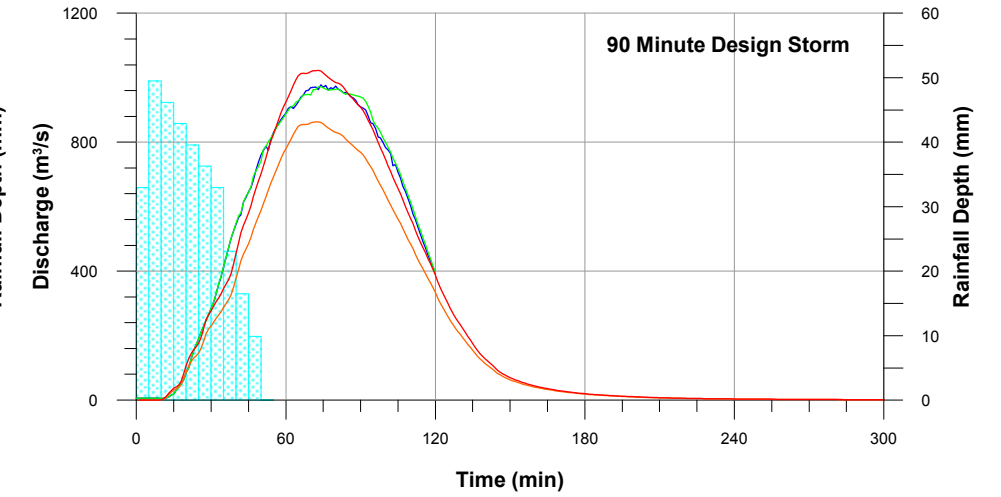
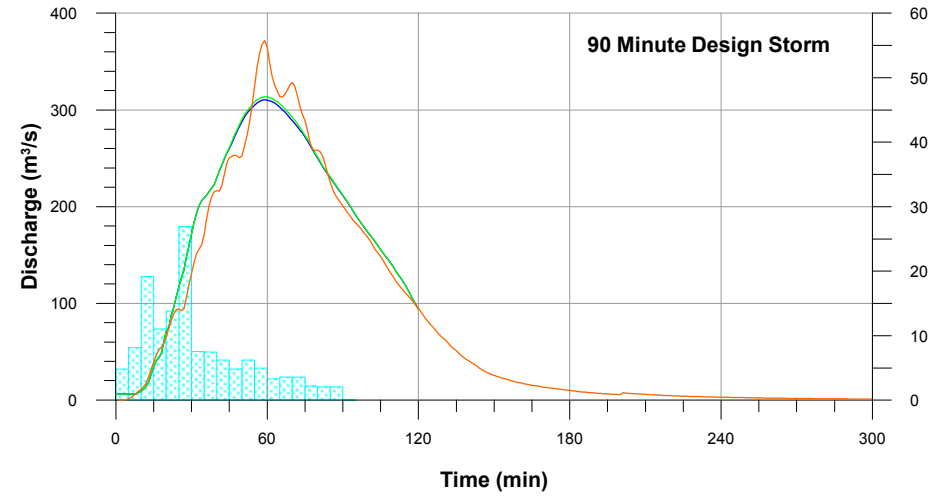
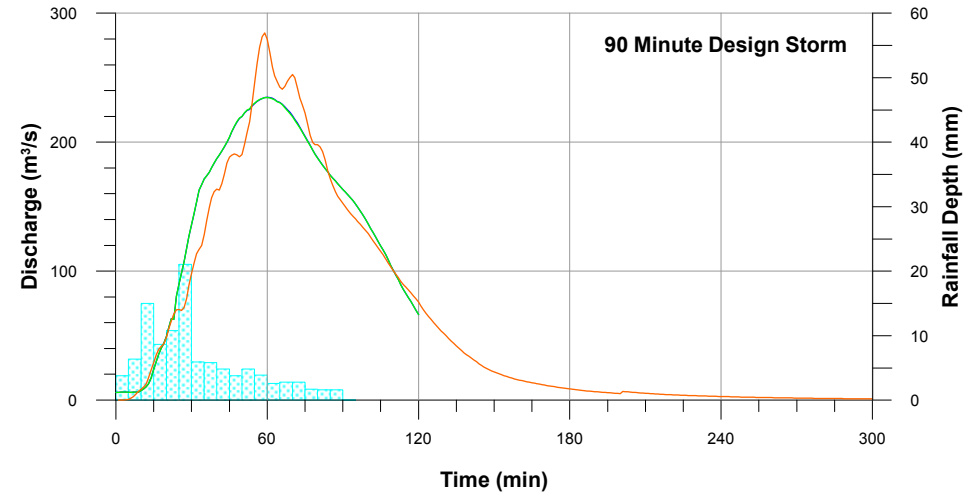
BEVERLY HILLS PARK
(Inflow to TUFLOW Model)



EASTERN SIDE OF KINGSGROVE ROAD



EASTERN SIDE OF BEXLEY ROAD



NOTE:

- (1) TUFLOW DISCHARGES FOR KINGSGROVE ROAD ARE THE SUM OF THE FLOW CROSSING KINGSGROVE ROAD TO THE NORTH AND SOUTH OF THE M5 MOTORWAY.
- (2) TUFLOW DISCHARGES AT BEVERLY HILLS PARK AND KINGSGROVE ROAD ARE THE SAME IN BOTH PRE- AND POST-UPGRADE CONDITIONS

LEGEND

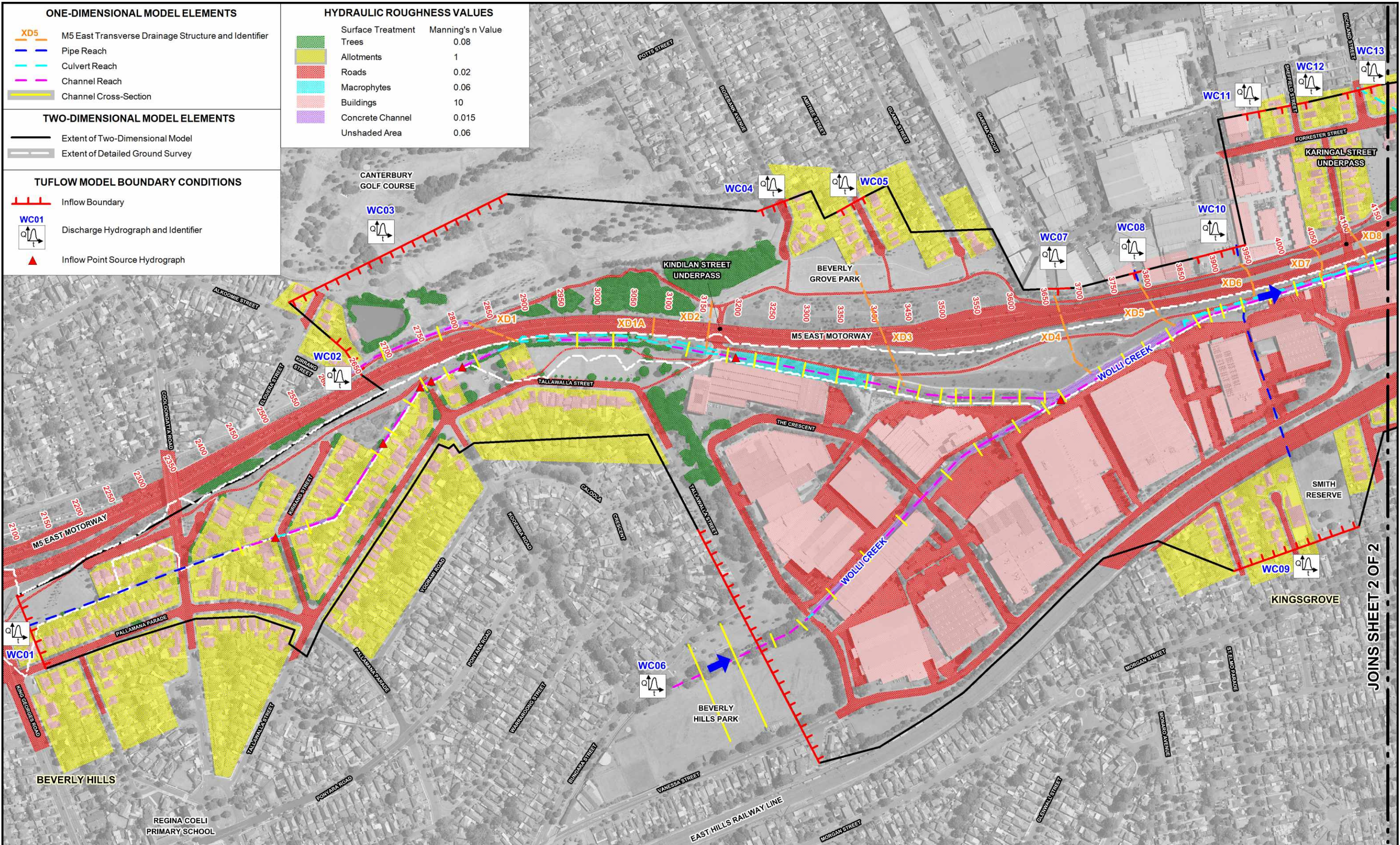
- Rainfall Depth (mm)
- RAFTS (BoM, 1994)
- RAFTS (BoM, 2003)
- TUFLOW (Pre-Upgrade Conditions)
- TUFLOW (Post-Upgrade Conditions)

**M5 EAST UPGRADE - KING GEORGES ROAD TO BEXLEY ROAD
FLOODING INVESTIGATION**

Figure 2.2

DESIGN DISCHARGE HYDROGRAPHS
WOLLI CREEK



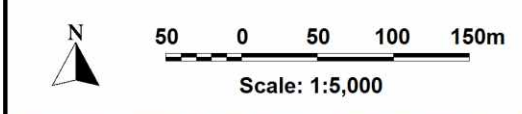


- ONE-DIMENSIONAL MODEL ELEMENTS**
- XD5** M5 East Transverse Drainage Structure and Identifier
 - Pipe Reach
 - Culvert Reach
 - Channel Reach
 - Channel Cross-Section
- TWO-DIMENSIONAL MODEL ELEMENTS**
- Extent of Two-Dimensional Model
 - Extent of Detailed Ground Survey
- TUFLOW MODEL BOUNDARY CONDITIONS**
- Inflow Boundary
 - Discharge Hydrograph and Identifier
 - Inflow Point Source Hydrograph

HYDRAULIC ROUGHNESS VALUES

Surface Treatment	Manning's n Value
Trees	0.08
Allotments	1
Roads	0.02
Macrophytes	0.06
Buildings	10
Concrete Channel	0.015
Unshaded Area	0.06

JOINS SHEET 2 OF 2



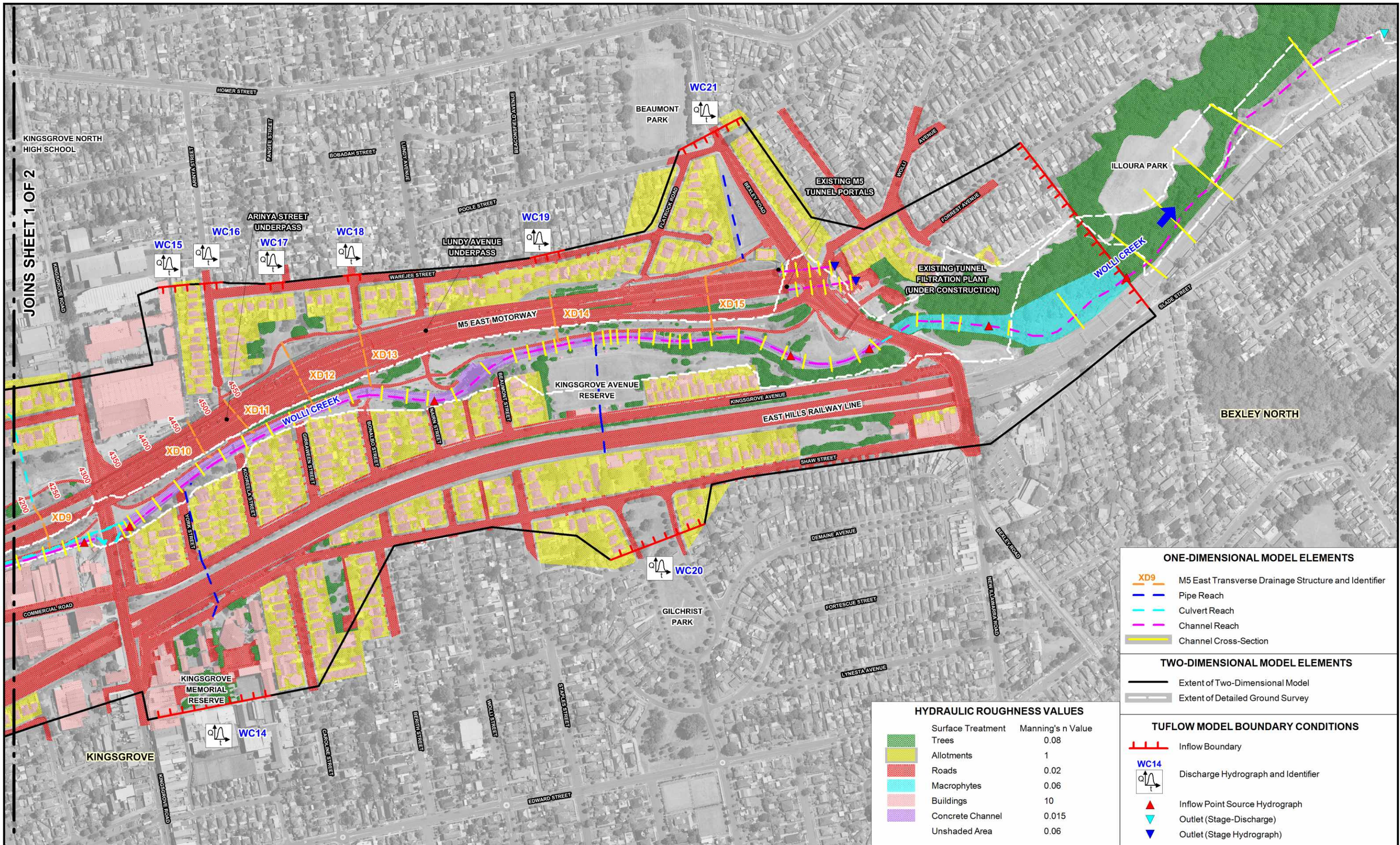
**KING GEORGES ROAD INTERCHANGE UPGRADE
FLOODING AND DRAINAGE INVESTIGATION**

Figure 2.3
(Sheet 1 of 2)



NOTE:
TUFLOW MODEL SHOWN ON THIS FIGURE IS REPRESENTATIVE OF PRESENT DAY CONDITIONS

TUFLOW MODEL LAYOUT



JOINS SHEET 1 OF 2

ONE-DIMENSIONAL MODEL ELEMENTS

- XD9 M5 East Transverse Drainage Structure and Identifier
- Pipe Reach
- Culvert Reach
- Channel Reach
- Channel Cross-Section

TWO-DIMENSIONAL MODEL ELEMENTS

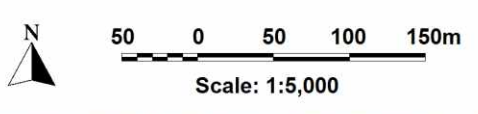
- Extent of Two-Dimensional Model
- Extent of Detailed Ground Survey

TUFLOW MODEL BOUNDARY CONDITIONS

- Inflow Boundary
- WC14 Discharge Hydrograph and Identifier
- Inflow Point Source Hydrograph
- Outlet (Stage-Discharge)
- Outlet (Stage Hydrograph)

HYDRAULIC ROUGHNESS VALUES

Surface Treatment	Manning's n Value
Trees	0.08
Allotments	1
Roads	0.02
Macrophytes	0.06
Buildings	10
Concrete Channel	0.015
Unshaded Area	0.06



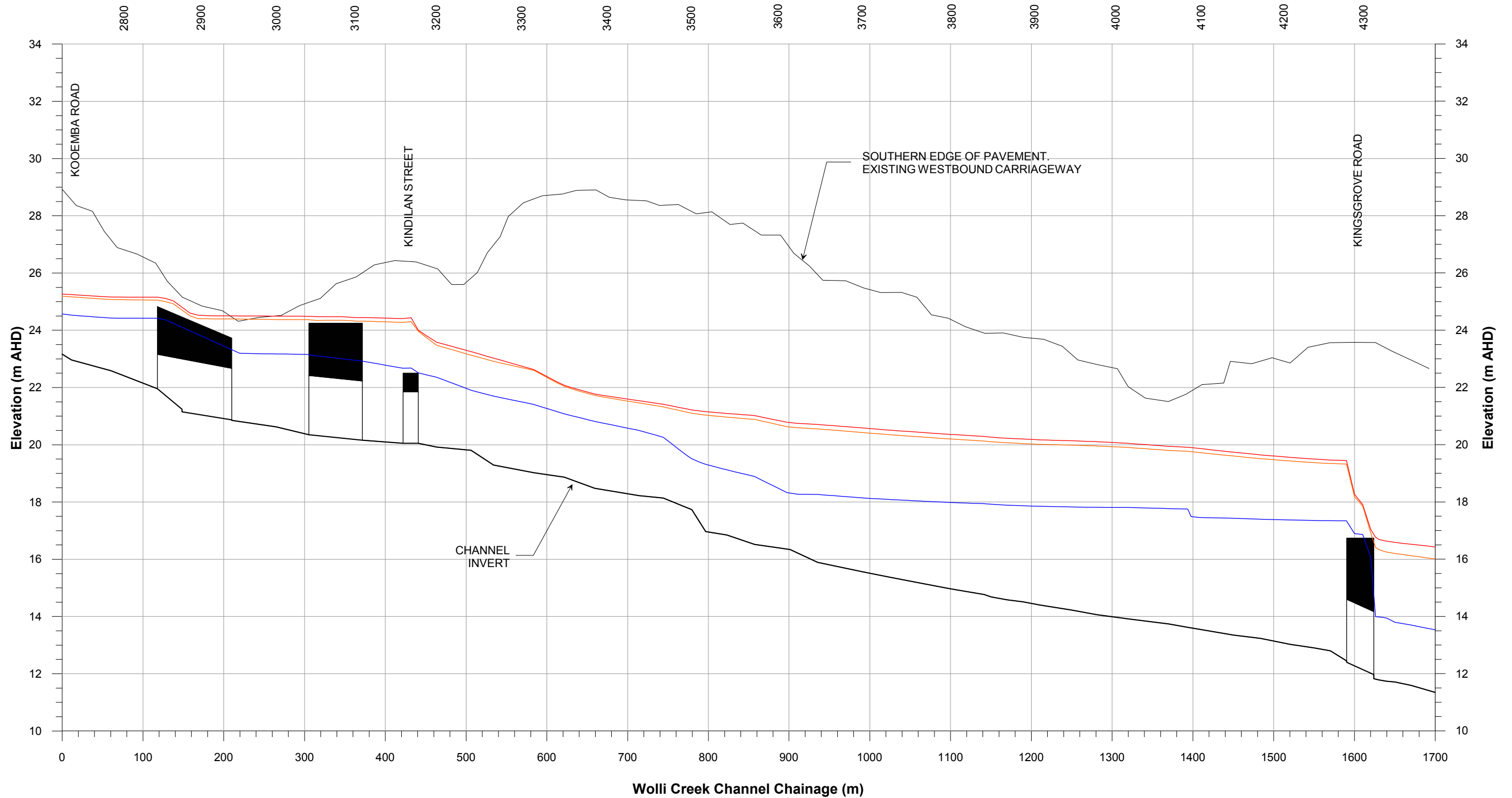
KING GEORGES ROAD INTERCHANGE UPGRADE FLOODING AND DRAINAGE INVESTIGATION

Figure 2.3 (Sheet 2 of 2)

NOTE: TUFLOW MODEL SHOWN ON THIS FIGURE IS REPRESENTATIVE OF PRESENT DAY CONDITIONS

TUFLOW MODEL LAYOUT

Motorway Chainage



NOTE:

(1) UPPER ENVELOPE OF FLOODING BASED ON HEC-RAS MODEL RESULTS AND REPRESENTS ENERGY GRADE LINE FOR PMF EVENT. ALL OTHER WATER SURFACE PROFILES BASED ON TUFLOW MODEL RESULTS.



WATER SURFACE PROFILES (1)

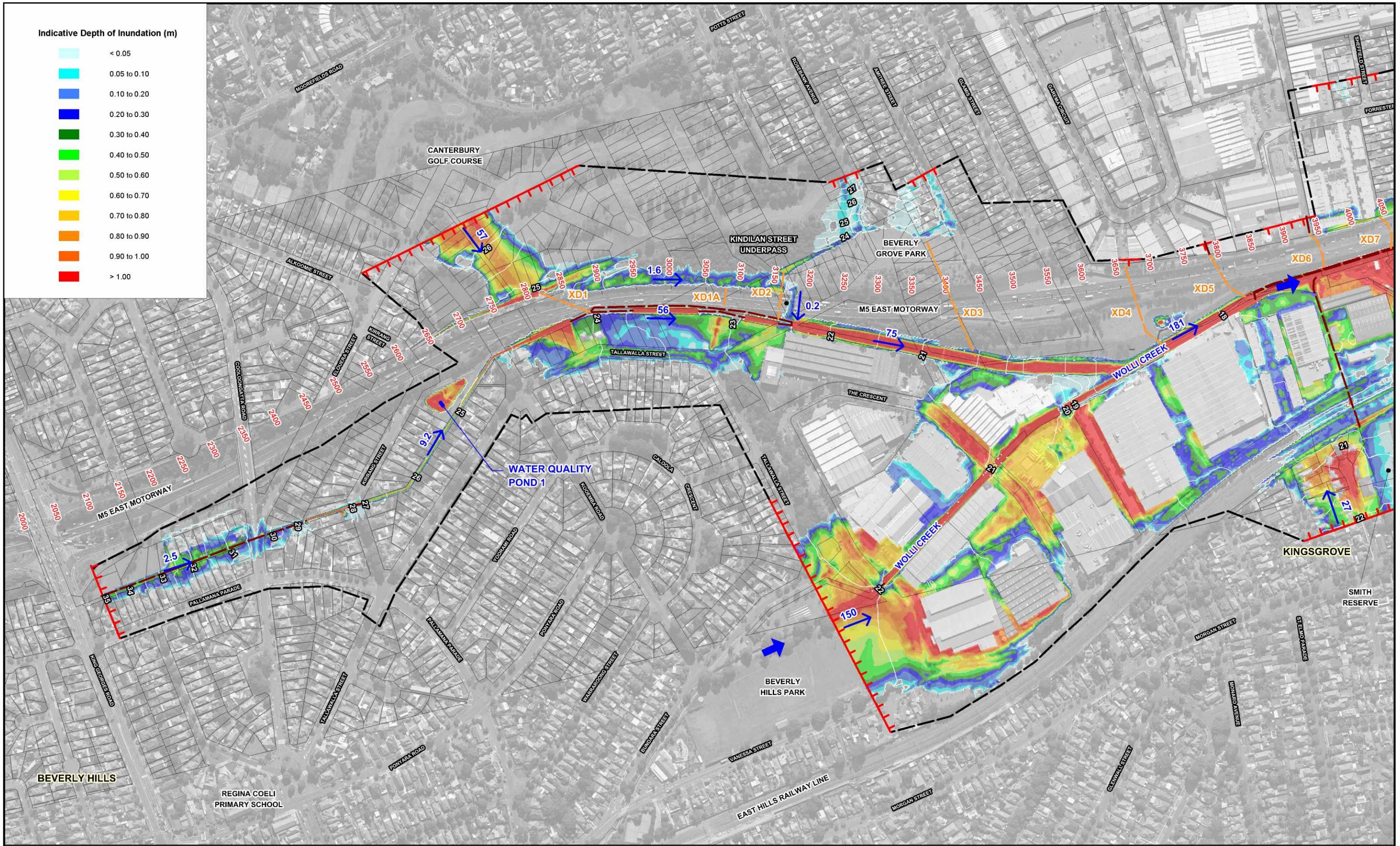
- PMF (BoM, 2003)
- PMF (BoM, 1994)
- 100 Year ARI

**KING GEORGES ROAD INTERCHANGE UPGRADE
FLOODING AND DRAINAGE INVESTIGATION**

Figure 2.4

DESIGN WATER SURFACE PROFILES
KOEEMBA ROAD TO KINGSGROVE ROAD
PRESENT DAY CONDITIONS

Indicative Depth of Inundation (m)



NOTE:
 THE EXTENTS AND DEPTHS OF FLOODING SHOWN WERE DETERMINED FROM AIRBORNE LASER SURVEY DATA AND ARE APPROXIMATE ONLY.
 THE INFORMATION SHOWN ON THIS PLAN SHOULD NOT BE USED TO PROVIDE FLOOD ADVICE IN INDIVIDUAL ALLOTMENTS.

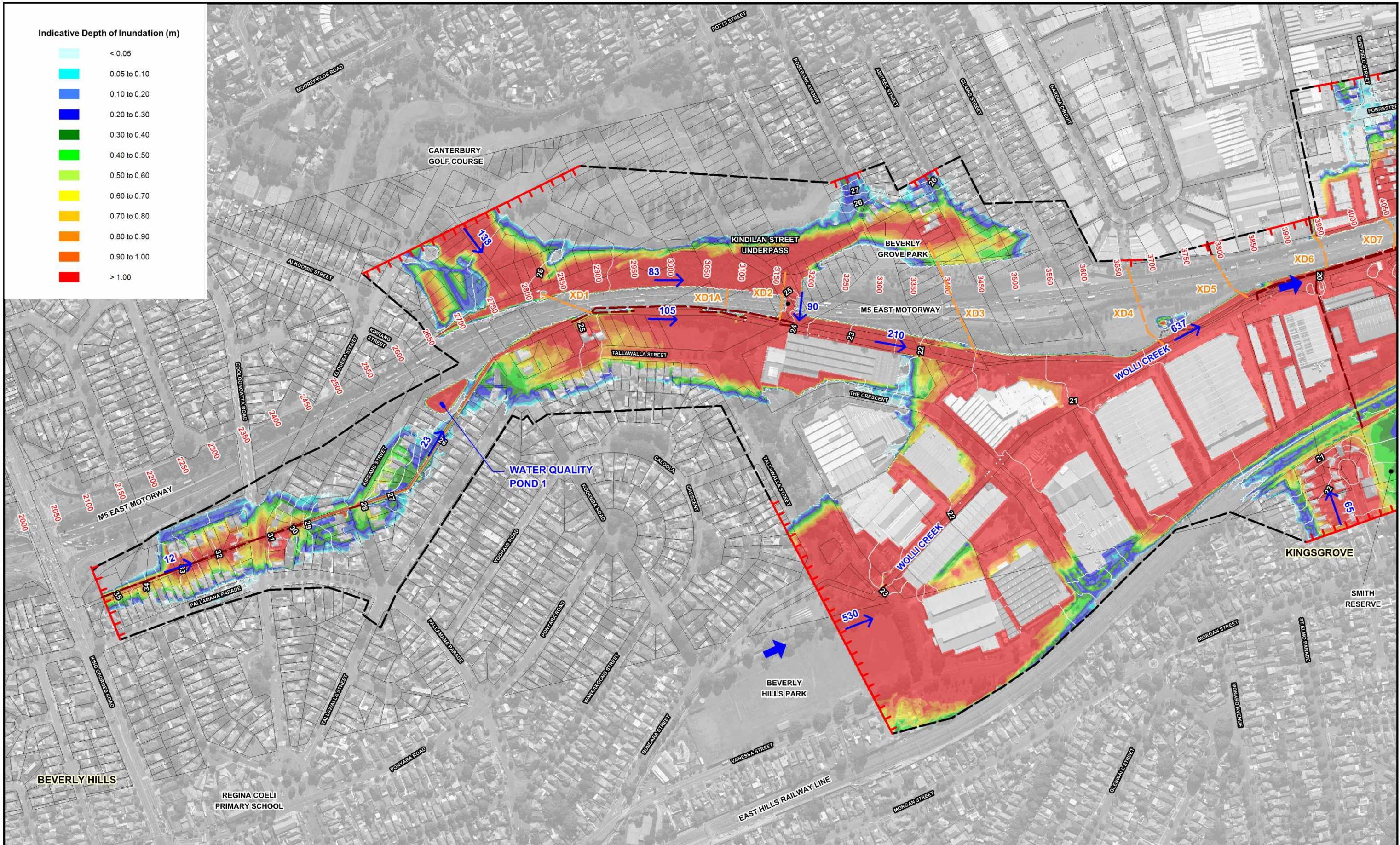
LEGEND

- TUFLOW Model Extent
- Inflow Boundary
- Modelled Drainage Network
- Existing Transverse Drainage Structure and Identifier (XD7)
- Peak Overland Flow (m³/s)
- Water Surface Contours (m AHD)

KING GEORGES ROAD INTERCHANGE UPGRADE FLOODING AND DRAINAGE INVESTIGATION

Figure 2.5

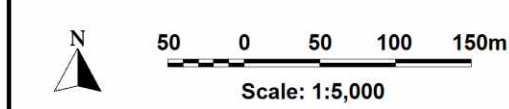
PRE-UPGRADE FLOODING PATTERNS
 100 YEAR ARI



**KING GEORGES ROAD INTERCHANGE UPGRADE
FLOODING AND DRAINAGE INVESTIGATION**

Figure 2.6

PRE-UPGRADE FLOODING PATTERNS
PMF (BoM, 1994)

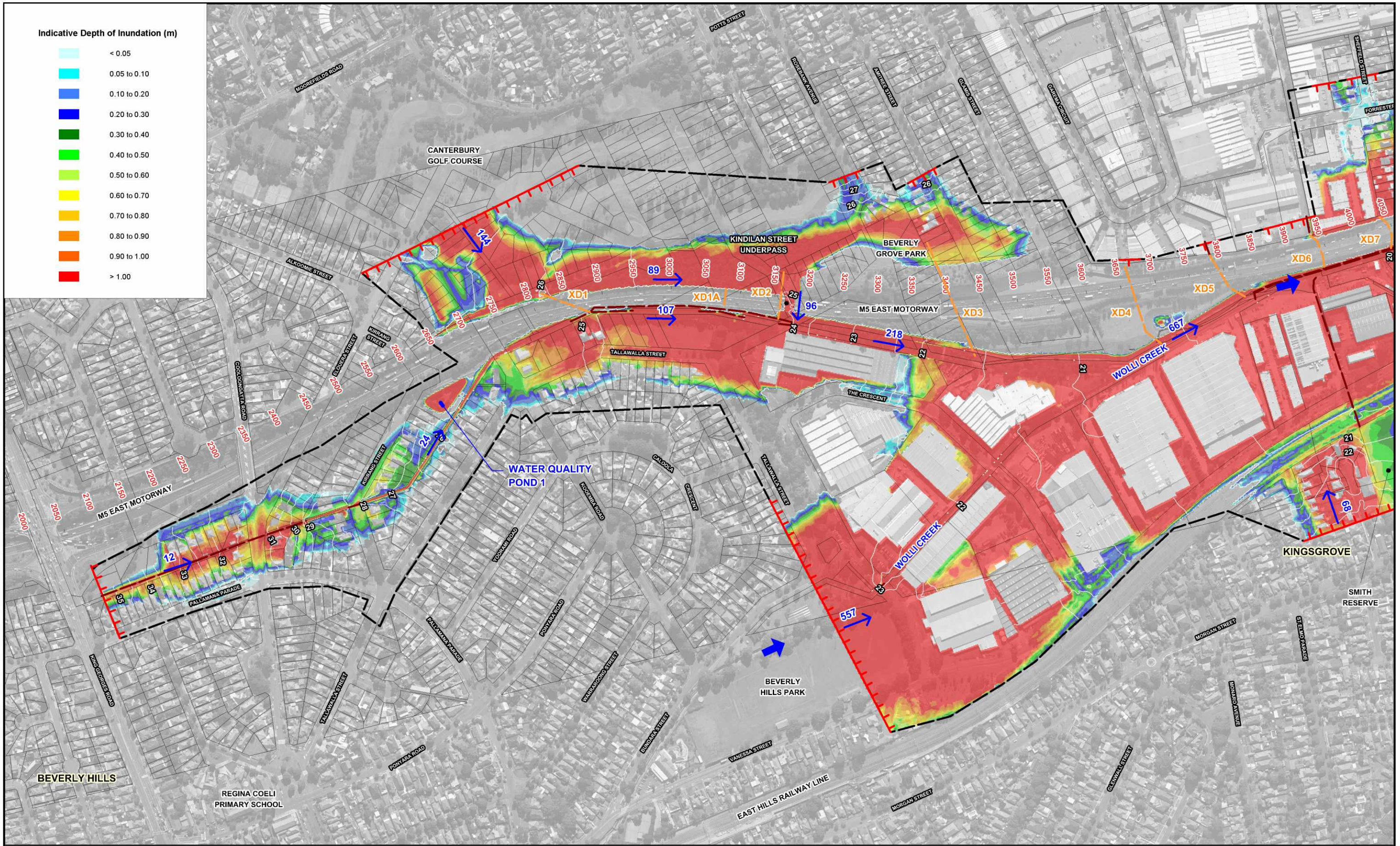


NOTE:
THE EXTENTS AND DEPTHS OF FLOODING SHOWN WERE DETERMINED FROM AIRBORNE LASER SURVEY DATA AND ARE APPROXIMATE ONLY.
THE INFORMATION SHOWN ON THIS PLAN SHOULD NOT BE USED TO PROVIDE FLOOD ADVICE IN INDIVIDUAL ALLOTMENTS.

- LEGEND**
- TUFLOW Model Extent
 - Inflow Boundary
 - Modelled Drainage Network
 - Existing Transverse Drainage Structure and Identifier
 - Peak Overland Flow (m^3/s)
 - Water Surface Contours (m AHD)



Indicative Depth of Inundation (m)



NOTE:
 THE EXTENTS AND DEPTHS OF FLOODING SHOWN WERE DETERMINED FROM AIRBORNE LASER SURVEY DATA AND ARE APPROXIMATE ONLY.
 THE INFORMATION SHOWN ON THIS PLAN SHOULD NOT BE USED TO PROVIDE FLOOD ADVICE IN INDIVIDUAL ALLOTMENTS.

LEGEND

- TUFLOW Model Extent
- Inflow Boundary
- Modelled Drainage Network
- Existing Transverse Drainage Structure and Identifier (XD7)
- Peak Overland Flow (m³/s)
- Water Surface Contours (m AHD)

KING GEORGES ROAD INTERCHANGE UPGRADE FLOODING AND DRAINAGE INVESTIGATION

Figure 2.7

PRE-UPGRADE FLOODING PATTERNS
 PMF (BoM, 2003)



Afflux (m)

- < -0.2
- 0.20 to -0.10
- 0.10 to -0.01
- 0.01 to 0.01
- 0.01 to 0.02
- 0.02 to 0.05
- 0.05 to 0.10
- 0.10 to 0.20
- 0.20 to 0.30
- 0.30 to 0.50
- Land Rendered Flood Free as a Result of Change
- Additional Area of Land Flooded as a Result of Change

JOINS SHEET 2 OF 2

**KING GEORGES ROAD INTERCHANGE UPGRADE
FLOODING AND DRAINAGE INVESTIGATION**

LEGEND
 - - - - - TUFLOW Model Extent

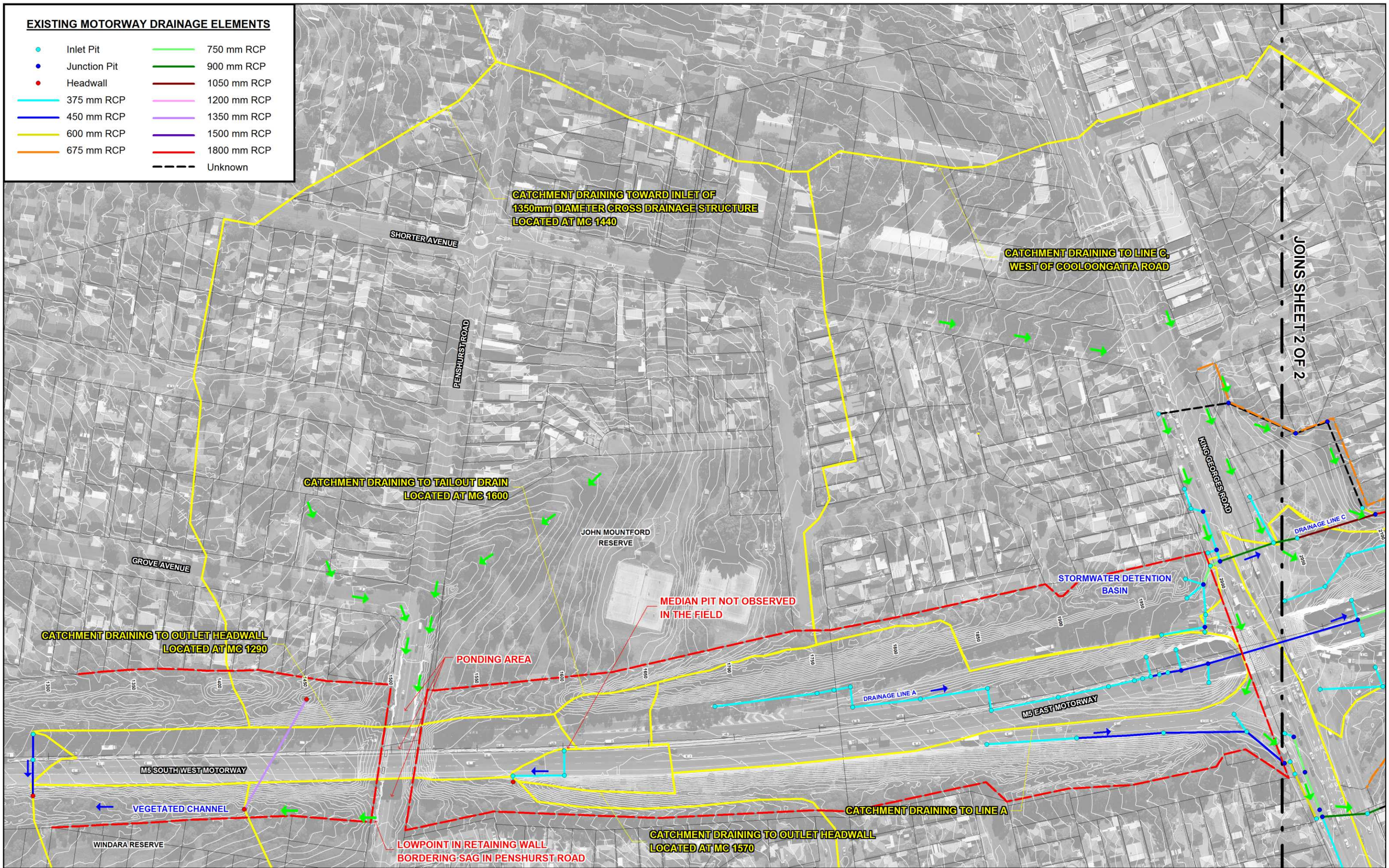
Scale: 1:5,000
 0 50 100 150m

NOTE:
 AFFLUX IS BASED ON A COMPARISON BETWEEN PEAK FLOOD LEVELS GENERATED BY APPLYING THE METHODOLOGIES SET OUT IN BOM, 1994 AND BOM, 2003. THE FIGURE SHOWS THAT INCREASES IN PEAK FLOOD LEVELS RESULT FROM THE APPLICATION OF THE METHODOLOGY SET OUT IN BOM, 2003.

Figure 2.8

EXISTING MOTORWAY DRAINAGE ELEMENTS

- | | |
|--|---|
| ● Inlet Pit | — 750 mm RCP |
| ● Junction Pit | — 900 mm RCP |
| ● Headwall | — 1050 mm RCP |
| — 375 mm RCP | — 1200 mm RCP |
| — 450 mm RCP | — 1350 mm RCP |
| — 600 mm RCP | — 1500 mm RCP |
| — 675 mm RCP | — 1800 mm RCP |
| | - - - Unknown |



JOINS SHEET 2 OF 2



- LEGEND**
- ➔ Overland Flow Path
 - ➔ Direction of Piped Flow
 - M5 East Motorway Property Boundary
 - - - M5 South West Motorway Lease Boundary

- NOTES:**
1. LOCAL STORMWATER DRAINAGE SYSTEM EXTERNAL TO MOTORWAY CORRIDOR NOT SHOWN
 2. EXISTING TABLE DRAINS ALONG MOTORWAY CORRIDOR NOT SHOWN
 3. CONTOURS ARE SHOWN AT 0.5m INTERVALS

**KING GEORGES ROAD INTERCHANGE UPGRADE
FLOODING AND DRAINAGE INVESTIGATION**

Figure 3.1
Sheet 1 of 2

LAYOUT OF EXISTING MOTORWAY DRAINAGE SYSTEM IN VICINITY OF KGRUI PROJECT