











# **APPENDIX A**



## **A1 - Geological Long Section & A2 Environmental Sampling Locations**

# MELBOURNE METRO RAIL PROJECT GEOLOGICAL LONG SECTION

## LEGEND

-  PROPOSED STATION EXTENT IN PLAN
-  CONTROL LINE PROPOSED WESTBOUND RAIL TUNNEL
-  CONTROL LINE PROPOSED EASTBOUND RAIL TUNNEL
-  INDICATIVE RAIL INFRASTRUCTURE
-  ALTERNATIVE CONTROL LINE
-  INDICATIVE PROPOSED RAIL TUNNEL PLATFORM (SECTION)
-  INDICATIVE EXISTING INFRASTRUCTURE (SECTION)
-  INFERRED GROUND WATER LEVEL (SECTION)

## LEGEND INVESTIGATION LOCATIONS

-  REFERENCE DESIGN BOREHOLE
-  Measured Groundwater Level
-  Screening























## NOTES

1. THESE NOTES APPLY TO ALL PROJECT DRAWINGS IN THE SET UNLESS NOTED OTHERWISE.
2. ALL LEVELS ARE IN METRES TO AHD.
3. ALL CO-ORDINATES ARE IN METRES TO MGA-55.
4. INFERRED GROUNDWATER LEVEL BASED ON MEASUREMENTS TAKEN IN MELBOURNE METRO BOREHOLES BETWEEN AUGUST AND DECEMBER 2015.
5. GEOLOGICAL UNITS SHOWN ARE SIMPLIFIED AND MATERIAL COMPOSITION AND STRENGTH CAN VARY CONSIDERABLY WITHIN GEOLOGICAL UNIT.
6. BOUNDARIES BETWEEN GEOLOGICAL UNITS ARE INFERRED ONLY AND SUBJECT TO CHANGE AS FURTHER SUBSURFACE INFORMATION BECOMES AVAILABLE.
7. AERIAL PHOTOGRAPH HAS 50% TRANSPARENCY APPLIED.
8. EXISTING STRUCTURES ARE INDICATIVE ONLY.












## REFERENCES

1. TUNNEL ALIGNMENT BASED ON PROPOSED RAIL ALIGNMENT (REVISION 2.3) SOURCED FROM AJM JV, FILE <MMR-AJM-PWAA-M2-DD-D08000-TRACK.DWG> AND <MMR-AJM-PWAA-M2-DD-D08000-PROF.DWG>, RECEIVED BY GOLDER ASSOCIATES 28-10-2015.
2. TUNNEL INFRASTRUCTURE SOURCED FROM AJM-JV FILE <MMR-AJM-PWAA-M2-CS-D05000-TNNL-STR.dwg>, RECEIVED BY GOLDER 16-11-2015.
3. STATION EXTENTS (REVISION 3.3) SOURCED FROM AJM JV, DWG FILE <MMR-AJM-PM2-M2-DD-D05000\_STN\_EXTENT.dwg>, RECEIVED BY GOLDER ASSOCIATES 16-11-2015.
4. AERIAL PHOTOGRAPH DATE OF CAPTURE OCTOBER 2014, IMAGE RESOLUTION 10 cm, SOURCED FROM PUBLIC TRANSPORT VICTORIA.
5. TOPOGRAPHY, ROADS AND RAIL DATA SOURCED FROM VICMAP 2013.

## LEGEND STRATIGRAPHY

- |  |   |
|--|---|
|  Recent Silt  |  Older Volcanics                           |
|  Fill   |  RS - EW (Residual to Extremely Weathered) |
|  Cooce Island Silt                                  |  HW - FR (Highly Weathered to Fresh)       |
|  Holocene Alluvium                                  |  Werribee Formation                        |
|  Jolimont Clay                                      |  Devonian Granite                          |
|  Newer Volcanics                                    |   |
|  Pleistocene Alluvium                               | <b>Sud - Melbourne Formation, Siltstone / Sandstone</b>   |
|  Fishermens Bend Silt (Upper)                       |  RS - EW (Residual to Extremely Weathered) |
|  Fishermens Bend Silt (Lower)                       |  HW - MW (Highly to Moderately Weathered)  |
|  Moray Street Gravels                               |  SW - FR (Slightly Weathered to Fresh)     |
|  Early Pleistocene Colluvial and Alluvial Sediments |   |
|  Newer Volcanics Swan St Basalt                     |   |
|  Punt Rd Sands                                      |   |
|  Brighton Group                                     |   |

## LEGEND HISTORICAL INVESTIGATION LOCATIONS

- |  |  |
|--|--|
| <b>MELBOURNE METRO BOREHOLES</b>   | <b>DESKTOP AUDIT BOREHOLES</b>   |
|  GOLDER BOREHOLE              |  DESKTOP AUDIT BOREHOLE - STAGE 1 |
|  GOLDER CONE PENETRATION TEST |  GOLDER ASSOCIATES FILES          |
|  GOLDER PROBE HOLE            |  REGIONAL RAIL LINK               |
|  AURECON STAGE 1 BOREHOLE     |  FEDERATION SQUARE                |
|  |  CITY LINK                        |
|  |  MURL                             |
|  |  WESTERN BYPASS                   |

## LEGEND RELIABILITY

QUALITY AND QUANTITY OF DATA	GEOLOGICAL COMPLEXITY				
	Very Complex	Complex	Intermediate	Simple	Very Simple
Very Poor	Very Low	Very Low	Low	Low	Moderate
Poor	Very Low	Low	Low	Moderate	High
Fair	Low	Moderate	Moderate	High	High
Good	Moderate	Moderate	High	High	Very High
Very Good	High	High	Very High	Very High	Very High

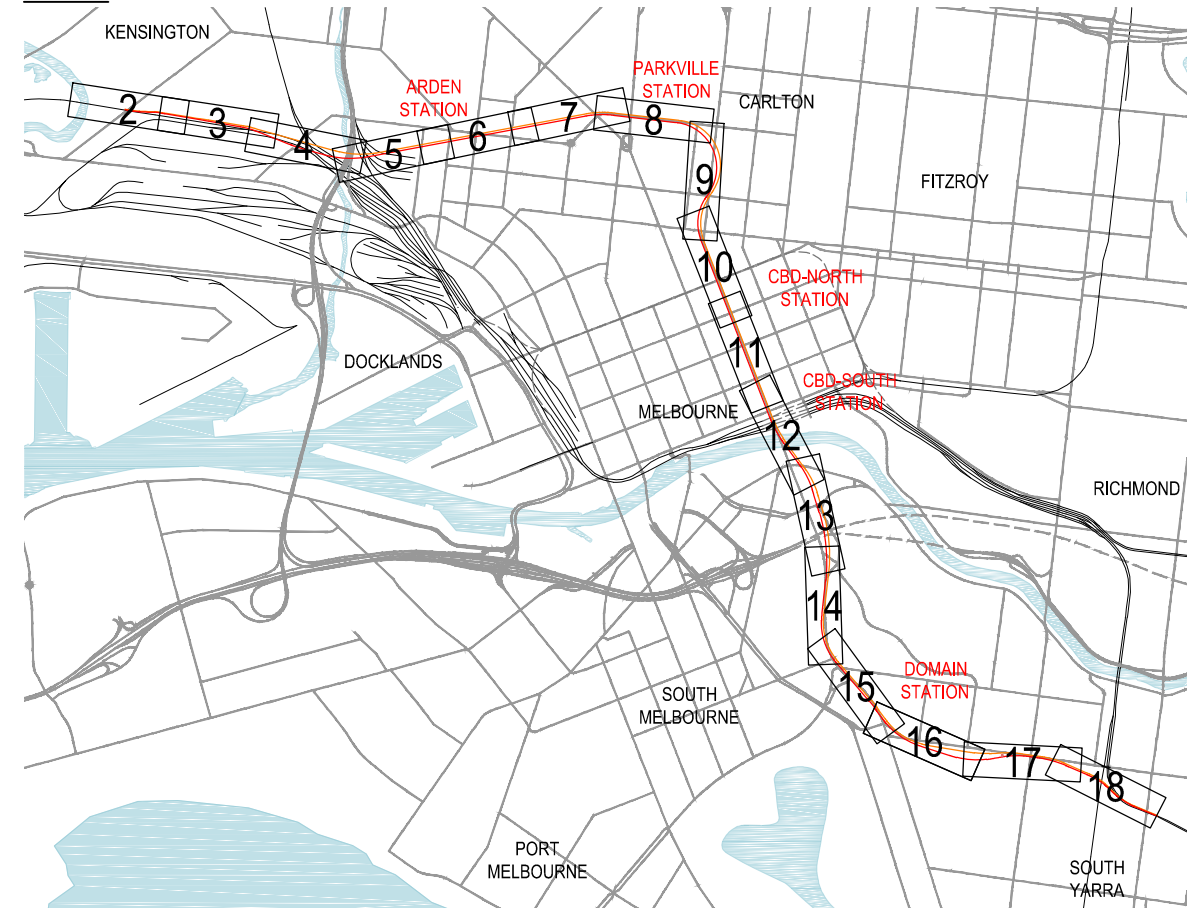
## GROUND MODEL RELIABILITY

Very low (VL)	Available information insufficient given the geological complexity to develop a basic conceptual model. Indicative only, should not be relied upon.
Low (L)	Available information sufficient given the geological complexity to develop a basic conceptual ground model. Insufficient to develop an observational model.
Moderate (M)	Sufficient information given the geological complexity to develop an observational model. Significant uncertainty requiring further investigation or risk management.
High (H)	Sufficient information given the geological complexity to develop an observational ground model. Some uncertainty requiring further investigation or risk management.
Very High (VH)	Able to develop detailed observational ground model. Sufficient information given the geological complexity to identify ground related uncertainty.

## FIGURE LIST MMR-AJM-PWAA-DR-NN-500450

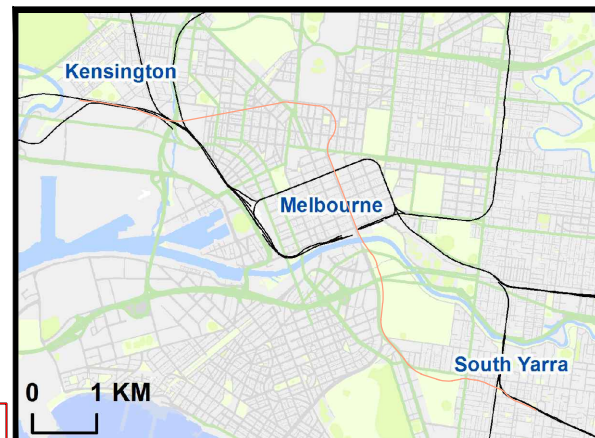
- |                |                                       |
|----------------|---------------------------------------|
| SHEET 1        | KEY MAP, LEGEND AND NOTES             |
| SHEET 2 TO 18  | GEOLOGICAL LONG SECTION               |
| SHEET 19 TO 35 | GEOLOGICAL LONG SECTION - RELIABILITY |

## KEY MAP



Note:  
Surface works are not shown

NOT FOR CONSTRUCTION



## Melbourne Metro Rail Project

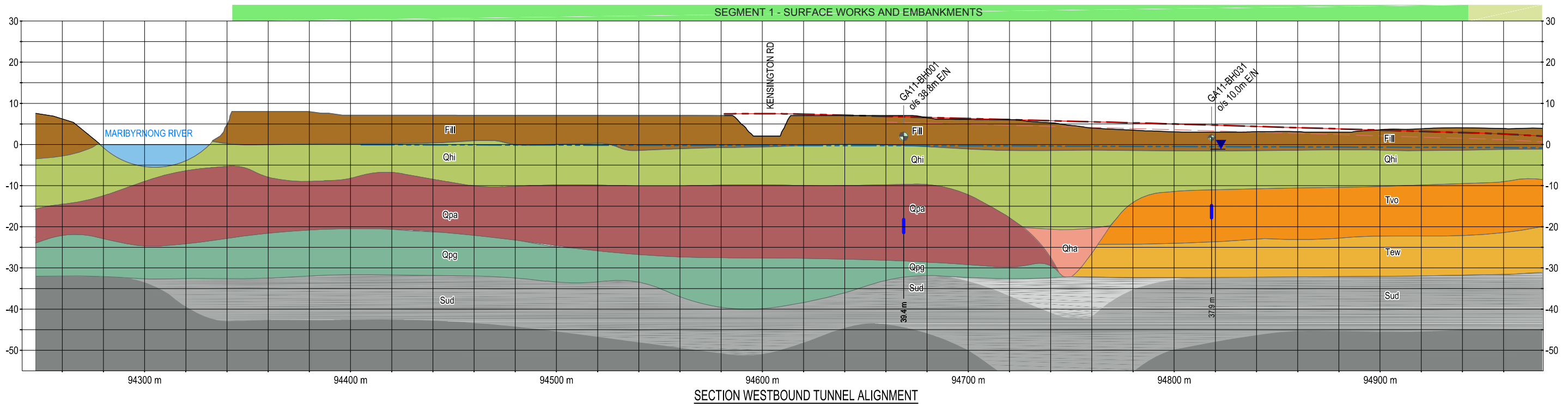
Title GEOLOGICAL LONG SECTION		SHEET 1 OF 35	
Drawing Number MMR-AJM-PWAA-DR-NN-500450		Revision P1.1	
Drawn By GOLDER	Approved By SLVB	Date 23-03-2016	Map Size A3







PLAN VIEW



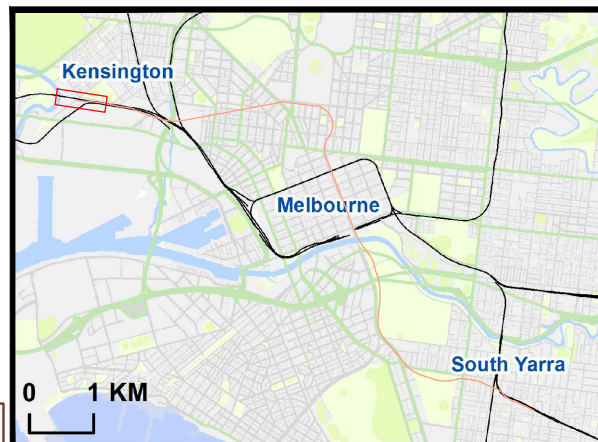
SECTION WESTBOUND TUNNEL ALIGNMENT

NOTES

1. REFER FIGURE MMR-AJM-PWAA-DR-NN-500450, SHEET 1 OF 35 FOR NOTES AND LEGEND.
2. ALL LEVELS ARE IN METRES TO AHD.
3. ALL COORDINATES ARE IN METRES TO MGA-Z55
4. INTERPRETED SUBSURFACE CONDITIONS SHOWN ON LONG SECTION TO BE USED FOR EES PURPOSES ONLY.

Note:  
Surface works are not shown

NOT FOR CONSTRUCTION



# Melbourne Metro Rail Project

Title: GEOLOGICAL LONG SECTION SHEET 2 OF 35

Drawing Number: MMR-AJM-PWAA-DR-NN-500450 Revision: P1.1

Drawn By: GOLDER Approved By: SLVB Date: 23-03-2016 Map Size: A3



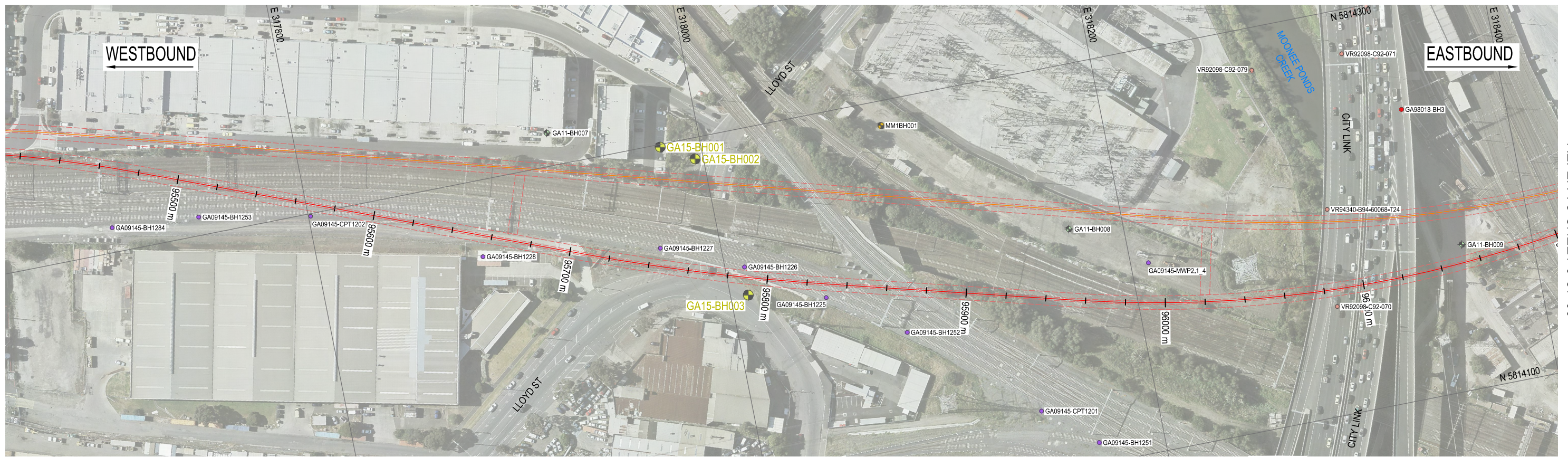




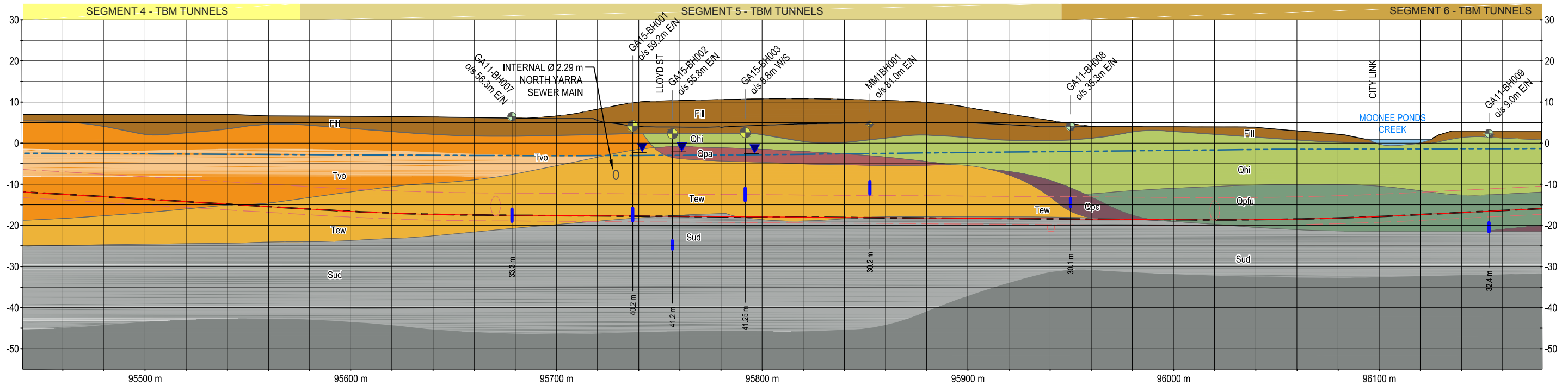


REFER TO SHEET 3 OF 35

REFER TO SHEET 5 OF 35



PLAN VIEW



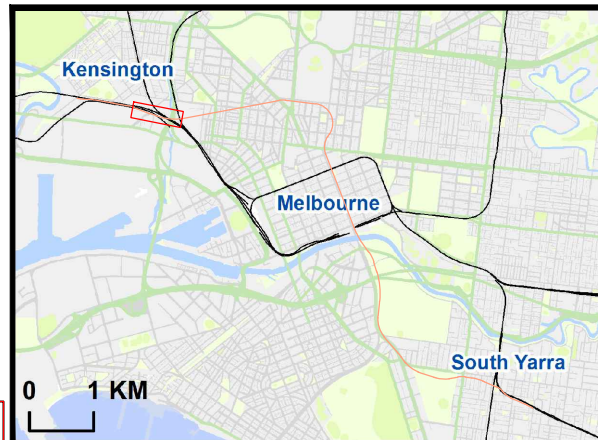
SECTION WESTBOUND TUNNEL ALIGNMENT

NOTES

1. REFER FIGURE MMR-AJM-PWAA-DR-NN-500450, SHEET 1 OF 35 FOR NOTES AND LEGEND.
2. ALL LEVELS ARE IN METRES TO AHD.
3. ALL COORDINATES ARE IN METRES TO MGA-Z55
4. INTERPRETED SUBSURFACE CONDITIONS SHOWN ON LONG SECTION TO BE USED FOR EES PURPOSES ONLY.

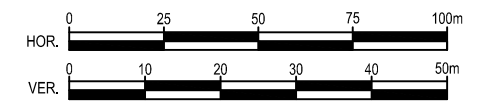
Note:  
Surface works are not shown

NOT FOR CONSTRUCTION



# Melbourne Metro Rail Project

Title GEOLOGICAL LONG SECTION		SHEET 4 OF 35	
Drawing Number MMR-AJM-PWAA-DR-NN-500450		Revision P1.1	
Drawn By GOLDER	Approved By SLVB	Date 23-03-2016	Map Size A3



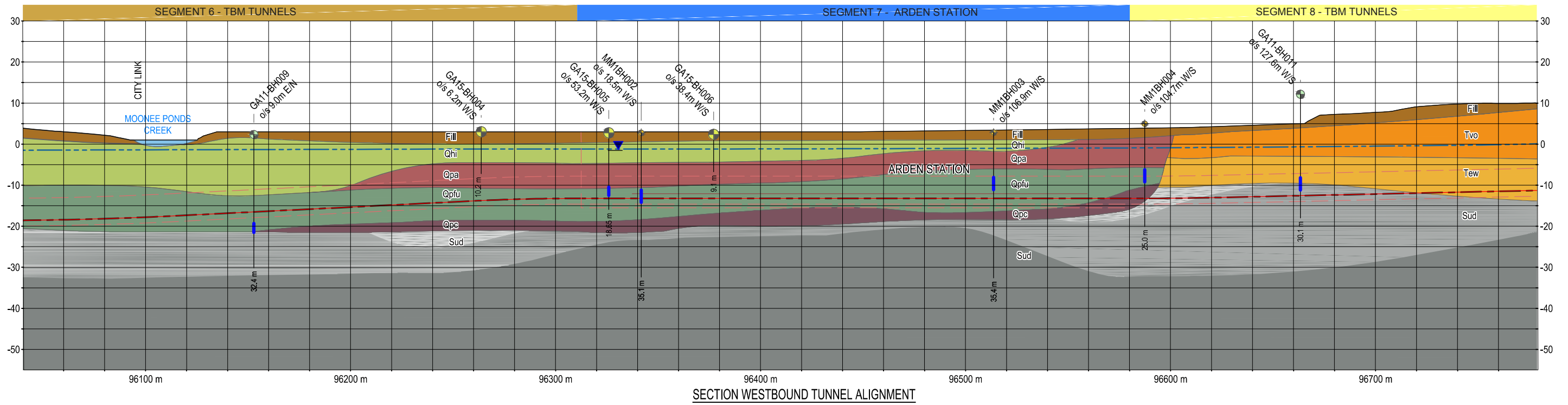


REFER TO SHEET 4 OF 35

REFER TO SHEET 6 OF 35



PLAN VIEW



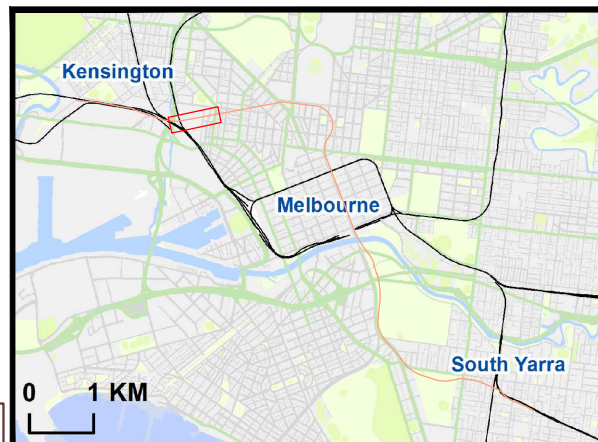
SECTION WESTBOUND TUNNEL ALIGNMENT

NOTES

1. REFER FIGURE MMR-AJM-PWAA-DR-NN-500450, SHEET 1 OF 35 FOR NOTES AND LEGEND.
2. ALL LEVELS ARE IN METRES TO AHD.
3. ALL COORDINATES ARE IN METRES TO MGA-Z55
4. INTERPRETED SUBSURFACE CONDITIONS SHOWN ON LONG SECTION TO BE USED FOR EES PURPOSES ONLY.

Note:  
Surface works are not shown

NOT FOR CONSTRUCTION

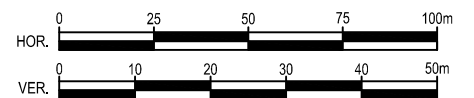


# Melbourne Metro Rail Project

Title: GEOLOGICAL LONG SECTION SHEET 5 OF 35

Drawing Number: MMR-AJM-PWAA-DR-NN-500450 Revision: P1.1

Drawn By: GOLDER Approved By: SLVB Date: 23-03-2016 Map Size: A3



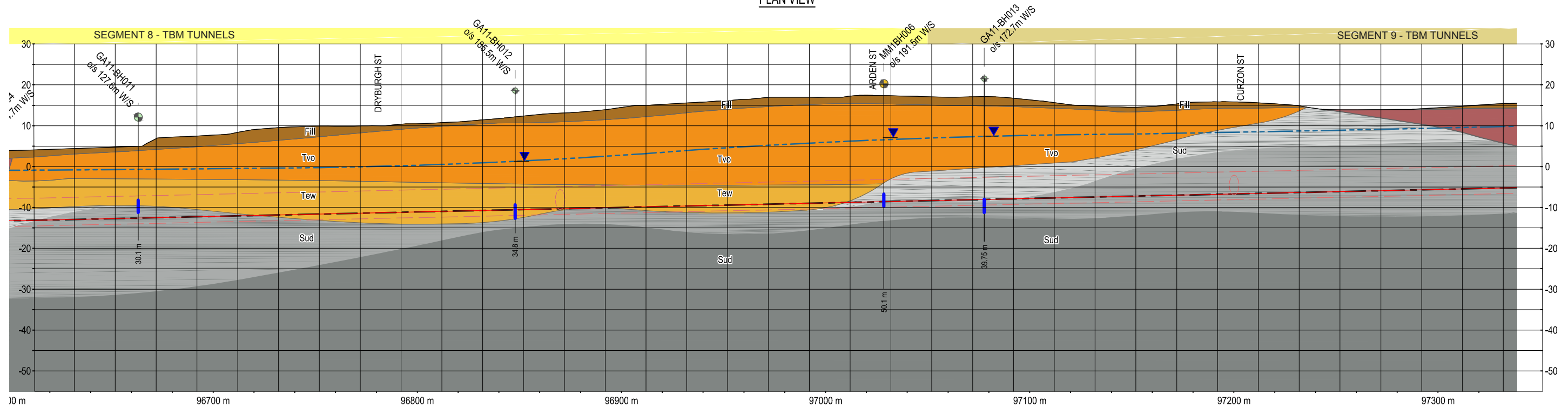


REFER TO SHEET 5 OF 35

REFER TO SHEET 7 OF 35



PLAN VIEW



SECTION WESTBOUND TUNNEL ALIGNMENT

NOTES

1. REFER FIGURE MMR-AJM-PWAA-DR-NN-500450, SHEET 1 OF 35 FOR NOTES AND LEGEND.
2. ALL LEVELS ARE IN METRES TO AHD.
3. ALL COORDINATES ARE IN METRES TO MGA-Z55
4. INTERPRETED SUBSURFACE CONDITIONS SHOWN ON LONG SECTION TO BE USED FOR EES PURPOSES ONLY.

Note:  
Surface works are not shown

NOT FOR CONSTRUCTION

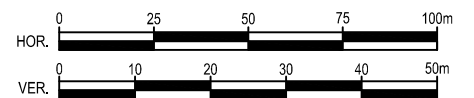


# Melbourne Metro Rail Project

Title: GEOLOGICAL LONG SECTION SHEET 6 OF 35

Drawing Number: MMR-AJM-PWAA-DR-NN-500450 Revision: P1.1

Drawn By: GOLDER Approved By: SLVB Date: 23-03-2016 Map Size: A3



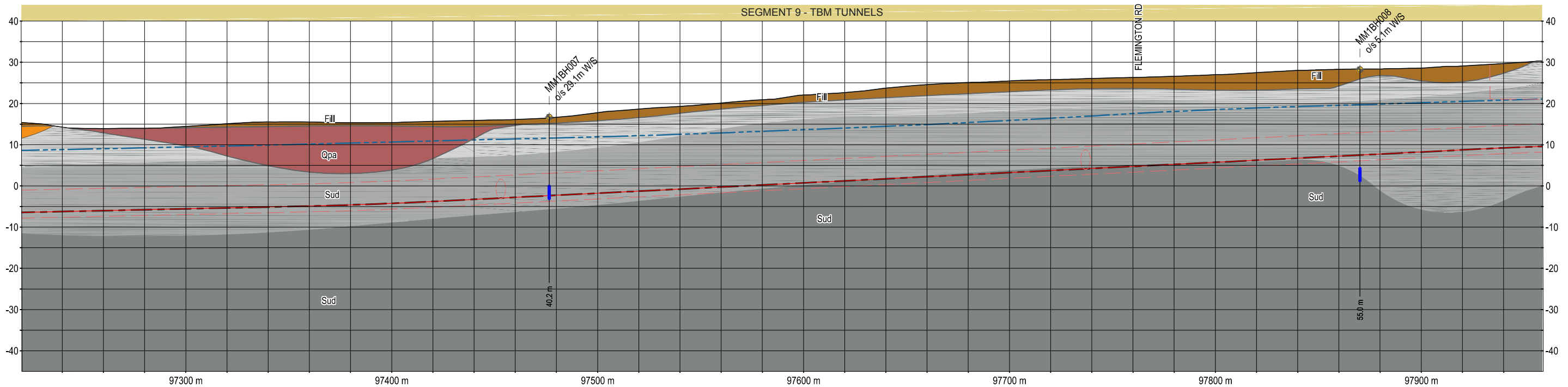


REFER TO SHEET 6 OF 35

REFER TO SHEET 8 OF 35



PLAN VIEW



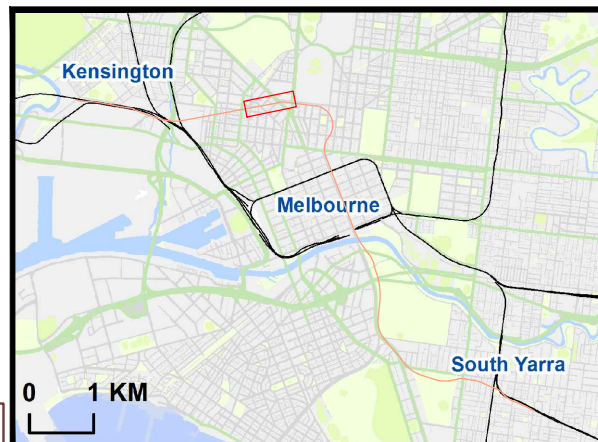
SECTION WESTBOUND TUNNEL ALIGNMENT

NOTES

1. REFER FIGURE MMR-AJM-PWAA-DR-NN-500450, SHEET 1 OF 35 FOR NOTES AND LEGEND.
2. ALL LEVELS ARE IN METRES TO AHD.
3. ALL COORDINATES ARE IN METRES TO MGA-Z55
4. INTERPRETED SUBSURFACE CONDITIONS SHOWN ON LONG SECTION TO BE USED FOR EES PURPOSES ONLY.

Note:  
Surface works are not shown

NOT FOR CONSTRUCTION

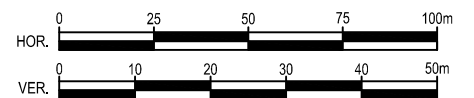


# Melbourne Metro Rail Project

Title: GEOLOGICAL LONG SECTION SHEET 7 OF 35

Drawing Number: MMR-AJM-PWAA-DR-NN-500450 Revision: P1.1

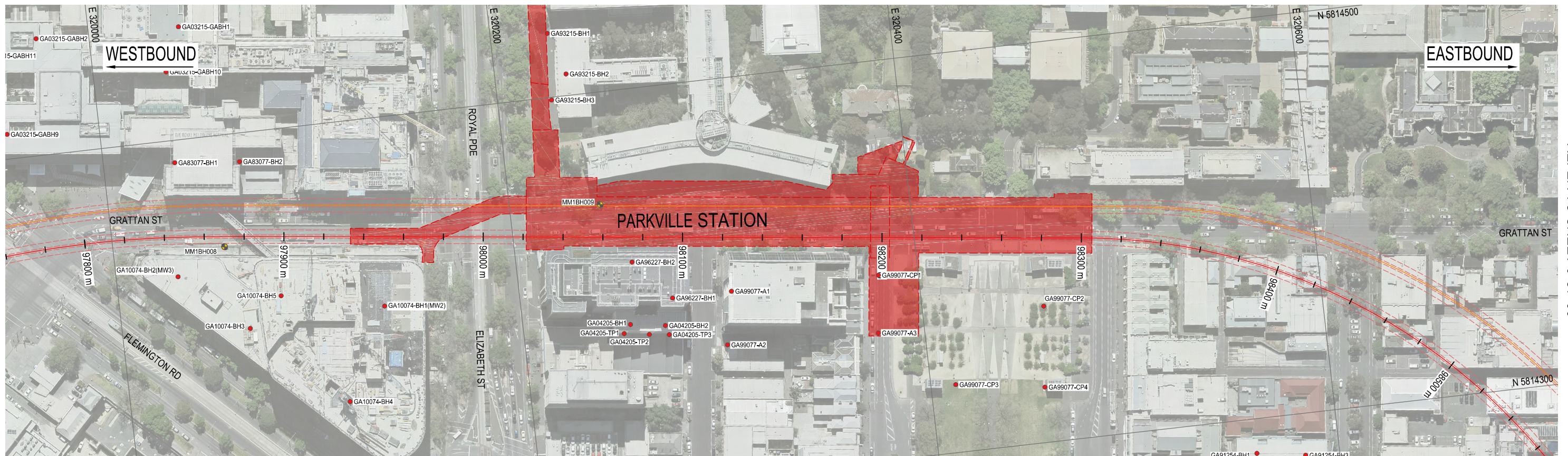
Drawn By: GOLDER Approved By: SLVB Date: 23-03-2016 Map Size: A3



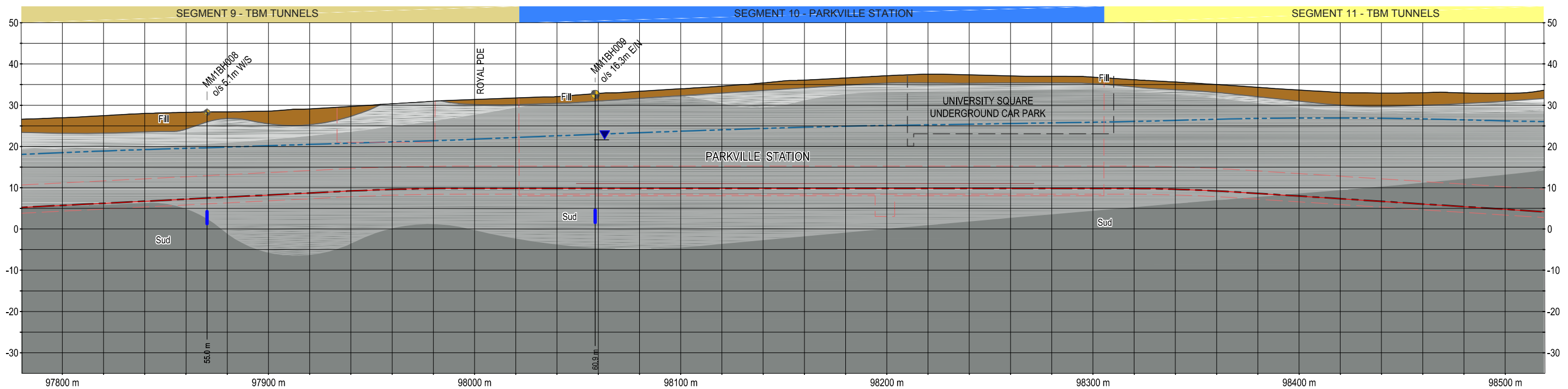


REFER TO SHEET 7 OF 35

REFER TO SHEET 9 OF 35



PLAN VIEW



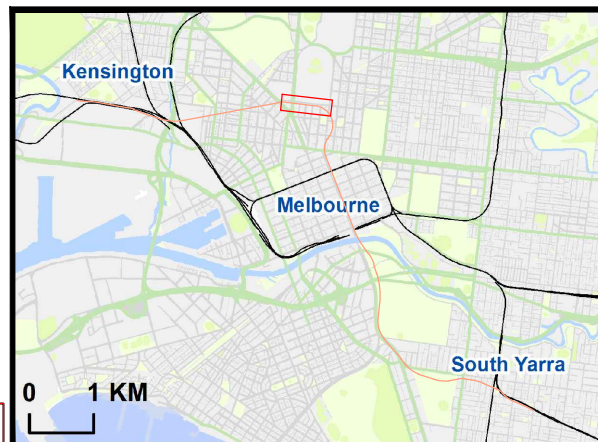
SECTION WESTBOUND TUNNEL ALIGNMENT

NOTES

1. REFER FIGURE MMR-AJM-PWAA-DR-NN-500450, SHEET 1 OF 35 FOR NOTES AND LEGEND.
2. ALL LEVELS ARE IN METRES TO AHD.
3. ALL COORDINATES ARE IN METRES TO MGA-Z55
4. INTERPRETED SUBSURFACE CONDITIONS SHOWN ON LONG SECTION TO BE USED FOR EES PURPOSES ONLY.

Note:  
Surface works are not shown

NOT FOR CONSTRUCTION



# Melbourne Metro Rail Project

Title: GEOLOGICAL LONG SECTION SHEET 8 OF 35

Drawing Number: MMR-AJM-PWAA-DR-NN-500450 Revision: P1.1

Drawn By: GOLDER Approved By: SLVB Date: 23-03-2016 Map Size: A3



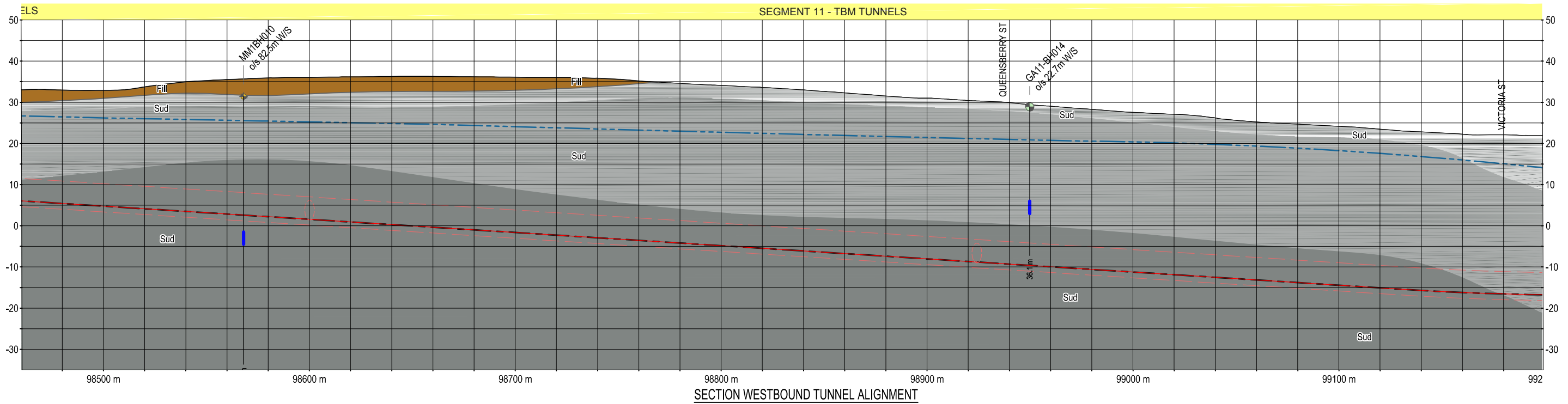


REFER TO SHEET 8 OF 35

REFER TO SHEET 10 OF 35



PLAN VIEW



SECTION WESTBOUND TUNNEL ALIGNMENT

NOTES

1. REFER FIGURE MMR-AJM-PWAA-DR-NN-500450, SHEET 1 OF 35 FOR NOTES AND LEGEND.
2. ALL LEVELS ARE IN METRES TO AHD.
3. ALL COORDINATES ARE IN METRES TO MGA-Z55
4. INTERPRETED SUBSURFACE CONDITIONS SHOWN ON LONG SECTION TO BE USED FOR EES PURPOSES ONLY.

Note:  
Surface works are not shown

NOT FOR CONSTRUCTION



# Melbourne Metro Rail Project

Title: GEOLOGICAL LONG SECTION SHEET 9 OF 35

Drawing Number: MMR-AJM-PWAA-DR-NN-500450 Revision: P1.1

Drawn By: GOLDER Approved By: SLVB Date: 23-03-2016 Map Size: A3

