



Appendix C

Preliminary Excavation Induced Settlement Contour Drawings



PLAN

NOTES

1. TUNNELLING INDUCED SETTLEMENT CONTOURS ARE BASED ON THE FOLLOWING ASSUMPTIONS:

GROUND TYPE	VOLUME LOSS (%)	TROUGH WIDTH PARAMETER
SOIL (ALL TYPES)	1.0	0.4
ROCK	0.5	0.6
ROCK (> 2D COVER)	0.5	0.7

2. SETTLEMENT CONTOURS FOR THE STATIONS, SHAFT, CUT & COVER, AND DECLINE STRUCTURES ARE BASED ON WALL DEFLECTIONS CALCULATED FROM FINITE ELEMENT MODELLING.

3. SETTLEMENT CONTOURS FOR THE STATIONS, SHAFT, CUT & COVER, AND DECLINE STRUCTURES ARE SUPERIMPOSED WITH THE TUNNEL SETTLEMENT CONTOURS TO SHOW THE TOTAL MAXIMUM SETTLEMENT FROM ALL CONSTRUCTION WORKS.

4. ESTIMATED CONSOLIDATION SETTLEMENT IS NOT SHOWN. REFER TO DRAWING MMR-AJM-PWAA-DR-NN-500377.

5. ESTIMATED INFLUENCE ZONE IS REPRESENTED BY THE AREA ENCLOSED BY THE 5mm CONTOUR LINES. REFER TO GIS FOR AFFECTED PROPERTY DETAILS. CONDITION SURVEY REQUIRED AND MONITORING PROGRAM TO BE IMPLEMENTED DURING CONSTRUCTION FOR STRUCTURES WITHIN THE INFLUENCE ZONE. EXTENT OF INFLUENCE ZONE MAY INCREASE WHERE COMPRESSIBLE SEDIMENTS ARE PRESENT.

6. TRACK ALIGNMENT SHOWN IS BASED ON TRACK ALIGNMENT VERSION P2.6. STATION EXTENTS SHOWN ARE BASED ON ARCHITECTURAL VERSION 3.9.

7. SETTLEMENT ASSESSMENT AND RESULTING CONTOURS BASED ON TRACK ALIGNMENT VERSION P2.3.

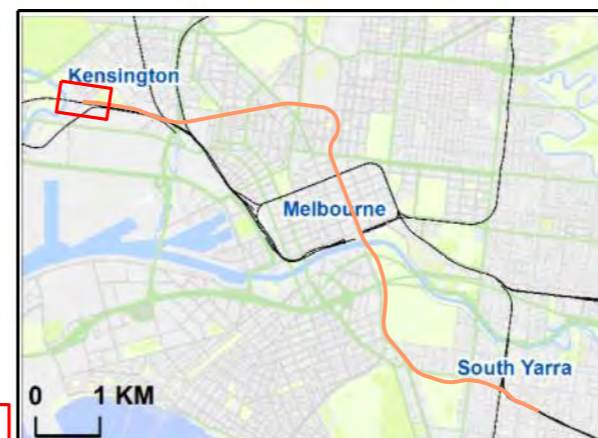
CONCEPT DESIGN: EXCAVATION INDUCED SETTLEMENT CONTOURS

LEGEND

- MMRP TRACKS
- TRACKS TO BE REMOVED
- TRACKS TO BE REALIGNED
- RETAINING WALL / VERTICAL WALL
- DIVIDING WALL
- BATTERS
- CUT AND COVER STATION FOOTPRINT
- PLATFORM
- DECLINE STRUCTURE
- TUNNEL - DRIVEN
- TUNNEL - CUT & COVER
- CROSS PASSAGE
- PRECAST CONCRETE RETAINING WALL
- SERVICE FACILITY / TBM RETRIEVAL POINT
- TUNNEL - MINED
- CITY LOOP
- CITYLINK CROWN ALLOTMENT
- EMERGENCY ACCESS SHAFT
- CAVERN STATION ENTRANCE AND PLANT SHAFT (TYP)
- MINED STATION MAIN CAVERN
- 5mm SETTLEMENT
- 10mm SETTLEMENT
- 20mm SETTLEMENT
- 30mm SETTLEMENT
- 40mm SETTLEMENT
- 50mm SETTLEMENT
- 60mm SETTLEMENT
- 70mm SETTLEMENT

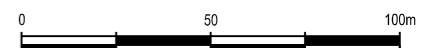
Note:
Surface works are not shown

NOT FOR CONSTRUCTION



Melbourne Metro Rail Project

Title SETTLEMENT CONTOURS		SHEET 1 OF 15	
Drawing Number MMR-AJM-UGAA-DR-NN-500431		Revision P1.1	
Drawn By N WIJERAYHNE	Approved By	Date	Map Size A3





PLAN

NOTES

1. FOR NOTES REFER DRG. MMR-AJM-UGAA-DR-NN-500431 SHEET 1 OF 15.

CONCEPT DESIGN: EXCAVATION INDUCED SETTLEMENT CONTOURS

LEGEND

- | | | |
|---------------------------------|---|-----------------|
| MMRP TRACKS | TUNNEL - CUT & COVER | 5mm SETTLEMENT |
| TRACKS TO BE REMOVED | CROSS PASSAGE | 10mm SETTLEMENT |
| TRACKS TO BE REALIGNED | PRECAST CONCRETE RETAINING WALL | 20mm SETTLEMENT |
| RETAINING WALL / VERTICAL WALL | SERVICE FACILITY / TBM RETRIEVAL POINT | 30mm SETTLEMENT |
| DIVIDING WALL | TUNNEL - MINED | 40mm SETTLEMENT |
| BATTERS | CITY LOOP | 50mm SETTLEMENT |
| CUT AND COVER STATION FOOTPRINT | CITYLINK CROWN ALLOTMENT | 60mm SETTLEMENT |
| PLATFORM | EMERGENCY ACCESS SHAFT | 70mm SETTLEMENT |
| DECLINE STRUCTURE | CAVERN STATION ENTRANCE AND PLANT SHAFT (TYP) | |
| TUNNEL - DRIVEN | MINED STATION MAIN CAVERN | |

Note:
Surface works are not shown

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Title SETTLEMENT CONTOURS		SHEET 2 OF 15	
Drawing Number MMR-AJM-UGAA-DR-NN-500431		Revision P1.1	
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PLAN

NOTES

1. FOR NOTES REFER DRG. MMR-AJM-UGAA-DR-NN-500431 SHEET 1 OF 15.

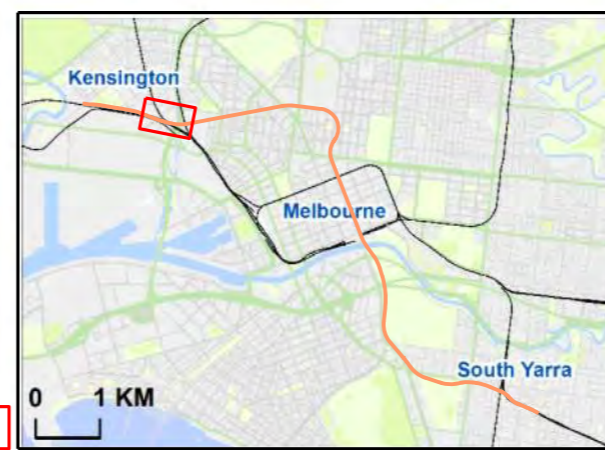
CONCEPT DESIGN: EXCAVATION INDUCED SETTLEMENT CONTOURS

LEGEND

- | | | |
|---------------------------------|---|-----------------|
| MMRP TRACKS | TUNNEL - CUT & COVER | 5mm SETTLEMENT |
| TRACKS TO BE REMOVED | CROSS PASSAGE | 10mm SETTLEMENT |
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| DIVIDING WALL | TUNNEL - MINED | 40mm SETTLEMENT |
| BATTERS | CITY LOOP | 50mm SETTLEMENT |
| CUT AND COVER STATION FOOTPRINT | CITYLINK CROWN ALLOTMENT | 60mm SETTLEMENT |
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| TUNNEL - DRIVEN | MINED STATION MAIN CAVERN | |

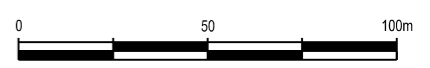
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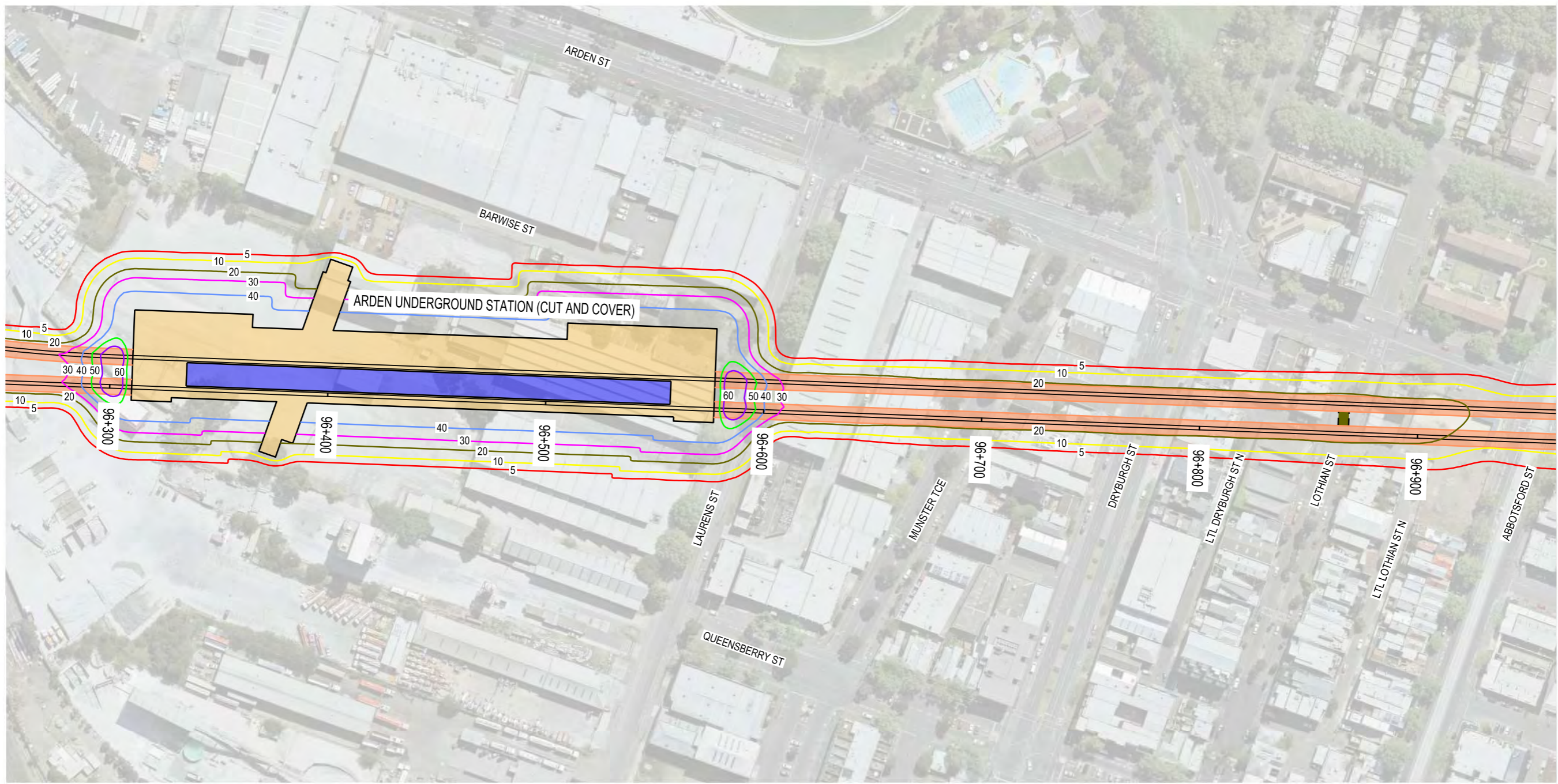
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Title	SETTLEMENT CONTOURS		SHEET 3 OF 15
Drawing Number	MMR-AJM-UGAA-DR-NN-500431		Revision
			P1.1
Drawn By	Approved By	Date	Map Size
N WIJERAYHNE			A3





PLAN

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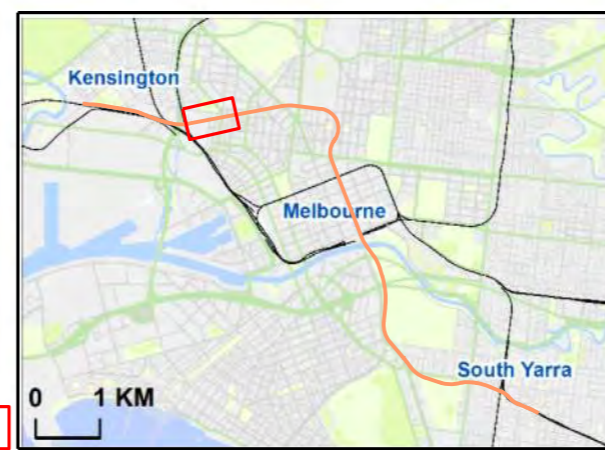
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CONCEPT DESIGN: EXCAVATION INDUCED SETTLEMENT CONTOURS

LEGEND	
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	TRACKS TO BE REMOVED
	TRACKS TO BE REALIGNED
	RETAINING WALL / VERTICAL WALL
	DIVIDING WALL
	BATTERS
	CUT AND COVER STATION FOOTPRINT
	PLATFORM
	DECLINE STRUCTURE
	TUNNEL - DRIVEN
	TUNNEL - CUT & COVER
	CROSS PASSAGE
	PRECAST CONCRETE RETAINING WALL
	SERVICE FACILITY / TBM RETRIEVAL POINT
	TUNNEL - MINED
	CITY LOOP
	CITYLINK CROWN ALLOTMENT
	EMERGENCY ACCESS SHAFT
	CAVERN STATION ENTRANCE AND PLANT SHAFT (TYP)
	MINED STATION MAIN CAVERN
	5mm SETTLEMENT
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	40mm SETTLEMENT
	50mm SETTLEMENT
	60mm SETTLEMENT
	70mm SETTLEMENT

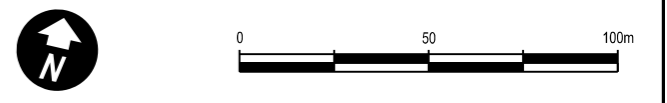
Note:
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Title SETTLEMENT CONTOURS		SHEET 4 OF 15	
Drawing Number MMR-AJM-UGAA-DR-NN-500431		Revision P1.1	
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PLAN

NOTES

1. FOR NOTES REFER DRG. MMR-AJM-UGAA-DR-NN-500431 SHEET 1 OF 15.

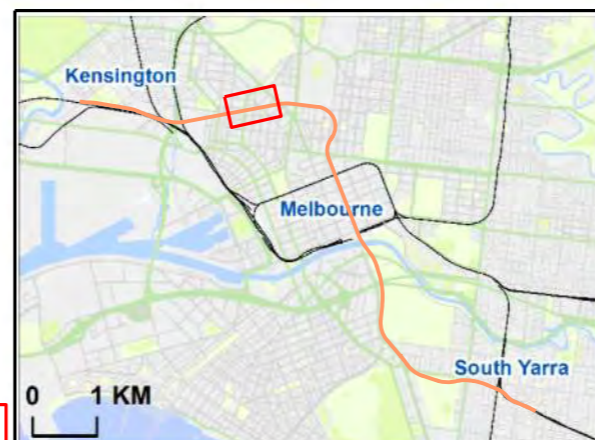
CONCEPT DESIGN: EXCAVATION INDUCED SETTLEMENT CONTOURS

LEGEND

- | | | |
|---------------------------------|---|-----------------|
| MMRP TRACKS | TUNNEL - CUT & COVER | 5mm SETTLEMENT |
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| TRACKS TO BE REALIGNED | PRECAST CONCRETE RETAINING WALL | 20mm SETTLEMENT |
| RETAINING WALL / VERTICAL WALL | SERVICE FACILITY / TBM RETRIEVAL POINT | 30mm SETTLEMENT |
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| CUT AND COVER STATION FOOTPRINT | CITYLINK CROWN ALLOTMENT | 60mm SETTLEMENT |
| PLATFORM | EMERGENCY ACCESS SHAFT | 70mm SETTLEMENT |
| DECLINE STRUCTURE | CAVERN STATION ENTRANCE AND PLANT SHAFT (TYP) | |
| TUNNEL - DRIVEN | MINED STATION MAIN CAVERN | |

Note:
Surface works are not shown

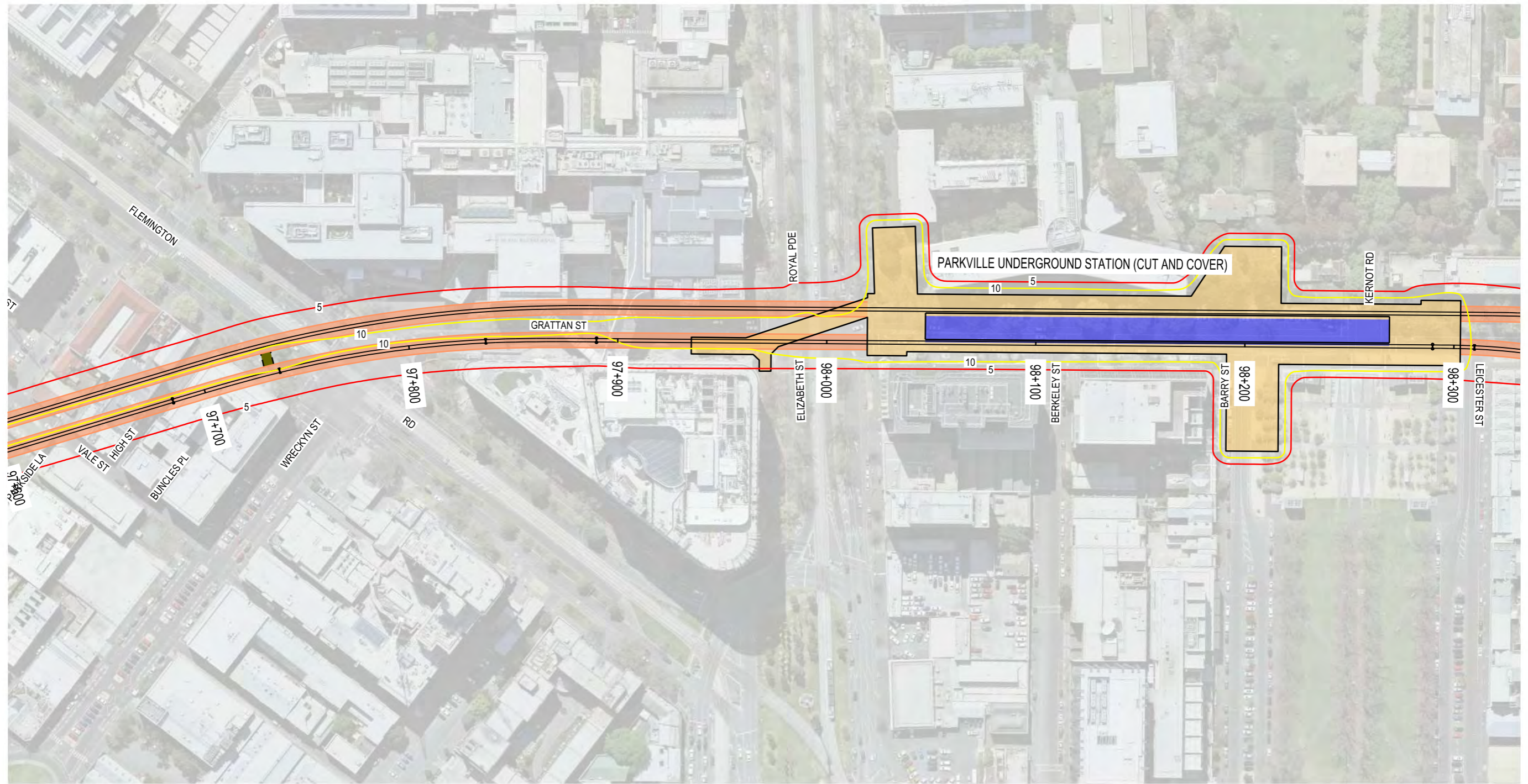
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Title SETTLEMENT CONTOURS		SHEET 5 OF 15	
Drawing Number MMR-AJM-UGAA-DR-NN-500431		Revision P1.1	
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PLAN

NOTES

1. FOR NOTES REFER DRG. MMR-AJM-UGAA-DR-NN-500431 SHEET 1 OF 15.

CONCEPT DESIGN: EXCAVATION INDUCED SETTLEMENT CONTOURS

LEGEND

- | | | |
|---------------------------------|---|-----------------|
| MMRP TRACKS | TUNNEL - CUT & COVER | 5mm SETTLEMENT |
| TRACKS TO BE REMOVED | CROSS PASSAGE | 10mm SETTLEMENT |
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| TUNNEL - DRIVEN | MINED STATION MAIN CAVERN | |

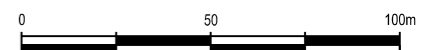
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Title SETTLEMENT CONTOURS		SHEET 6 OF 15	
Drawing Number MMR-AJM-UGAA-DR-NN-500431		Revision P1.1	
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PLAN

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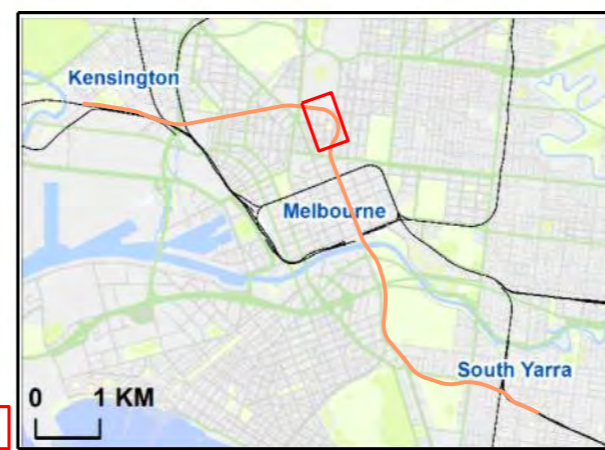
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CONCEPT DESIGN: EXCAVATION INDUCED SETTLEMENT CONTOURS

LEGEND	
	MMRP TRACKS
	TRACKS TO BE REMOVED
	TRACKS TO BE REALIGNED
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	DIVIDING WALL
	BATTERS
	CUT AND COVER STATION FOOTPRINT
	PLATFORM
	DECLINE STRUCTURE
	TUNNEL - DRIVEN
	TUNNEL - CUT & COVER
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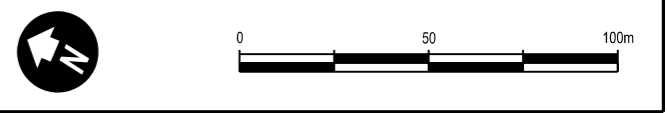
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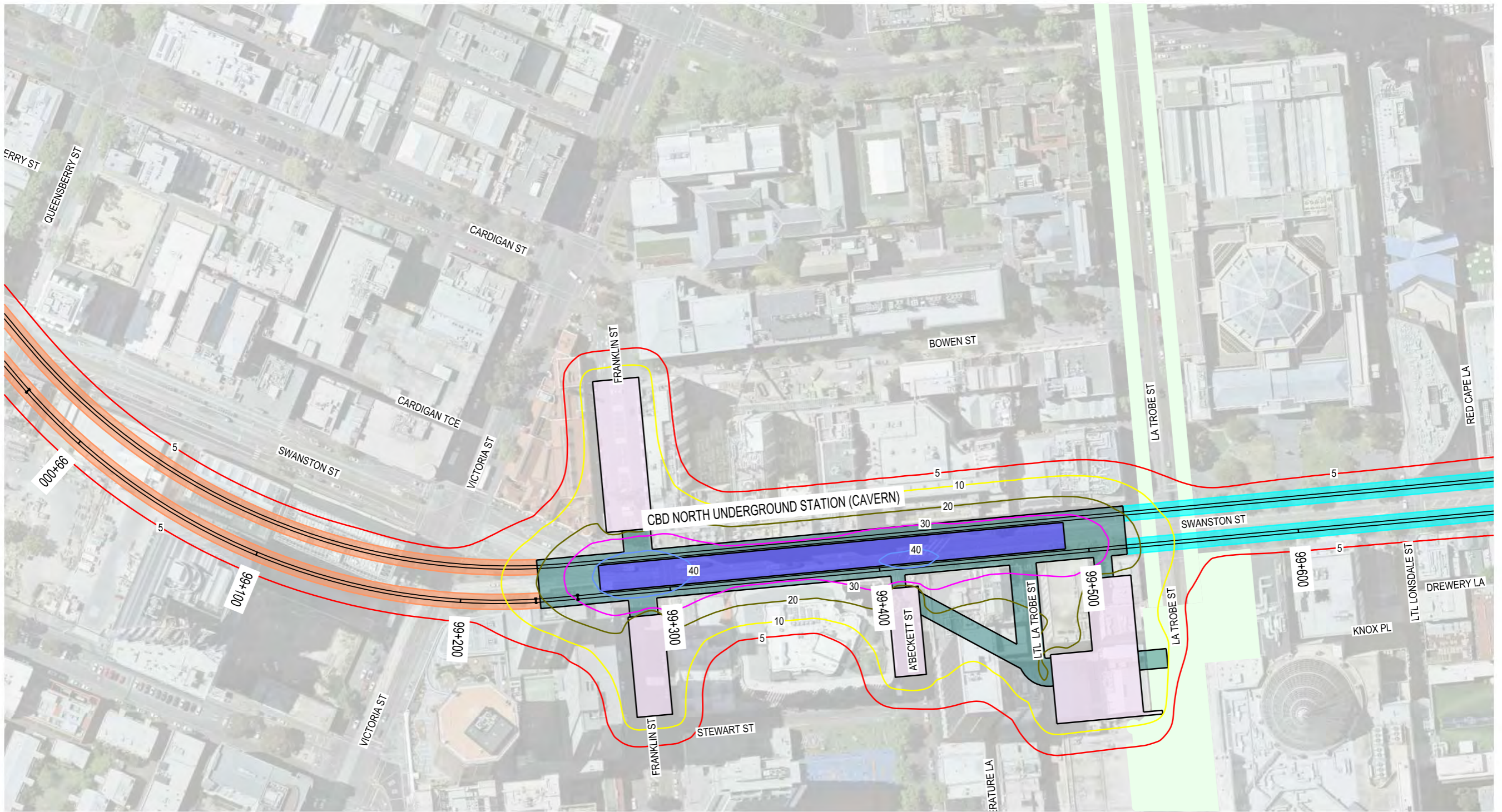
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Melbourne Metro Rail Project

Title SETTLEMENT CONTOURS		SHEET 7 OF 15	
Drawing Number MMR-AJM-UGAA-DR-NN-500431		Revision P1.1	
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PLAN

NOTES

1. FOR NOTES REFER DRG. MMR-AJM-UGAA-DR-NN-500431 SHEET 1 OF 15.

CONCEPT DESIGN: EXCAVATION INDUCED SETTLEMENT CONTOURS

LEGEND	
	MMRP TRACKS
	TRACKS TO BE REMOVED
	TRACKS TO BE REALIGNED
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	CUT AND COVER STATION FOOTPRINT
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	5mm SETTLEMENT
	10mm SETTLEMENT
	20mm SETTLEMENT
	30mm SETTLEMENT
	40mm SETTLEMENT
	50mm SETTLEMENT
	60mm SETTLEMENT
	70mm SETTLEMENT

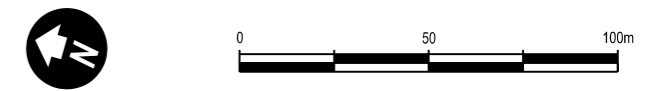
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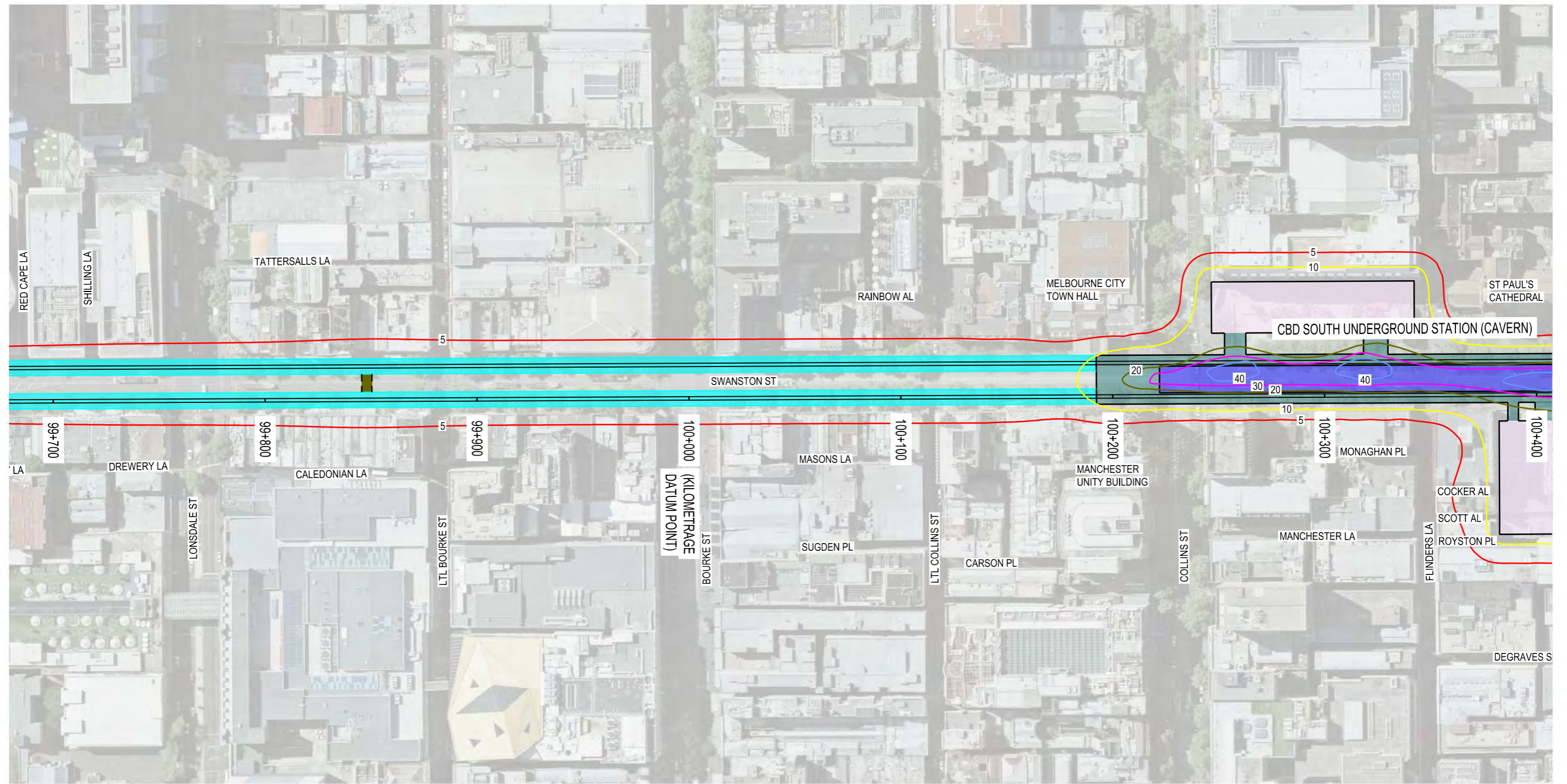
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Melbourne Metro Rail Project

Title SETTLEMENT CONTOURS		SHEET 8 OF 15	
Drawing Number MMR-AJM-UGAA-DR-NN-500431		Revision P1.1	
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PLAN

NOTES

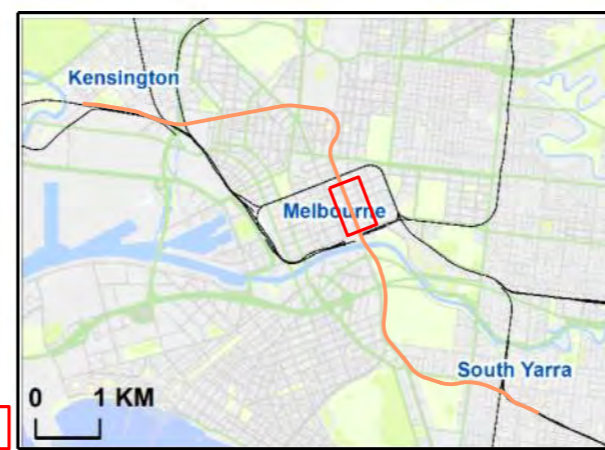
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CONCEPT DESIGN: EXCAVATION INDUCED SETTLEMENT CONTOURS

LEGEND	
	MMRP TRACKS
	TRACKS TO BE REMOVED
	TRACKS TO BE REALIGNED
	RETAINING WALL / VERTICAL WALL
	DIVIDING WALL
	BATTERS
	CUT AND COVER STATION FOOTPRINT
	PLATFORM
	DECLINE STRUCTURE
	TUNNEL - DRIVEN
	TUNNEL - CUT & COVER
	CROSS PASSAGE
	PRECAST CONCRETE RETAINING WALL
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	5mm SETTLEMENT
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	20mm SETTLEMENT
	30mm SETTLEMENT
	40mm SETTLEMENT
	50mm SETTLEMENT
	60mm SETTLEMENT
	70mm SETTLEMENT

Note:
Surface works are not shown

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Melbourne Metro Rail Project

Title: SETTLEMENT CONTOURS SHEET 9 OF 15

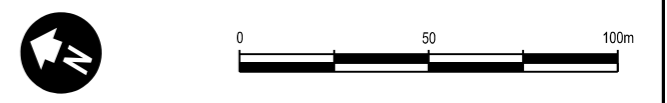
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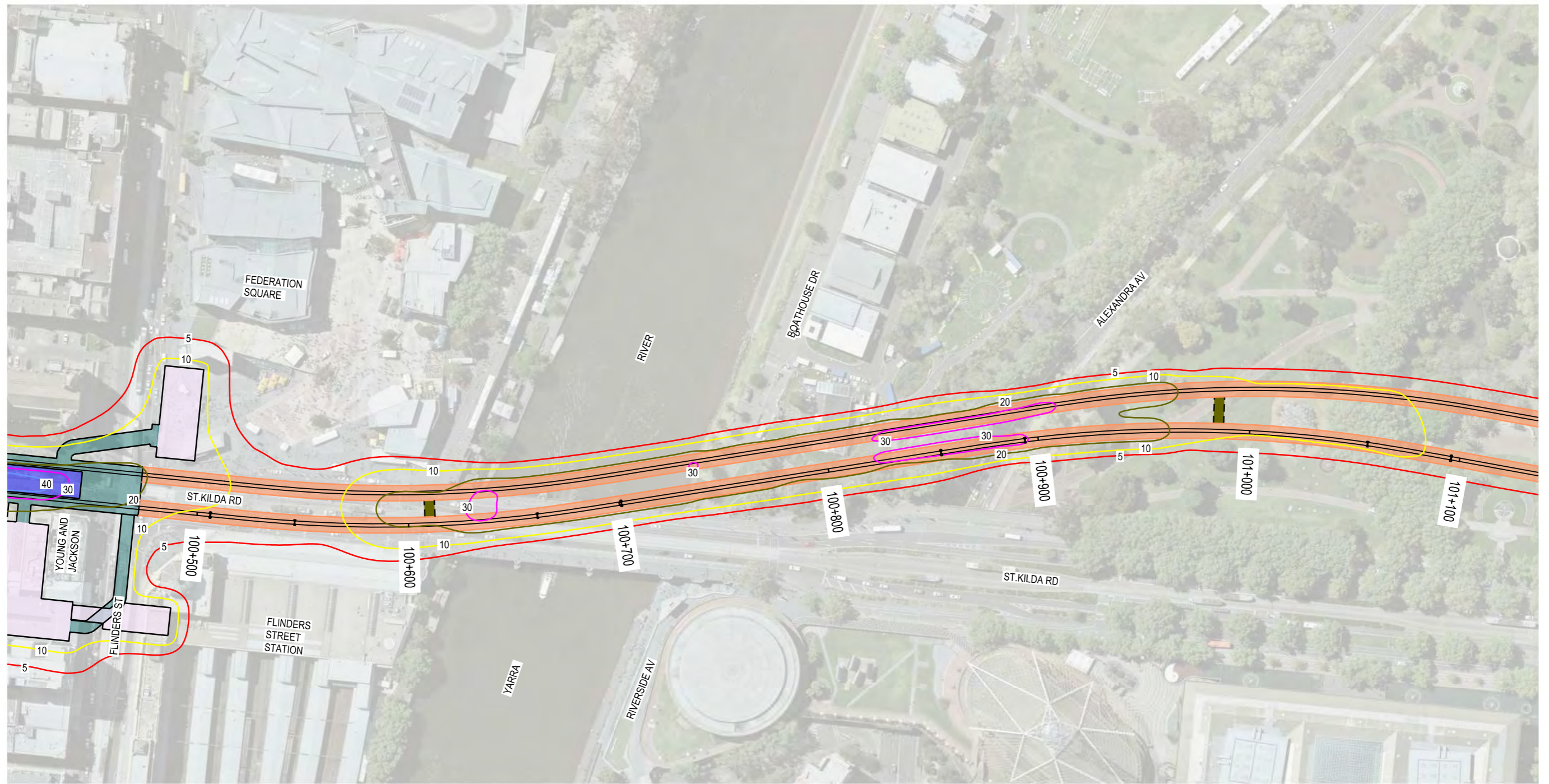
Revision: P1.1

Drawn By: N WIJERAYHNE

Approved By: _____ Date: _____

Map Size: A3





PLAN

NOTES

1. FOR NOTES REFER DRG. MMR-AJM-UGAA-DR-NN-500431 SHEET 1 OF 15.
2. SETTLEMENT AT PRINCESS BRIDGE IS DEPENDENT ON THE QUALITY OF BASALT FORMATION.

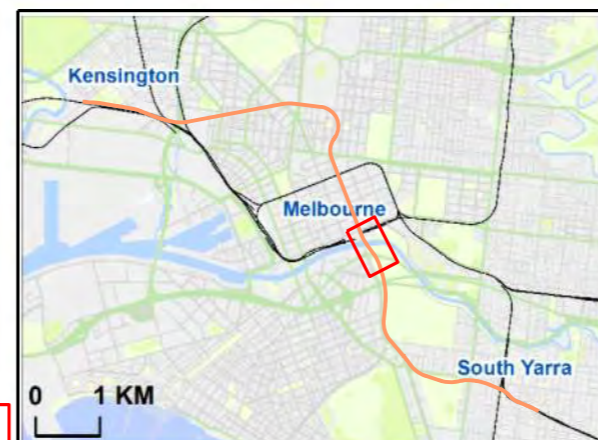
CONCEPT DESIGN: EXCAVATION INDUCED SETTLEMENT CONTOURS

LEGEND

- | | | | | | |
|--|---------------------------------|--|---|--|-----------------|
| | MMPR TRACKS | | TUNNEL - CUT & COVER | | 5mm SETTLEMENT |
| | TRACKS TO BE REMOVED | | CROSS PASSAGE | | 10mm SETTLEMENT |
| | TRACKS TO BE REALIGNED | | PRECAST CONCRETE RETAINING WALL | | 20mm SETTLEMENT |
| | RETAINING WALL / VERTICAL WALL | | SERVICE FACILITY / TBM RETRIEVAL POINT | | 30mm SETTLEMENT |
| | DIVIDING WALL | | TUNNEL - MINED | | 40mm SETTLEMENT |
| | BATTERS | | CITY LOOP | | 50mm SETTLEMENT |
| | CUT AND COVER STATION FOOTPRINT | | CITYLINK CROWN ALLOTMENT | | 60mm SETTLEMENT |
| | PLATFORM | | EMERGENCY ACCESS SHAFT | | 70mm SETTLEMENT |
| | DECLINE STRUCTURE | | CAVERN STATION ENTRANCE AND PLANT SHAFT (TYP) | | |
| | TUNNEL - DRIVEN | | MINED STATION MAIN CAVERN | | |

Note:
Surface works are not shown

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Melbourne Metro Rail Project

Title SETTLEMENT CONTOURS		SHEET 10 OF 15	
Drawing Number MMR-AJM-UGAA-DR-NN-500431		Revision P1.1	
Drawn By N WIJERAYHNE	Approved By	Date	Map Size A3





PLAN

NOTES

1. FOR NOTES REFER DRG. MMR-AJM-UGAA-DR-NN-500431 SHEET 1 OF 15.

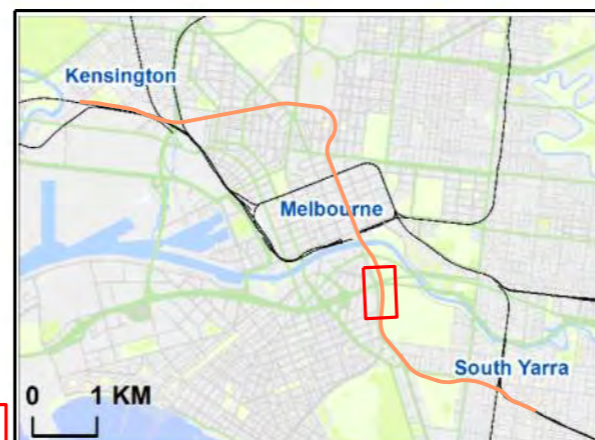
CONCEPT DESIGN: EXCAVATION INDUCED SETTLEMENT CONTOURS

LEGEND

- | | | |
|---------------------------------|---|-----------------|
| MMRP TRACKS | TUNNEL - CUT & COVER | 5mm SETTLEMENT |
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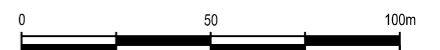
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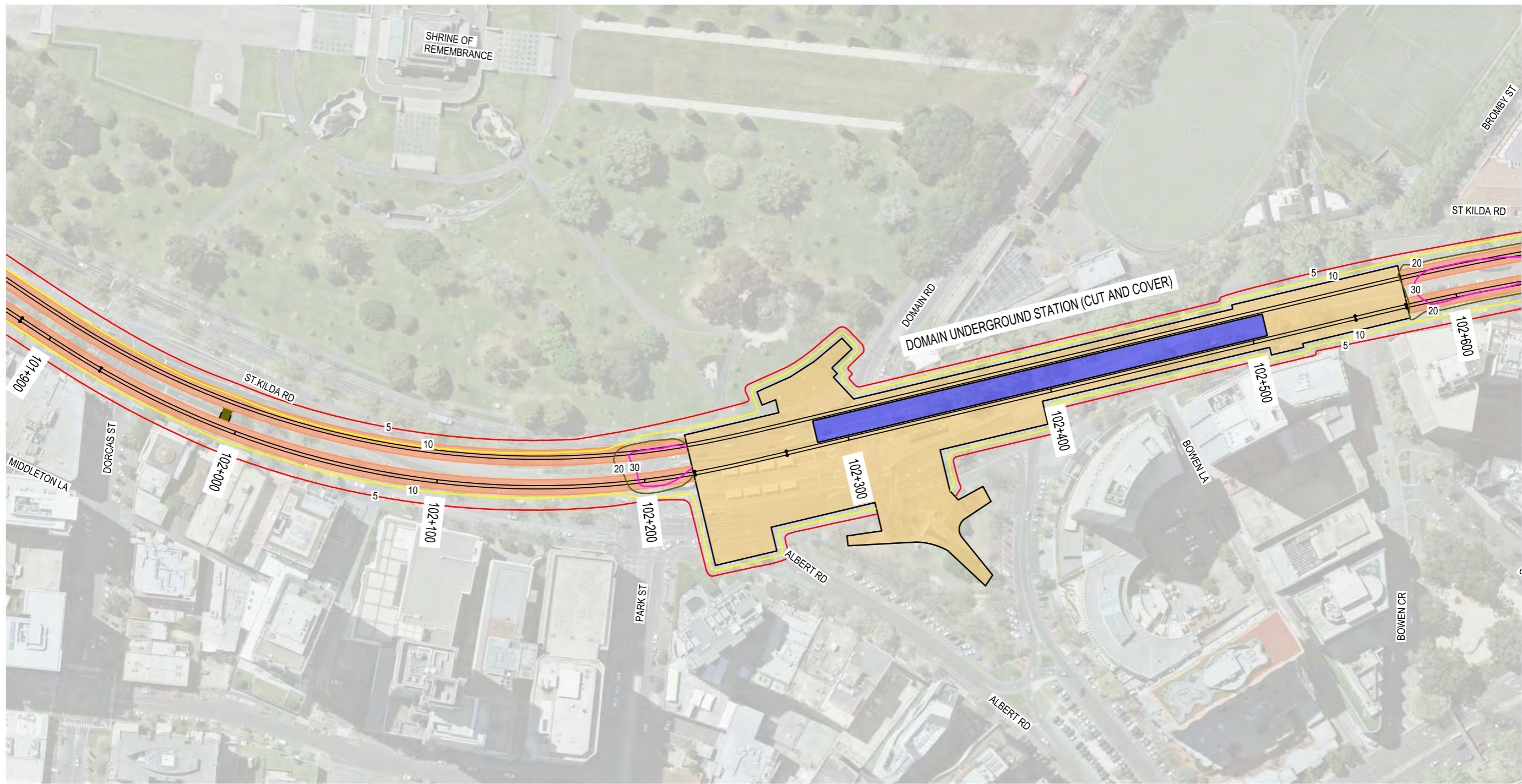
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Title SETTLEMENT CONTOURS		SHEET 11 OF 15	
Drawing Number MMR-AJM-UGAA-DR-NN-500431		Revision P1.1	
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PLAN

NOTES

1. FOR NOTES REFER DRG. MMR-AJM-UGAA-DR-NN-500431 SHEET 1 OF 15.

CONCEPT DESIGN: EXCAVATION INDUCED SETTLEMENT CONTOURS

LEGEND

- | | | |
|---------------------------------|---|-----------------|
| MMRP TRACKS | TUNNEL - CUT & COVER | 5mm SETTLEMENT |
| TRACKS TO BE REMOVED | CROSS PASSAGE | 10mm SETTLEMENT |
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| DECLINE STRUCTURE | CAVERN STATION ENTRANCE AND PLANT SHAFT (TYP) | |
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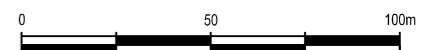
Note:
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Melbourne Metro Rail Project

Title SETTLEMENT CONTOURS		SHEET 12 OF 15	
Drawing Number MMR-AJM-UGAA-DR-NN-500431		Revision P1.1	
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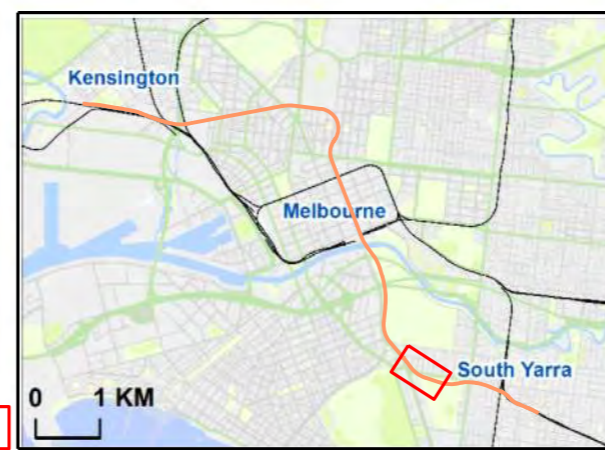
1. FOR NOTES REFER DRG. MMR-AJM-UGAA-DR-NN-500431 SHEET 1 OF 15.

CONCEPT DESIGN: EXCAVATION INDUCED SETTLEMENT CONTOURS

LEGEND	
	MMRP TRACKS
	TRACKS TO BE REMOVED
	TRACKS TO BE REALIGNED
	RETAINING WALL / VERTICAL WALL
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	BATTERS
	CUT AND COVER STATION FOOTPRINT
	PLATFORM
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	TUNNEL - DRIVEN
	TUNNEL - CUT & COVER
	CROSS PASSAGE
	PRECAST CONCRETE RETAINING WALL
	SERVICE FACILITY / TBM RETRIEVAL POINT
	TUNNEL - MINED
	CITY LOOP
	CITYLINK CROWN ALLOTMENT
	EMERGENCY ACCESS SHAFT
	CAVERN STATION ENTRANCE AND PLANT SHAFT (TYP)
	MINED STATION MAIN CAVERN
	5mm SETTLEMENT
	10mm SETTLEMENT
	20mm SETTLEMENT
	30mm SETTLEMENT
	40mm SETTLEMENT
	50mm SETTLEMENT
	60mm SETTLEMENT
	70mm SETTLEMENT

Note:
Surface works are not shown

NOT FOR CONSTRUCTION

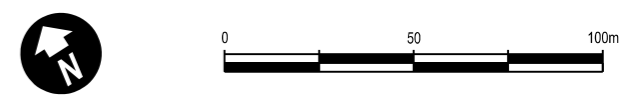


Melbourne Metro Rail Project

Title: SETTLEMENT CONTOURS SHEET 13 OF 15

Drawing Number: MMR-AJM-UGAA-DR-NN-500431 Revision: P1.1

Drawn By: N WIJERAYHNE Approved By: _____ Date: _____ Map Size: A3





PLAN

NOTES

1. FOR NOTES REFER DRG. MMR-AJM-UGAA-DR-NN-500431 SHEET 1 OF 15.

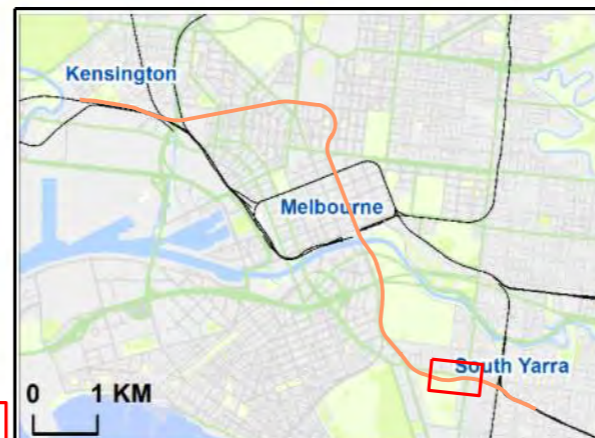
CONCEPT DESIGN: EXCAVATION INDUCED SETTLEMENT CONTOURS

LEGEND

- | | | |
|---------------------------------|---|-----------------|
| MMRP TRACKS | TUNNEL - CUT & COVER | 5mm SETTLEMENT |
| TRACKS TO BE REMOVED | CROSS PASSAGE | 10mm SETTLEMENT |
| TRACKS TO BE REALIGNED | PRECAST CONCRETE RETAINING WALL | 20mm SETTLEMENT |
| RETAINING WALL / VERTICAL WALL | SERVICE FACILITY / TBM RETRIEVAL POINT | 30mm SETTLEMENT |
| DIVIDING WALL | TUNNEL - MINED | 40mm SETTLEMENT |
| BATTERS | CITY LOOP | 50mm SETTLEMENT |
| CUT AND COVER STATION FOOTPRINT | CITYLINK CROWN ALLOTMENT | 60mm SETTLEMENT |
| PLATFORM | EMERGENCY ACCESS SHAFT | 70mm SETTLEMENT |
| DECLINE STRUCTURE | CAVERN STATION ENTRANCE AND PLANT SHAFT (TYP) | |
| TUNNEL - DRIVEN | MINED STATION MAIN CAVERN | |

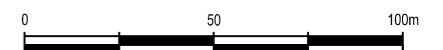
Note:
Surface works are not shown

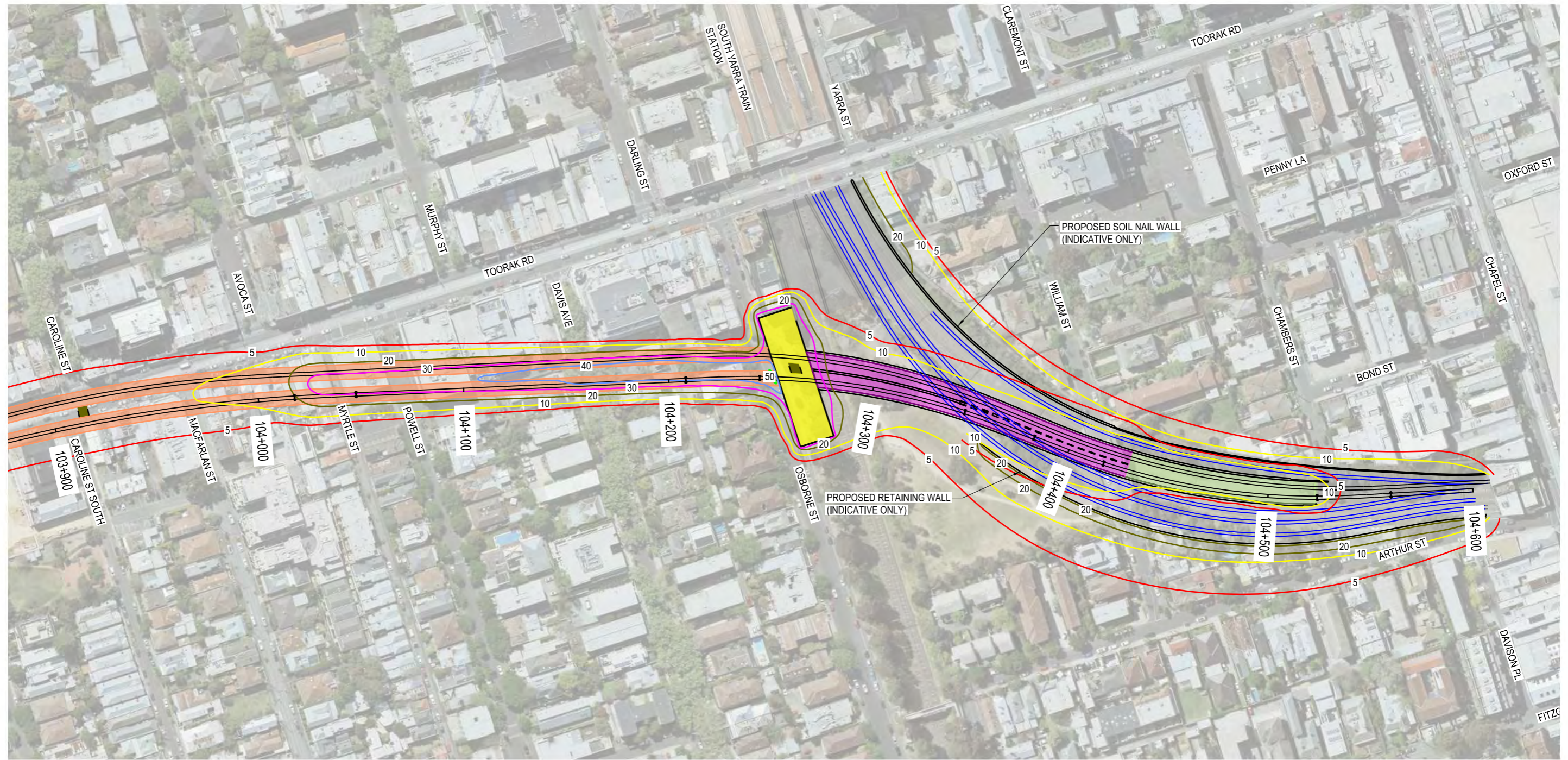
NOT FOR CONSTRUCTION



Melbourne Metro Rail Project

Title	SETTLEMENT CONTOURS	SHEET 14 OF 15
Drawing Number	MMR-AJM-UGAA-DR-NN-500431	Revision P1.1
Drawn By	Approved By	Date
N WIJERATHNE		
		Map Size A3





PLAN

NOTES

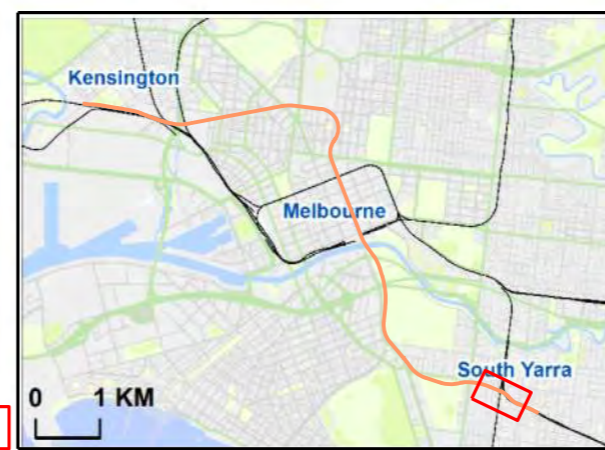
1. FOR NOTES REFER DRG. MMR-AJM-UGAA-DR-NN-500431 SHEET 1 OF 15.

CONCEPT DESIGN: EXCAVATION INDUCED SETTLEMENT CONTOURS

LEGEND	
	MMRP TRACKS
	TRACKS TO BE REMOVED
	TRACKS TO BE REALIGNED
	RETAINING WALL / VERTICAL WALL
	DIVIDING WALL
	BATTERS
	CUT AND COVER STATION FOOTPRINT
	PLATFORM
	DECLINE STRUCTURE
	TUNNEL - DRIVEN
	TUNNEL - CUT & COVER
	CROSS PASSAGE
	PRECAST CONCRETE RETAINING WALL
	SERVICE FACILITY / TBM RETRIEVAL POINT
	TUNNEL - MINED
	CITY LOOP
	CITYLINK CROWN ALLOTMENT
	EMERGENCY ACCESS SHAFT
	CAVERN STATION ENTRANCE AND PLANT SHAFT (TYP)
	MINED STATION MAIN CAVERN
	5mm SETTLEMENT
	10mm SETTLEMENT
	20mm SETTLEMENT
	30mm SETTLEMENT
	40mm SETTLEMENT
	50mm SETTLEMENT
	60mm SETTLEMENT
	70mm SETTLEMENT

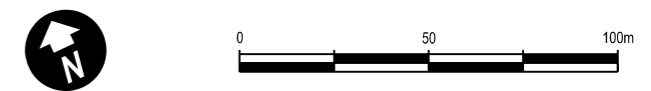
Note:
Surface works are not shown

NOT FOR CONSTRUCTION



Melbourne Metro Rail Project

Title	SETTLEMENT CONTOURS	SHEET 15 OF 15
Drawing Number	MMR-AJM-UGAA-DR-NN-500431	Revision
		P1.1
Drawn By	Approved By	Date
N WIJERAYHNE		
		Map Size
		A3





PLAN

NOTES

1. TUNNELLING INDUCED SETTLEMENT CONTOURS ARE BASED ON THE FOLLOWING ASSUMPTIONS:

GROUND TYPE	VOLUME LOSS (%)	TROUGH WIDTH PARAMETER
SOIL (ALL TYPES)	1.0	0.4
ROCK	0.5	0.6
ROCK (> 2D COVER)	0.5	0.7

2. SETTLEMENT CONTOURS FOR THE STATIONS, SHAFT, CUT & COVER, AND DECLINE STRUCTURES ARE BASED ON WALL DEFLECTIONS CALCULATED FROM FINITE ELEMENT MODELLING.

3. SETTLEMENT CONTOURS FOR THE STATIONS, SHAFT, CUT & COVER, AND DECLINE STRUCTURES ARE SUPERIMPOSED WITH THE TUNNEL SETTLEMENT CONTOURS TO SHOW THE TOTAL MAXIMUM SETTLEMENT FROM ALL CONSTRUCTION WORKS.

4. ESTIMATED CONSOLIDATION SETTLEMENT IS NOT SHOWN. REFER TO DRAWING MMR-AJM-PWAA-DR-NN-500377.

5. ESTIMATED INFLUENCE ZONE IS REPRESENTED BY THE AREA ENCLOSED BY THE 5mm CONTOUR LINES. REFER TO GIS FOR AFFECTED PROPERTY DETAILS. CONDITION SURVEY REQUIRED AND MONITORING PROGRAM TO BE IMPLEMENTED DURING CONSTRUCTION FOR STRUCTURES WITHIN THE INFLUENCE ZONE. EXTENT OF INFLUENCE ZONE MAY INCREASE WHERE COMPRESSIBLE SEDIMENTS ARE PRESENT.

6. TRACK ALIGNMENT SHOWN IS BASED ON TRACK ALIGNMENT SHOWN ON DRG. MMR-AJM-PWAA-DR-DD-600191 [P2.3] AND DRG. MMR-AJM-PWAA-DR-DD-600192 [P2.2].

ALTERNATIVE DESIGN OPTION: EXCAVATION INDUCED SETTLEMENT CONTOURS - WESTERN PORTAL

LEGEND

- MMRP TRACKS
- TRACKS TO BE REMOVED
- TRACKS TO BE REALIGNED
- RETAINING WALL / VERTICAL WALL
- DIVIDING WALL
- BATTERS
- CUT AND COVER STATION FOOTPRINT
- PLATFORM
- DECLINE STRUCTURE
- TUNNEL - DRIVEN
- TUNNEL - CUT & COVER
- CROSS PASSAGE
- PRECAST CONCRETE RETAINING WALL
- SERVICE FACILITY / TBM RETRIEVAL POINT
- TUNNEL - MINED
- CITY LOOP
- CITYLINK CROWN ALLOTMENT
- EMERGENCY ACCESS SHAFT
- CAVERN STATION ENTRANCE AND PLANT SHAFT (TYP)
- MINED STATION MAIN CAVERN
- 5mm SETTLEMENT
- 10mm SETTLEMENT
- 20mm SETTLEMENT
- 30mm SETTLEMENT
- 40mm SETTLEMENT
- 50mm SETTLEMENT
- 60mm SETTLEMENT
- 70mm SETTLEMENT

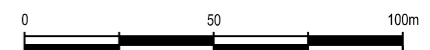
Note:
Surface works are not shown

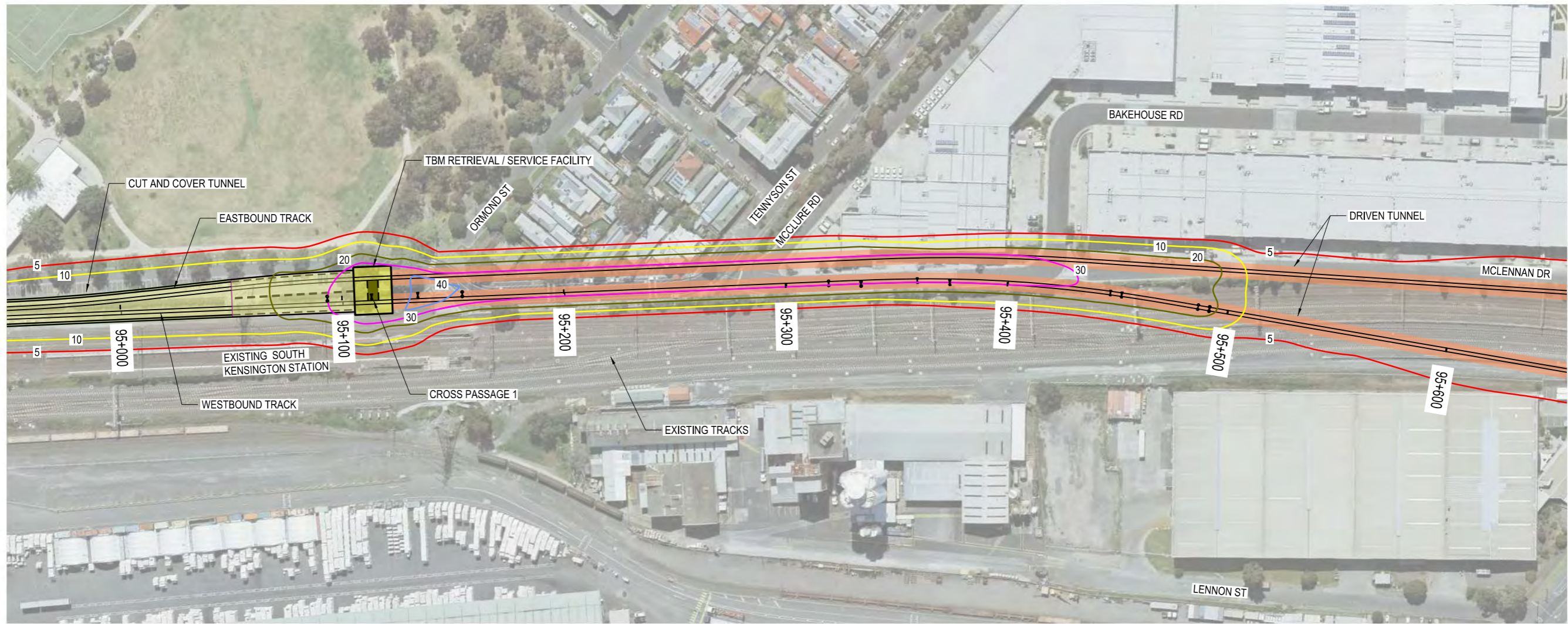
NOT FOR CONSTRUCTION



Melbourne Metro Rail Project

Title SETTLEMENT CONTOURS		SHEET 1 OF 2	
Drawing Number MMR-AJM-UGAA-DR-NN-500381		Revision P1.1	
Drawn By N WIJERATHNE	Approved By	Date	Map Size A3





PLAN

NOTES

1. FOR NOTES REFER DRG. MMR-AJM-UGAA-DR-NN-500381 SHEET 1 OF 2.

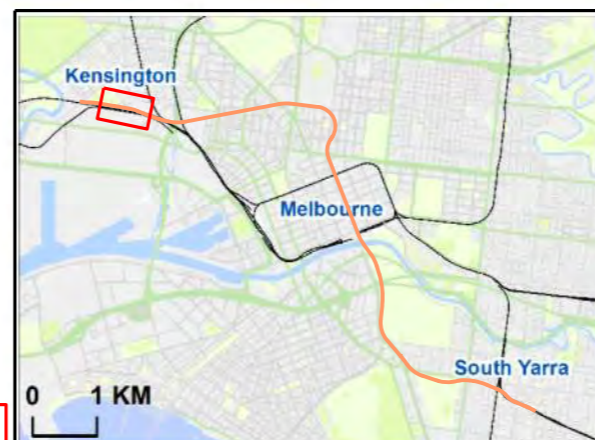
ALTERNATIVE DESIGN OPTION: EXCAVATION INDUCED SETTLEMENT CONTOURS - WESTERN PORTAL

LEGEND

- | | | |
|---------------------------------|---|-----------------|
| MMRP TRACKS | TUNNEL - CUT & COVER | 5mm SETTLEMENT |
| TRACKS TO BE REMOVED | CROSS PASSAGE | 10mm SETTLEMENT |
| TRACKS TO BE REALIGNED | PRECAST CONCRETE RETAINING WALL | 20mm SETTLEMENT |
| RETAINING WALL / VERTICAL WALL | SERVICE FACILITY / TBM RETRIEVAL POINT | 30mm SETTLEMENT |
| DIVIDING WALL | TUNNEL - MINED | 40mm SETTLEMENT |
| BATTERS | CITY LOOP | 50mm SETTLEMENT |
| CUT AND COVER STATION FOOTPRINT | CITYLINK CROWN ALLOTMENT | 60mm SETTLEMENT |
| PLATFORM | EMERGENCY ACCESS SHAFT | 70mm SETTLEMENT |
| DECLINE STRUCTURE | CAVERN STATION ENTRANCE AND PLANT SHAFT (TYP) | |
| TUNNEL - DRIVEN | MINED STATION MAIN CAVERN | |

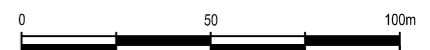
Note:
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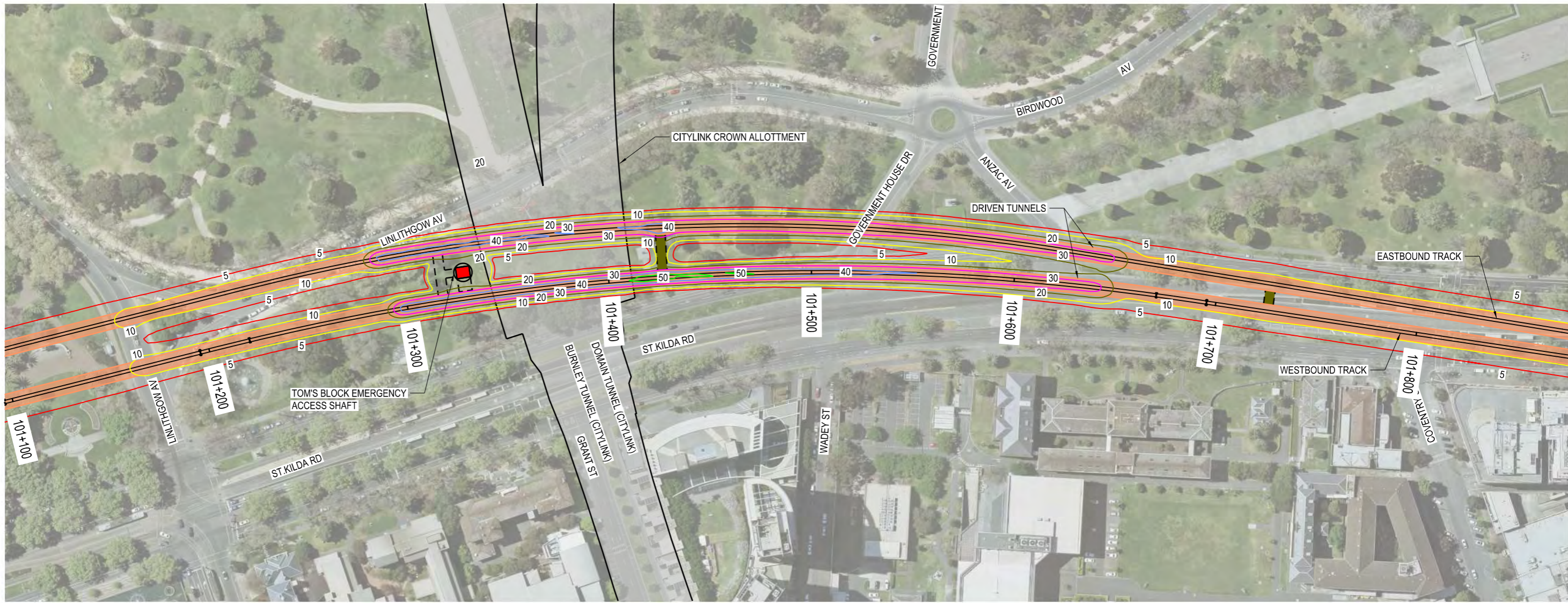
NOT FOR CONSTRUCTION



Melbourne Metro Rail Project

Title SETTLEMENT CONTOURS		SHEET 2 OF 2	
Drawing Number MMR-AJM-UGAA-DR-NN-500381		Revision P1.1	
Drawn By N WIJERATHNE	Approved By	Date	Map Size A3





PLAN

NOTES

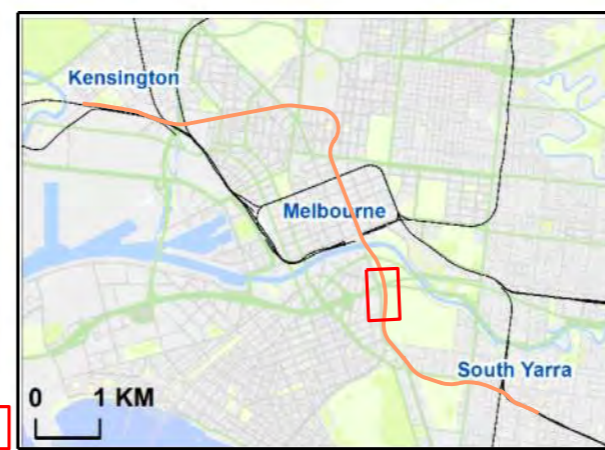
1. FOR NOTES REFER DRG. MMR-AJM-UGAA-DR-NN-500431 SHEET 1 OF 15.

ALTERNATIVE DESIGN OPTION: EXCAVATION INDUCED SETTLEMENT CONTOURS - TOM'S BLOCK EMERGENCY ACCESS SHAFT

LEGEND	
	MMRP TRACKS
	TRACKS TO BE REMOVED
	TRACKS TO BE REALIGNED
	RETAINING WALL / VERTICAL WALL
	DIVIDING WALL
	BATTERS
	CUT AND COVER STATION FOOTPRINT
	PLATFORM
	DECLINE STRUCTURE
	TUNNEL - DRIVEN
	TUNNEL - CUT & COVER
	CROSS PASSAGE
	PRECAST CONCRETE RETAINING WALL
	SERVICE FACILITY / TBM RETRIEVAL POINT
	TUNNEL - MINED
	CITY LOOP
	CITYLINK CROWN ALLOTMENT
	EMERGENCY ACCESS SHAFT
	CAVERN STATION ENTRANCE AND PLANT SHAFT (TYP)
	MINED STATION MAIN CAVERN
	5mm SETTLEMENT
	10mm SETTLEMENT
	20mm SETTLEMENT
	30mm SETTLEMENT
	40mm SETTLEMENT
	50mm SETTLEMENT
	60mm SETTLEMENT
	70mm SETTLEMENT

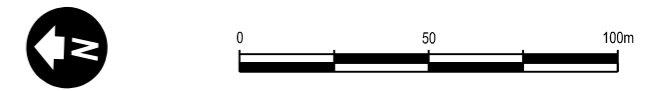
Note:
Surface works are not shown

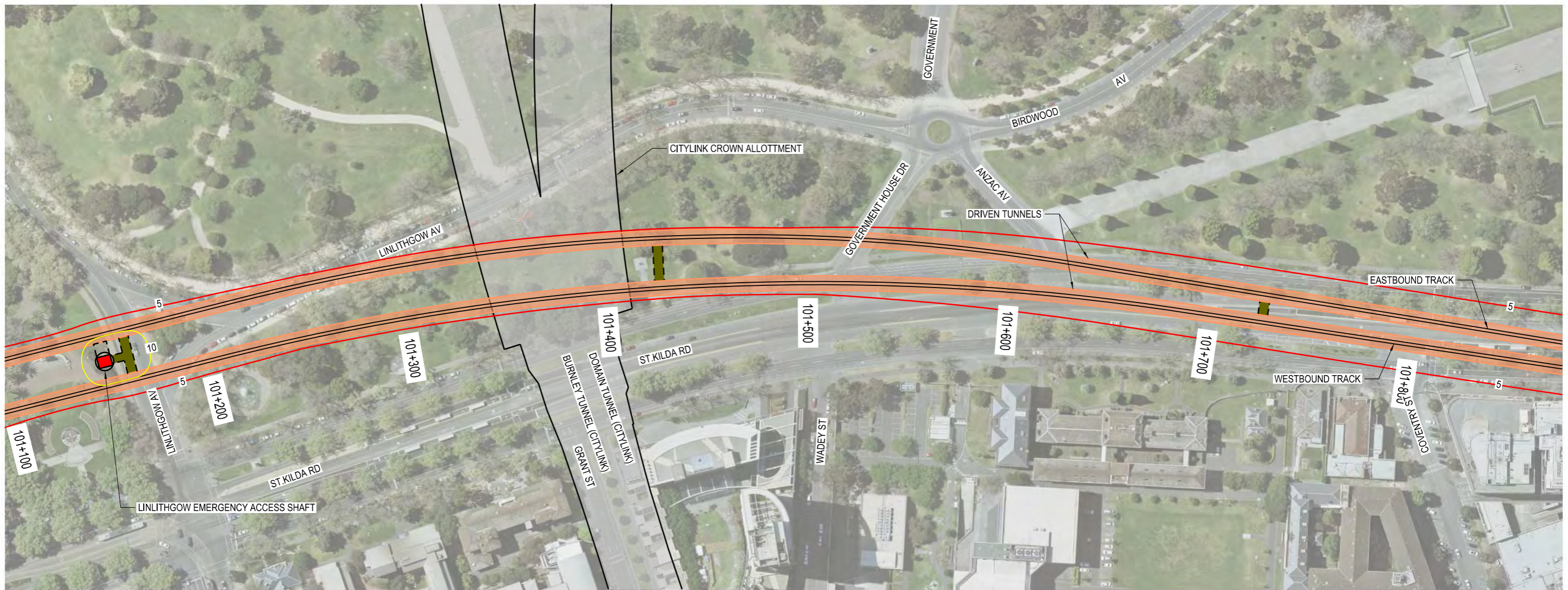
NOT FOR CONSTRUCTION



Melbourne Metro Rail Project

Title SETTLEMENT CONTOURS		Revision P1.1
Drawing Number MMR-AJM-UGAA-DR-NN-500383		Map Size A3
Drawn By N WIJERATHNE	Approved By	Date





PLAN

NOTES

1. FOR NOTES REFER DRG. MMR-AJM-UGAA-DR-NN-500431 SHEET 1 OF 15.

ALTERNATIVE DESIGN OPTION: EXCAVATION INDUCED SETTLEMENT CONTOURS - CITYLINK UNDER CROSSING

LEGEND

- | | | |
|---------------------------------|---|-----------------|
| MMRP TRACKS | TUNNEL - CUT & COVER | 5mm SETTLEMENT |
| TRACKS TO BE REMOVED | CROSS PASSAGE | 10mm SETTLEMENT |
| TRACKS TO BE REALIGNED | PRECAST CONCRETE RETAINING WALL | 20mm SETTLEMENT |
| RETAINING WALL / VERTICAL WALL | SERVICE FACILITY / TBM RETRIEVAL POINT | 30mm SETTLEMENT |
| DIVIDING WALL | TUNNEL - MINED | 40mm SETTLEMENT |
| BATTERS | CITY LOOP | 50mm SETTLEMENT |
| CUT AND COVER STATION FOOTPRINT | CITYLINK CROWN ALLOTMENT | 60mm SETTLEMENT |
| PLATFORM | EMERGENCY ACCESS SHAFT | 70mm SETTLEMENT |
| DECLINE STRUCTURE | CAVERN STATION ENTRANCE AND PLANT SHAFT (TYP) | |
| TUNNEL - DRIVEN | MINED STATION MAIN CAVERN | |

Note:
Surface works are not shown

NOT FOR CONSTRUCTION



Melbourne Metro Rail Project

Title
SETTLEMENT CONTOURS

Drawing Number
MMR-AJM-UGAA-DR-NN-500384

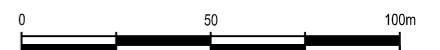
Drawn By
N WIJERATHNE

Approved By

Date

Revision
P1.1

Map Size
A3





PLAN

NOTES

1. FOR NOTES REFER DRG. MMR-AJM-UGAA-DR-NN-500431 SHEET 1 OF 15.

ALTERNATIVE DESIGN OPTION: EXCAVATION INDUCED SETTLEMENT CONTOURS - FAWKNER PARK EMERGENCY ACCESS SHAFT

LEGEND

- | | | |
|---------------------------------|---|-----------------|
| MMRP TRACKS | TUNNEL - CUT & COVER | 5mm SETTLEMENT |
| TRACKS TO BE REMOVED | CROSS PASSAGE | 10mm SETTLEMENT |
| TRACKS TO BE REALIGNED | PRECAST CONCRETE RETAINING WALL | 20mm SETTLEMENT |
| RETAINING WALL / VERTICAL WALL | SERVICE FACILITY / TBM RETRIEVAL POINT | 30mm SETTLEMENT |
| DIVIDING WALL | TUNNEL - MINED | 40mm SETTLEMENT |
| BATTERS | CITY LOOP | 50mm SETTLEMENT |
| CUT AND COVER STATION FOOTPRINT | CITYLINK CROWN ALLOTMENT | 60mm SETTLEMENT |
| PLATFORM | EMERGENCY ACCESS SHAFT | 70mm SETTLEMENT |
| DECLINE STRUCTURE | CAVERN STATION ENTRANCE AND PLANT SHAFT (TYP) | |
| TUNNEL - DRIVEN | MINED STATION MAIN CAVERN | |

Note:
Surface works are not shown

NOT FOR CONSTRUCTION



Melbourne Metro Rail Project

Title
SETTLEMENT CONTOURS

Drawing Number
MMR-AJM-UGAA-DR-NN-500385

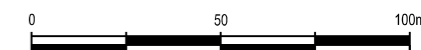
Drawn By
N WIJERATHNE

Approved By

Date

Revision
P1.1

Map Size
A3












Appendix D

Preliminary Primary Consolidation Settlement Contour Drawings

MELBOURNE METRO RAIL PROJECT GROUND MOVEMENT ASSESSMENT

INDICATIVE CONTOURS OF PRIMARY CONSOLIDATION SETTLEMENT DUE TO GROUNDWATER DRAWDOWN

LEGEND

-  PROPOSED STATION EXTENT IN PLAN
-  CONTROL LINE PROPOSED WESTBOUND RAIL TUNNEL
-  CONTROL LINE PROPOSED EASTBOUND RAIL TUNNEL
-  INDICATIVE RAIL INFRASTRUCTURE
-  RECENT SILT
-  COODE ISLAND SILT
-  INFERRED EXTENT OF NEWER VOLCANICS (BASALT)

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. AERIAL PHOTOGRAPH HAS 50% TRANSPARENCY APPLIED.
5. EXISTING STRUCTURES ARE INDICATIVE ONLY.
6. EXTENTS OF INDICATIVE SETTLEMENT DUE TO CONSOLIDATION OF COODE ISLAND SILT ARE BASED ON PRELIMINARY EES GROUNDWATER MODELLING RESULTS.
7. SETTLEMENT ASSESSMENT CONSIDERED THE ESTIMATED MAXIMUM GROUNDWATER DRAWDOWNS RESULTING FROM MMRP WORKS, FOR THE CONSTRUCTION AND OPERATIONAL PHASES FOR THE VARIOUS SCENARIOS CONSIDERED.
8. THESE DRAWINGS SHOULD BE READ IN CONJUNCTION WITH GROUND MOVEMENT ASSESSMENT REPORT BY GOLDER ASSOCIATES FOR MMRP.

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-PMAA-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 INDICATIVE PRIMARY CONSOLIDATION SETTLEMENT





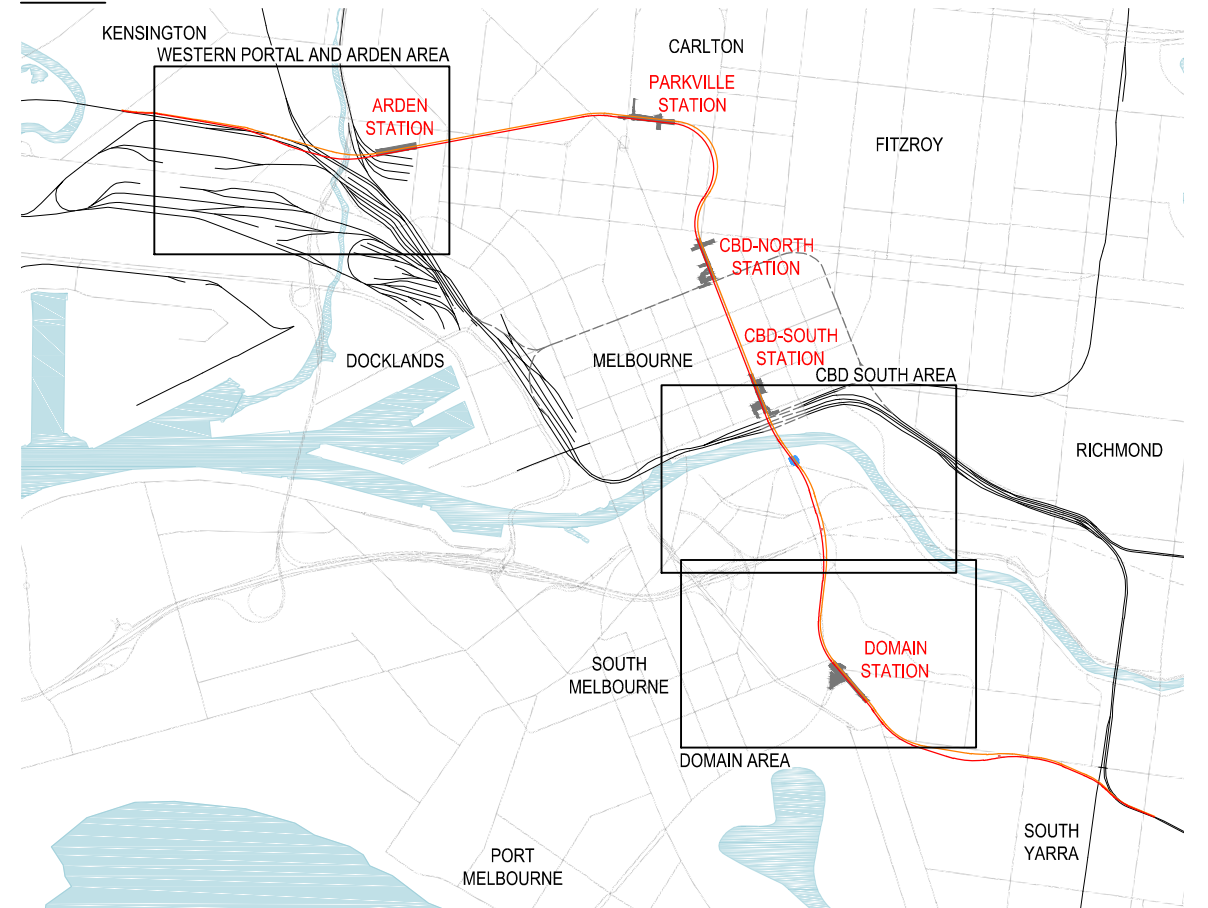
-  < 10mm
 -  10-20mm
 -  20-50mm
 -  > 50mm
- INDICATIVE SETTLEMENT DUE TO CONSOLIDATION OF COODE ISLAND SILT, INDUCED BY GROUNDWATER DRAWDOWN.

FIGURE LIST

- MMR-AJM-PWAA-DR-NN-500377 - SHEET 1 OF 4
 - MMR-AJM-PWAA-DR-NN-500377 - SHEET 2 OF 4
 - MMR-AJM-PWAA-DR-NN-500377 - SHEET 3 OF 4
 - MMR-AJM-PWAA-DR-NN-500377 - SHEET 4 OF 4
- KEY MAP, LEGEND AND NOTES
WESTERN PORTAL AND ARDEN STATION
CBD SOUTH STATION
DOMAIN STATION

KEY MAP



PRESENTED CONTOURS DO NOT INCLUDE AN ALLOWANCE FOR SETTLEMENT DUE TO MMRP EXCAVATIONS OR FOR FUTURE CREEP MOVEMENT OF THE COODE ISLAND SILT. FOR CONTOURS OF SETTLEMENT DUE TO MMRP EXCAVATIONS REFER TO DRAWINGS MMR-AJM-UGAA-DR-NN-500431-500445 AND MMR-AJM-UGAA-DR-NN-500381-500385

Note:
Surface works are not shown

NOT FOR CONSTRUCTION



Melbourne Metro Rail Project

Title
GROUND MOVEMENT ASSESSMENT SHEET 1 OF 4

Drawing Number
MMR-AJM-PWAA-DR-NN-500377

Revision
P1.1

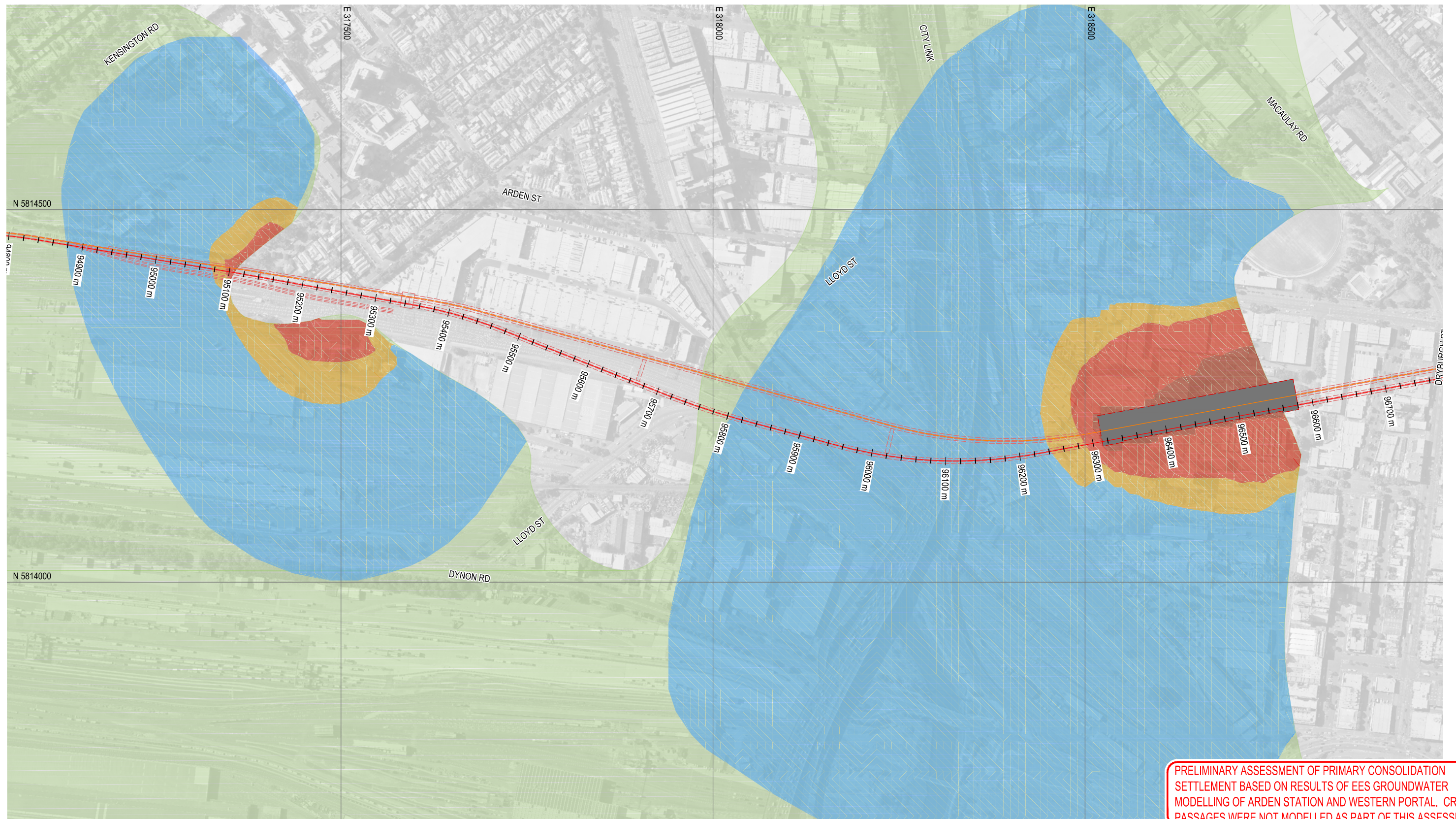
Drawn By
GOLDER

Approved By
SLVB

Date
23-03-2016

Map Size
A3





PRELIMINARY ASSESSMENT OF PRIMARY CONSOLIDATION SETTLEMENT BASED ON RESULTS OF EES GROUNDWATER MODELLING OF ARDEN STATION AND WESTERN PORTAL. CROSS PASSAGES WERE NOT MODELLED AS PART OF THIS ASSESSMENT.

LEGEND INDICATIVE PRIMARY CONSOLIDATION SETTLEMENT

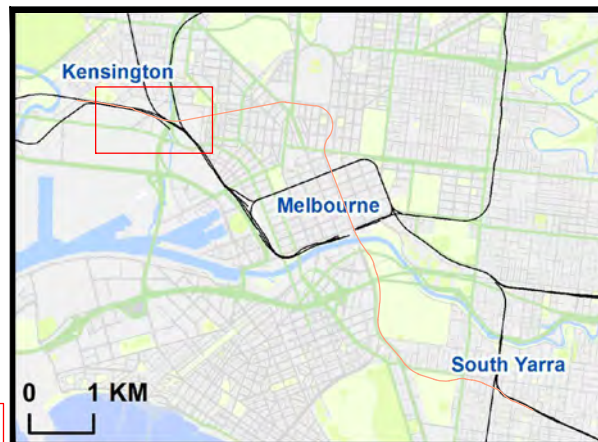
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	10-20mm	
	20-50mm	
	> 50mm	

NOTES

1. REFER FIGURE MMR-AJM-PWAA-DR-NN-500377-SHEET 1 OF 4 FOR NOTES AND LEGEND.
2. ALL LEVELS ARE IN METRES TO AHD.
3. ALL COORDINATES ARE IN METRES TO MGA-Z55
4. THESE DRAWINGS SHOULD BE READ IN CONJUNCTION WITH GOLDER ASSOCIATES GROUND MOVEMENT ASSESSMENT EES SUMMARY REPORT PREPARED FOR MELBOURNE METRO.

Note:
Surface works are not shown

NOT FOR CONSTRUCTION

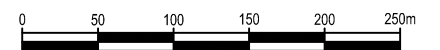


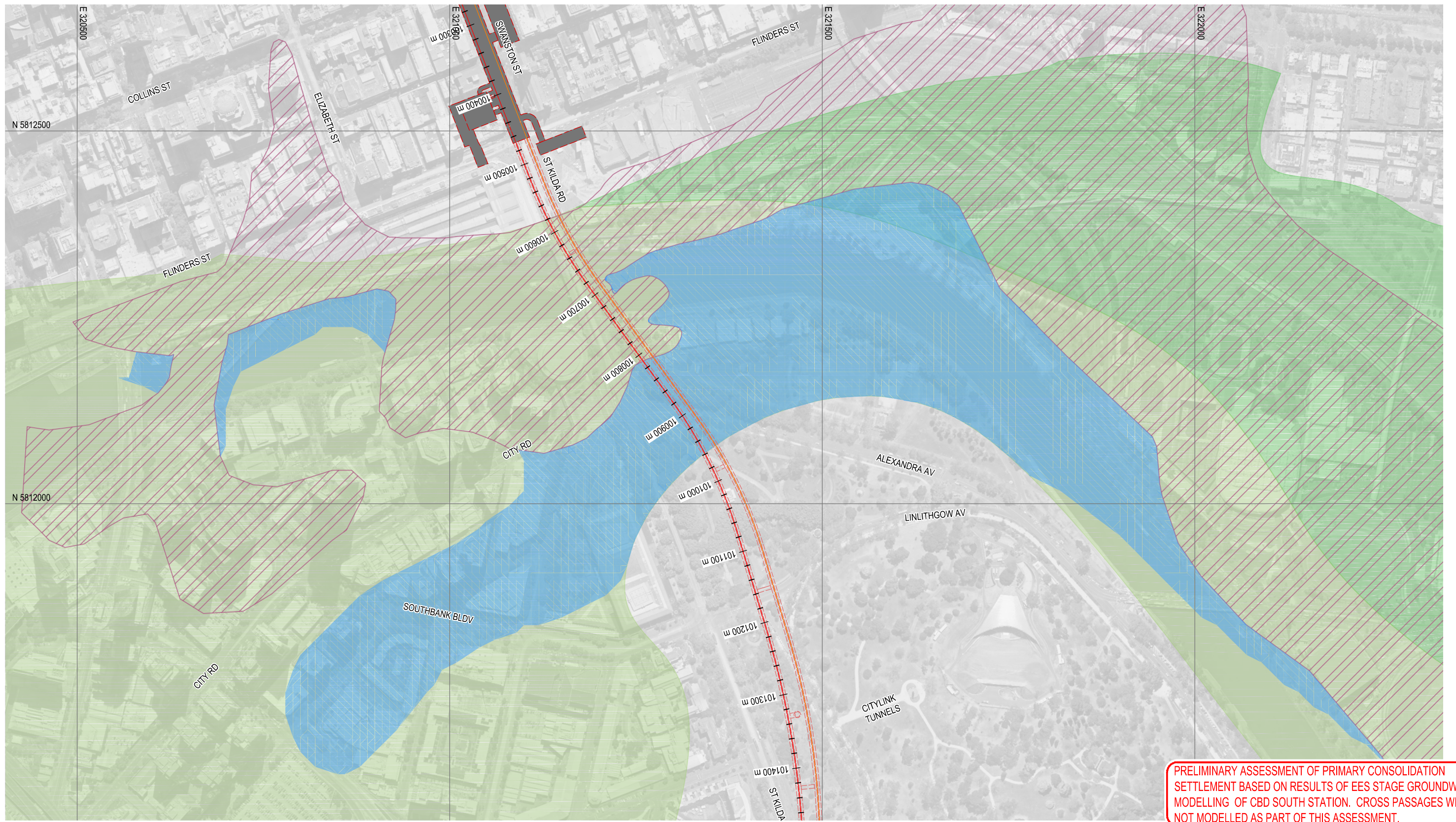
Melbourne Metro Rail Project

Title
GROUND MOVEMENT ASSESSMENT SHEET 2 OF 4

Drawing Number
MMR-AJM-PWAA-DR-NN-500377

Drawn By GOLDER	Approved By SLVB	Date 23-03-2016	Revision P1.1	Map Size A3
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PRELIMINARY ASSESSMENT OF PRIMARY CONSOLIDATION SETTLEMENT BASED ON RESULTS OF EES STAGE GROUNDWATER MODELLING OF CBD SOUTH STATION. CROSS PASSAGES WERE NOT MODELLED AS PART OF THIS ASSESSMENT.

LEGEND INDICATIVE PRIMARY CONSOLIDATION SETTLEMENT

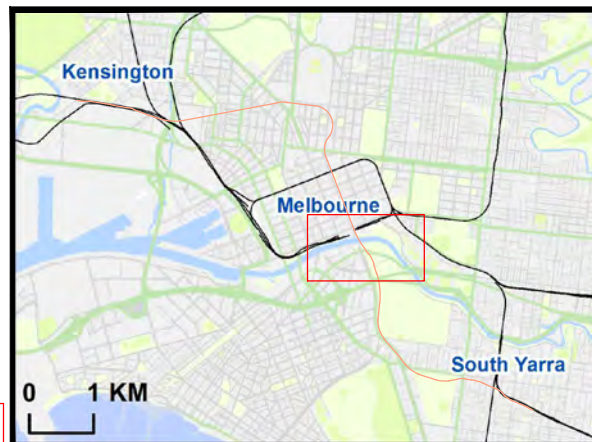
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	10-20mm	
	20-50mm	
	> 50mm	

NOTES

1. REFER FIGURE MMR-AJM-PWAA-DR-NN-500377-SHEET 1 OF 4 FOR NOTES AND LEGEND.
2. ALL LEVELS ARE IN METRES TO AHD.
3. ALL COORDINATES ARE IN METRES TO MGA-Z55
4. THESE DRAWINGS SHOULD BE READ IN CONJUNCTION WITH GOLDER ASSOCIATES GROUND MOVEMENT ASSESSMENT EES SUMMARY REPORT PREPARED FOR MELBOURNE METRO.

Note:
Surface works are not shown

NOT FOR CONSTRUCTION

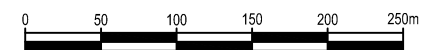


Melbourne Metro Rail Project

Title
GROUND MOVEMENT ASSESSMENT SHEET 3 OF 4

Drawing Number
MMR-AJM-PWAA-DR-NN-500377

Drawn By GOLDER	Approved By SLVB	Date 23-03-2016	Revision P1.1	Map Size A3
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LEGEND INDICATIVE PRIMARY CONSOLIDATION SETTLEMENT

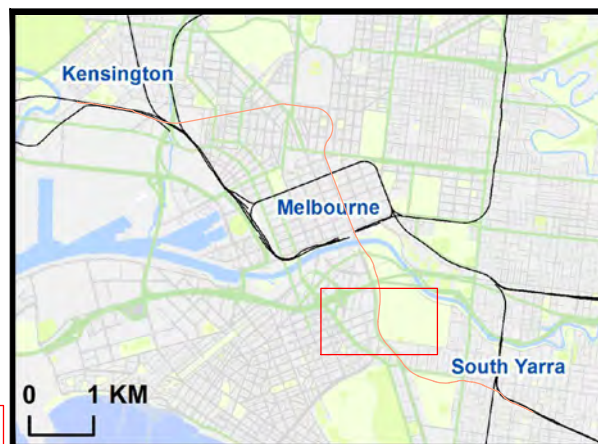
	< 10mm	INDICATIVE SETTLEMENT DUE TO CONSOLIDATION OF COODE ISLAND SILT, INDUCED BY GROUNDWATER DRAWDOWN.
	10-20mm	
	20-50mm	
	> 50mm	

NOTES

1. REFER FIGURE MMR-AJM-PWAA-DR-NN-500377-SHEET 1 OF 4 FOR NOTES AND LEGEND.
2. ALL LEVELS ARE IN METRES TO AHD.
3. ALL COORDINATES ARE IN METRES TO MGA-Z55
4. THESE DRAWINGS SHOULD BE READ IN CONJUNCTION WITH GOLDER ASSOCIATES GROUND MOVEMENT ASSESSMENT EES SUMMARY REPORT PREPARED FOR MELBOURNE METRO.

Note:
Surface works are not shown

NOT FOR CONSTRUCTION



Melbourne Metro Rail Project

Title
GROUND MOVEMENT ASSESSMENT SHEET 4 OF 4

Drawing Number
MMR-AJM-PWAA-DR-NN-500377

Revision
P1.1

Drawn By
GOLDER

Approved By
SLVB

Date
23-03-2016

Map Size
A3





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