MATCHLINE: 25-A-287-LA0083

MATCHLINE: 25-A-287-LA0085

BEECHBORO ROAD NORTH

TR05

Refer Civil Documentation
for Beechboro Road North
Design Layout

MATCHLINE: 25-A-287-LA0088

1 25-A-287-LA0086
1 : 250

PRELIMINARY ONLY
NOT FOR CONSTRUCTION

Model Rev:B.01 Issued:x.x.21

REV	DATE	AMENDMENT	DSN	DRN	CHK	APP
B01	13/08/21	DA Submission	UDLA	KT	SL	SL
A	4/06/21	Issue for 100% RD	UDLA	KT	SL	MA
A02	29/04/21	Issue for RD-IDC	UDLA	KT	SL	MA
A01	29/03/21	Issue for 50% RD	UDLA	KT	SL	MA

ORIG SIZE A1

0 10 20 30 40 50 100mm
AT ORIGINAL PLOT SIZE

MEL connx

REFERENCES

SCALE 1 : 250 (@ A1)

DATUM
HORIZONTAL: PCG2020
VERTICAL: AHD71

DESIGNED UDLA
DRAWN Kurt Tanner
CHECKED Scott Lang
APPROVED Manoj Aravind
DATE 13/08/21

Government of Western Australia
Public Transport Authority

MORLEY ELLENBROOK LINE

MALAGA STATION - LANDSCAPING
PLANTING PLAN

PTA Drawing No: 25-A-287-LA0086 Rev: B01

CAD DRAWING PATHNAME U:\1 - udla PROJECTS\MELCONNX Morley Ellenbrook Line\2. Drawings\0. Revit\3. Malaga\25-B-287-LA0001.rvt

MATCHLINE: 25-A-287-LA0084

MATCHLINE: 25-A-287-LA0085

N

TR04

TR04

TR04

TR04

TR04

Main Street

Development Lot

Kiss & Ride

TR05

TR05

TR05

TR05

TR05

TR05

TR05

TR05

TR05

TR05

TR05

TR05

TR05

TR05

TR05

Refer Civil Documentation for Road and Carpark Design Layout

Development Lot

MATCHLINE: 25-A-287-LA0088

MATCHLINE: 25-A-287-LA0089

PRELIMINARY ONLY
NOT FOR CONSTRUCTION

1 25-A-287-LA0087
1 : 250

Model Rev:B.01 Issued:x.x.21

REV	DATE	AMENDMENT	DSN	DRN	CHK	APP
B01	13/08/21	DA Submission	UDLA	KT	SL	SL
A	4/06/21	Issue for 100% RD	UDLA	KT	SL	MA
A02	29/04/21	Issue for RD-IDC	UDLA	KT	SL	MA
A01	29/03/21	Issue for 50% RD	UDLA	KT	SL	MA

ORIG SIZE A1

0 10 20 30 40 50 100mm
AT ORIGINAL PLOT SIZE

MEL connx

REFERENCES

SCALE 1 : 250 (@ A1)

DATUM
HORIZONTAL: PCG2020
VERTICAL: AHD71

DESIGNED UDLA
DRAWN Kurt Tanner
CHECKED Scott Lang
APPROVED Manoj Aravind
DATE 13/08/21

Government of Western Australia Public Transport Authority

MORLEY ELLENBROOK LINE

MALAGA STATION - LANDSCAPING
PLANTING PLAN

PTA Drawing No: 25-A-287-LA0087 Rev: B01

CAD DRAWING PATHNAME U:\1 - udla PROJECTS\MELCONNX Morley Ellenbrook Line\2. Drawings\0. Revit\3. Malaga\25-B-287-LA0001.rvt

MATCHLINE: 25-A-287-LA0085

MATCHLINE: 25-A-287-LA0086

MATCHLINE: 25-A-287-LA0087

N

TR05

Refer Civil Documentation for Road and Carpark Design Layout

Beechboro Rd North

BEECHBORO ROAD NORTH

Refer Civil Documentation for Beechboro Road North Design Layout

MATCHLINE: 25-A-287-LA0090

PRELIMINARY ONLY
NOT FOR CONSTRUCTION

1 25-A-287-LA0088
1 : 250

Model Rev:B.01 Issued:x.x.21

REV	DATE	AMENDMENT	DSN	DRN	CHK	APP
B01	13/08/21	DA Submission	UDLA	KT	SL	SL
A	4/06/21	Issue for 100% RD	UDLA	KT	SL	MA
A02	29/04/21	Issue for RD-IDC	UDLA	KT	SL	MA
A01	29/03/21	Issue for 50% RD	UDLA	KT	SL	MA

ORIG SIZE A1

0 10 20 30 40 50 100mm
AT ORIGINAL PLOT SIZE

MEL connx

REFERENCES

SCALE 1 : 250 (@ A1)

DATUM
HORIZONTAL: PCG2020
VERTICAL: AHD71

DESIGNED UDLA
DRAWN Kurt Tanner
CHECKED Scott Lang
APPROVED Manoj Aravind
DATE 13/08/21

Government of Western Australia Public Transport Authority

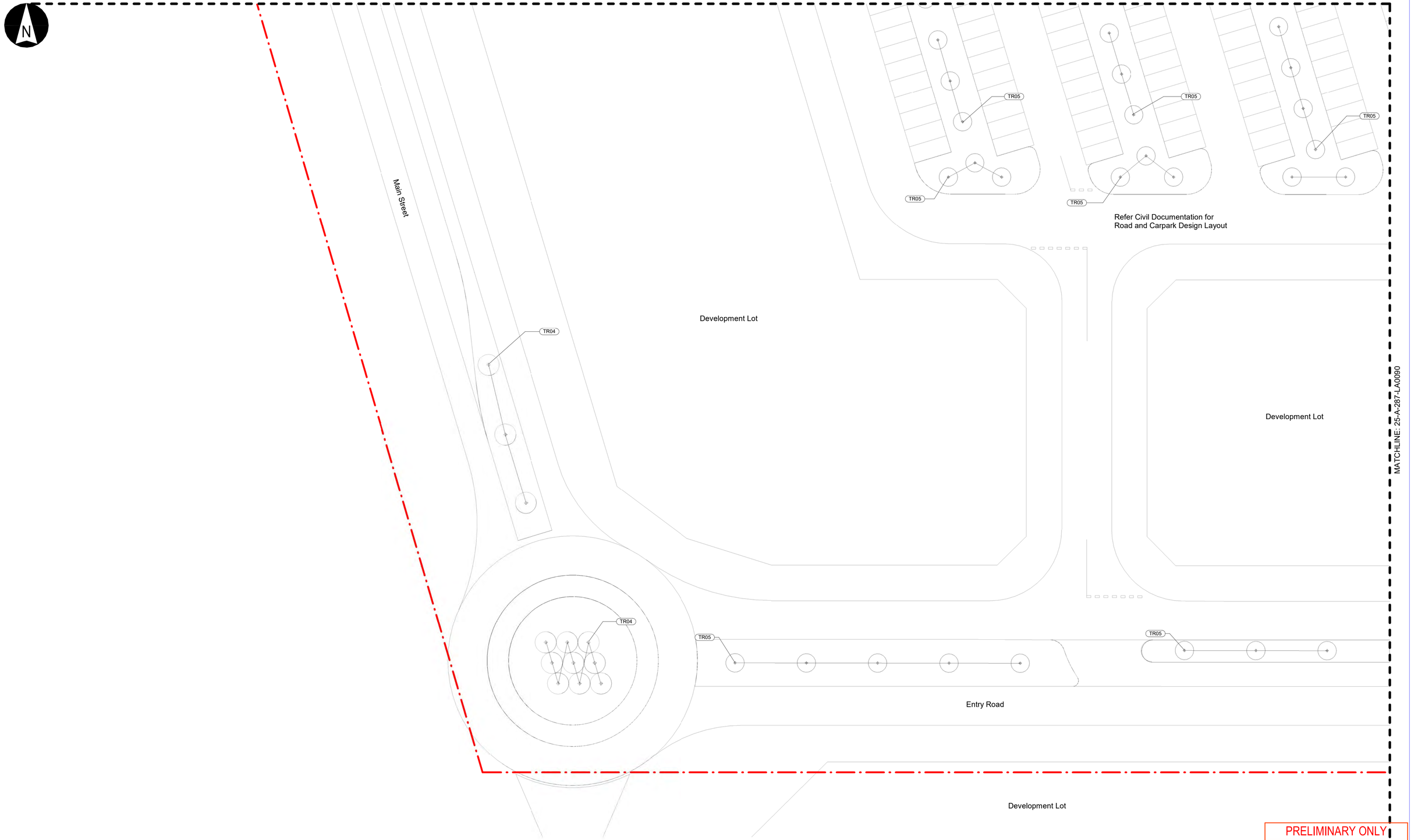
MORLEY ELLENBROOK LINE

MALAGA STATION - LANDSCAPING
PLANTING PLAN

PTA Drawing No: 25-A-287-LA0088 Rev: B01

CAD DRAWING PATHNAME U:\1 - udla PROJECTS\MELCONNX Morley Ellenbrook Line\2. Drawings\0. Revit\3. Malaga\25-B-287-LA0001.rvt

MATCHLINE: 25-A-287-LA0087



PRELIMINARY ONLY
NOT FOR CONSTRUCTION

1 25-A-287-LA0089
1 : 250

Model Rev:B.01 Issued:x.x.21

REV	DATE	AMENDMENT	DSN	DRN	CHK	APP
B01	13/08/21	DA Submission	UDLA	KT	SL	SL
A	4/06/21	Issue for 100% RD	UDLA	KT	SL	MA
A02	29/04/21	Issue for RD-IDC	UDLA	KT	SL	MA
A01	29/03/21	Issue for 50% RD	UDLA	KT	SL	MA

ORIG SIZE A1

0 10 20 30 40 50 100mm
AT ORIGINAL PLOT SIZE

MEL connx

REFERENCES

SCALE 1 : 250 (@ A1)

DATUM
HORIZONTAL: PCG2020
VERTICAL: AHD71

DESIGNED UDLA
DRAWN Kurt Tanner
CHECKED Scott Lang
APPROVED Manoj Aravind
DATE 13/08/21

Government of Western Australia
Public Transport Authority

MORLEY ELLENBROOK LINE

MALAGA STATION - LANDSCAPING
PLANTING PLAN

PTA Drawing No: 25-A-287-LA0089 Rev: B01

CAD DRAWING PATHNAME U:\1 - udla PROJECTS\MELCONNX Morley Ellenbrook Line\2. Drawings\0. Revit\3. Malaga\25-B-287-LA0001.rvt

MATCHLINE: 25-A-287-LA0088

MATCHLINE: 25-A-287-LA0089

TR05

Refer Civil Documentation for
Road and Carpark Design Layout

Development Lot

Drainage design under development
Refer Civil Documentation

BEECHBORO ROAD NORTH

Refer Civil Documentation for
Beechboro Road North Design Layout

Entry Road

Ring Main Unit
By Others

Development Lot

PRELIMINARY ONLY
NOT FOR CONSTRUCTION

1 25-A-287-LA0090
1 : 250

Model Rev:B.01 Issued:x.x.21

REV	DATE	AMENDMENT	DSN	DRN	CHK	APP
B01	13/08/21	DA Submission	UDLA	KT	SL	SL
A	4/06/21	Issue for 100% RD	UDLA	KT	SL	MA
A02	29/04/21	Issue for RD-IDC	UDLA	KT	SL	MA
A01	29/03/21	Issue for 50% RD	UDLA	KT	SL	MA

ORIG SIZE A1

0 10 20 30 40 50 100mm
AT ORIGINAL PLOT SIZE

MEL connx

REFERENCES

SCALE 1 : 250 (@ A1)

DATUM
HORIZONTAL: PCG2020
VERTICAL: AHD71

DESIGNED UDLA
DRAWN Kurt Tanner
CHECKED Scott Lang
APPROVED Manoj Aravind
DATE 13/08/21

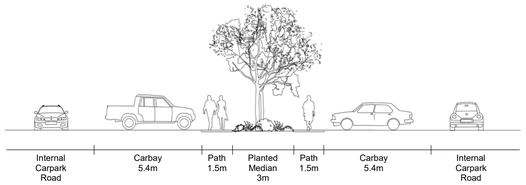
Government of Western Australia
Public Transport Authority

MORLEY ELLENBROOK LINE

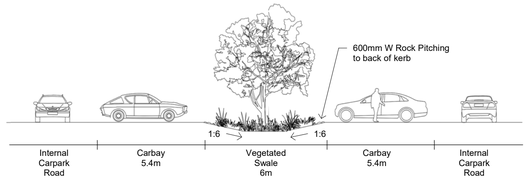
MALAGA STATION - LANDSCAPING
PLANTING PLAN

PTA Drawing No: 25-A-287-LA0090 Rev: B01

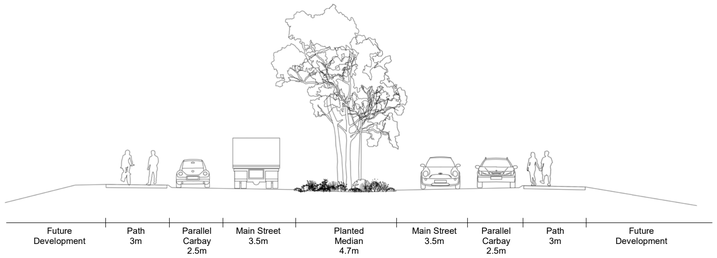
CAD DRAWING PATHNAME U:\1 - udla PROJECTS\MELCONNX Morley Ellenbrook Line\2. Drawings\0. Revit\3. Malaga\25-B-287-LA0001.rvt



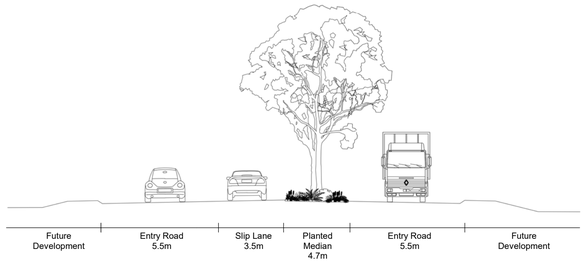
A SECTION A
1 : 150



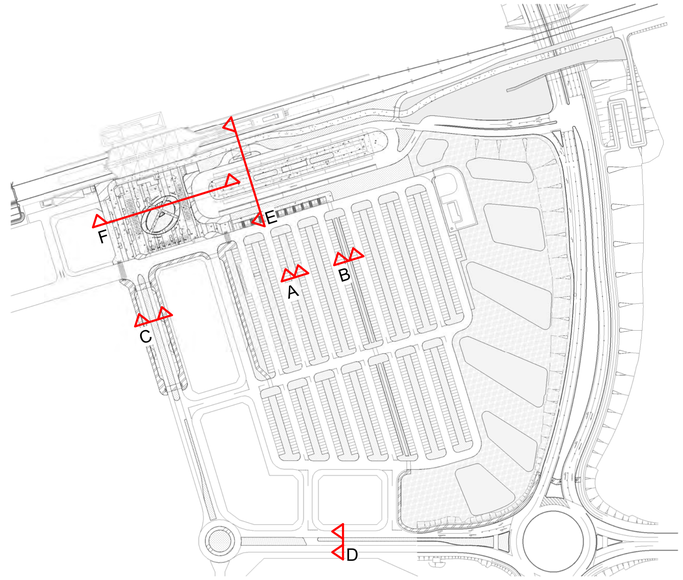
B SECTION B
1 : 150



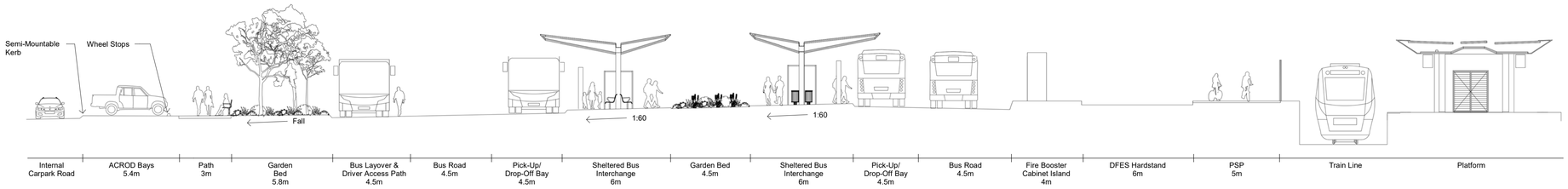
C SECTION C
1 : 150



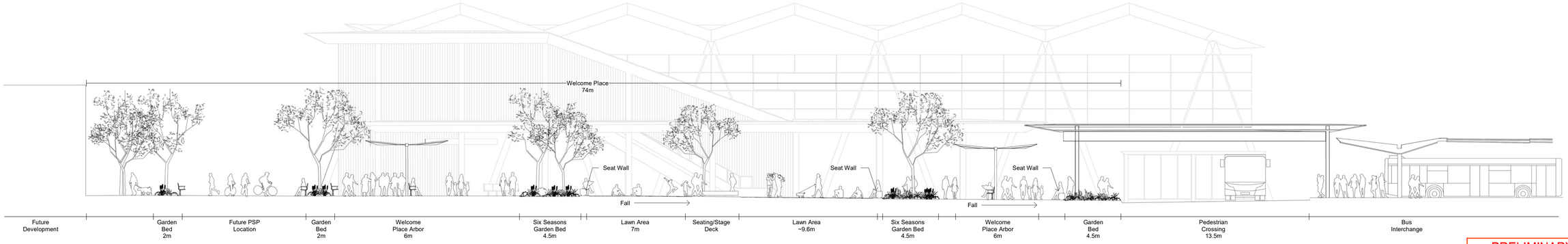
D SECTION D
1 : 150



1 LOCATION PLAN
1 : 2500



E SECTION E
1 : 150



F SECTION F
1 : 150

PRELIMINARY ONLY
NOT FOR CONSTRUCTION

Model Rev:B.01 Issued:x.x.21

REV	DATE	AMENDMENT	DSN	DRN	CHK	APP
B01	13/08/21	DA Submission	UDLA	KT	SL	SL

ORIG SIZE A1

0 10 20 30 40 50 100mm
AT ORIGINAL PLOT SIZE

MEL connx

REFERENCES

SCALE 1 : 2500 (@ A1)

DATUM
HORIZONTAL: PCG2020
VERTICAL: AHD71

DESIGNED UDLA
DRAWN Kurt Tanner
CHECKED Scott Lang
APPROVED Manoj Aravind
DATE 13/08/21

Government of Western Australia Public Transport Authority

MORLEY ELLENBROOK LINE

MALAGA STATION - LANDSCAPING

LANDSCAPE SECTIONS

PTA Drawing No: 25-A-287-LA0108 Rev: B01

CAD DRAWING PATHNAME U:\1 - udla PROJECTS\MELCONNX Morley Ellenbrook Line\2. Drawings\0. Revit\3. Malaga\25-B-287-LA0001.rvt

MORLEY ELLENBROOK LINE (MEL) - STATION & PRECINCT - ARCHITECTURAL MASTER MATERIALS SCHEDULE

DOC NO:	**MEL-MLCX-AR-SCH-00007**		**13/08/2021**
STATION:	**MALAGA STATION**		**REV - B02**

CODE	ITEM	LOCATION	DESCRIPTION	IMAGE	NOTES	SWTC
ACCESSORIES (AC)						
AC:01	Not in Use					
AC:02	Accessible Grab Rail - Right / Left Hand	DDA Accessible Toilets - All stations	Manufacturer: Description: Model: Size: Finish:	Britex or equivalent Vandal Resistant SS Backrest w 90deg RHS Grab Rail Set BTX-BRC-R90_VR 870x700 140 Deg Grab Rail Satin Stainless Steel		
AC:03	Accessible Grab Rail - Straight	DDA Accessible Toilets - All stations	Manufacturer: Description: Model: Size: Finish:	Britex or equivalent 450mm SS Grab Rail Straight Concealed BTR-01-038 450mm L Satin Stainless Steel		
AC:04	Ambulant Grab Rail - Right / Left Hand	Ambulant Toilets - All stations	Manufacturer: Description: Model: Size: Finish:	Britex or equivalent SS 90deg Ambulant Grab Rail BTR-01-058 450 x 450 Satin Stainless Steel		
AC:05	Toilet Roll Holder	All public and staff toilets - All stations	Manufacturer: Description: Model: Size: Finish:	Britex or equivalent SS Jumbo Roll Toilet Tissue Dispenser BTX-06-046 273 x 273 x 120 304 Satin Stainless Steel		
AC:06	Clothes Hook	All staff toilets - All stations	Manufacturer: Description: Model: Size: Finish:	Britex or equivalent SS Double Robe Hook BTX-10-035 100 x 52 x 52 Satin Stainless Steel		
AC:07	Paper Towel Dispenser	All public and staff toilets - All stations	Manufacturer: Description: Model: Size: Finish:	Britex or equivalent Recessed Paper Towel Dispenser w 19L Waste Receptacle BTX-03-012 1397 x 333 x 115 Satin Stainless Steel		
AC:08	Shower Curtain Track	All shower areas: - All stations	Manufacturer: Description: Model: Size: Finish:	Argent or equivalent Shower Curtain Track Aluminium Kit RBA4177-1668 Polished Steel		

MORLEY ELLENBROOK LINE (MEL) - STATION & PRECINCT - ARCHITECTURAL MASTER MATERIALS SCHEDULE

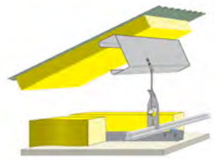
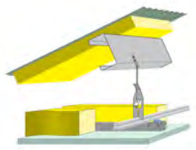
DOC NO:	**MEL-MLCX-AR-SCH-00007**		**13/08/2021**
STATION:	**MALAGA STATION**		**REV - B02**

CODE	ITEM	LOCATION	DESCRIPTION	IMAGE	NOTES	SWTC
AC:09	Soap Dish Holder	All shower areas: - All stations	Manufacturer: Britex or equivalent Description: Recessed HD Soap Dish SS Model: BTX-05-017 Size: 188 x 152 x 63 Finish: Satin Stainless Steel			
AC:10	DDA Shower Seat	All shower areas: - All stations	Manufacturer: Britex or equivalent Description: Accessible Folding Shower Seat with Support Legs Model: BTX-11-014 Size: 960 x 410 x476 H. Finish: White Compact Laminate			
AC:11	Locker	Staff crib rooms: - All stations	Manufacturer: Description: Model: Size: Finish: TBC			
AC:12	Baby change table	Parenting Room - All stations	Manufacturer: Britex or equivalent Description: Stainless Steel Baby Change Tables Model: BTX-09-013 Recessed mounted Size: 940 x 590. Finish: Stainless steel with HDPE interior			
CLADDING (CD)						
CD:01	Aluminium Cladding - Standing seam steel wall cladding with concealed fixing	Cladding to external façade: - Malaga - Morley - Noranda - Whiteman Park Services Buildings	Material: Aluminium sheet cladding Thickness: 3mm Finish: Colourbond. Colour: TBC Fixing: Concealed clip fixings to structural tophats or studs fixed to block wall, to Manufacturer's requirements. Product: LONGLINE 305 or similar approved Thickness: 0.70BMT Manufacturer: Lysaght Panel size: 2400 x 1150mm		Attributes: - Fire resistant, deemed non-combustible to AS1530.1 - High durability - anti-scratch, impact resistant - UV Stable - Graffiti resistant Sustainability: - TBC	
CD:02	Compressed Fibre Cement Cladding - Façade	Cladding to internal façade of station accommodation: - Malaga - Morley - Noranda - Whiteman Park	Material: Compressed fibre cement board. Thickness: TBC Finish: Flush finish, painted Fixing: Direct fixing to wall studs with sarking membrane Product: ExoTec or equivalent Manufacturer: BlueChip Group or equivalent Panel size: 2400 x 1200mm			
CD:03	Fibre Cement Sheet Capping	Capping to all exposed steel structural columns: - All stations	Material: Pre-finished Fibre Cemenet panel Thickness: 12mm Finish: PVDF Fluoropolymer coating system Colour: TBC Fixing: Exposed colour matched screws or rivets fixed to welded angles to steel columns, to Manufacturer's requirements. Product: Ultrapearl or similar approved Manufacturer: BlueChip Group or equivalent Panel size: 2400 x 1150mm		Attributes: - Fire resistant, deemed non-combustible to AS1530.1 - High durability - anti-scratch, impact resistant - Low Maintenance - UV Stable - Graffiti resistant Sustainability: - TBC	

MORLEY ELLENBROOK LINE (MEL) - STATION & PRECINCT - ARCHITECTURAL MASTER MATERIALS SCHEDULE

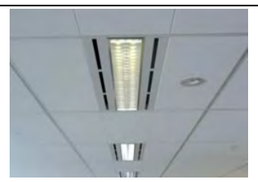
DOC NO: MEL-MLCX-AR-SCH-00007 | **13/08/2021**

STATION: MALAGA STATION | **REV - B02**

CODE	ITEM	LOCATION	DESCRIPTION	IMAGE	NOTES	SWTC
CD:04	Not in Use					
CEILINGS & SOFFITS (CL)						
CL:01	Plasterboard ceiling	General ceilings to station accommodation: - All stations	Material: Thickness: Finish: Fixing: Product: Manufacturer: Panel size: Standard gypsum plasterboard ceiling 13mm thk Flushed finish, painted PA:02 Rondo or similar furring channel suspension system Gyprock or equivalent CSR or equivalent 2400 X 1200mm		Flush access panels where required.	
CL:02	Moisture Resistant Plasterboard ceiling	Ceilings to wet areas: - Public and Staff Bathrooms: - All stations	Material: Thickness: Finish: Fixing: Product: Manufacturer: Panel size: Moisture resistant gypsum plasterboard ceiling 13mm thk Flushed finish, painted PA:02 Rondo or similar furring channel suspension system Gyprock Aquachek or equivalent CSR or equivalent 2400 X 1200mm		Flush access panels where required.	
CL:03	Fire rated self-supporting ceiling system	Electrical and Services rooms: - All stations	Material: FRL: Finish: Fixing: Product: Manufacturer: Panel size: Fyrchek FR plasterboard FRL 120/120/120 from both sides Painted PA:02. Fixed to 150 steel joists, as per system requirements Gyprock Fyrchek or equivalent CSR or equivalent 2400 x 1200mm		Joints and gaps to be fully sealed with FR sealant to achieve required FRL.	
CL:04	Profiled Colorbond steel cladding	Ceiling below pedestrian bridge at entrance building: - Malaga - Noranda	Material: Thickness: Finish: Fixing: Product: Manufacturer: Panel size: Ribbed steel sheet metal cladding with low fluted profile. Nom. 0.42BMT, 4mm profile Colourbond coated, Colour: Basalt grey Face fixed with Tek screws with washers to sub framing Panel Rib or equivalent Lysaght or equivalent Custom L x 850mm W		Attributes: - Fire resistant, deemed non-combustible to AS1530.1 - Colorbond - high durability - Low maintenance - UV resistant Sustainability: - Recyclable	
CL:05	Fire rated suspended ceiling system	Ceiling to Store & Cleaners Rooms below Staircases: - All stations	Material: FRL: Finish: Fixing: Product: Manufacturer: Panel size: Fyrchek FR plasterboard FRL 120/120/120 from below Painted PA:02, if visible. Fixed to furring channels, as per system requirements Gyprock Fyrchek or equivalent CSR or equivalent 2400 x 1200mm		Joints and gaps to be fully sealed with FR sealant to achieve required FRL.	

MORLEY ELLENBROOK LINE (MEL) - STATION & PRECINCT - ARCHITECTURAL MASTER MATERIALS SCHEDULE

DOC NO:	**MEL-MLCX-AR-SCH-00007**		**13/08/2021**
STATION:	**MALAGA STATION**		**REV - B02**

CODE	ITEM	LOCATION	DESCRIPTION	IMAGE	NOTES	SWTC
CL:06	Timber-look Cladding	Soffits to Station roofs, Entrance buildings and bus canopies: - All stations	Material: Timber-look Cladding Thickness: TBC Finish: TBC Fixing: Standard fixing system to tophats & sarking behind Product: TBC Manufacturer: TBC Panel size: TBC			
CL:07	Suspended grid ceiling	To Staff rooms - All stations	Material: Mineral fibre ceiling panels Size: 1200 mm L x 300mm W x 19mm or similar Finish: Pre-finished smooth non-directional white finish Suspension: Suprafine XL grid Product: Ultima Plank - bevelled tegulr edge or equivalent Manufacturer: Armstrong Ceilings or equivalent			
CL:08	Timber-look batterns	Station Concourse Soffits	Material: Timber-look Cladding Thickness: TBC Finish: TBC Fixing: TBC Product: TBC Manufacturer: TBC Panel size: TBC			
CONCRETE ENGINEERING (CE) - FINISHES ONLY						
CE:01	Prefabricated formwork concrete staircases	Concrete Staircases - All stations	Material: Precast concrete staircase with permanent steel formwork Thickness: As per Manufacturer's requirements Finish: Painted and galvanized Tread: Tiled with stair nosings to AS1428.1 Product: Fast Tread or equivalent Manufacturer: FTI Group or equivalent Size: As per drawings		To comply with Luminance Contrast requirement of AS1428.1 for treads and risers.	
CE:02	Concrete Roof Slab	TBC	Material: TBC Thickness: Finish: Fixing: Product:			
CE:03	Precast Concrete	Viaduct Structures - Whiteman Park Station	Material: TBC Thickness: Finish: Fixing: Product:			
CASEWORK (CW)						
CW:01	Kitchenette	Staff & Driver's Crib - All stations	Material: Finish: Product: Manufacturer: Size: Colour:			

MORLEY ELLENBROOK LINE (MEL) - STATION & PRECINCT - ARCHITECTURAL MASTER MATERIALS SCHEDULE

DOC NO:	**MEL-MLCX-AR-SCH-00007**						**13/08/2021**
STATION:	**MALAGA STATION**						**REV - B02**
CODE	**ITEM**	**LOCATION**	**DESCRIPTION**		**IMAGE**	**NOTES**	**SWTC**
CW:02	Work Station	Staff Crib - All stations	Material: Thickness: Finish: Fixing: Product: Manufacturer: Panel size:	TBC			
CW:03	L-Shape Workstation	CSO - All stations	Material: Thickness: Finish: Fixing: Product: Manufacturer: Panel size:	TBC			
DOORS (DR)							
DR:01	Security roller grille	Concourse Secure Line Gate - All stations	Material: Thickness: Finish: Operation: Locking: Product: Manufacturer:	Steel roller grille shutter - heavy duty commercial for external applications 16mm dia.x 1.2mm galv steel tubes sleeved with 20mm dia x 1.2mm aluminium tube at 90mm ctrs, linked with 3mm steel links at 208mm ctrs in brick pattern. Anodized aluminium Motorized or chain operated with overhead roller drum & guides Motor locked or shootbolt mechanism Steel Roller Grille Airport Doors or equivalent Max. 8m W x 4.2m H		Attributes: - Heavy duty - Maximum vision and ventilation - Motorized operation Sustainability: - recyclable	
DR:02	Single Doors - Non FR	Standard doors to operational rooms (non-Fire Rated): - All stations	Material: FRL: Thickness: Frame: Finish: Acoustics: Locking: Product: Manufacturer: Size:	Flush panel solid-core timber doors n/a TBC Aluminium door frames TBC To Acoustic requirements To Security requirements Pyropanel non-FR doors or equivalent Pyropanel or equivalent As per drawings and AS1428.1 requirements		To comply with Luminance Contrast requirement of AS1428.1.	
DR:03	Single Doors - Glazed	Glazed door to CSO's: - All stations	Material: Glass: Thickness: Frame: Finish: Acoustics: Locking: Product: Manufacturer: Size:	Steel frame door with full glazed panel. Clear Grade A safety glass with protective film to AS1288 & SWTC requirements TBC Aluminium door frames TBC To Acoustic requirements To Security requirements TBC TBC As per drawings and AS1428.1 requirements		To comply with Luminance Contrast requirement of AS1428.1.	

MORLEY ELLENBROOK LINE (MEL) - STATION & PRECINCT - ARCHITECTURAL MASTER MATERIALS SCHEDULE

DOC NO:	**MEL-MLCX-AR-SCH-00007**		**13/08/2021**
STATION:	**MALAGA STATION**		**REV - B02**

CODE	ITEM	LOCATION	DESCRIPTION	IMAGE	NOTES	SWTC
DR:04	Single Doors - FR	Fire rated doors to electrical & store rooms: - All stations	Material: Flush panel solid-core timber doors FRL: To suit wall FRL requirements Thickness: TBC Frame: Pressed steel door frames (FR) Finish: TBC Acoustics: To Acoustic requirements Locking: To Security requirements Product: Pyropanel FR doors or equivalent Manufacturer: Pyropanel or equivalent Size: As per drawings and AS1428.1 requirements		To comply with Luminance Contrast requirement of AS1428.1.	
DR:05	Louvered Doors	Louvered doors to mechanical rooms: - All stations	Material: Aluminium doors with louvered panels FRL: n/a Thickness: TBC Frame: Aluminium door frames Finish: TBC Acoustics: To Acoustic requirements Locking: To Security requirements Product: TBC Manufacturer: TBC Size: As per drawings and AS1428.1 requirements		To comply with Luminance Contrast requirement of AS1428.1.	
DR:06	Double Doors - Non FR	Standard doors to operational rooms (non-Fire Rated) - All stations	Material: Flush panel solid-core timber doors FRL: n/a Thickness: TBC Frame: Aluminium door frames Finish: TBC Acoustics: To Acoustic requirements Locking: To Security requirements Product: Pyropanel non-FR doors or equivalent Manufacturer: Pyropanel or equivalent Size: As per drawings and AS1428.1 requirements		To comply with Luminance Contrast requirement of AS1428.1.	
DR:07	Roller shutter with vision panels	Kiosks - All stations	Material: Fire rated interlocking steel slat roller shutter FRL 2 hours FRL to Fire Engineer's requirements Thickness: 75mm H x 18mm D x 1.0mm thk roll-formed steel slats. Finish: Powder coated Steel Operation: Motorized with overhead roller drum & guides Locking: Motor locked or shootbolt mechanism Product: 2HR Fire Shutter Manufacturer: Airport Doors or equivalent Size: Max. 8.0m W x 5.0m H		Attributes: - Certified integrity for 2hr fire rated - Controlled descent mechanism Sustainability: - Recyclable	
DR:08	Fire Hydrant Cabinet Doors	Concourse areas - All stations	Material: Flush panel solid-core timber or metal doors FRL: n/a Thickness: TBC Frame: Aluminium door frames Finish: TBC Acoustics: n/a Locking: To Security requirements Product: Pyropanel non-FR doors or equivalent Manufacturer: Pyropanel or equivalent Size: As per drawings and AS1428.1 requirements		DFES signage to be provided for ease of identification of Hydrant cabinets.	
EQUIPMENT (EQ)						

MORLEY ELLENBROOK LINE (MEL) - STATION & PRECINCT - ARCHITECTURAL MASTER MATERIALS SCHEDULE

DOC NO:	**MEL-MLCX-AR-SCH-00007**		**13/08/2021**
STATION:	**MALAGA STATION**		**REV - B02**

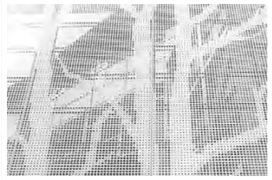
CODE	ITEM	LOCATION	DESCRIPTION	IMAGE	NOTES	SWTC
EQ:01	Lighting poles - Mid-hinge type	Platform level - All stations	Material: Finish: Locking: Product: Manufacturer: Size:	Mid-hinged (breakback) lighting poles in CHS or tapered octagonal profile to Electrical Engineer's specifications. Powder coated Tamper & vandal resistant fixings & locks. Mid Hinged Poles & Columns G&S Industries or equivalent To Lighting & Electrical Engineer's requirements.			
EQ:02	Public telephone	Concourse unpaid zone: - All stations	Product: Manufacturer: Finish: Numbers:	TBC TBC Stainless steel To PTA SWTC requirements		At least one accessible telephone shall be an accessible type as prescribed in AS1428.2 1992 Clause 30.1. The accessible telephone shall be fitted with volume control and an in-built hearing aid coupler and identified with the international symbol for deafness.	
EQ:03	Bike Racks	Bicycle storage racks - All stations	Material: Finish: Product: Manufacturer: Size:	Tow-tier bicycle racking system Powder coated Easy-lift bicycle rack or equivalent VelopA or equivalent To suit bicycle numbers required			
EQ:04	Drink fountains	Concourse area: - All stations	Material: Finish: Product: Manufacturer: Size:	Stainless steel Satin 304 stainless steel finish Dado Round Double Drinking Fountain Britexor equivalent 1000 x 490		Dual mounting heights. AS1428 Compliant.	
EQ:05	Hand dryers	Staff & UAT Toilets - all stations	Material: Finish: Product: Manufacturer: Size:	Stainless steel Linished No.4 finish Airblade V Dyson or equivalent TBC		**Not what has been specified in the Room Data Sheet.**	
EQ:06	Hand dryers	Staff & UAT Toilets - all stations	Material: Finish: Product: Manufacturer: Size:	Stainless steel Linished No.4 finish Airblade V Dyson or equivalent TBC			
EQ:07	Fridge	Staff & Driver's Crib - All Stations	Material: Finish: Product: Manufacturer: Size:	TBC TBC TBC TBC TBC			

MORLEY ELLENBROOK LINE (MEL) - STATION & PRECINCT - ARCHITECTURAL MASTER MATERIALS SCHEDULE

DOC NO:	**MEL-MLCX-AR-SCH-00007**		**13/08/2021**
STATION:	**MALAGA STATION**		**REV - B02**

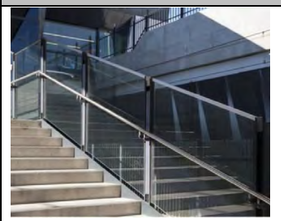
CODE	ITEM	LOCATION	DESCRIPTION		IMAGE	NOTES	SWTC
EQ:08	Microwave	Staff & Driver's Crib - All Stations	Material: Finish: Product: Manufacturer: Size:	TBC TBC TBC TBC TBC			
EQ:09	Television	Staff Crib - All stations	Material: Finish: Product: Manufacturer: Size:	TBC TBC TBC TBC TBC			
EQ:10	Computer	Staff Crib & Office - All stations	Material: Finish: Product: Manufacturer: Size:	TBC TBC TBC TBC TBC			
EQ:11	Ticket Machine	Concourse area: - All stations	Material: Thickness: Finish: Fixing: Product: Manufacturer: Panel size:	TBC			
EQ:12	ATM Machine	Concourse area: - All stations	Material: Thickness: Finish: Fixing: Product: Manufacturer: Panel size:	TBC			
FURNITURE (FN)							
FN:01	Dining Table	Staff Crib - All stations	Material: Finish: Product: Manufacturer: Size: Colour:				
FN:02	Dining Chairs	Staff Crib - All stations	Material: Finish: Product: Manufacturer: Size: Colour:				

MORLEY ELLENBROOK LINE (MEL) - STATION & PRECINCT - ARCHITECTURAL MASTER MATERIALS SCHEDULE

DOC NO:	**MEL-MLCX-AR-SCH-00007**						**13/08/2021**
STATION:	**MALAGA STATION**						**REV - B02**
CODE	**ITEM**	**LOCATION**	**DESCRIPTION**		**IMAGE**	**NOTES**	**SWTC**
FN:03	Work Table	Staff Crib - All stations	Material: Finish: Product: Manufacturer: Size: Colour:	600(w) x 1500(l)			
FN:04	Office Chairs	Staff Crib - All stations	Material: Finish: Product: Manufacturer: Size: Colour:				
FLOOR COVERINGS (FC)							
FC:01	Anti-static Sheet vinyl flooring	Staff Crib / Transit Guard Booth - CSO: - All stations	Material: Finish: Product: Manufacturer: Size: Colour:	Slip resistant Vinyl sheets flooring with matching skirting. P4 / R11 Slip resistance, Anti-static to services rooms Safeguard R12 or sim. equivalent. Armstrong Flooring or equivalent 2m x 20m x 2.00mm gauge sheet Slate		Vinyl flooring to suit specific area of use. To comply with DDA accessibility requirements.	
FABRICATED METALWORK (FM)							
FM:01	Perforated Aluminium Vertical Screening with Artwork Graphic by Artist	Concourse edge screening & Entrance building: - Noranda Platform level screening: - Whiteman Park	Material: Thickness: Finish: Pattern: Product: Manufacturer: Size: Colour:	Perforated solid aluminium panel. 3 - 4mm thick Anodized or Interpon D2525 powder coating Graphic perforations (<5mm diameter for safety). Pic Perf or equivalent Locker Group or equivalent 2440mm x 1220mm std TBC			
FM:02	Angled perforated vertical screening with Artwork Graphic by Artist	Concourse level, including Entrance Building bridge screening: - Malaga	Material: Thickness: Finish: Pattern: Product: Manufacturer: Size: Colour:	Perforated solid aluminium panel. 3 - 4mm thick Anodized or Interpon D2525 powder coating Standard perforations (<5mm diameter for safety). To be flat panels fixed to angled frames to create a 3D effect. Perforated Locker Group or equivalent 2440mm x 1220mm std; full height of opening TBC			
FM:03	Metal Screening	Barriers that are located adjoining vertical drops - All stations	Material: Thickness: Finish: Pattern: Product: Manufacturer: Size: Colour:	Perforated solid aluminium panel. 3 - 4mm thick Anodized or Interpon D2525 powder coating Standard perforations (<5mm diameter for safety). Perforated Locker Group or equivalent 2440mm x 1220mm std; 2400mm height TBC			

MORLEY ELLENBROOK LINE (MEL) - STATION & PRECINCT - ARCHITECTURAL MASTER MATERIALS SCHEDULE

DOC NO:	**MEL-MLCX-AR-SCH-00007**		**13/08/2021**
STATION:	**MALAGA STATION**		**REV - B02**

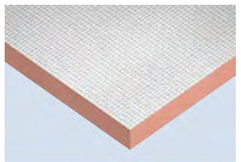
CODE	ITEM	LOCATION	DESCRIPTION	IMAGE	NOTES	SWTC
FM:04	Glass balustrades with stainless steel stanchions & LED handrails	Concourse voids, staircases and lift areas: - Malaga - Morley - Noranda - Whiteman Park	Material: Thickness: Finish: Protection: Handrail: Product: Manufacturer:	Grade A clear laminated safety glass sealed to 900 H Grade 316 stainless steel plate stanchions at 1200 - 1500 ctrs. Glass: TBC Stanchions: Nom. 8mm thk. No.4 /Linished /Hairline finish 3M Anti-Graffiti film AG-6 to inside face of glass. Nom. 42 dia. stainless steel with LED lighting Forrest range or equivalent Lumorail or equivalent			
FM:05	Handrails - with LED lighting	DDA Accessible areas: - All stations	Material: Fixing: Size: Finish: Product: Manufacturer:	Side mounted stainless steel handrails with LED lighting Bracket mounted to walls, posts and screening frames. Nom. 42mm dia. stainless steel circular rail Satin finish with 300mm section of yellow high visibility paint to ends. Forrest range Lumorail or equivalent			
FM:06	Not in Use						
FM:07	Weather protection glazed screens	Platforms, bust waiting areas - All stations	Material: Glass: Size: Finish: Product:	Steel RHS framing with glazed screen infill GL:03 As per drawings Linished No.4 Custom			
FM:08	Perforated Metal Cladding	Side of viaduct structure. - Whiteman Park					
FIRE PROTECTION (FP)							
FP:01	Fire Protection - Structural Steelwork	Structural steelwork - All stations	Material: Thickness: Finish: Product: Manufacturer:	Vermiculite Gypsum Based wet mix spray or Intumescent Paint To meet required FRL n/a CAFCO or equivalent, to Structural Engineer's specifications Promat or equivalent			
FP:02	Fire collars	Penetrations through suspended slabs: - Morley - Malaga - Noranda - Whiteman Park	Material: FRL: Product: Manufacturer:	Penetration Seals for Pipes As per floor FRL requirements Promaseal Retrofit Collar or equivalent PROMAT or equivalent			
GLAZING (GL)							

MORLEY ELLENBROOK LINE (MEL) - STATION & PRECINCT - ARCHITECTURAL MASTER MATERIALS SCHEDULE

DOC NO:	**MEL-MLCX-AR-SCH-00007**						**13/08/2021**
STATION:	**MALAGA STATION**						**REV - B02**
CODE	**ITEM**	**LOCATION**	**DESCRIPTION**		**IMAGE**	**NOTES**	**SWTC**
GL:01	Laminated Safety Glass - Glazed Windows and Doors	CSO, Offices and Rooms: - All stations	Material: Thickness: Colour: Framing: Fixing: ESD: Product: Glass Manufacturer: Panel size: Protection:	Clear laminated Grade A safety glass Nom. 17.52thk. TBC by Structural Engineer & to AS1288. Clear Aluminium - anodized Gasket or sealant within glazing pockets All Glazed Elements SHGC: 0.80 to ESD requirements. Laminated safety glass Cooling Brothers or equivalent Nom. 1200 - 1500mm W. 3M Anti-Graffiti film AG-6 to public face of glass.		All glass protected from graffiti by using an anti-graffiti film of 0.6mm, applied on the side that is prone to public reach.	
GL:02	Fritted Laminated Safety Glass - Skylights	Station and Platform roof skylights - All stations	Material: Thickness: Colour: Framing: Fixing: ESD: Product: Glass Manufacturer: Panel size:	Clear laminated Grade A safety glass Nom. 17.52thk. TBC by Structural Engineer & to AS1288 for trafficability. Clear with 75% solid white dot-matrix ceramic frit pattern. Aluminium - anodized Gasket or structural silicone sealant. All Glazed Elements to ESD and NCC Section J requirements. Laminated safety glass Cooling Brothers or equivalent Nom. 1200 - 1500mm W.			
GL:03	Laminated Safety Glass - Glazed Screens	Protective glass shelters & screens - All platforms Concourse edge - Malaga - Morley	Material: Thickness: Colour: Framing: Fixing: ESD: Product: Glass Manufacturer: Panel size: Protection:	Clear laminated Grade A safety glass Nom. 17.52thk. TBC by Structural Engineer & to AS1288. Clear Aluminium - anodized Gasket or sealant within glazing pockets n/a Laminated safety glass Cooling Brothers or equivalent Nom. 1200-1500mm W. x 2400mmH 3M Anti-Graffiti film AG-6 to public face of glass.			
GL:04	Laminated safety Glass - Lift Enclosure	Glass lifts - Morley - Malaga - Noranda - Whiteman Park	Material: Thickness: Colour: Framing: Fixing: ESD: Product: Glass Manufacturer: Panel size: Protection:	Clear laminated Grade A safety glass Nom. 17.52thk. TBC by Structural Engineer & to AS1288. Clear Stainless steel - Linished No.4 finish Gasket or sealant within glazing pockets All Glazed Elements SHGC: 0.80 to ESD requirements. Laminated safety glass Cooling Brothers or equivalent Nom. 1200 - 1500mm W. 3M Anti-Graffiti film AG-6 to public face of glass.			
INSULATION (IN)							

MORLEY ELLENBROOK LINE (MEL) - STATION & PRECINCT - ARCHITECTURAL MASTER MATERIALS SCHEDULE

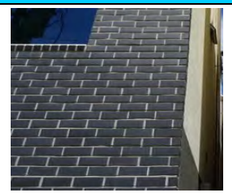
DOC NO:	**MEL-MLCX-AR-SCH-00007**		**13/08/2021**
STATION:	**MALAGA STATION**		**REV - B02**

CODE	ITEM	LOCATION	DESCRIPTION		IMAGE	NOTES	SWTC
IN:01	Roof thermal insulation	Station & Accommodation roofs: - All stations	Material: Thickness: Fixing: ESD: Product: Manufacturer:	Rockwool Anticon insulation with HD Thermofoil or equivalent Nom. 60mm, TBC by ESD Engineer With Safebridge HP roof insulation system on mesh R-Value TBC by ESD Engineer Bradford or equivalent CSR or equivalent			
IN:02	Bulk Ceiling insulation	Ceilings: - All stations	Material: Thickness: Fixing: ESD: Acoustics: Product: Manufacturer:	Rockwool Anticon insulation with HD Thermofoil or equivalent Nom. 60mm, TBC by ESD Engineer With Safebridge HP roof insulation system on mesh R-Value TBC by ESD Engineer Rw TBC by Acoustic Engineer Bradford or equivalent CSR or equivalent			
IN:03	Wall and partition insulation	Accommodation building: - All stations	Material: Thickness: Fixing: ESD: Acoustics: Product: Manufacturer:	Rockwool Acoustigard insulation 11kg or equivalent Nom. 75 thk - TBC by ESD Engineer Laid within drywall partition between studs R-Value TBC by ESD Engineer Rw TBC by Acoustic Engineer Bradford or equivalent CSR or equivalent			
IN:04	Rigid Under slab Insulation	Elevated Concourse - Malaga - Morley - Noranda - Whiteman Park	Material: Thickness: Fixing: ESD: Acoustics: Product: Manufacturer:	Kooltherm K10 FM rigid insulation board w foil face or equivalent Nom. 75 thk - TBC by ESD Engineer Mushroom head fixing pins to underside of slab R-Value TBC by ESD Engineer n/a Kooltherm K10 FM Soffit Board or equivalent Kingspan or equivalent			
LOUVRES (LV)							
LV:01	Ventilation Louvers - Rain Defence	Mechanical rooms, electrical rooms, etc: - All stations	Material: Finish: Product: Manufacturer: Size:	Two stage aluminium louvers within aluminium framing Aluminium, anodized RSH-5700 Storm Resistant Louvre with 50mm blade pitch. Louvre performance TBC to Mechanical Engr's requirements CS Louvers or equivalent 1200mm W panels, as per drawing			
LV:02	Ventilation Louvers - Non rain defence	Protected mechanical rooms - All stations	Material: Finish: Product: Manufacturer: Size:	Single stage aluminium louvers within aluminium framing Aluminium, anodized Louvre with 50mm blade pitch. Louvre performance TBC to Mechanical Engr's requirements CS Louvers or equivalent 1200mm W panels, as per drawing			

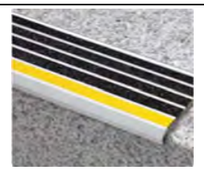
MORLEY ELLENBROOK LINE (MEL) - STATION & PRECINCT - ARCHITECTURAL MASTER MATERIALS SCHEDULE

DOC NO: MEL-MLCX-AR-SCH-00007 | **13/08/2021**

STATION: MALAGA STATION | **REV - B02**

CODE	ITEM	LOCATION	DESCRIPTION		IMAGE	NOTES	SWTC
MASONRY (MA)							
MA:01a	Brick Wall	Entrance building - Noranda Station - Whiteman Park Service Building - Ellenbrook Station	Material: Finish: Mortar: Colour: Product: Manufacturer: Size: Protection:	Clay face brick commons Smooth face Class M3 and M4, Concave mortar joints Estilo Nero Azul (Dark Charcoal). Spanish Collection or equivalent Midland Brick or equivalent 230mm x 110mm x 76mm Clear anti-graffiti coating			
MA:01b	Brick Wall	Accommodation buildings - Ellenbrook Station Ancillary buildings - linewide precincts	Material: Finish: Mortar: Colour: Product: Manufacturer: Size: Protection:	Clay face brick commons Smooth face Class M3 and M4, Concave mortar joints Restoration Red Coach or equivalent Midland Reds or equivalent Midland Brick or equivalent 230mm x 110mm x 76mm Clear anti-graffiti coating			
METALWORK (MW)							
MW:01	Folded Metal Shroud	Concourse and Platform Skylight - All stations	Material: Thickness: Finish: Product: Manufacturer:	Folded solid aluminium sheet to conceal structural beams to skylight. 3mm PVDF Fluoropolymer coated finish to match other cladding elements. Mondoclad or equivalent TBC			Note: **Lower section of portal to be reinforced with backing board up to height of 1500mm for protection against impact damage.**
MW:02	Door and Wall opening portals	Concourse - All stations	Material: Thickness: Finish: Product: Manufacturer:	Nom. 510 x 50mm wide folded solid aluminium sheet to form portal around door frames and recessed concourse openings. 3mm PVDF Fluoropolymer coated finish to match door frames and other cladding elements. Mondoclad or equivalent TBC			
MW:03	Balustrade	Fare Gates		Proprietary framed glass balustrade system with base mounted glazing channel			
MW:04	Bench Seating	Platform seating - All stations and precinct	Material: Thickness: Finish: Product: Manufacturer:	Stainless Steel Seats as Per PTA standard design			Seats located in positions where the arrival of services can be observed, without affecting the general flow of pedestrians. Seats should not allow visitors access to higher levels (i.e. adjoining stair voids) If the perforated sheeting is to be used as a seat base there should be no low level framing to the front or rear of the unit (cleaning access). Materiality: Stainless-steel
MW:05	Bins	Precinct, platform and concourse levels - All stations	Material: Thickness: Finish: Product: Manufacturer:	Stainless Steel Bins as Per PTA standard design			The bin lid is locked in place to prevent removal of the liner. Materiality: Perforated, stainless steel outer and liner

MORLEY ELLENBROOK LINE (MEL) - STATION & PRECINCT - ARCHITECTURAL MASTER MATERIALS SCHEDULE

DOC NO:	**MEL-MLCX-AR-SCH-00007**						**13/08/2021**
STATION:	**MALAGA STATION**						**REV - B02**
CODE	**ITEM**	**LOCATION**	**DESCRIPTION**		**IMAGE**	**NOTES**	**SWTC**
MW:06	Service/ Refuge zones	Refuge zone railings - All stations	Material: Thickness: Finish: Product: Manufacturer:	Steel - hot dip galvanised safety fence			
MW:07	Steel staircase and railing	Platform level - All stations	Material: Thickness: Finish: Product: Manufacturer:	Mild steel - hot dip galvanised stair, grating and balustrade Nom 40 dia. rail Hot dipped galvanized finish Access Products or equivalent Webforge or equivalent			
MW:08	Not in Use						
MW:09	Not in Use						
MW:10	Safety Stair nosing	Concourse & Entrance Building Staircases - Malaga - Morley - Noranda - Whiteman Park	Material: Size: Finish: Product: Manufacturer:	Aluminium ribbed safety stair nosing 50mm Anodized, with 4 carborundum strips and safety yellow strip, R13 anti-slip rating. ProStep 5 or equivalent CTA Australia or equivalent		In compliance with Luminance Contrast requirement of AS1428.1.	
MW:11	Stainless steel mirror	Public toilets: - All stations	Material: Size: Finish: Product: Manufacturer:	Anti-vandal Polished stainless steel mirror 1000 x 450, High-polished No. 8 mirror finish Security Stainless Mirror or equivalent Anti-Vandal, anti-ligature, Disabled Compliant Britex -SMIR or equivalent			
PAINT (PA)							
PA:01	Paint to Metalwork	All stations and bus interchanges	Type: Product: Manufacturer: Colour:	Dulux high performance paint Weathermax HBR or equivalent Dulux or equivalent Black			
PA:02	Paint to Plasterboard Ceilings	All stations	Type: Product: Manufacturer: Colour:	Flat acrylic to plasterboard ceilings & bulkheads Dulux Porter's Ceiling Flat or equivalent Dulux or equivalent White			
PA:03	Anti Graffiti Coating	All stations	Type: Product: Manufacturer: Colour:	Anti graffiti coating SurfaceShield HD Clear or equivalent Dulux or equivalent TBC			

MORLEY ELLENBROOK LINE (MEL) - STATION & PRECINCT - ARCHITECTURAL MASTER MATERIALS SCHEDULE

DOC NO: MEL-MLCX-AR-SCH-00007 | **13/08/2021**

STATION: MALAGA STATION | **REV - B02**

CODE	ITEM	LOCATION	DESCRIPTION	IMAGE	NOTES	SWTC
PA:04	Paint to Interior Walls	All stations	Type: Low Sheen acrylic to plasterboard Product: Dulux Wash and Wear Low Sheen or equivalent Manufacturer: Dulux or equivalent Colour: TBC			
PA:05	Paint to Exterior Walls	All stations	Type: TBC Product: TBC Manufacturer: Dulux or equivalent Colour: TBC			
PA:06	Paint to Concrete	All stations	Type: TBC Product: TBC Manufacturer: Dulux or equivalent Colour: TBC			
PA:07	Contrasting colour finish	All stations	Type: TBC Product: TBC Manufacturer: Dulux or equivalent Colour: TBC			
PA:08	Bike Shelter paint	All stations	Type: TBC Product: TBC Manufacturer: Dulux or equivalent Colour: TBC			
PA:09	Paint to Plasterboard Ceilings - Wet Areas	All stations	Type: Flat acrylic to plasterboard ceilings & bulkheads Product: Dulux Porter's Ceiling Flat or equivalent Manufacturer: Dulux or equivalent Colour: White			
PARTITIONS & DRYWALLING (PD)						
PD:01	Standard partition	Accommodation building - All stations	Material: 2x13mm Plasterboard lining both sides on 76 stud Height: Full height / Ceiling Height Product: Gyprock or equivalent Manufacturer: CSR or equivalent Finish: Flushed and painted PA:XX			
PD:02	Lining	Accommodation building - All stations	Material: 2x13mm Plasterboard lining one side only (risers/ducts) Height: Full height / Ceiling Height Product: Gyprock or equivalent Manufacturer: CSR or equivalent Finish: Flushed and painted PA:XX			
PD:03	Fire rated partition - FRL120/120/120 both sides	Accommodation building - All stations	Material: 2x16mm Fyrchek lining both sides on 76 stud FRL: FRL 120/120/120 Height: Full height Product: Fyrchek / MR Fyrchek or equivalent (MR where abutting Wet Areas) Manufacturer: CSR or equivalent Finish: Flushed and painted PA:XX			
PD:04	Fire rated lining - FRL120/120/120 one side - Full height	Accommodation building - All stations	Material: 3x16mm Fyrchek lining on 76 stud (risers/ducts/enclosed rooms) FRL: FRL 120/120/120 from one side only Height: Full height lining Product: Fyrchek or equivalent Manufacturer: CSR or equivalent Finish: Flushed and painted PA:XX			

MORLEY ELLENBROOK LINE (MEL) - STATION & PRECINCT - ARCHITECTURAL MASTER MATERIALS SCHEDULE

DOC NO:	**MEL-MLCX-AR-SCH-00007**						**13/08/2021**
STATION:	**MALAGA STATION**						**REV - B02**
CODE	**ITEM**	**LOCATION**	**DESCRIPTION**		**IMAGE**	**NOTES**	**SWTC**
PD:05	Fire rated partition - FRL-/90/90 both sides - Full height	Accommodation building - All stations	Material: FRL: Height: Product: Manufacturer: Finish:	16mm Fyrchek both sides on 76 stud (kiosk) FRL -/90/90 Full height Fyrchek or equivalent CSR or equivalent Flushed and painted PA:XX			
PD:06	Fire rated lining - FRL-/90/90 one side - Full height	Accommodation building - All stations	Material: FRL: Height: Product: Manufacturer: Finish:	3x13mm Fyrchek on 76 stud (kiosk at external wall) FRL -/90/90 from one side only, Full height lining Fyrchek or equivalent CSR or equivalent Flushed and painted PA:XX			
PD:07	Glazed partition	Lift Enclosure	Material: Glass:	Framed glazed partitions fixed to lift steel enclosure, with stainless steel trims GL:04			
PD:08	Brick Veneer Wall	Accommodation building - Ellenbrook	Material: Height: Product: Manufacturer: Finish:	110 Face brick w 2x13mm Plasterboard lining on one side of 76 studs Full height Gyprock or equivalent CSR or equivalent Flushed and painted PA:XX			
PD:09	Fire rated Brick Veneer Wall - FRL-/90/90	Accommodation building - Ellenbrook	Material: FRL: Height: Product: Manufacturer: Finish:	110 Face brick with 2x13mm Fyrchek lining on one side of 76 studs FRL -/90/90 Full height Fyrchek or equivalent CSR or equivalent Flushed and painted PA:XX			
PLUMBING SERVICES FIXTURES (PF)							
PF:01	Toilet Suite	Public Toilets - All stations	Manufacturer: Type: Model: Size: Finish:	Britex or equivalent Wall Mounted toilet suite PWM or equivalent 515mm x 350mm 304 Satin Stainless Finish		4Star WELS rating & Watermark Certified. Concealed cistern Automatic flush sensor Ultra Vandal resistant. **Since this will be installed in the ambulant toilet, need to note: To be installed in compliance with AS1428.1**	
PF:02	Vanity Basin	Public Toilets - All stations	Manufacturer: Type: Model: Size: Finish:	Britex or equivalent Wall Mounted Hand Basin or equivalent HBS or equivalent 500mm x 425mm 304 Satin Stainless Finish		Vandal resistant	
PF:03	Vanity Basin Mixer	Public Toilets - All stations	Manufacturer: Type: Model: Size: Finish:	Britex or equivalent Eco TIMED Flow Pillar Tap TW-9101 or equivalent 500mm x 425mm Stainless Finish		Vandal resistant	

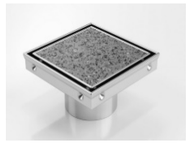
MORLEY ELLENBROOK LINE (MEL) - STATION & PRECINCT - ARCHITECTURAL MASTER MATERIALS SCHEDULE

DOC NO:	**MEL-MLCX-AR-SCH-00007**		**13/08/2021**
STATION:	**MALAGA STATION**		**REV - B02**

CODE	ITEM	LOCATION	DESCRIPTION	IMAGE	NOTES	SWTC
PF:04	Toilet Suite	Staff Toilets - All stations	Manufacturer: Argent or equivalent Type: Vista Hygienic Flush Wall Hung Toilet Model: 8991001S4B or equivalent Size: 540mm x 370mm Finish: White ceramic			
PF:05	Vanity Basin	Staff Toilets - All stations	Manufacturer: Britex or equivalent Type: 850 Ceramic Furniture Wash Basin 0 One Tap Hole Model: BSW-FWB850-1 or equivalent Size: 850mm x 480mm Finish: White Ceramic			
PF:06	Vanity Basin Mixer	Staff Toilets - All stations	Manufacturer: Britex or equivalent Type: Hob Mounted Mixer Tap - Fixed Spout Model: TW-MIX-01 or equivalent Size: n/a Finish: Bright Chrome			
PF:07	UAT Toilet Suite	UAT & UAT Staff Toilets - All stations	Manufacturer: Britex or equivalent Type: Accessible Toilet Suite Model: PTSD or equivalent Size: 800mm x 355mm Finish: 304 Satin Stainless Finish		4Star WELS rating & Watermark Certified. Ultra Vandal resistant AS1428 Compliant Automatic flush sensor	**Is this also for UAT Staff?**
PF:08	UAT Basin	UAT & UAT Staff Toilets - All stations	Manufacturer: Type: Accessible Bellagio Basin w Integrated Side Shelf or equivalent Model: HBBEL-DS or equivalent Size: 500mm x 425mm Finish: 304 Satin Stainless Finish		Vandal resistant	
PF:09	UAT Basin Mixer	UAT & UAT Staff Toilets - All stations	Manufacturer: Britex or equivalent Type: Eco Timed Flow Pillar Tap Model: TW-9101 or equivalent Size: 500mm x 425mm Finish: Stainless Finish		Vandal resistant	
PF:10	UAT Shower Mixer	UAT & UAT Staff Toilets - All stations	Manufacturer: Britex or equivalent Type: Accessible Lever Activated Shower Mixer Model: TW-MIX-22 or equivalent Size: with 150mm accessible handle Finish: Bright Chrome		Vandal resistant	
PF:11	Urinals	Staff Toilets - All stations	Manufacturer: Britex or equivalent Type: Ceramic Wall Mounted Urinal Pod Model: BSW-UP or equivalent Size: 270mm x 340mm Finish: White ceramic			

MORLEY ELLENBROOK LINE (MEL) - STATION & PRECINCT - ARCHITECTURAL MASTER MATERIALS SCHEDULE

DOC NO:	**MEL-MLCX-AR-SCH-00007**		**13/08/2021**
STATION:	**MALAGA STATION**		**REV - B02**

CODE	ITEM	LOCATION	DESCRIPTION	IMAGE	NOTES	SWTC
PF:12	UAT Shower Rail & Hand Shower	UAT & UAT Staff Toilets - All stations	Manufacturer: Britex or equivalent Type: Adjustable Height Hand Held Shower Set w Grab Rail Model: BTR-01-062 or equivalent Size: 500mm x 425mm Finish: Stainless Steel			
PF:13	Floor Waste - General	All wet areas & showers - All stations	Manufacturer: Storm Tech or equivalent Type: Tile Insert Drain Model: SQ100Ti20-80 or equivalent Size: 130 x 130 Finish: Stainless Steel			
PF:14	Ambulant Toilet	Public & Staff Toilets - All stations	Manufacturer: Britex or equivalent Type: Centurion Ambulant Pan Model: PCAM or equivalent Size: 650mm x 355mm Finish: 304 Satin Stainless Finish		4Star WELS rating & Watermark Certified. Vandal resistant AS1428 Compliant Automatic flush sensor	
PF:15	Urinals	Male Public & Staff Toilets - All stations	Manufacturer: Britex or equivalent Type: Barren Waterless Urinal Model: UBW or equivalent Size: 360mm x 395mm Finish: 304 Satin Stainless Finish		Fully waterless urinal (no water connection) Vandal resistant	
PF:16	Kitchen Sink	Staff Crib / Tea Prep - All stations	Manufacturer: Britex or equivalent Type: Laboratory Sink Model: CAFE or equivalent Size: 500mm x 900mm Finish: 304 Satin Stainless Finish			
PF:17	Kitchen Mixer	Staff Crib / Tea Prep - All stations	Manufacturer: Britex or equivalent Type: Hob Mounted Mixer Tap - Swivel Spout Model: TW-MIX-02 or equivalent Size: n/a Finish: Bright Chrome			
PF:18	Cleaner's trough	Cleaner's Room - All stations	Manufacturer: Britex or equivalent Type: Floor Mounted Cleaner's Sink Model: CSF or equivalent Size: 600mm x 590mm Finish: 316 Stainless Finish		With sand filter	
PAVING (PV)						

MORLEY ELLENBROOK LINE (MEL) - STATION & PRECINCT - ARCHITECTURAL MASTER MATERIALS SCHEDULE

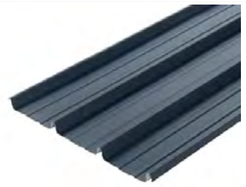
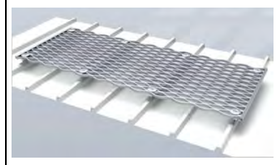
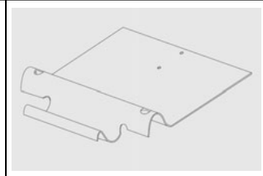
DOC NO: MEL-MLCX-AR-SCH-00007 | **13/08/2021**

STATION: MALAGA STATION | **REV - B02**

CODE	ITEM	LOCATION	DESCRIPTION	IMAGE	NOTES	SWTC
PV:01	Clay pavers	Platform level - All stations	Material: Solid clay segmented paver in Herringbone configuration. Size: 230 x 114 x 60 .Finish: Finish: Kiln 9 (grain to run length of face). No sealer. Product: Heavy Duty 60 or equivalent Manufacturer: Midland Brick or equivalent Colour: Red trafficable type Lay on 1:6 cement/sand screed. Slip rating: Slip resistant CoF >0.4 wet.		1:100 minimum cross fall away from track	
PV:02	Safety Tactile TGSI Pavers - platform edge	Platform level - All stations	Material: Warning Integrated TGSI concrete paver Size: 400 x 400 x 60 and 300 x 300 x 60 (bus stands) Finish: Tactile ground surface indicators Product: TBC Manufacturer: TBC Colour: Yellow/ Black/ Grey/ Red Slip rating: Non-slip, P5 rating to AS3661.1		To comply with Luminance Contrast requirement of AS1428.1.	
PV:03	Safety Yellow Edge Paving - platform edge conditions	Platform level - All stations	Material: Engineered high strength concrete paver Size: 400 x 100 x 60 Finish: Non-slip Product: TBC Manufacturer: TBC Colour: Yellow Slip rating: Non-slip, P5 rating to AS3661.1		To comply with Luminance Contrast requirement of AS1428.1.	
ROOFING (RO)						
RO:01	Roof sheeting - Flat Pan	Main Station Roof & Bus Area canopies: - All stations	Material: Roof sheeting Size: TBC Fixing: TBC Finish: Colorbond Colour: Nom. Basalt Product: TBC Manufacturer: TBC Insulation: TBC		All flashing and cappings to match roofing colour.	
RO:02	Profiled aluminium roof edge cladding	Main Station Roof & Bus Area canopies: - All stations	Material: Precoated solid aluminium cladding Thickness: 3mm thk Fixing: Mechanical cassette fixing to tophats on sub framing Finish: TBC Colour: To match roof sheeting Product: Mondoclad or equivalent Manufacturer: HVG Facades or equivalent Insulation: n/a			
RO:03	Gutters	Main Station Roof & Bus Area canopies: - All stations	Material: Marine grade Aluminium Size: To Hydraulic Engineer's requirements Thickness: TBC Fixing: Supported on metal gutter boards and straps, with allowance for trafficability. Finish: Powder coated Insulation: Anti drumming membrane			
RO:04	Rainwater Downpipe Shrouds	Where exposed/ not able to be concealed within cladding	Material: TBC Thickness: TBC Finish: TBC			

MORLEY ELLENBROOK LINE (MEL) - STATION & PRECINCT - ARCHITECTURAL MASTER MATERIALS SCHEDULE

DOC NO:	**MEL-MLCX-AR-SCH-00007**		**13/08/2021**
STATION:	**MALAGA STATION**		**REV - B02**

CODE	ITEM	LOCATION	DESCRIPTION		IMAGE	NOTES	SWTC
R0:05	Roof sheeting - Standard	Accommodation roof - All stations	Material: Size: Fixing: Finish: Colour: Product: Manufacturer: Insulation:	Profiled steel roof sheeting Nom. 700mm wide, 0.48-0.55BMT Concealed clip fixings, trafficable Colorbond Surfmist Klip-Lok 700 Hi-Strength or equivalent Lysaght or equivalent Refer to Insulation section, IN:XX With Safebridge HP roof insulation system on mesh		All flashing and cappings to match roofing colour.	
SAFETY & ACCESS SYSTEM (SA)							
SA:01	Static line System (Previously Stairs & Ramps)	High level accessible areas for maintenance to Roofs, canopies; - All stations	Type: Fixing: Finish: Colour: Product: Manufacturer:	Static Line system to Specialist's design To all Standards and Code requirements Powder coated To match roof colour. X-clerate Horizontal Static Line or equivalent SafeMaster or equivalent			
SA:02	Roof access walkway	High level accessible areas for maintenance to Roofs, canopies; - All stations	Type: Size: Fixing: Finish: Colour: Product: Manufacturer:	Aluminium access walkway grating 600mm W To all Standards and Code requirements Powder coated To match roof colour. Slipnot or equivalent SafeMaster or equivalent			
SA:03	Ladder Hook	High level accessible areas for maintenance to Roofs, canopies; - All stations	Type: Size: Fixing: Finish: Colour: Product: Manufacturer:	Aluminium access walkway grating TBC To all Standards and Code requirements Powder coated To match roof colour. Ladder Brackets SafeMaster or equivalent			
STEEL ENGINEERING (SE) - FINISHES ONLY							
SE:01	Structural Steel - Non-visible	Concealed structural steelwork - non visible to public & staff areas - All stations	Material:	Protective finish of structural steel to Structural Engineer's specifications.			
SE:02	Exposed structural & secondary steel - Semi visible	Structural & secondary steel - visible to staff areas - All stations	Material: Finish:	Protective finish of structural steel to Structural Engineer's specifications. To be primed and painted, **PA:XX**			

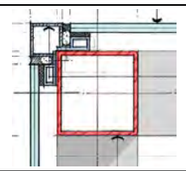
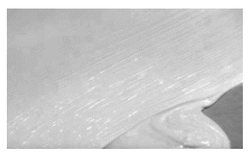
MORLEY ELLENBROOK LINE (MEL) - STATION & PRECINCT - ARCHITECTURAL MASTER MATERIALS SCHEDULE

DOC NO:	**MEL-MLCX-AR-SCH-00007**		**13/08/2021**
STATION:	**MALAGA STATION**		**REV - B02**

CODE	ITEM	LOCATION	DESCRIPTION	IMAGE	NOTES	SWTC
SE:03	Structural Steel Columns	All structural steel columns - All station buildings	Material: Finish: Protective finish of structural steel to Structural Engineer's specifications. TBC			
SIGNAGE & GRAPHICS (SN)						
SN:xx	Station Signage	All PTA Station Signage - All stations & precinct	**REFER TO PTA SIGNAGE GUIDE**			
TILING (TL)						
TL:01	Vitrified tiles.	All stations - Concourse level - Fully enclosed areas (Refer PV:04 for Open Areas)	Material: Size: Finish: Product: Manufacturer: Colours: Slip rating: Vitrified tiles. TBC Charcoal epoxy grout Granito 'Optima' Eureka 'Boulevard' or equivalent Granito or equivalent Light grey, Steel grey, Black, Alabaster, Charcoal. R12			
TL:02	Vitrified tile floor finish	Public and Staff Bathrooms - all stations	Material: Size: Finish: Product: Manufacturer: Colour: Slip rating: non-slip vitrified tiles. 200x200 Charcoal epoxy grout Granito: 'Optima' or equivalent Granito or equivalent Light Grey, Steel Grey, Black R12		Of dark grout to minimise any residual impact of graffiti of suitable coefficient to prevent slip hazards when wet	
TL:03	Vitrified tile wall finish	Public and Staff Bathrooms - all stations	Material: Size: Finish: Product: Manufacturer: Colours: Slip rating: Ceramic tiles 200x200 mm Gloss finish to Staff bathrooms only. Charcoal epoxy grout. Tiles should be butt jointed and cover strips of stainless steel should be added to external angles. TBC TBC ultra-white plain, Ultra-white ripple R12		Full height from floor to ceiling (including cubicles) in public bathrooms. Floor height to minimum 2700mm in Staff bathrooms	
TOPPING & SCREEDS (TP)						
TP:01	Screed to Slab	Concourse floor slab - All stations	Material: Application: Product: Manufacturer: Sand cement screed - premixed To manufacturer's requirements, provide reinforcement mesh of screeds over 40mm thk. Ardex A36 Abascreed or equivalent ARDEX Australia or equivalent			

MORLEY ELLENBROOK LINE (MEL) - STATION & PRECINCT - ARCHITECTURAL MASTER MATERIALS SCHEDULE

DOC NO:	**MEL-MLCX-AR-SCH-00007**		**13/08/2021**
STATION:	**MALAGA STATION**		**REV - B02**

CODE	ITEM	LOCATION	DESCRIPTION	IMAGE	NOTES	SWTC
TP:02	Screed to Toilets	Toilets and Wet Areas - All stations	Material: Rapid Set Screed Cement Application: To manufacturer's requirements, provide reinforcement mesh of screeds over 40mm thk. Product: Ardex A38 or equivalent Manufacturer: ARDEX Australia or equivalent			
TRIM (TR)						
TR:01	Skirtings	Accommodation building - CSO, Staff Crib, etc - All stations	Material: Stainless steel skirting Size: 150mm H Finish: Linished No. 4 finish, flush with wall lining. Product: TBC Manufacturer: TBC			Skirting material shall resist the following, without noticeable change in surface appearance: i. vandalism; ii. heavy impacts; and iii. abrasion from cleaning methods and maintenance systems. The materials and finishes for skirting in public areas shall be selected from the following range: 316 stainless steel; and / or Material to match floor finish.
TR:02	Lift Enclosure - Corner & Door Trims	DDA Lifts - Malaga - Morley - Noranda - Whiteman Park	Material: Stainless steel corner & door trims Size: To lift details Finish: Linished No. 4 finish, flush with glazing. Product: TBC Manufacturer: TBC			
WINDOWS (WD)						
WD:01	Windows	Station accommodation building - All stations	Material: Extruded aluminium framing Size: As per drawings Finish: Anodized finish Colour: TBC Glass: Clear laminated glass, **GL:01** Product: 419 SG Flushline system (Single Glazed) or equivalent Manufacturer: Capral or equivalent ESD: In compliance with ESD Engineer's requirements for NCC Section J 2019.			
WATERPROOFING (WP)						
WP:01	To external floor slab	Elevated Concourse - Malaga - Morley - Noranda - Whiteman Park	Material: Liquid Applied Water Based Epoxy Membrane Finish: Undertile to external areas Product: WPM300 (HydrEpoxy 300) or equivalent Two component water based epoxy polyamide membrane. Manufacturer: ARDEX Australia or equivalent			
WP:02	To wet areas	Toilets, showers, Changerooms - All stations	Material: Liquid applied Undertile PU Acrylic Hybrid Membrane Finish: Under tile to Wet Areas Product: WPM155 Rapid or equivalent Water-based polyurethane acrylic hi-performance membrane Manufacturer: ARDEX Australia or equivalent			

Appendix D - Acoustic Report

METRONET Stage 1: Morley-Ellenbrook Line

Malaga Station Acoustic Design Report

MEL-MLCX-AR-RPT-00033

Rev	Date	Purpose of Issue	Prepared	Reviewed	Approved
A01	2021-08-12	Issued for Information	A Deivasigamani	L Zoontjens	

Document Details	
Project	METRONET Stage1: Morley-Ellenbrook Line
Client	Public Transport Authority
PTA Contract Number	PTA200001
Laing O'Rourke Project No.	K97

Document revision history

Rev	Date	Purpose of Issue	Sections revised	Reason for updates
A01	2021-08-12	Issued for Information	-	-

Table of contents

Tables

Figures

1. Executive Summary

This document discusses noise and vibration levels expected with operation of the proposed Malaga Station and the extent to which those levels comply with applicable statutory and project requirements.

On the basis of the assessment undertaken it is concluded that:

- Overall environmental rail noise levels, when assessed at nearby potential noise sensitive premises are expected to comply with applicable state noise regulations and planning policy. Rail vibration levels are expected to be compliant with recommended levels.
- Noise from car parking areas, local vehicle traffic and bus movements will increase significantly in the area from current conditions but are expected to remain compliant with relevant state policies.
- Car parking areas should avoid the use of speed humps, loose laid road coverings or smooth concrete surfaces to minimise noise emissions.
- Design of the station plant and facilities such as mechanical services, public address and crowding areas to meet applicable environmental noise regulations may be achieved through conventional / industry standard design approaches and therefore is not anticipated to require specialist design input.

Acknowledgement of Country

MELconnx acknowledges the Whadjuk People of the Noongar Nation as the Traditional Custodians of the land and waters on which the Morley-Ellenbrook Line Project is located. We pay our respect to their Elders, both past and present and thank them for their continuing connection to the country, culture and community.

2. Project overview

2.1 METRONET Vision and Objectives

As Perth's single largest investment in public transport, METRONET will transform the way people commute and connect. It will create jobs and business opportunities and stimulate local communities and economic development to assist communities to thrive. The METRONET vision is for a well-connected Perth with more transport, housing and employment choices.

In delivering METRONET, the WA Government has considered peoples' requirements for work, living and recreation within future urban centres with a train station at the heart.

The objectives are to:

- Support economic growth with better connected businesses and greater access to jobs
- Deliver infrastructure that promotes easy and accessible travel and lifestyle options
- Create communities that have a sense of belonging and support Perth's growth and prosperity
- Plan for Perth's future growth by making the best use of our resources and funding
- Lead a cultural shift in the way government, private sector and industry work together to achieve integrated land use and transport solutions for the future of Perth.

2.2 Morley-Ellenbrook Line overview

As Perth grows, so does the need for rail infrastructure and METRONET is a critical element of the State Government's infrastructure agenda. The Morley-Ellenbrook Line (MEL) Project will improve connectivity between the north east metropolitan area and the rest of the city and unlock economic development in these local community areas.

Figure 1: Morley-Ellenbrook Line © METRONET

The Public Transport Authority (PTA) is the lead agency delivering the MEL Project, with Main Roads WA (MRWA) undertaking some enabling works.

2.2.1 Project features

Transport infrastructure works for the Project include:

- A 21km rail line spurring from the Midland Line east of Bayswater Station, travelling north in the Tonkin Highway median, east through land north of Marshall Road and north on the western side of New Lord Street into Ellenbrook
- Stations at Morley, Noranda, Malaga, Whiteman Park and Ellenbrook with future-proofing for a station at Bennett Springs East
- Parking and bus interchanges/facilities at stations
- Significant grade separations at key road crossings
- Underpasses to allow the rail line to enter and exit the Tonkin Highway median
- Principal shared paths for walking and cycling access along the rail line
- Track and associated infrastructure to connect to the existing Midland Line
- Road and bridge reconfiguration works
- Integration across the packages of works and other nearby projects.

2.2.2 General scope of works

The Project's general scope of works includes the design and delivery of rail infrastructure and ancillary works to support operational passenger rail between Bayswater and Ellenbrook, including stations with inter-modal bus and rail with parking and associated road works at Bayswater, Morley, Noranda, Malaga, Whiteman Park and Ellenbrook stations.

The Project activities include all investigation, design, approvals, construction, testing and commissioning, Entry Into Service (EIS), training and operational readiness required to incorporate the new railway to Ellenbrook, and tie into the existing network including the associated road, utilities and other required works to interface with adjacent works and contracts. This will include bulk earthworks and retaining structures, grade separations, roads and drainage.

The design and delivery of the main works package for the Project is broken into three distinct stages:

- Alliance Development Stage
- Project Alliance Reference Design Stage
- Project Alliance Delivery Stage (Detailed Design through to Project close-out).

Figure 2: Architect's Impression of Malage Station © MELconnx

2.2.3 Key Project Objectives, Key Compliance Objectives and Critical Success Factors

The PTA and MELconnx's single Non-Owner Participant (NOP) Laing O'Rourke Construction Australia Pty Ltd, have formed an integrated, collaborative Project Alliance to successfully deliver rail infrastructure that reflects our absolute commitment to achieving the Project Objectives and delivering positive outcomes for the State.

The following image demonstrates how we have mapped each Key Project Objective in the Project Alliance Agreement (PAA) against the Critical Success Factors to achieve best-for-project outcomes, underpinned by the Key Compliance Objectives.

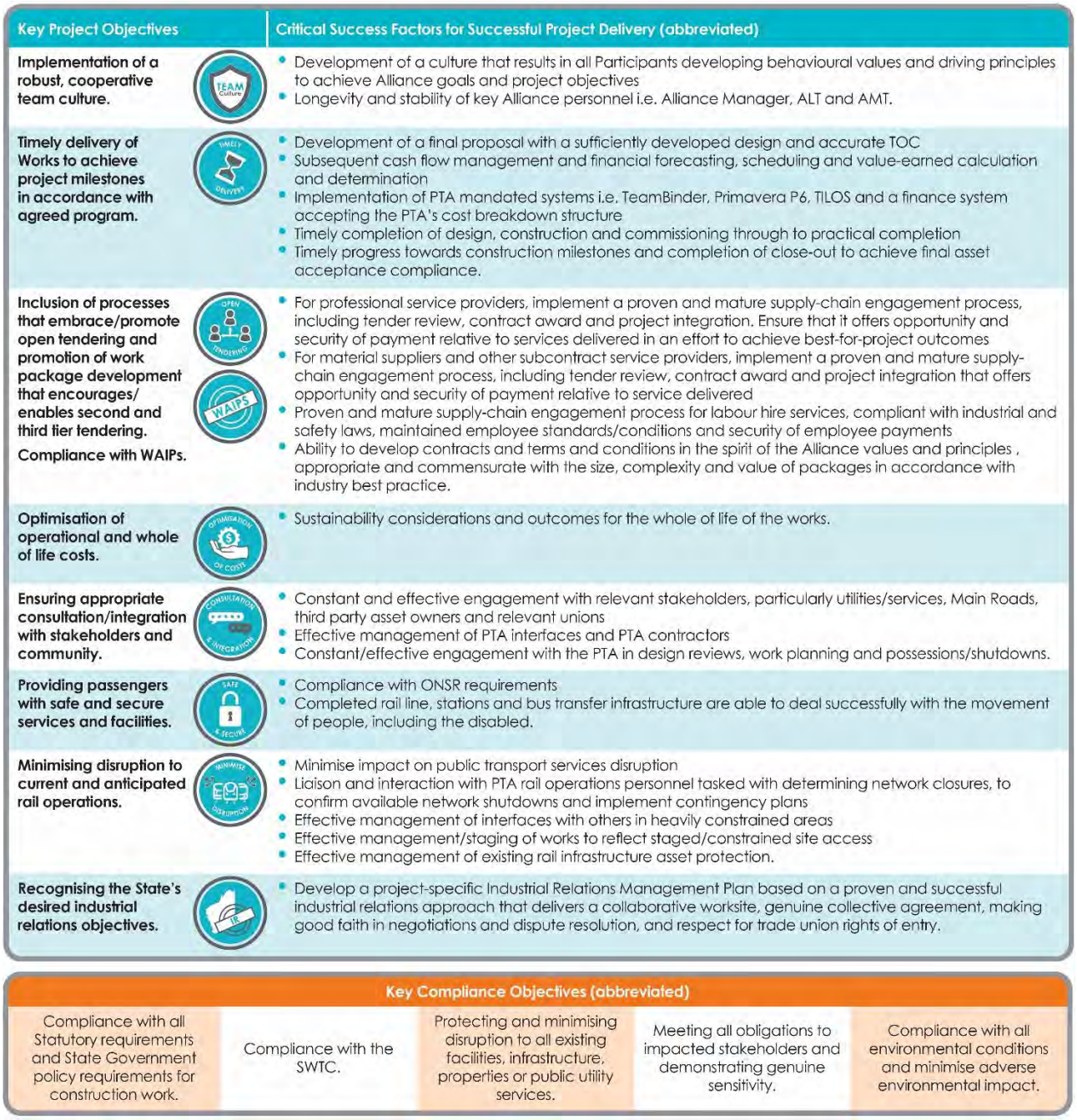


Figure 3: Key Project Objectives, Critical Success Factors and Key Compliance Objectives

2.3 Alliance vision and delivery approach

The MEL Project will be delivered under an alliance contract to support the management of project and stakeholder interfaces and to mitigate project risks. A collaborative alliance approach will see the Works carried out in a cooperative, coordinated and efficient manner in compliance with the Alliance Principles.

MELconnx understands that the successful delivery of the Project is critically linked to meeting the PTA's Key Project Objectives. These objectives have shaped our vision for the Project that is around delivering a high-quality product and creating exceptional value-for-money. We are committed to a no-blame culture and to the prompt and mutual resolution of any issues that may arise.

During the AD Stage, representatives from both the PTA and MELconnx participated in an interactive workshop to begin the process of developing a suitable Alliance Vision for the Project (refer Figure 4 below for workshop outcomes).

Figure 4: AD Stage Alliance Vision Development Outcomes (developed with the PTA)

The Alliance Foundation workshop was held on 11/11/2020 and the results of this workshop generated the basis for the Vision, Purpose, Values and Behaviours Commitment Statements represented here.

Figure 5: MELconnx Alliance Vision, Purpose and Values

2.4 Purpose of the Report

Malaga Station is proposed as a key station where all trains will slow down and stop at the station (no non-stop 'through' traffic).

The project will also involve the construction of car parks, bus and car drop off points and pedestrian facilities, the operation of which may involve a change in noise levels at nearby residential and other sensitive locations.

This document discusses noise and vibration levels expected with operation of the proposed Malaga Train Station and the extent to which those levels comply with applicable statutory and project requirements.

This Design Report identifies any interdependencies between each Design Package and how those dependencies have been accommodated within the document. The Design Report describes the relationship between each of the Package(s) engineering lifecycle and the assurance gates throughout the Project.

2.5 Changes Since Previous Design Submission

2.5.1 Alliance Development Stage to Reference Design Stage

Not applicable at this Design Stage.

2.5.2 Reference Design to Interim Detailed Design

Not applicable at this Design Stage.

2.5.3 Interim Detailed Design to Final Detailed Design

Not applicable at this Design Stage.

2.5.4 IFC Design Finalisation

Not applicable at this Design Stage.

3. Design Description

3.1 Scope of this Design Package

The scope of this Design Package is outlined as follows.

- A schedule of recommended controls where required to be considered and reviewed for design optimisation and design/statutory planning approval within the packages is described in Section 3.3.
- No development of software and application data for systems.
- No specific computer hardware resources including processor type, operating systems, development environment, capacity, interfaces and timing diagrams.

The details of the future masterplan (i.e. buildings in the vicinity of the station and car park) are currently unknown, and hence they cannot be assessed in detail at this stage. The indicative future development masterplan show that the future sensitive uses may be in the order of 70 m from the station transformers located in the north of the service road, and is directly adjacent to the traction power station located at the south end of the service road. It is anticipated that compliance with the Noise Regulations can be achieved via careful unit orientations and shielding (such as screens and enclosures) where necessary. Detailed impacts and mitigation measures (if required) to this future development will be assessed once more details are available during the course of the design.

3.2 Design Description

The following subsections discuss the key project noise and vibration issues assessed in further detail.

3.2.1 Rail operations

Treatments to the railway sections involved at Malaga Station are considered not required. Speeds in the immediate vicinity of the station are too low for rolling noise levels to be above State Planning Policy 5.4 (SPP5.4) targets that may be assessable at nearby development.

Note that compliance with SPP5.4 does not prevent community complaint. Subjectively, residents in the area may notice noise from low speed rail movements and the braking system air release as trains depart. Train air conditioning systems may also be noticeable on unusually hot days. These noise emissions are modelled to be within SPP5.4 targets.

Given the expected speeds in the immediate vicinity of the station, vibration levels are expected to be within recommended criteria applicable at anticipated future development sites nearby.

3.2.2 Station and associated infrastructure

Asphaltic or bitumen-based road and vehicle parking surfaces should be used instead of smooth concrete or heavily painted surfaces which can result in strong sound reflections and tyre squeal under cornering.

Speed bumps or sudden changes in road level (e.g. loose gutters, expansion control joints) should be avoided.

From Section 5.2 it can be seen that noise impacts at adjacent future development areas from road vehicles can be managed to levels compliant with applicable criteria.

On the basis of a screening assessment of proposed public address systems (Section 4.8.1) and likely crowd noise (Section 4.8.2), compliance with relevant assigned noise levels is expected.

The station is expected to comply with SWTC requirements with regards to internal reverberation levels provided on the basis of hard diffusive internal walls and the open 'sawtooth' style ceiling and roof system which provides significant access to open air.

3.2.3 Electrical transformer noise

The transformer located at the north-end of the service road, west of the proposed car park is more than 200 metres from the nearest noise sensitive (residential) premises. The traction power substation is located at the south of the station precinct north of Marshall Road is also more than 150 m away from the closest (residential) receiver. Based on expected loading and sound power levels for transformers, it is expected that noise emissions will be compliant with applicable noise regulations.

3.2.4 Mechanical noise

A basic screening assessment has been undertaken considering the minimum distance to potential future noise sensitive development and the proposed mechanical plant and equipment. Given the equipment comprises small enclosed fan coil units and domestic level air conditioning outdoor condensers, compliance with applicable noise regulations is expected.

3.2.5 Local road traffic and new roundabouts

Local road vehicle traffic noise may vary due to the introduction of the proposed train station but is not assessable within the criteria outlined.

3.3 Relationship with other Design Packages

The relationship and/or reliance of this design package on other MEL design packages is derived from the N2 Matrix and is outlined in the Table below.

Relationship with other Design Packages	Description/Title	Interface Elements	Integration Strategy
E018	Line wide - Permanent Way and Stabling & Track – Transit Space & Structure /Ballast Interface	Trackform Rail web dampers Under ballast matting	Confirm trackform Review rail web damper options

E016	LW Urban Design - Urban Design - Architecture	Noise walls	Confirm spatial inputs and coordinate implementation of recommended treatments
E017	Linewide Urban Design - Landscape	Noise walls	Confirm spatial inputs and coordinate implementation of recommended treatments
E007	Malaga Precinct – Urban Design – Architecture	Noise walls	Confirm spatial inputs and coordinate implementation of recommended treatments
E087	Malaga Precinct Civil - Fencing and Gates, Retaining Walls & Minor Structures, Noise Walls	Noise walls	Confirm spatial inputs and coordinate implementation of recommended treatments
E090	Malaga Station – Electrical - Lighting & LV & Comms & Security	Electrical plant noise emissions	Confirm inputs and coordinate implementation of any recommended treatments
E093	Malaga Station – Mechanical and BMSC	Mechanical plant noise emissions	Confirm inputs and coordinate implementation of any recommended treatments

3.4 External Interfaces

The relationship and/or reliance of this design package on external interfaces and details of integration strategies are outlined in the Table below.

Item	External Party	Interface Elements	Integration Strategy
	N/A		

4. Design Inputs

4.1 Project Design Requirements

The following design inputs, loads combinations, standards and other key design inputs have been used in preparation of this report;

4.1.1 Environmental noise regulations

Refer to Section 4.5.1 below.

4.1.2 SWTC Requirements

Refer to Section 4.5.3 below.

4.1.3 Operational Scenarios

Normal operations are expected to result in 74 train movements per day (6am to 10pm) and 16 movements per night (10pm to 6am) at the Malaga Station.

The “PTA Concept Train Operating Plan” described as being within Book 5 of the SWTC could not be accessed. In lieu of this information, these volumes are used from the Reference Design.

4.1.4 Stations and Infrastructure

Stations and infrastructure have been assessed on the basis of supplied drawings to date and 16 buses per hour typical day scenario.

We note that the design of each station utilises natural ventilation strategies, with significant openings at roof level throughout the station.

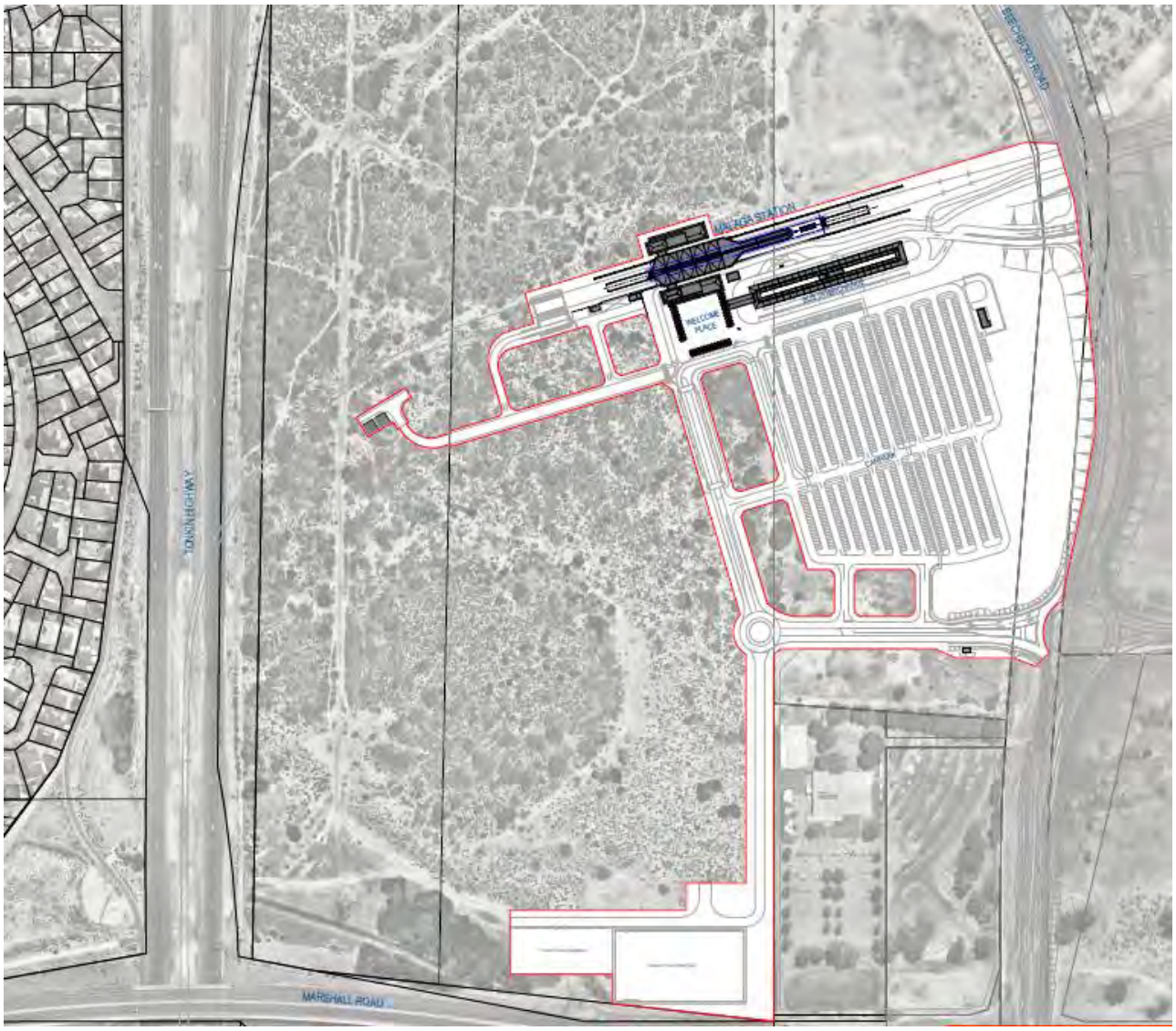


Figure 6: Extract of architectural location plan 25-A-287-AR0012_B01 indicating site locality.

4.1.5 Electrical transformers

From the supplied drawings, it can be seen that the transformers associated with the station are approximately 150 metres or more from the nearest noise sensitive residential premises (south of Marshall Road) and more than 100 m from Potter's House Christian Centre. By inspection of the likely transformer sound power level / loading and the proposed screening elements, compliance with the relevant assigned noise levels is expected.

4.1.6 Electrical pumps

From the supplied drawings, it can be seen that the pumps within the station precinct are approximately 200 metres or more from the nearest noise sensitive premises. By inspection of the likely pump sound power level / loading and the proposed screening elements, compliance with the relevant assigned noise levels is expected.

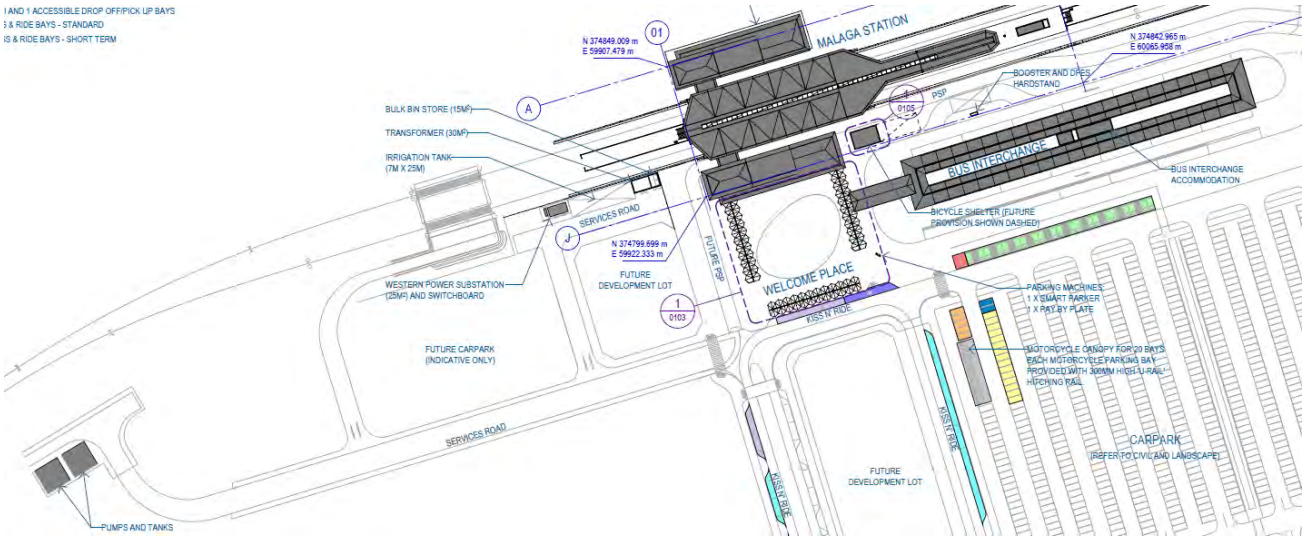


Figure 7: Extract of architectural plan 25-A-287-AR0015_B01

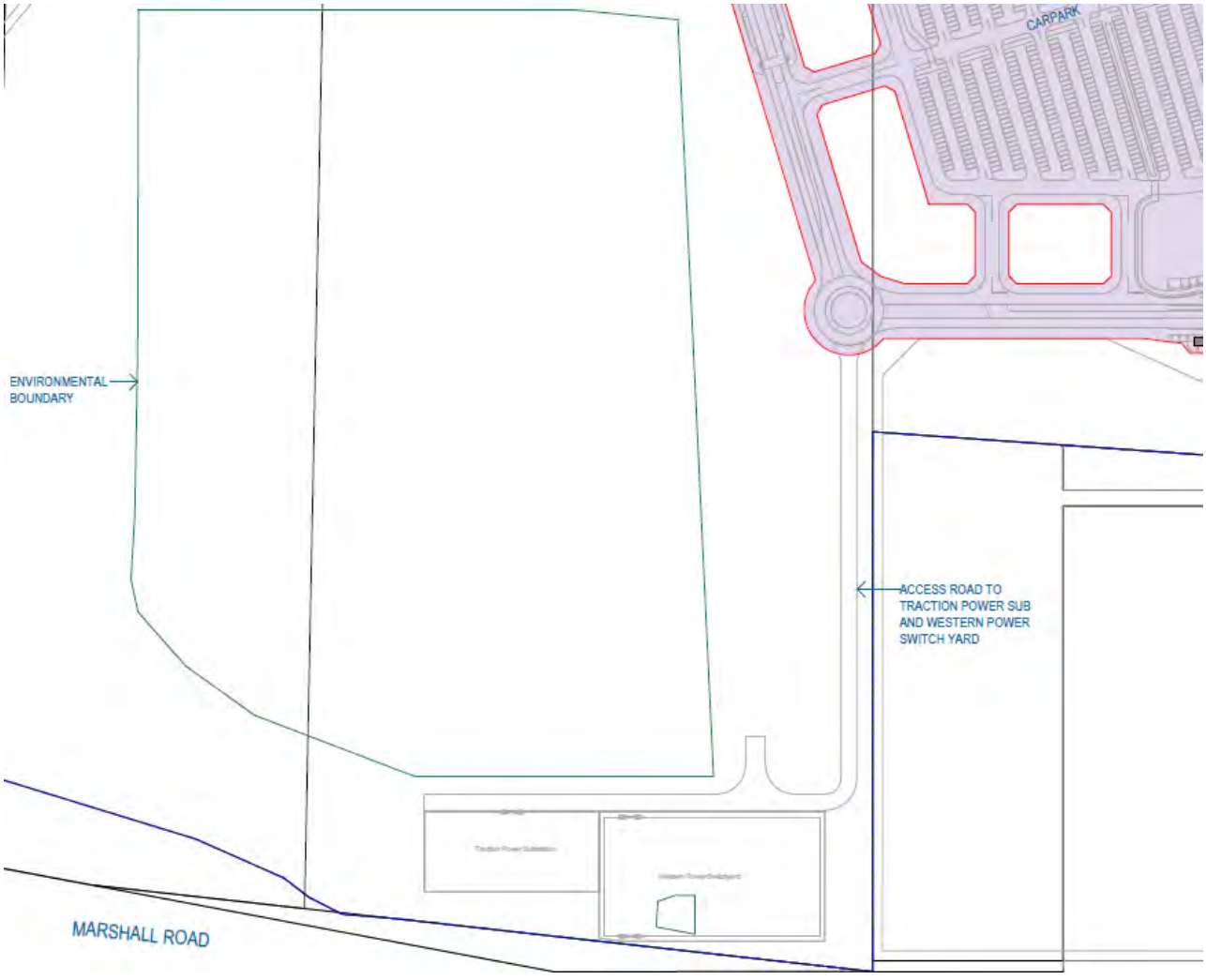


Figure 8: Extract of architectural overall plan 25-A-287-AR0014_B01

4.1.7 Mechanical outdoor plant

Drawings 25-A-287-ME0008 to -ME0014 indicate that the outdoor mechanical plant comprise condenser units. Based on rooms served, each would have capacities the order of 6 kW or less (similar to domestic residential air conditioning systems). These units, assessed in cumulative terms, are considered compliant with the assigned noise levels defined in Section 4.5.1 at the nearest noise sensitive premises.

4.2 Design Software Used for this Package

Computer software used to develop this package is outlined in the Table below.

Reference	Supplier	Usage
MS Office 2013	Microsoft Inc. (with proprietary SLR code)	Calculation of in-car noise levels Calculation of 3D receiver distances Calculation of 1D vibration propagation Consolidation and presentation of results 1D propagation / noise analyses
SoundPLAN v8.1	SoundPLAN GmbH	Calculation of site wide airborne noise emissions according to prescribed standards

4.3 Applicable Codes and Standards

Applicable standards, codes and guidelines to this design package (at time of project commencement) including identification of specific provisions, criteria and classifications are provided in the Table below.

Reference	Description/Title	Compliance (Specific Provisions, Criteria and Classifications)
Australian and Other Standards and Guidelines		
CR NOI TSI	Technical specification for interoperability relating to the subsystem 'rolling stock – noise' of the trans-European conventional rail system, adopted by the Commission Decision 2011/229/EU, April 2011	
SPP5.4	State Planning Policy No. 5.4 Road and Rail Noise 2019	
EPNR	Western Australia Environmental Protection (Noise) Regulations 1997	
AS 2670.1	Evaluation of human exposure to whole-body vibration - General requirements	
AS 2670.2	Evaluation of human exposure to whole-body vibration - Continuous and shock-induced vibration in buildings (1 to 80 Hz)	
ISO GUIDE 98-3	Uncertainty of measurement — Part 3:Guide to the expression of uncertainty in measurement (GUM:1995)	
ISO 2631-1:1997	Mechanical vibration and shock - Evaluation of human exposure to whole-body vibration - Part 1: General requirements.	

Reference	Description/Title	Compliance (Specific Provisions, Criteria and Classifications)
AS ISO 2631.2:2014	Mechanical vibration and shock - Evaluation of human exposure to whole-body vibration - Vibration in buildings (1 Hz to 80 Hz).	
ASHRAE	American Society of Heating, Refrigerating and Air-Conditioning Engineers, Inc, 2011 ASHRAE Handbook - Heating, Ventilating, and Air-Conditioning APPLICATIONS - SI Edition, Atlanta GA http://www.ashrae.org	
FTA	C.E. Hanson, D.A. Towers, and L.D. Meister 2006, Transit Noise and Vibration Impact Assessment, Office of Planning and Environment, Federal Transit Administration, Report FTA-VA-90-1003-06, Washington DC	
Nord2000	Jonasson HG, Storeheier S. Nord 2000. New Nordic prediction method for rail traffic noise [Internet]. 2001. (SP Rapport).	
Green Star	Green Star Design and As-built Requirements for Railway Stations (v1.1)	
ISCA	Infrastructure Sustainability Council of Australia (ISv2.0) Design and As Built	
PTA Standards and Specifications		

4.4 Reference Information

The project specific reference information and reports that have been used as inputs into the development of the detailed design are included in the table below.

Document Reference	Description/Title	Revision
25-A-287-AR0001 to -AR0180	E007 Malaga Station - Urban Design - Architecture	A, A01
25-A-287-EG0001 to -EG0195	E090 Malaga Station - Electrical - Lighting & LV & Comms & Security	A, A01
25-A-287-ME0001 to -ME0017	E093 Malaga Station – Mechanical and BMSC	A, A01
25-A-287-EC0151	MEL - MLCX - MALAGA STATION - COMMUNICATIONS - EASE ACOUSTIC MODEL - SHEET 01	A
25-A-287-EC0152	MEL - MLCX - MALAGA STATION - COMMUNICATIONS - EASE ACOUSTIC MODEL - SHEET 02	A
25-A-287-EC0153	MEL - MLCX - MALAGA STATION - COMMUNICATIONS - EASE ACOUSTIC MODEL - SHEET 03	A

Document Reference	Description/Title	Revision
GCOR-LOR-LW-00096	Track Inputs for Noise Modelling	02-Jun-2021 13:10 AWST
GCOR-LOR-PW-00193	Design data for SLR noise modelling	07-May-2021 19:02 AWST
GCOR-LOR-PW-00166	MELconnx CAD issue to SLR	30-Apr-2021 09:42 AWST
GCOR-LOR-LW-00047	Latest WIP rail strings	19-Apr-2021 11:51 AWST
GCOR-LOR-PW-00128	Update to Health Safety Environmental Management System	06-Apr-2021 15:56 AWST
GCOR-LOR-PW-00071	Aerial Imagry (sic)	01-Apr-2021 15:48 AWST
GCOR-LOR-PW-00067	Project AD Design Information On ASite	23-Feb-2021 11:16 AWST
(TBA)	<Architectural and Civil Drawing packages>	
	Baseline Noise and Vibration Measurements (SLR Consulting)	(in preparation)

4.5 Design Criteria

The design criteria utilised in the development of this report are outlined below.

4.5.1 Environmental Noise Regulations

Environmental noise emissions (excluding trains and some emissions from road vehicles) from various premises to nearby noise receiving premises are covered by legislation in the form of the *Western Australia Environmental Protection (Noise) Regulations 1997,* which operate under the *Environmental Protection Act 1986*. For this project, these regulations apply to stations and ancillary operational equipment, and specifically do not apply to narrow gauge trains.

To achieve compliance, received noise levels at nearby premises including noise sensitive premises (for example, residential, commercial and industrial premises) are not to exceed specified noise limits in the form of assigned noise levels. The Act gives state authorities powers to order financial penalties and closure of plant that are in excess of assigned noise levels through a formal investigation process. There are methods within the Regulations by which assets found to be producing excessive noise be managed on an ongoing basis in consultation with the Department of Water and Environment Regulation (DWER), say through noise management plans and/or alternative criteria, however at its core of any such agreement is that the proponent will exercise all reasonable and practicable measures to minimise noise.

The assigned noise levels, as shown in Table 1, vary for each noise sensitive receiver, as they are determined from consideration of Influencing Factors (IF) which takes into account the amount of commercial, industrial and road transport infrastructure within specific distances to the receiving noise sensitive premises.

Table 1 Table of Assigned Noise Levels, dB

Part of premises receiving noise	Time of day	LA10	LA1	LAmax
Noise Sensitive premises at locations within 15 metres of a	0700 to 1900 hours Monday to Saturday	45 + IF	55 + IF	65 + IF

Part of premises receiving noise	Time of day	LA10	LA1	LAmax
building directly associated with a noise sensitive use	0900 to 1900 hours Sunday and public holidays	40 + IF	50 + IF	65 + IF
	1900 to 2200 hours all days	40 + IF	50 + IF	55 + IF
	2200 hours on any day to 0700 Monday to Saturday and 0900 hours Sunday and public holidays	35 + IF	45 + IF	55 + IF
Noise Sensitive premises at locations further than 15 metres from a building directly associated with a noise sensitive use.	All hours	60	75	80
Commercial premises	All hours	60	75	80
Industrial and utility premises	All hours	65	80	90

Regulation 7 of the *Environmental Protection (Noise) Regulations 1997* requires that, if noise emitted from any premises when received at any other premises cannot reasonably be free of intrusive characteristics of tonality, modulation and impulsiveness, then a series of adjustments must be added to the emitted levels (measured or calculated) and the adjusted level must comply with the assigned level. The adjustments are detailed in Table 2 and are further defined in Regulation 9(1) of the *Environmental Protection (Noise) Regulations 1997*.

Note that the following adjustments (Table 2) generally apply to fixed plant and infrastructure only.

Table 2 Table of adjustments for intrusive characteristics

Application	Where tone(s) are present	Where modulation is present	Where impulsiveness is present
Adjustment where noise emission is not music (These adjustments are cumulative to a maximum of 15 dB)	+5dB	+5dB	+10dB

Tones are defined in Regulation 9(1) as being present where the difference between the A weighted sound pressure level in any one third octave band and the arithmetic average of the A-weighted sound pressure levels in the two adjacent one third octave bands is greater than 3dB in terms of $L_{Aeq,T}$ where the time period T is greater than 10% of the representative assessment period, or greater than 8dB at any time when the sound pressure levels are determined as LAS levels.

Modulation is defined as a variation in the emission of noise that —

- is more than 3 dB L_{AF} or is more than 3 dB L_{AF} in any one third octave band;
- is present for at least 10% of the representative assessment period; and
- is regular, cyclic and audible.

Impulsiveness is defined as present where the difference between L_{Apeak} and L_{ASmax} is more than 15dB when determined for a single representative event.

During the assessment process the above adjustments have been applied to relevant noise sources, taking into account specific intrusive characteristics of these noise sources based on SLR's in-house noise database. It is unlikely that modulation or impulsiveness characteristics would apply to PTA fixed assets being typically electrical power transformers or air handling plant

4.5.2 SPP5.4

SWTC 13.6.1-3 states that

The Alliance must design and construct the operating passenger railway and any associated noise mitigation controls to meet the requirements of "State Planning Policy No. 5.4 Road and Rail Noise (SPP 5.4)" (WAPC, 2019).

The Alliance must design and construct the operating passenger railway to ensure that the LAmax applicable to the 95th percentile train passby event is 80 dB or less at buildings with a noise sensitive use located on noise sensitive premises.

The table below outlines the adopted noise objective levels in regard to airborne noise during road and rail operations. Noise mitigation must be provided where the noise level is above these targets

Table 3 SPP5.4 criteria

Metric	Application	Value(s)	Notes
Period average noise levels	**Major upgrade of existing railway** *Applied where emissions from MID and FAL lines are considered significant (Bayswater area)*	$L_{Aeq,day}$ 60 dB	SPP5.4
		$L_{Aeq,night}$ 55 dB	
	New railway *(All other locations)*	$L_{Aeq,day}$ 55 dB	
		$L_{Aeq,night}$ 50 dB	
Maximum noise levels	**Line wide**	L_{Amax} 80 dB	95th percentile. SWTC

These objectives are assessed outdoors, 1 metre from the main building on a lot associated with a noise sensitive usage. Consistent with SPP5.4, the criteria are assessed

- Only at premises that are occupied or designed for occupation or use for residential purposes (including dwellings, residential buildings or short-stay accommodation), caravan parks, camping grounds, educational establishments, child care premises, hospital, nursing home, corrective institution; or place of worship (Note that this excludes recreational parks, commercial and industrial premises along the alignment – results will be determined for these locations, but mitigation would not be recommended); and
- at all floor levels where identified from surveys, noting that sufficient mitigation (in the context of the targets) may not reasonable or practicable at higher floors.

4.5.3 Stations and Associated Infrastructure

Section 13.7 of Book 5 of the SWTC details the noise and vibration Technical Criteria requirements for the design and operation of the station and associated infrastructure, and includes the following statements:

The Alliance must address noise and vibration impacts associated with station noise impacts, inclusive of any new road infrastructure to service the stations, to surrounding sensitive receivers, occupational health and amenity for PTA staff and patrons.

[..] Noise and Vibration Criteria for Impacts to Surrounding Sensitive Premises at Stations and associated infrastructure (eg. car parks, plant rooms etc.) must be designed to comply with the requirements of the Environmental Protection (Noise) Regulations 1997 (WA).

[..] The Alliance shall determine the noise criteria for impacts from Station entry roads and grade separations and design roads and any associated noise mitigation controls to meet the requirements of Western Australia State Planning Policy No 5.4, Road and Rail Noise 2019.

4.5.3.1 Ambient Noise Levels within Passenger Station Areas

Section 13.7.1 of the SWTC defines acceptable noise levels via the following table, as defined in AS 1055.1:1997 and assessed according to AS/NZS 2107:2000. In accordance with the SWTC it is proposed to follow this the 2000 version of AS/NZS 2107 and not the more recent 2016 version.

Table 4 Ambient noise level criteria

Area	Scenario	Minimum acceptable noise level (dB)	Maximum acceptable noise level (dB)
Ticket sales area	Building services and plant	-	L_{Aeq} 45
General office areas	Building services and plant	-	L_{Aeq} 45
Staff crib rooms	Building services and plant	-	L_{Aeq} 45
Public waiting areas, kiosks	Building services and plant	-	L_{Aeq} 45
Toilets and amenities	Building services and plant	L_{Aeq} 45	L_{Aeq} 55
Parking and waste storage areas	Building services and plant	-	L_{Aeq} 65
Platforms, at any position within 1.5m of platform edge or centreline (whichever is closer to track), and more than 8 metres from Portals	Stationary trains, auxiliary equipment operating as normal	-	L_{Aeq} 70
	Moving trains	-	L_{ASmax} 80
	Building services and plant (ventilation, escalators, etc.)	-	L_{Aeq} 55
	Emergency smoke fan systems	-	L_{Aeq} 85
Plantrooms	Building services and plant	-	L_{Aeq} 85
All other areas	All	-	Table 1, AS/NZS 2107:2000 'Satisfactory' values plus 5dB

Section 13.7.1 of the SWTC also states that

For enclosed rooms containing plant, equipment and electrical power Assets, noise levels must be assessed at no less than 1 metre from any item of equipment; and noise levels from mechanical ventilation systems serving the room must not exceed L_{Aeq} 65dB.

The criteria listed above in this section do not apply to systems or components operating in emergency mode. In this situation, noise generated by the systems or their components must comply with AS 1670.4 and AS 1668.1, and not exceed levels that affect speech intelligibility in egress paths, evacuation assembly areas, or operational or emergency control rooms or areas.

4.5.3.2 Noise and Vibration Ingress into Passenger Station Areas

Section 13.7.2 of the SWTC states that the Alliance shall comply with the following requirements:

External noise ingress from all associated road and rail traffic sources controlled according to the requirements of the WAPC State Planning Policy No 5.4 Road and Rail Noise (SPP 5.4) 2019.

Floor vibration levels within publicly accessible areas from plant, equipment or external sources not exceed $L_{v, RMS,1s}$ 112dB.

4.5.3.3 Reverberation within Passenger Station Areas

Section 13.7.3 of the SWTC states that the Alliance shall comply with the following requirements:

Within platform areas, the spatial average reverberation time (RT60) values for the full octave bands with centre frequencies 500Hz and 1kHz not exceed 1.3 seconds for the scenario where 100 patrons are present, or 1.6 seconds when empty.

At all other areas, spatial average reverberation time (RT60) values for the full octave bands with centre frequencies 500Hz and 1 kHz be in accordance with AS/NZS 2107:2000 given the usage of each space.

4.5.3.4 Public Address Systems within Passenger Station Areas

Section 13.7.4 of the SWTC states that:

The Alliance must ensure that the PA systems achieve the minimum sound level and speech intelligibility requirements of clause 4.3.4 and 4.3.6 of AS 1670.4 for all representative locations, environmental conditions and passenger levels

External noise ingress from adjacent road traffic sources must be assessed and considered when designing and constructing all stations to ensure that the public address systems within passenger station Areas achieve the minimum sound level and speech intelligibility requirements of clause 4.3.4 and 4.3.6 of AS 1670.4 for all representative locations, environmental conditions and passenger levels.

4.5.3.5 Acoustic Sound Insulation within Passenger Station Areas

Section 13.7.5 of the SWTC states that:

Airborne sound insulation targets are given in terms of the weighted level difference, Dw between two spaces. The Alliance must ensure that design complies with the following general in-situ airborne sound insulation targets:

- *Dw ≥ 35dB between normally occupied enclosed spaces.*
- *Dw ≥ 28dB between normally occupied spaces where the common partition includes a door.*

The following table presents criteria that supersede these general requirements for specific occupied spaces. Where two different space types are adjacent to one another, the Alliance must ensure that the more onerous target applies.

Table 5 Vibration criteria (SWTC Book 5 Table 31: Airborne Sound Insulation Requirements)

	Space Type / Occupancy	Minimum Weighted Sound Level Difference, Dw, dB
Between normally occupied back of house offices and crib rooms	Generally	40
	Where the common partition at the interface includes a door	30
Toilets and amenities to nearby public areas	Generally	42
	Where the common partition at the interface includes a door	25
	Where the common partition at the interface has no door	16

SWTC 13.7.5 also states that

Where receiving spaces are not fully enclosed, the closest point of assessment must be at least 4 metres from the nearest door or window or the nearest scheduled seating position, whichever is closest.

Noise from hydraulic services associated with toilet amenities (e.g. flushing) must not be audible in any other publicly accessible area.

Noise from hand dryers within toilets and amenities should not be audible at any position more than 2 metres from the entrance, and must not be audible at any commercial retail or patron seating areas.

4.6 Design Life

Not applicable.

4.7 Durability Requirements

Not applicable.

4.8 Specialist Technical Inputs

4.8.1 Public Address (PA) Systems

The public address system will need to be designed to be sufficiently audible (involving both sound level and speech intelligibility) to meet relevant provisions of Australia Standard 1670.4, Fire Detection, Warning, Control and Intercom Systems - System Design, Installation and Commissioning - Sound Systems and Intercom Systems for Emergency Purposes (AS 1670.4) such that patrons can be advised in case of emergencies.

By inspection of each station arrangement, supplied 'EASE' model outputs and distancing to the nearest residential receivers (screening assessment), it can be seen that there is a range of sound levels which can meet both the minimum sound level limit requirements of AS 1670.4 and the maximum noise level limits listed.

An active PA system which regulates speaker volume depending on actual ambient sound level conditions to maintain intelligibility is recommended for the Malaga Station.

4.8.2 Crowd / Patron Noise

Average crowd and patron noise levels in the context of the design criteria and other environmental noise sources are considered insignificant.

The arrangement of the station has passenger waiting areas on the platform, busway waiting areas and pick up points at distances over 200 metres from sensitive premises and/or generously spaced open environments.

Providing this level of distance separation and low crowd densities is expected to ensure that any sustained crowd / patron noise levels (conversations, walking) as individually L_{Aeq} 60dB @ 1 metre and therefore below L_{Aeq} 30dB @ 40 metres will be at a cumulative level that is inaudible at nearby residential locations against other background environmental noise.

4.8.3 Vehicle Car Parking

EU Parking Area Noise 2007[1] guidelines have been used to provide an indicative level of noise emissions on surrounding areas.

- Vehicle movement rate for P&R facilities over 12km from CBD. A vehicle entering or exiting a parking bay is one movement, so the same vehicle arriving and departing on the same day completes two movements.
  - 0.30 per hour per parking bay (6am to 10pm).
  - 0.10 per hour per parking bay (10pm to 6am).
- Random fill across all parking lots.[2]

[1] Bayer, Landesamt für Umwelt 2007, Parking Area Noise - Recommendations for the Calculation of Sound Emissions of Parking Areas, Motorcar Centers and Bus Stations as well as of Multi-Storey Car Parks and Underground Car Parks, Bayerisches Landesamt für Umwelt, Parkplatzlämstudie 6, Aufl., August 2007.

[2] Random fill assumed in the absence of a specific car parking traffic analysis. Fill patterns in practice may vary due to proximity to train station, and presence of ticketed parking and/or reserved parking.

- Impulse correction K_I 4dB.
- L_{w0} 63dB (standardised vehicle sound power level).

4.8.4 Bus movements

Bus vehicles have been modelled using Nord2000 methodologies with the following parameters:

- Bus movements of up to 4 buses per stand per hour during the day (up to 48 buses/hour in total), and 0.5 bus per stand per hour during the night (up to 6 buses/hour in total) has been assumed for the assessment.
- Changes in level from arriving / idling / departure at stations (as assessed at nearest noise sensitive location) have been determined insignificant and not modelled. Publicly accessible road sections beyond the loop or its intersections are not included.
- Ground class F (compacted dense ground).
- Category 2a vehicles (up to 12.5m length and 2 axles, e.g. Volgren OC500LE), approximately L_{Amax} 75dB, L_{AE} 78dB at 7.5m and 35km/hr.
- Traffic case F (35km/hr max).
- Asphalt concrete surface, any increases in noise level due to gradients was included on the basis of the ground topography provided.

4.8.5 Kiss and Ride

Car movements have been modelled using Nord2000 methodologies with the following parameters:

- Movements of up to 40 vehicles per hour during the day, and up to 10 vehicles per hour during the night has been assumed for the assessment.
- Changes in level from arriving / idling / departure at stations (as assessed at nearest noise sensitive location) have been determined insignificant and not modelled. Publicly accessible road sections beyond the loop or its intersections are not included.
- Ground class F (compacted dense ground).
- Category 1 vehicles approximately L_{AE} 78dB at 7.5m and 40km/hr.
- Traffic case F (40km/hr max).
- Asphalt concrete surface, any increases in noise level due to gradients was included on the basis of the ground topography provided.

4.8.6 Noise Propagation Effects

4.8.6.1 Path Attenuation Factors

Outside the rail reserve, the environmental factors relevant to noise propagation were modelled as follows:

- Topography dataset of existing conditions for the assessment area was sourced from Landgate and adapted to the provided alignment in 3D dwg format.
- Given the relatively short propagation distances, weather conditions for each time period were considered neutral, with 20°C ambient temperature and no prevailing wind or temperature gradient effects.
- Existing noise barrier and fence heights and locations were reviewed with necessary corrections being made to reflect their realistic existing conditions. The modelling was then carried out on the basis that these fences and barriers are acoustically solid, i.e. they perform as effective noise barriers, being of suitable construction to sufficiently reduce noise transmission.

4.8.6.2 Air Attenuation and Diffraction

The propagation of railway noise from source to nearby sensitive areas has been estimated using industry standard numerical code that has been validated through field measurements.

- 'N2k': The Nord2000 Rail prediction method is an update to the Kilde formulation based on advancements in the late 1990s. The main benefit comes from the fact that the N2k methodology calculates in terms of one-third octave bands, rather than a single number to represent all frequencies. This is critical in regards to the design of noise walls, because their effectiveness is strongly frequency dependent – the difference in noise reduction at higher frequencies is vastly different compared to low frequencies.
- The ISO 9613 Industrial Prediction Model has been used for predicting noise from stationary assets with noise sources including sirens and bells. Various weather conditions can be taken into account in this modelling algorithm.

Stationary noise sources are modelled according to the parameters outlined in the following Table.

Parameter	Day period	Night period
Wind speed	Nil (ISO 9613, C_{met} = 0dB)	Nil (ISO 9613, C_{met} = 0dB)
Temperature inversion lapse rate	Nil (ISO 9613)	Nil (ISO 9613)
Temperature	20°C	15°C
Relative humidity	50%	50%
Mean barometric pressure	1013hPa	1013hPa

These sources are generally those assessed under the Regulations, such as crowd noise, public address systems, fixed mechanical plant and idling buses not on public roads.

4.8.6.3 Ground absorption

The table below summarises the ground absorption rates modelled.

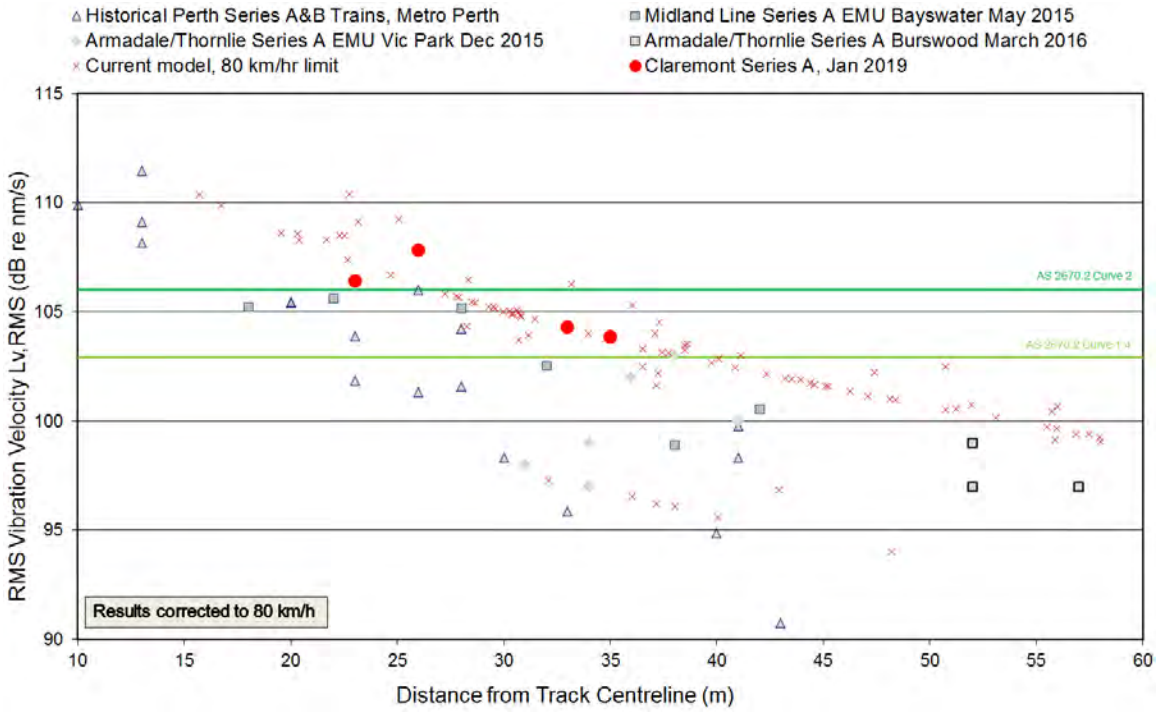
Parameter	Value	Comments
Default	0	Hard ground
Rail reserve generally	0	Hard ground
Undeveloped sites, loose soil	0	Conservatively assuming future development / sealed surfaces
Significant road and sealed concrete surfaces	0	Conservatively 100% hard reflective
Established parks and reserves	0.6	60% sound absorptive

4.8.7 Vibration source levels

Vibration emissions from the site will be mainly controlled by rail traffic. Road vehicles will also contribute where speed humps, loose panels (e.g. gutter or pit covers) or sudden variations in road surface are introduced.

This assessment acknowledges that typical rail vibration levels in the immediate area will decrease from corresponding decreases in rail speeds when all trains pass through Malaga (rather than pass through the area at or near the track section limit).

On a number of previous projects in Perth, ground vibration measurements have been carried out by SLR adjacent to surface rail track carrying passenger trains at a variety of distances from the rail centreline at each site.



Adjusting for speeds around 40 km/hr, which would be the highest speed that could be expected in the vicinity of the station, typical vibration levels will comply with Curve 1.4 (Residential) at approximately 30m from the nearest track centreline. Curve 2 will be complied with at approximately 20m from the nearest track centreline. For reduced speeds associated with stopping trains, rail vibration levels applicable to station areas are also considered to meet the $L_{v, RMS,1s}$ 112dB requirement referenced in Section 4.5.3.2.

Actual results will vary from these estimates according to rail condition, in situ soil and terrain profiles; however even after allowing for such variation, vibration levels are expected to be compliant.

On the basis of the above, the project provisions for vibration mitigation may be limited to avoiding road speed humps and loose coverings for buses and heavy vehicle traffic.

4.9 Constructability Requirements

Not applicable.

4.10 Environmental & Sustainability Design Criteria

Not applicable.

4.11 Future Proofing

Not applicable.

4.12 Value Engineering

Not applicable.

4.13 Third Party Operational Stakeholders

Not applicable.

4.14 Design Input from Stakeholders and Community Involvement Process

Not applicable.

4.15 Design Risks, Assumptions, Issues, Dependencies, Opportunities, and Constraints (RAIDOC)

Detailed of design risks, assumptions, issues, dependencies, opportunities and constraints are outlined below.

4.15.1 Design Risk Register

Design risks related to this design package are detailed in the Table below;

ID	Description	Status	Evidence of Validation
	Not applicable at this design stage		

4.15.2 Design Assumptions

Design assumptions related to this design package are detailed in the Table below;

ID	Description	Status	Evidence of Validation
	Rough / diffusive wall finishes. If walls are hard reflective, then wall extents may need to be revised.		
	Existing residential walls and noise walls relevant to the report outcomes are acoustically sound, continuous / without gaps.		

4.15.3 Design Issues

Design issues related to this design package are detailed in the Table below;

ID	Description	Status	Evidence of Validation
	Not applicable at this design stage		

4.15.4 Design Dependencies

Design dependencies related to this design package are detailed in the Table below;

ID	Description	Status	Evidence of Validation
	Noting Rail Systems Australia appears to have already constructed EASE models for Malaga and Ellenbrook (25-A-287-EC0151, 25-A-287-EC0152, 25-A-287-EC0153, 25-A-291-EC0151, 25-A-291-EC0152), responsibility for production of Speech Transmissibility Index (STI) contours and design of loudspeaker arrangements to be submitted as part of the various Station packages will rest with Rail Systems Australia.		

	Until directed to undertake such modelling as per agreement SK97/0018, SLR has not undertaken such calculations to independently verify these claims.		

4.15.5 Design Opportunities

Design opportunities related to this design package are detailed in the Table below;

ID	Description	Status	Evidence of Validation
	Not applicable at this design stage		

4.15.6 Design Constraints

Design constraints related to this design package are detailed in the Table below;

ID	Description	Status	Evidence of Validation
	Not applicable at this design stage		

4.16 Requests for Information (RFI)

Requests for information submitted in relation to this design package are outlined in the Table below. Copies of the RFIs are provided in Appendix W of this report.

RFI	Description/Title	Response
062 **CRFI-SLR-PW-00001**	Noise and Vibration - Baseline Measurements	Closed
063 **CRFI-SLR-PW-00002**	Noise and Vibration Assessments - Data Input Log / Requests	Closed
068 **CRFI-SLR-PW-00003**	Conversion of federated model 25-B-00-0001.4.0.IFI to AutoCAD	Closed

5. Design Outputs

5.1 Deliverables List

Not applicable.

5.2 Drawings and Models

5.2.1 Bus and car parking activities

The below figure gives an example of potential noise levels in the vicinity of the station as a result of modelled bus operations and car parking facilities according to Section 4. It can be seen that the predicted levels from car park

and bus movements at the station are within the targets outlined in Section 4.5.2 to the nearest receivers, including the potential future development.

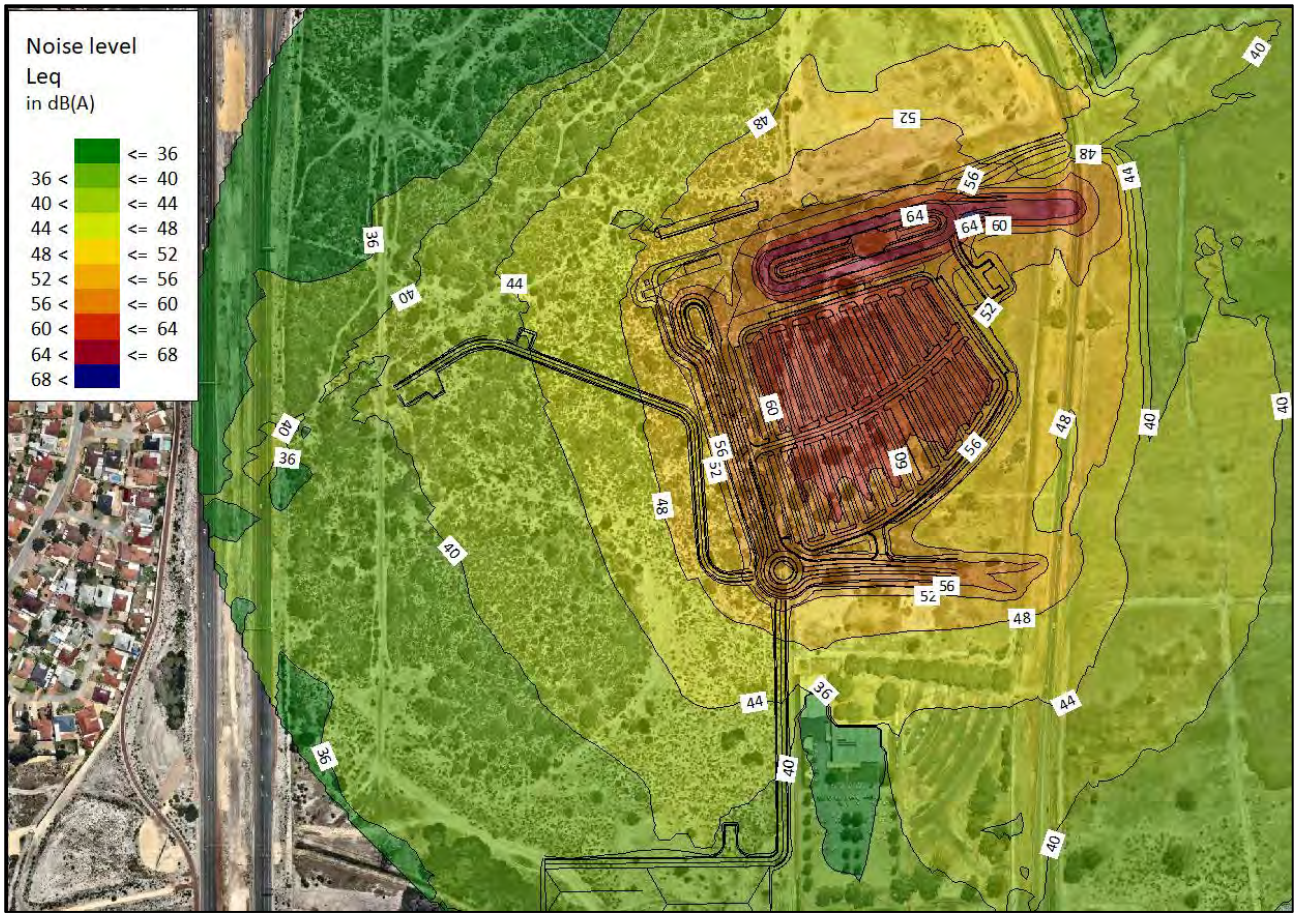


Figure 9: Indicative distribution in airborne noise from station, bus and car parking areas for comparison with L_{Aeq} day criteria

5.3 Specifications

Not applicable at this design stage.

5.4 Standard Reference Drawings

Not applicable.

5.5 System Coordination Drawings and Models

Not applicable.

5.6 Type Approvals

Not applicable.

5.7 Calculations

Not applicable.

5.8 Schedules

Not applicable.

6. Competence for Design

Not applicable at this Design Stage.

7. Design Reviews and Certification

7.1 Interdisciplinary Design Check (IDC) Review

Not applicable at this Design Stage.

7.2 IDC Certificate

Not applicable at this Design Stage.

7.3 Design Verification

Not applicable at this Design Stage.

7.4 Independent Verification

Not applicable at this Design Stage.

7.5 BCA

Not applicable at this Design Stage.

7.6 DDA

Not applicable at this Design Stage.

7.7 PTA Design Submission Reviews.

Not applicable at this Design Stage.

8. Design Compliance

The demonstration of compliance with the requirements of the Project Definition Documents, including any non-conformances of concessions is summarised on the following sections.

8.1 Standards & Guidelines

Not applicable at this Design Stage.

8.2 SWTC

Not applicable at this Design Stage.

8.3 Planning & Environmental Approvals

Not applicable at this Design Stage.

8.4 Third Party Requirements

Not applicable at this Design Stage.

8.5 Deviation Register

Not applicable at this Design Stage.

8.6 Non-Compliances Register

Not applicable at this Design Stage.

9. External Interface Work Packages

9.1 Project Interface Control Plan

Not applicable at this Design Stage.

10. Effects of the Works

Not applicable.

11. Safety in Design

11.1 Overview

Not applicable.

11.2 Systems Safety Assurance Plan.

Not applicable.

11.3 Compliance with Safety Assurance Plan

Not applicable.

11.4 Safety Analysis

Not applicable.

11.5 Safety Argument

Not applicable.

11.6 Hazard Analysis

Not applicable.

11.7 Satisfaction of Safety Integrity Level Targets

11.8 Satisfaction of GSN Requirements

Not applicable.

11.9 Management of Safety Requirements

Not applicable.

11.10 Transfer of Residual Risks and Safety Related Operational Conditions

Not applicable.

11.11 Safety Assurance Statement

Not applicable.

12. Systems Engineering

12.1 Sub-system Allocation

Not applicable.

12.2 Requirements Management

Not applicable.

12.3 Engineering Assurance Summary

Not applicable.

13. Sustainability in Design

Not applicable.

14. Testing & Commissioning Requirements

Not applicable.

14.1 ITP's

Not applicable.

14.2 Hold Points

Not applicable.

14.3 Witness Points

Not applicable.

15. Human Factors

Not applicable.

16. Reliability, Availability and Maintainability (RAM)

16.1 General RAM Provisions

Not applicable.

16.2 RAM Targets

Not applicable.

17. Construction Methodology

17.1 Construction Methods

Not applicable.

17.2 Operational Staging

Not applicable.

17.3 Works in Track Occupancies

Not applicable.

18. Asset Maintenance Strategy

Not applicable.

18.1 RTO Assets

18.2 Other Assets

Not applicable.

19. Asset Operations Strategy

The following operational strategy has been assumed in this design package:

19.1 Normal Modes of Operations

19.2 Degraded Modes of Operations

20. Decommissioning Strategy

Not applicable.

20.1 Capability to Modify

20.2 Decommissioning Strategy

21. Project Actions Register

A list of outstanding issues and assumptions that may affect the design are outlined in the Table below.

ID	Outstanding Issues	Potential Effect	Status
	Final arrangement of loudspeakers / PA systems	Increased noise emissions	
	Land use of future development	Noise sensitive premises within the indicated future development may introduce additional receivers closer to the station and car park areas, thereby requiring potential mitigation measures (such as transformer and pump enclosures, car park screening, etc). Refer to Section 5.2.1 above for comment in this regard.	

Appendix E – Transport Impact Assessment

To be provided as a separate addendum

Morley-Ellenbrook Line

Malaga Station Transport Impact Assessment

MEL-MLCX-MO-RPT-00008

Rev	Date	Purpose of Issue	Prepared	Reviewed	Approved
A	05/08/2021	Issued for Review	Jason Hoad Joshua Bandi	Daniel Beresford (JAJV SRE)	Manoj Aravind (SEM)
B	06/09/2021	Issued for review	Joshua Bandi	Scott Arbon (JAJV SRE)	Manoj Aravind (SEM)

Document Details	
Project	Morley-Ellenbrook Line
Client	Public Transport Authority
PTA Contract Number	PTA200001
Laing O'Rourke Project No.	K97

Document revision history

Rev	Date	Purpose of Issue	Sections revised	Reason for updates
A	05/08/2021	Issued for review	N/A	N/A
B	06/09/2021	Issued for review	2,3,4,5,6	Comments from stakeholders

Table of Contents

Glossary

Phrase	Meaning	Notes
ACROD	*Australian Council for Rehabilitation of Disabled*	*ACROD bays are specifically designated bays for those with disabilities who qualify for the ACROD parking program*
DA	*Development Application*	*The required statutory application for individual developments on a parcel of land that go beyond the remit of a simple building application to the local government*
DOS	*Degree of saturation*	*A percentage measure of demand/capacity for an intersection, approach or lane*
DPLH	*Department of Planning, Lands and Heritage*	*The WA state government department responsible for land-use planning*
KnR	*Kiss and Ride*	*Pick-up/drop-off facility for the train station*
LOS	*Level of service*	*A categorisation of the delay vehicles experience at a particular intersection, approach or lane*
MEL	*Morley-Ellenbrook Line*	*The proposed train line connecting from Bayswater to Ellenbrook as a spur line from the existing Midland line*
PCU	*Passenger Car Unit*	*A unit to measure the equivalent number of passenger cars represented by vehicles larger than a passenger car*
PDO	*Property Damage Only*	*A crash that causes damage only to property (built form or vehicles for example), with no harm caused to people*
PDP	*Project Definition Phase*	*The concept design phase of the Morley Ellenbrook Line*
PnR	*Park and Ride*	*All-day parking facility for the train station*
PUDO	*Pick-up/drop-off*	*Pick-up/drop-off parking bays typically have a maximum 5 minute parking time*
PSP	*Principal Shared Path*	*A wide (>3 metre) shared path, usually with lighting and priority or signalised crossings at road crossings*
SCATS	*Sydney Coordinated Adaptive Traffic System*	*The control system used for all traffic lights within Western Australia*
STEM	*Strategic Transport Evaluation Model*	*The Department of Transport's multi-modal strategic transport model, used to forecast and assess transport demands in the Perth Metropolitan area*
SWTC	*Scope of Works and Technical Criteria*	*The documentation outlining the scope and criteria for the design and construction of the MEL project*
TIA	*Transport/Traffic Impact Assessment*	*An assessment report of the impact that a development or subdivision has on the surrounding transport network*
WAPC	*Western Australian Planning Commission*	*The section of the DPLH responsible for assessing statutory planning applications such as Development Applications*

Summary

As Perth grows, so does the need for rail infrastructure and METRONET is a critical element of the State Government's infrastructure agenda. The Morley-Ellenbrook Line (MEL) Project will improve connectivity between the north east metropolitan area and the rest of the city and unlock economic development in these local community areas.

Malaga Station has been identified by METRONET and key stakeholders as a significant transit hub in connecting the Malaga area by mass transit to Bayswater on MEL, and additionally to the Perth CBD via the Midland Line. The station provides a significant point of transport access for residents in an identified congestion problem area. This provision of this station provides some relief to the Joondalup line for residents in between the two station catchments

In accordance with the *WAPC Transport impact assessment guidelines*, this report provides an overview of the Transport Impact for the proposed Malaga Station, comprising an assessment of the site's existing and future transport context, covering changes to the network, integration with surrounding land uses and an analysis of the development's traffic impact. This station is assessed to generate over 100 vehicles per hour during the peak hour, and as such is classified as 'high impact' under the guidelines, necessitating a Transport Impact Assessment.

Malaga Station is proposed to be located below grade and outside of the Tonkin Highway median in the land east of Tonkin Highway. This land is currently undeveloped with some utility and environmental constraints.

At opening day (proposed by year 2024). Malaga Station is proposed to consist of:

- One island platform
- A 12-stand bus interchange comprising of:
  - 10 standard bus bays
  - 2 articulated bus bays
  - Plus 6 layover bays (4 standard, 2 articulated
- A 1,087 bay Park and Ride (PnR) facility comprising:
  - 1,042 standard all-day bays
  - 15 standard short-term bays
  - 1 tenant bay
  - 2 EV charging bays
  - 21 ACROD bays
  - 2 service/loading bays
  - 4 staff bays
- A 13 bay Kiss and Ride (KnR) facility comprising:
  - 11 standard pick-up/ drop-off (PUDO) bays
  - 1 accessible PUDO bays
  - 1 taxi PUDO bays
- 20 sheltered motorcycle bays
- Secure bicycle storage shelters, with storage for up to 72 bicycles and 12 U-rail bicycle stands within the station precinct

The site is currently situated in an unoccupied brownfield area, with little existing development immediately surrounding the proposed site. Currently, there is a low provision of infrastructure to enable sufficient access for pedestrians and cyclists immediately surrounding the proposed Malaga Station, particularly to the west, south and southeast of the site. Furthermore, the site currently has no direct public transport links. The surrounding area however is served currently by two bus services, the 362 and 345 services, with stops approximately 400m and 900m from the proposed station area respectively.

Given the existing site is largely undeveloped, the introduction of a transit node connecting the surrounding area to high capacity public transport creates a crucial need for significant transport infrastructure upgrades. In order to facilitate safe and efficient access to support the station, a comprehensive upgrade to the existing active transport and road network, including feeder public transport services, is needed.

The proposed station precinct has been designed to introduce significant modifications and new infrastructure to the surrounding transport network to facilitate access for all modes. This includes the construction of new shared path connections, provision of secure bicycle parking at the forefront of the station entry, a bus interchange and associated feeder bus services, and a PnR/KnR facility with associated access points from a realigned Beechboro Road North.

Table S1: Generated traffic demand – PnR and KnR facilities

	PnR demand (veh/ %)		KnR demand (veh/ %)		Total (veh)	
Peak	Inbound	Outbound	Inbound	Outbound	Inbound	Outbound
AM peak hour	792 (66%)	0	264 (22%)	264 (22%)	1,056	264
PM peak hour	0	540 (45%)	192 (16%	192 (16%)	192	732

Table S2: All-day traffic generated for future development surrounding Malaga Station

Associated forecast year	Growth of inbound all-day trips	Growth of outbound all-day trips
2031	200	300
2041	1,700	1,700

The trips generated by the station and the surrounding development have been estimated respectively based on benchmarking exercises of existing stations and STEM all-day link volume growth as provided by METRONET. Table S1 and S2 adjacent, summarise the estimated trips generated by the station PnR/ KnR facilities and development.

An assessment of the impacts of the generated trips on the surrounding road network has been based on the combined traffic generated by the PnR/ KnR facilities, the development and background traffic growth in the area using SIDRA intersection software. The following intersections were assessed:

- Beechboro Road North/ Marshall Road
- Beechboro Road North/ PnR access
- Beechboro Road North/ Bus interchange access.

Based on the analysis completed, both the Beechboro Road North/ Bus Interchange Access signalised intersection and the Beechboro Road North/ Park n Ride/ Kiss n Ride Access roundabout will operate well within capacity during the project-case scenario years. However, the existing Beechboro Road North/ Marshall Road intersection is forecast to reach capacity during the 2029 AM peak, with a LOS E and DOS of 96.6% in the project case.

An upgraded geometry with auxiliary right turn lanes on both the Marshall Road and Beechboro Road North approaches has also been tested to resolve the initial capacity issues within the project case assessment – this has been demonstrated to work up to and including 2034. It should be noted that the only modification to this intersection proposed for the project will be addition of the pedestrian crossing on the eastern arm, as the intersection is due to be converted to a roundabout in the short term by the City of Swan as part of the Beechboro Road duplication.

In addition to the operational requirement, an access strategy was also undertaken for all modes accessing the precinct. The assessment of the proposed design have highlighted a number of minor recommendations that could be considered before finalising the designs for the access arrangement of the site and the provision of car parking.

Overall, it is shown that the station is to be well serviced by both the existing and proposed surrounding transport network, facilitating safe and adequate access for pedestrians, cyclists, buses and general vehicles.

1 Introduction and background

1.1 Overview

Acknowledgement of Country

MELConnx acknowledges the Whadjuk People of the Noongar Nation as the Traditional Custodians of the land and waters on which the Morley-Ellenbrook Line Project is located. We pay our respects to their Elders, both past and present and thank them for their continuing connection to the country, culture and community

1.1.1 METRONET vision and objectives

As Perth's single largest investment in public transport, METRONET will transform the way people commute and connect. It will create jobs and business opportunities and stimulate local communities and economic development to assist communities to thrive. The METRONET vision is for a well-connected Perth with more transport, housing, and employment choices.

In delivering METRONET, the WA Government has considered peoples' requirements for work, living and recreation within future urban centres with a train station at the heart.

The objectives are to:

- Support economic growth with better connected businesses and greater access to jobs
- Deliver infrastructure that promotes easy and accessible travel and lifestyle options
- Create communities that have a sense of belonging and support Perth's growth and prosperity
- Plan for Perth's future growth by making the best use of our resources and funding
- Lead a cultural shift in the way government, private sector, and industry work together to achieve integrated land use and transport solutions for the future of Perth.

1.1.2 Morley-Ellenbrook Line overview

As Perth grows, so does the need for rail infrastructure and METRONET is a critical element of the State Government's infrastructure agenda. The Morley-Ellenbrook Line (MEL) Project will improve connectivity between the north east metropolitan area and the rest of the city and unlock economic development in these local community areas.

The Public Transport Authority (PTA) is the lead agency delivering the MEL Project, with Main Roads WA (MRWA) undertaking some enabling works.

1.1.2.1 Project features

Transport infrastructure works for the Project include:

- A 21km rail line spurring from the Midland Line east of Bayswater Station, travelling north in the Tonkin Highway median, east through land north of Marshall Road and north on the western side of New Lord Street into Ellenbrook
- Stations at Morley, Noranda, Malaga, Whiteman Park and Ellenbrook with future-proofing for a station at Bennett Springs East
- Parking and bus interchanges/ facilities at stations
- Significant grade separations at key road crossings
- Underpasses to allow the rail line to enter and exit the Tonkin Highway median
- Principal Shared Paths (PSP) for walking and cycling access along the rail line
- Track and associated infrastructure to connect to the existing Midland Line
- Road and bridge reconfiguration works
- Integration across the packages of works and other nearby projects.

1.1.2.2 General scope of works

The Project's general scope of works includes the design and delivery of rail infrastructure and ancillary works to support operational passenger rail between Bayswater and Ellenbrook, including stations with inter-modal bus and rail with parking and associated road works at Bayswater, Morley, Noranda, Malaga, Whiteman Park and Ellenbrook stations.

Figure 1: Morley-Ellenbrook Line © METRONET

The Project activities include all investigation, design, approvals, construction, testing and commissioning, Entry Into Service (EIS), training and operational readiness required to incorporate the new railway to Ellenbrook, and tie into the existing network including the associated road, utilities and other required works to interface with adjacent works and contracts. This will include bulk earthworks and retaining, structures, grade separations, roads, and drainage.

The design and delivery of the main works package for the Project is broken into three distinct stages:

- Alliance Development Stage
- Project Alliance Reference Design Stage
- Project Alliance Delivery Stage (Detailed Design through to Project close-out).

Figure 2: Architect's Impression of Ellenbrook Station © MELconnx

1.1.2.3 Key project objectives, key compliance objectives and critical success factors

The PTA and MELConnx's single Non-Owner Participant (NOP) Laing O'Rourke Construction Australia Pty Ltd, have formed an integrated, collaborative Project Alliance to successfully deliver rail infrastructure that reflects our absolute commitment to achieving the Project Objectives and delivering positive outcomes for the State.

The following image demonstrates how we have mapped each Key Project Objective in the Project Alliance Agreement (PAA) against the Critical Success Factors to achieve best-for-project outcomes, underpinned by the Key Compliance Objectives.

Key Project Objectives	Critical Success Factors for Successful Project Delivery (abbreviated)
Implementation of a robust, cooperative team culture.	• Development of a culture that results in all Participants developing behavioural values and driving principles to achieve Alliance goals and project objectives • Longevity and stability of key Alliance personnel i.e. Alliance Manager, ALT and AMT.
Timely delivery of Works to achieve project milestones in accordance with agreed program.	• Development of a final proposal with a sufficiently developed design and accurate TOC • Subsequent cash flow management and financial forecasting, scheduling and value-earned calculation and determination • Implementation of PTA mandated systems i.e. TeamBinder, Primavera P6, TILOS and a finance system accepting the PTA's cost breakdown structure • Timely completion of design, construction and commissioning through to practical completion • Timely progress towards construction milestones and completion of close-out to achieve final asset acceptance compliance.
Inclusion of processes that embrace/promote open tendering and promotion of work package development that encourages/ enables second and third tier tendering. **Compliance with WAIPs.**	• For professional service providers, implement a proven and mature supply-chain engagement process, including tender review, contract award and project integration. Ensure that it offers opportunity and security of payment relative to services delivered in an effort to achieve best-for-project outcomes • For material suppliers and other subcontract service providers, implement a proven and mature supply-chain engagement process, including tender review, contract award and project integration that offers opportunity and security of payment relative to service delivered • Proven and mature supply-chain engagement process for labour hire services, compliant with industrial and safety laws, maintained employee standards/conditions and security of employee payments • Ability to develop contracts and terms and conditions in the spirit of the Alliance values and principles , appropriate and commensurate with the size, complexity and value of packages in accordance with industry best practice.
Optimisation of operational and whole of life costs.	• Sustainability considerations and outcomes for the whole of life of the works.
Ensuring appropriate consultation/integration with stakeholders and community.	• Constant and effective engagement with relevant stakeholders, particularly utilities/services, Main Roads, third party asset owners and relevant unions • Effective management of PTA interfaces and PTA contractors • Constant/effective engagement with the PTA in design reviews, work planning and possessions/shutdowns.
Providing passengers with safe and secure services and facilities.	• Compliance with ONSR requirements • Completed rail line, stations and bus transfer infrastructure are able to deal successfully with the movement of people, including the disabled.
Minimising disruption to current and anticipated rail operations.	• Minimise impact on public transport services disruption • Liaison and interaction with PTA rail operations personnel tasked with determining network closures, to confirm available network shutdowns and implement contingency plans • Effective management of interfaces with others in heavily constrained areas • Effective management/staging of works to reflect staged/constrained site access • Effective management of existing rail infrastructure asset protection.
Recognising the State's desired industrial relations objectives.	• Develop a project-specific Industrial Relations Management Plan based on a proven and successful industrial relations approach that delivers a collaborative worksite, genuine collective agreement, making good faith in negotiations and dispute resolution, and respect for trade union rights of entry.

Key Compliance Objectives (abbreviated)				
Compliance with all Statutory requirements and State Government policy requirements for construction work.	Compliance with the SWTC.	Protecting and minimising disruption to all existing facilities, infrastructure, properties or public utility services.	Meeting all obligations to impacted stakeholders and demonstrating genuine sensitivity.	Compliance with all environmental conditions and minimise adverse environmental impact.

Figure 3: Key Project objectives, Critical Success Factors and Key Compliance Objectives

1.1.3 Alliance vision and delivery approach

The MEL Project will be delivered under an alliance contract to support the management of project and stakeholder interfaces and to mitigate project risks. A collaborative alliance approach will see the Works carried out in a cooperative, coordinated, and efficient manner in compliance with the Alliance Principles.

MELConnx understands that the successful delivery of the Project is critically linked to meeting the PTA's Key Project Objectives. These objectives have shaped our vision for the Project that is around delivering a high-quality product and creating exceptional value-for-money. We are committed to a no-blame culture and to the prompt and mutual resolution of any issues that may arise.

During the AD Stage, representatives from both the PTA and MELConnx participated in an interactive workshop to begin the process of developing a suitable Alliance Vision for the Project (refer Figure 4 below for workshop outcomes).

Figure 4: AD Stage Alliance Vision Development Outcomes (developed with the PTA)

The Alliance Foundation workshop was held on 11/11/2020 and the results of this workshop generated the basis for the Vision, Purpose, Values and Behaviours Commitment Statements represented here.

Figure 5: MELConnx Alliance Vision, Purpose and Values

1.2 Introduction

This report provides an overview of the Transport Impact Assessment for the proposed Malaga Station situated on the Morley-Ellenbrook Line. The sections following comprise an assessment of the site's existing and future transport context, covering changes to the network, integration with surrounding land uses and an analysis of the development's traffic impact.

1.3 Development proposal

Malaga Station has been identified by METRONET and key stakeholders as a significant transit hub in connecting the Malaga area by mass transit to Bayswater, and additionally to the Perth CBD via the Midland Line. The station provides a significant point of transport access for residents in an identified congestion problem area. This provision of this station provides some relief to the Joondalup line for residents in between the two station catchments. Malaga station may also facilitate a future tie-in location in for the future New Northern Line (NNL); however, no concept design has been developed currently.

Malaga Station is proposed to be located at grade in a parcel of land east of Tonkin Highway, adjacent to Beechboro Road North. This land is currently undeveloped with some utility and environmental constraints.

At opening day (proposed by year 2024). Malaga Station is proposed to consist of:

- One island platform
- A 12-stand bus interchange comprising of:
  - 10 standard bus bays
  - 2 articulated bus bays
  - Plus 6 layover bays (4 standard, 2 articulated
- A 1,087 bay Park and Ride (PnR) facility comprising:
  - 1042 standard all-day bays
  - 15 standard short-term bays
  - 1 tenant bay
  - 2 EV charging bays
  - 21 ACROD bays
  - 2 service/loading bays
  - 4 staff bays
- A 13 bay Kiss and Ride (KnR) facility comprising:
  - 11 standard pick-up/ drop-off (PUDO) bays
  - 1 accessible PUDO bays
  - 1 taxi PUDO bays
- 20 sheltered motorcycle bays
- Secure bicycle storage shelters, with storage for up to 72 bicycles
- 12 U-rail bicycle stands within the station precinct

Figure 6 shows the current general layout of the Malaga Station development.

1.4 Key issues

Given the existing site is largely undeveloped, the introduction of a transit node connecting the surrounding area to high capacity public transport creates a crucial need for significant transport infrastructure upgrades. In order to facilitate safe and efficient access to support the station, a comprehensive upgrade to the existing active transport and road network, including feeder public transport services, is needed.

1.5 Background information/ previous studies

A number of studies have been within the surrounding station precinct and along the wider Morley-Ellenbrook Line, including the following:

- Swan Urban Growth Corridor Sub-Regional Structure Plan (2009)
- Perth & Peel @ 3.5 million – North-East Sub-Regional Planning Framework (2018)
- MEL Engineering and Land Use Planning (ELUP) study (2018)
- MEL Project Definition Phase (2019-20)
- MEL TSAP Stage 1 Traffic Modelling Study (2020-21)
- City of Swan Concept Design for conversion of Marshall/Beechboro to dual-lane roundabout (2019)

Figure 6: Malaga Station overall location plan

2 Existing context

To understand the transport impact of the proposed Malaga Station, it is important to understand the existing operation and condition of the surrounding active, public and private transport network. Despite this particular area undergoing significant change as part of the station development, understanding the current context will enable the identification of any existing constraints and opportunities that can be applied to the site and surrounding transport network.

This section of the report covers the following contextual aspects of the site in relation to its existing and surrounding land uses, provisions for pedestrians, cyclists, buses and vehicles, road network and crash history.

2.1 Site uses

The site is currently situated in an unoccupied brownfield area, with little existing development immediately surrounding the proposed site. Due to the site vacancy, the site currently does not generate any trips within the area. The only development in proximity of the precinct is Potter's House Christian Centre, located approximately 750m to the south of the proposed site.

The site is currently zoned General Rural under the *City of Swan's Local Planning Scheme 17*.

2.2 Surrounding land uses

The subject site is located in the vicinity of a number of different land uses. As seen in Figure 7, the site sits within the Whiteman locality, and is surrounded by the suburbs of Ballajura, Cullacabardee, Malaga and Bennett Springs.

Ballajura and Bennett Springs are both predominately zoned as *Residential* under the , with a density of R20, representing low-density housing. Both of these suburbs are established, largely being built out in the 1980s and 1990s. Both suburbs have transitional lots along the frontage with Reid Highway which provide a significant buffer to the road reserve.

Malaga is mostly zoned General Industrial and Industrial Development under the City's planning scheme, and is fully built out.

Whiteman is almost entirely zoned as *Regional Reserve – Parks & Recreation*, largely vacant and mostly designated as *Bush* Forever (protected bushland). Two parcels of land within the local are zoned *Industrial Development* – Potter's House, and the parcel of land on the north-east of the Marshall/Beechboro intersection, which is currently undeveloped.

Cullacabardee is almost entirely undeveloped and zoned as *Regional Reserve – Parks & Recreation*, with the exception of several developed *General Rural* properties off Hepburn Avenue and Hennessey Road. As with Whiteman, the areas designated as recreation reserve are mostly designated as *Bush* Forever.

Figure 7: Surrounding land use locale map

2.3 Active transport provisions

A high-level summary of the existing pedestrian and cycling infrastructure surrounding the future station is provided in Figure 8.

Currently, there is a low provision of infrastructure to enable sufficient access for pedestrians and cyclists immediately surrounding the proposed Malaga Station, particularly to the west, south and southeast of the site. To the northeast, an existing footpath runs along the eastern side of Beechboro Road North between the Whiteman Park access road and the Tonkin Highway roundabout (recently constructed as part of the Northlink 2 project). The footpath currently connects with a PSP that traverses Whiteman Park to the northeast.

There is a shared path running east-west for the majority of the southern side of Marshall Road to the west, however it terminates before Beechboro Road North to the east. Additionally, following the completion of Northlink 2, a PSP runs north-south along the western side of Tonkin Highway. Neither the Marshall Road shared path or Tonkin Highway PSP connect directly with the proposed station site. The City of Swan has identified future cycling routes at the following locations in its 2051 Cycle Network Plan (refer to Figure 8):

- Marshall Road (Secondary Route)
- Beechboro Road North (Secondary Route)
- Whiteman Drive East (Secondary Route) connecting through to Cassowary Drive (Local Route) to provide access to Ballajura via a flyover across Tonkin Highway.

Note that these provisioned routes were also identified in Department of Transport's Long Term Cycle Network plan.

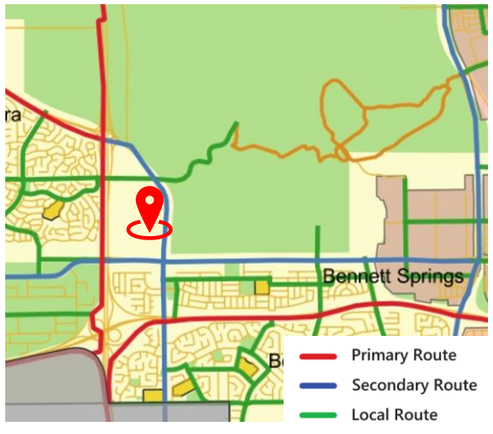


Figure 8: City of Swan Cycle Future Network Plan excerpt

2.4 Public transport provisions

A high-level summary of the existing public transport provisions surrounding the future station is provided in Figure 9.

The proposed Malaga Station has no direct public transport links. The surrounding area however is served currently by two bus services, the 362 and 345 services, with stops approximately 400m and 900m from the proposed station area respectively. They serve the developments to the west and southeast operating:

- **Route 362 –** between Perth Busport and Guadalupe Drive after Marshall Road, typical 12-minute headways in peak hours
- **Route 345 –** between Morley Bus Station and Bennett Springs Drive after Oriole Gardens, typical 10-minute headways in peak hours.

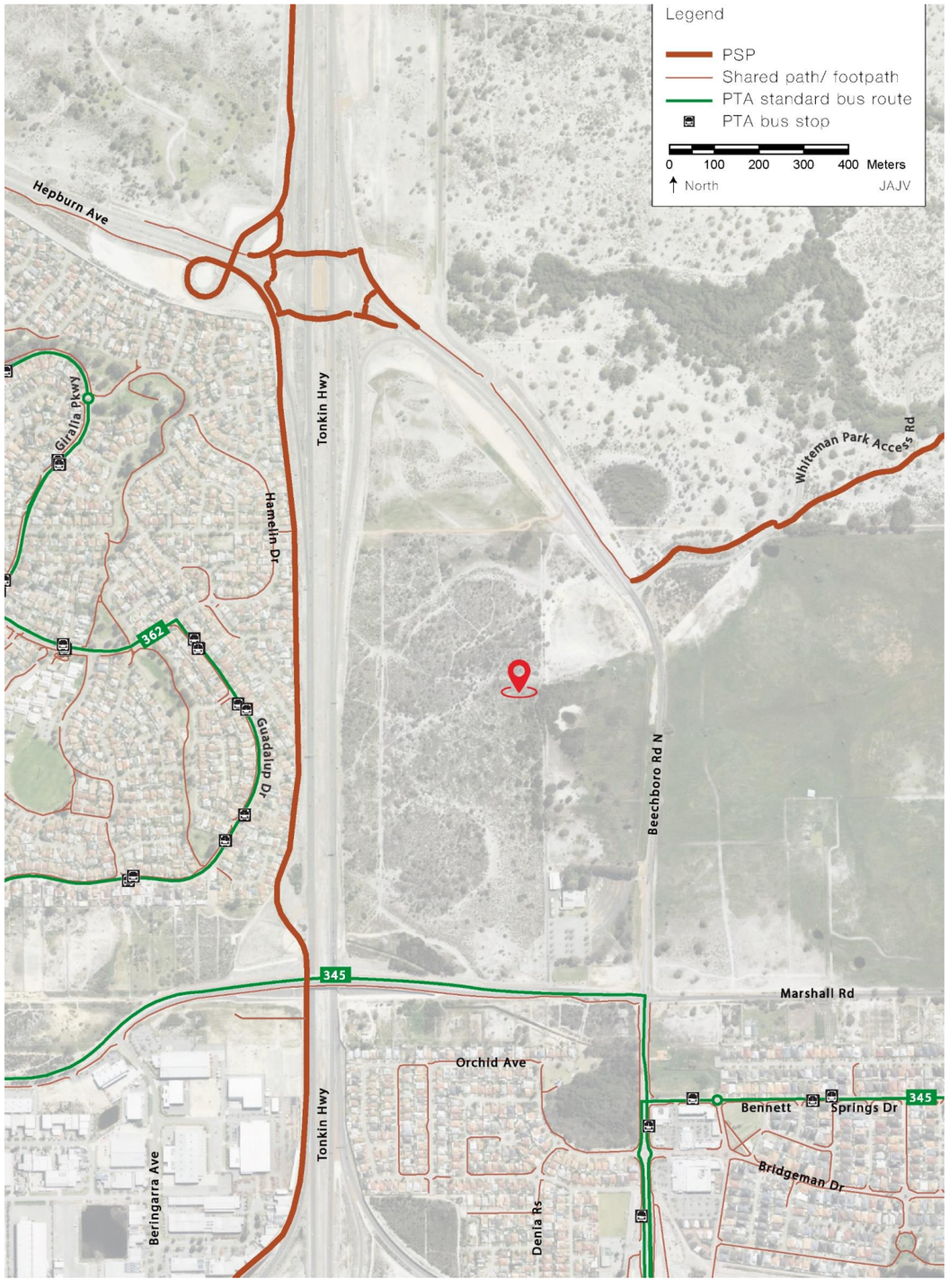


Figure 9: Existing active and public transport provisions

2.5 Vehicle provisions

2.5.1 Road network

The functional road hierarchy of key roads surrounding the site are summarised below and shown in Figure 10.

Tonkin Highway – Is a six-lane Primary Distributor road running north-south directly west of the site. It provides primary access northbound to Ellenbrook and Muchea before becoming Great Northern Highway, and southbound to Bayswater and Perth Airport before continuing south to Byford. Designed to Freeway standard, it comprises a number of significant grade separations at intersections with Beechboro Road North and Marshall Road. The posted speed limit is 80kph and it carries approximately 44,000 vehicles per day (Main Roads WA Traffic Map, 2021).

Marshall Road – Is a four-lane Distributor A road running east-west to the south of the site. It provides access eastbound towards the Dayton via North Bennett Springs, and westbound through the Malaga Industrial Area before becoming Beach Road. The posted speed limit is 70kph and carries approximately 13,000 vehicles per day (Main Roads WA Traffic Map, 2021).

Beechboro Road North – Is a two-lane Distributor A road running north-south directly east of the site. It provides access northbound to Tonkin Highway and Hepburn Avenue, and southbound to Marshall Road and the residential areas of Beechboro and Kiara. The posted speed limit is 70kph and carries approximately 9,000 vehicles per day (Main Roads WA Traffic Map, 2021).

2.5.2 Parking provisions

There are currently no parking provisions associated with the site or on any of the surrounding roads proximate to the site

2.6 Existing intersections surrounding the site

Surrounding the site, the following existing intersections have been identified as being potentially impacted by the site development traffic.

Tonkin Highway/ Beechboro Road North is a four-way grade separated roundabout. Staged PSP crossings are provided along all approaches to the intersection providing median refuges and full access underneath the Tonkin Highway bridge.

Marshall Road/ Beechboro Road North is a four-way at-grade signalised intersection. Existing footpaths approach the intersection on the southern side of Marshall Road, however a protected pedestrian crossing phase is not provided.

2.7 Crash data

Historical crash data (last five years, 2016-2020) has been presented in Figure 10, in the form of a heatmap, and tabulated in Table 1. The data highlights that a high number of crashes have occurred at key intersections surrounding the site, namely Marshall Road/ Beechboro Road North and Tonkin Highway/ Beechboro Road North. Midblock crashes on Beechboro Road North and Marshall Road are also notable. A high majority of these crashes at intersections and midblock were from rear-end and right-angle/ right-turn through collisions and were likely a result of high speeds and often of a severe nature. It is also important to note that the total of 32 crashes recorded at the Tonkin Highway/ Beechboro Road North separated roundabout have only been recorded since the opening of the Northlink 2 project in early-2019, highlighting the frequency of incidents in this location.

Table 1: Crash types at surrounding intersections and midblock locations

Crash type	Tonkin Highway/ Beechboro Road North	Marshall Road/ Beechboro Road North	Beechboro Road North (midblock)	Marshall Road (midblock)
Rear end	10	30	27	8
Head on	1	0	1	2
Sideswipe	8	5	14	4
Right angle/ right turn thru	11	31	5	1
Non-collision/ other	0	3	1	2
Hit object	2	0	5	4
Total	***32***	***69***	***53***	***21***

Figure 10: Functional road hierarchy and crash data

3 Proposal

The Malaga Station precinct is proposed to comprise an underground island platform, at-grade bus interchange and an at-grade 1,087 bay PnR to the southeast of the new station entry building. The delivery of the station with be accompanied by the opening of MEL, which will provide a heavy rail transit (HRT) connection for residents of the North Eastern Suburbs (NES) to Bayswater and to the Perth CBD and beyond via the Midland Line. As a major transfer station with a large catchment area, this station is expected to serve a significant number of rail patrons. This will require improvements to transport connections to, through and within the station to support ease of access and encourage ridership.

Initially the station's forecast patronage is relatively low, however as the area surrounding the Malaga Station Precinct is planned as a significant development area by the state of Western Australia – patronage for the station is expected to grow rapidly in the medium term.

By 2041 – even with development surrounding the station – the forecast mode split is still expected to be largely dominated by private vehicles (46%), with bus transfer (28%) and active transport (26%) as the lower utilised access modes.

Major changes to support the site include the realignment of Beechboro Road North to include a new access road into the station precinct, along with a bus only entrance for the bus interchange. These roads will support access for vehicles to the station's PnR and KnR facilities and a number of new bus services to the bus interchange. A new PSP will also be constructed, including a number of new shared paths to connect the precinct to the wider active transport network.

Figure 11 shows a summary of transport infrastructure upgrades to be delivered as part of the Malaga Station development.

3.1 Precinct vision and land use integration

The City of Swan's existing Local Planning Scheme (LPS) No.17 (LPS170) classes the area immediately surrounding the station as General Rural, with the North Bennett Springs and North Ballajura areas classed as a Regional Reserve.

Previous land use planning work undertaken in high collaboration with METRONET has identified the Malaga Station precinct with Neighbourhood Centre potential. According to the METRONET Station Precincts document, Neighbourhood Centres are defined by their medium to high density residential character, mixing retail and services to meet the daily needs of the local community.

The introduction of high capacity public transport in the form of HRT unlocks the development potential of existing neighbouring suburbs and surrounding strategic urban investigation areas such as North Bennett Springs and North Ballajura. With potential for the creation of a significant number of dwellings, this high level of regional accessibility by public transport enables the creation of additional employment opportunities and community facilities within the area.

It is likely that future high density development will be within walking catchment of the station, enabling people to either walk or cycle to the station. Existing residential areas to the south and west of the station will be well serviced by future bus services and a high capacity PnR facility. Future residential areas to the north and east of the station will be serviced to a similar standard.

While further planning is required into these high development potential areas, it is recommended that both active and public transport provisions are reviewed and optimised to serve new development areas to the north and east, particularly North Bennett Springs to the east. This will ensure new developments are enabled with diversity in access to the station, while limiting pressures on the surrounding road network and encouraging sustainable modes of transport.

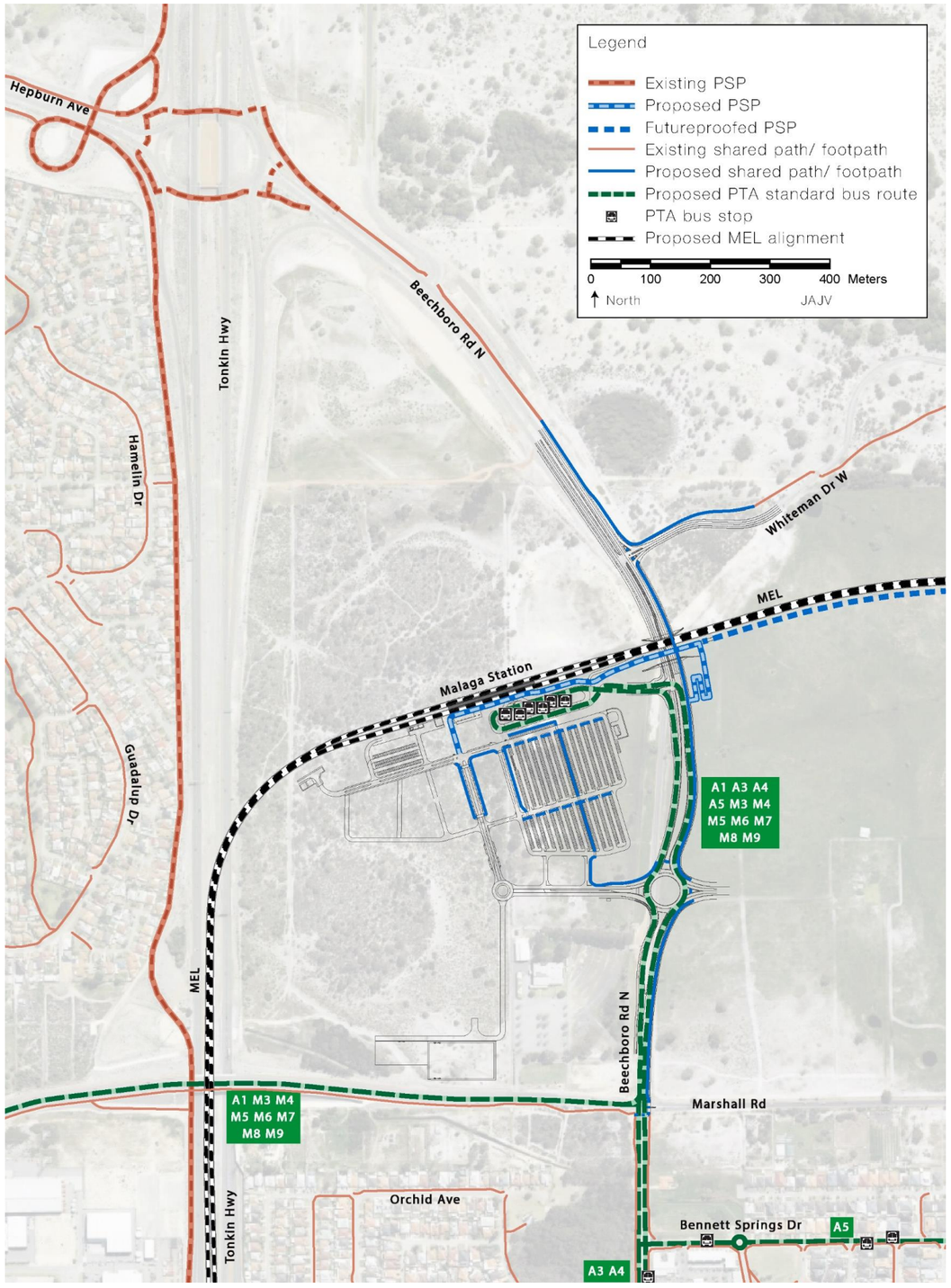


Figure 11: Proposed development and transport infrastructure upgrades

3.2 Proposed access arrangement

3.2.1 Proposed pedestrian and cycling infrastructure

Station precincts have been designed to prioritise safe and easy movement for pedestrians throughout the area. As development around Malaga Station occurs with time, pedestrian and cyclist journeys will become increasingly appealing.

The following improvements are proposed to facilitate pedestrian and cycle access (see Figure 13, Section 5):

- Provision of vertical transport servicing the northern side of the station platform – currently vacant land – to future proof for pedestrian and cycle access when development occurs here, or a flyover to Ballajura is provisioned over the Tonkin Highway
- Provision of access from Tonkin Highway PSP to Malaga Station and wider MEL PSP via the existing shared path along Marshall Road which will connect with the proposed shared path along Beechboro Road North
- Futureproofed PSP from Malaga Station to Whiteman Park Station running adjacent to the rail line for approximately 4.3 kilometres
- Addition of pedestrian signals/ phasing for Beechboro Rd North intersection
- Clear signage and/or separating cyclists and pedestrian traffic may be required at the Tonkin PSP and pedestrian/cyclist overpass intersection. This should be closely monitored in the future for potential conflicts between pedestrians and cyclists that could occur.
- 72 secure bicycle parking in a locked cycle shelter – proposed as double stacked racks. These will utilise Transperth's existing secure cycle storage system, requiring registration and use of a SmartRider card for access.

3.2.2 Proposed public transport provisions

The introduction of Malaga Station and MEL will provide a significant increase to public transport provisions in the proposed area. Malaga Station will provide access to Bayswater station for southbound patrons and access to the north-eastern suburbs (Dayton, Brabham, Aveley, Ellenbrook and The Vines) for northbound patrons via HRT.

Five services per hour (in each direction) are anticipated to operate during peak periods. During the inter-peak periods, four services per hour (in each direction) are anticipated to operate, with approximately two services per hour in the evening hours (in each direction). The hours of operation for the MEL line and this station are planned to align with existing operations across the Transperth rail network.

Given the anticipated commuter demand for the station, a bus interchange at Malaga Station is required in order to increase connectivity and improve access to the station for additional bus services. The concept design, including additional bus service routes as indicated by the PTA, is shown in Figure 11. A signalised intersection and dedicated turning slip-lane have been proposed at the entrance to the Station in order to facilitate safe access to/ from the facility from the future dual carriageway on Marshall Rd.

The minimum requirements for the interchange facility were discussed with PTA as part of the development of the concept design. These include 12 active stands (10 standard and 2 articulated) and 8 layover stands (6 standard and 2 articulated).

The bus routes proposed to service the future Malaga Station bus interchange will replace the existing routes 345 and 362, while stops located at the bus interchange are well within a 400m walk to the station entry building. Anticipated frequencies vary from twelve services per hour to three and are provided in more detail in Section 4.

3.2.3 Proposed vehicle access and parking

The station design has been undertaken to allow for station access for commuter and service vehicles, and for buses travelling to and from the bus interchange. This design has been informed on the basis of the assessment completed for Stage 1 traffic modelling approval as outlined within the Main Roads WA Traffic Signals Approvals Policy (TSAP).

The incorporation of access points to and from Malaga Station within the road network, together with future projects anticipated by Main Roads (along Beechboro Road North and Marshall Road) will result in changes to the layout of the surrounding road network. These changes are depicted in Figure 12 and include:

- Beechboro Road North upgraded to dual carriageway north of Marshall Road to the Tonkin Highway Interchange, connecting with Hepburn Avenue to the west;
- Upgrade of Marshall Road to dual carriageway in the vicinity of the Malaga precinct (i.e. east of Beechboro Road North to Drumpellier Drive)
- Addition of a new signalised intersection on Beechboro Road North, approximately 670 metres north of Marshall Road. This report will refer to this intersection as 'Beechboro Road North/ Bus Interchange Access' which will provide access for buses accessing and egressing the bus interchange. This access will only be utilised by Transperth buses, emergency vehicles and other authorised Transperth vehicles.
- Addition of a new dual-lane roundabout on Beechboro Road North, approximately 315 metres north of Marshall Road. This report will refer to this intersection as 'Beechboro Road North/ Park n Ride/ Kiss n Ride Access which will provide access for vehicles associated with the Malaga Station Park n Ride facility

Due to its location adjacent to several established residential catchments, Malaga Station will serve as a major PnR destination. As such, a reasonably sized PnR facility with the provision of 1,087 bays has been allocated to account for this. A KnR facility has also been allocated to the south west of the station entry building.

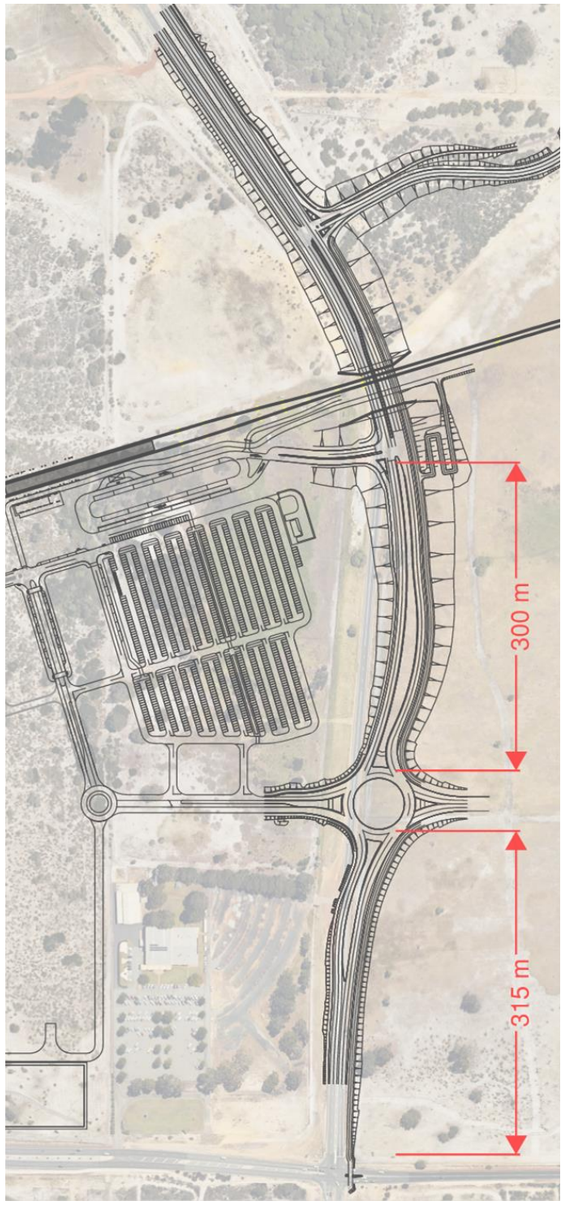


Figure 12: Proposed road network upgrades

4 Access strategy

4.1 Pedestrian and cyclist access

The pedestrian and cyclist catchment surrounding the Malaga Station development will be serviced by connections both internal to the station precinct and the wider network. Future connections in the study area detailed in the Long Term Cycle Network (LTCN) plan have also been considered as part of this strategy.

Active transport access to the station is primarily serviced by the introduction of a new PSP running along the eastern edge of the realigned Beechboro Road North. The PSP then links to the wider PSP network by connecting with the existing Tonkin Highway PSP from a new ramp on the western side of the Marshall Road bridge. Users of this PSP will be able to reach the proposed bike shelters in the Malaga Station precinct while being entirely segregated from vehicular traffic and without having to cross a road through the proposed footpath switchback east of the bus interchange access.

It is also proposed to futureproof a PSP running along the southern side of the MEL alignment, connecting with the Malaga Station precinct north of the bus interchange access from Beechboro Road North.

In addition, the new shared paths proposed along the eastern side of Beechboro Road North heading northbound towards the Tonkin Highway/ Beechboro Road North roundabout will provide secondary at-grade access to the station for pedestrians and cyclists. Figure 13 shows the key connections surrounding the site.

In addition to the proposed cycling provisions, the following additional measures are recommended:

- To support access for northbound patrons accessing from Beechboro Road North south of Marshall Road, it is recommended that the Marshall Road/ Beechboro Road North signalised intersection is modified to allow a signal phase for pedestrians. This would allow pedestrians and cyclists to cross safely at the intersection and connect them with the proposed PSP running along the eastern edge of Beechboro Road North.
- The futureproofed PSP along the rail alignment to the east should be constructed as a priority. It is understood that the development of this route is tied to the planned residential developments of Bennett Springs East.
- Provision of shared path connection to Ballajura by flyover across Tonkin Highway should be delivered as a priority project. This is detailed in the LTCN and City of Swan's 2051 Cycle Network Plan (see Section 2.3, Figure 8) and will provide direct active transport access to the existing residents.

4.2 Public transport access

The public transport network proposed to service the Malaga Station precinct and surrounding area is illustrated in Figure 14. The precinct will be primarily serviced by the MEL passenger rail service that will operate eastbound towards Whiteman Park and southbound towards Noranda.

The station will also be serviced by a number of feeder bus services connecting the station to wider residential areas primarily to the south, east and west of the precinct. Proposed routes include a number of new bus services that will replace the existing services in the surrounding area.

The services will access the Malaga Station bus interchange by turning left from Beechboro Road North left-in slip lane. Upon exiting the bus interchange, services will turn right onto Beechboro Road North at the signalised intersection on its own dedicated signal phase free of an conflicting movements before accessing the wider network at the Marshall Road/ Beechboro Road North intersection.

It is anticipated that public transport users will encounter limited issues in accessing services. Based on the latest design, conflict points between pedestrians and vehicles are avoided due to the bus interchange's prioritised location at in front of the station entry building.

While planning for the surrounding area is limited and future road layouts are unconfirmed, it is recommended that proposed services are reviewed to enable new developments to the north and east of the station are well serviced by public transport, with bus stops within 400m of dwellings.

It would be prudent for bus priority measures to be considered at the proposed conversion of Marshall Road/Beechboro Road North intersection into a dual-lane roundabout. This should form part of City of Swan's future study on this proposed conversion and the impact of the planned land development surrounding Malaga Station. This is to be conducted as a separate study to the TIA detailed in this report.

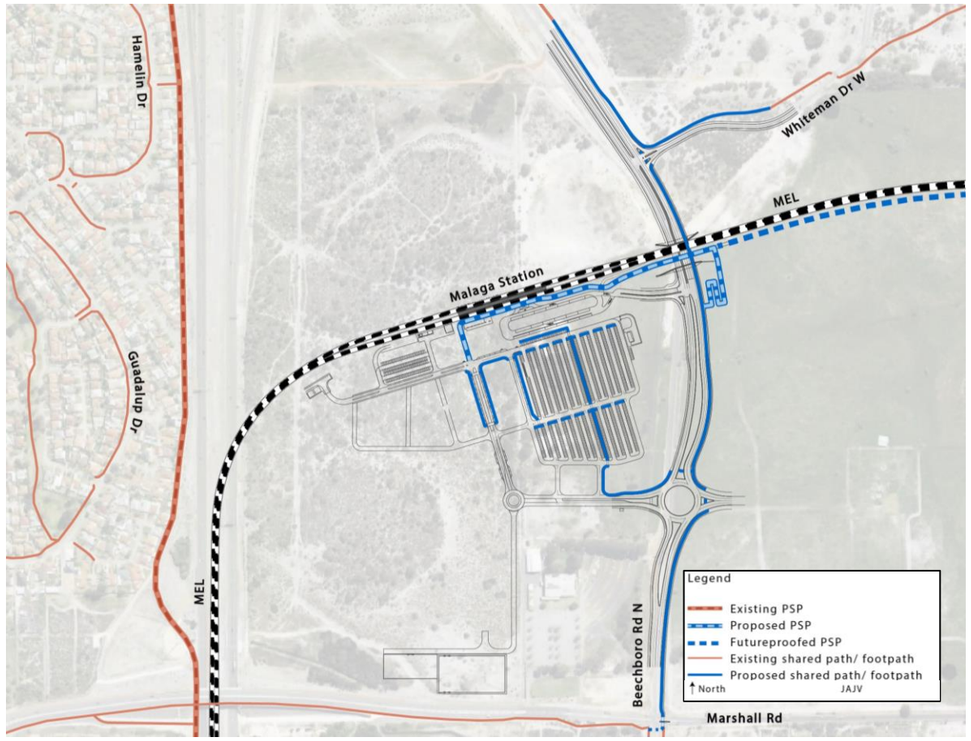


Figure 13: Pedestrian and cycling connections surrounding the development

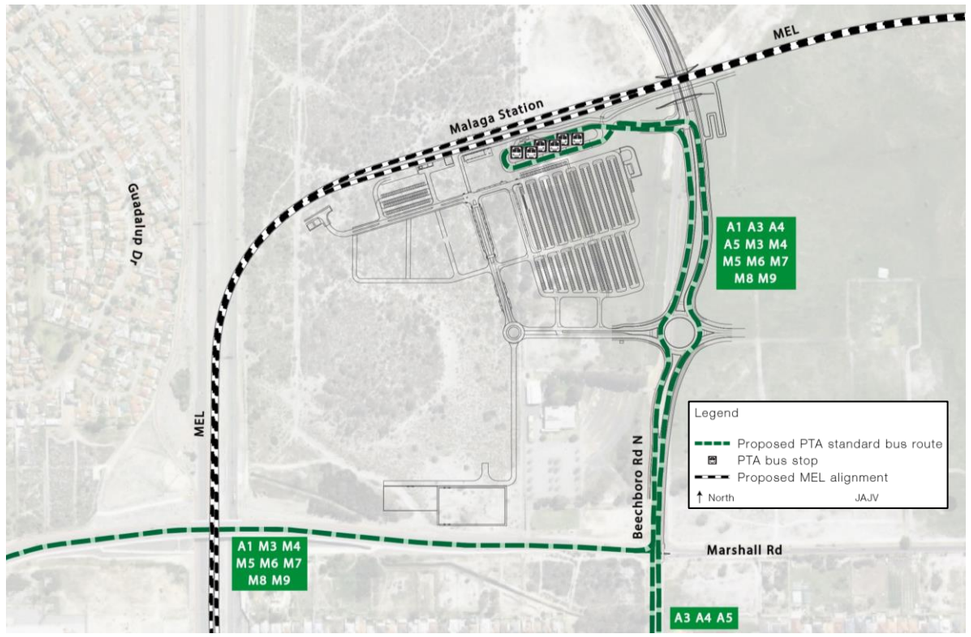


Figure 14: Public transport provisions surrounding the development

4.3 Vehicular access

Based on the proposed access arrangement and modification of existing roads as described in Section 3.1, Figure 15 illustrates the proposed inbound and outbound routes from various origin and destination points surrounding the station precinct. As shown, access and egress to the station PnR and KnR facilities will be facilitated by the proposed access road off the Beechboro Road North roundabout.

During the AM peak period, inbound vehicles from the south, east and west will achieve access via the Marshall Road/ Beechboro Road North signalised intersection before turning left at the roundabout into the station precinct. As shown, these vehicles will be required to yield for vehicles accessing the station from the north, however it is indicated by the modelling exercise that this will likely not lead to significant problems.

In the PM peak, egressing vehicles are likely to incur limited delays, as it is anticipated that there will be a limited number of northbound vehicles opposing the flow from the PnR/ KnR access road.

Vehicle tracking has been conducted for the design using suitable design vehicles – this is attached for reference in Appendix E.

4.3.1 Parking and parking management

A 1,087 bay PnR facility is proposed at Malaga Station to support patronage to the MEL passenger rail service. A breakdown of the facility comprises:

- 1042 standard all-day bays
- 15 standard short-term bays
- 1 tenant bay
- 2 EV charging bays
- 21 ACROD bays
- 2 service/loading bays
- 4 staff bays

20 sheltered motorcycle bays are also provided within the PnR (in addition to the 1,087 car bays). These bays (with the exception of the short-term bays) will be available for all-day parking for station passengers. This will be controlled through the existing SmartParker regime, which requires those using the facility to have a registered SmartRider pass associated with their vehicle, and pay a small parking fee – currently $2.

In addition to this, a 13 bay Kiss and Ride (KnR) facility comprising:

- 11 standard pick-up/ drop-off (PUDO) bays
- 1 accessible PUDO bays
- 1 taxi PUDO bays

These bays will be restricted as 5-minute pick-up/drop-off bays only.

Both the PnR and KnR facilities will be managed, controlled and enforced by Transperth operations.

As indicated by Figure 15, both access points to the PnR offer access and egress movements, enabling better circulation and multiple opportunities to enter and exit the facility.

The following points are recommended for consideration as the design of the facility is progressed:

- Future mixed-use development has been proposed around Malaga Station west of the KnR and PnR facilities. Whilst planning is yet to be undertaken and the access arrangement for the development is yet to be determined, it is understood that the station car park is to be shared with the proposed future development. It is recommended that the PTA engage developers early in the process to understand the requirements of the car park in meeting demand. Parking for the Malaga Station development should be considered holistically, rather than just focusing on the station parking in isolation. This includes providing adequate access for vehicles and the safe movement of pedestrians to/ from their vehicles.

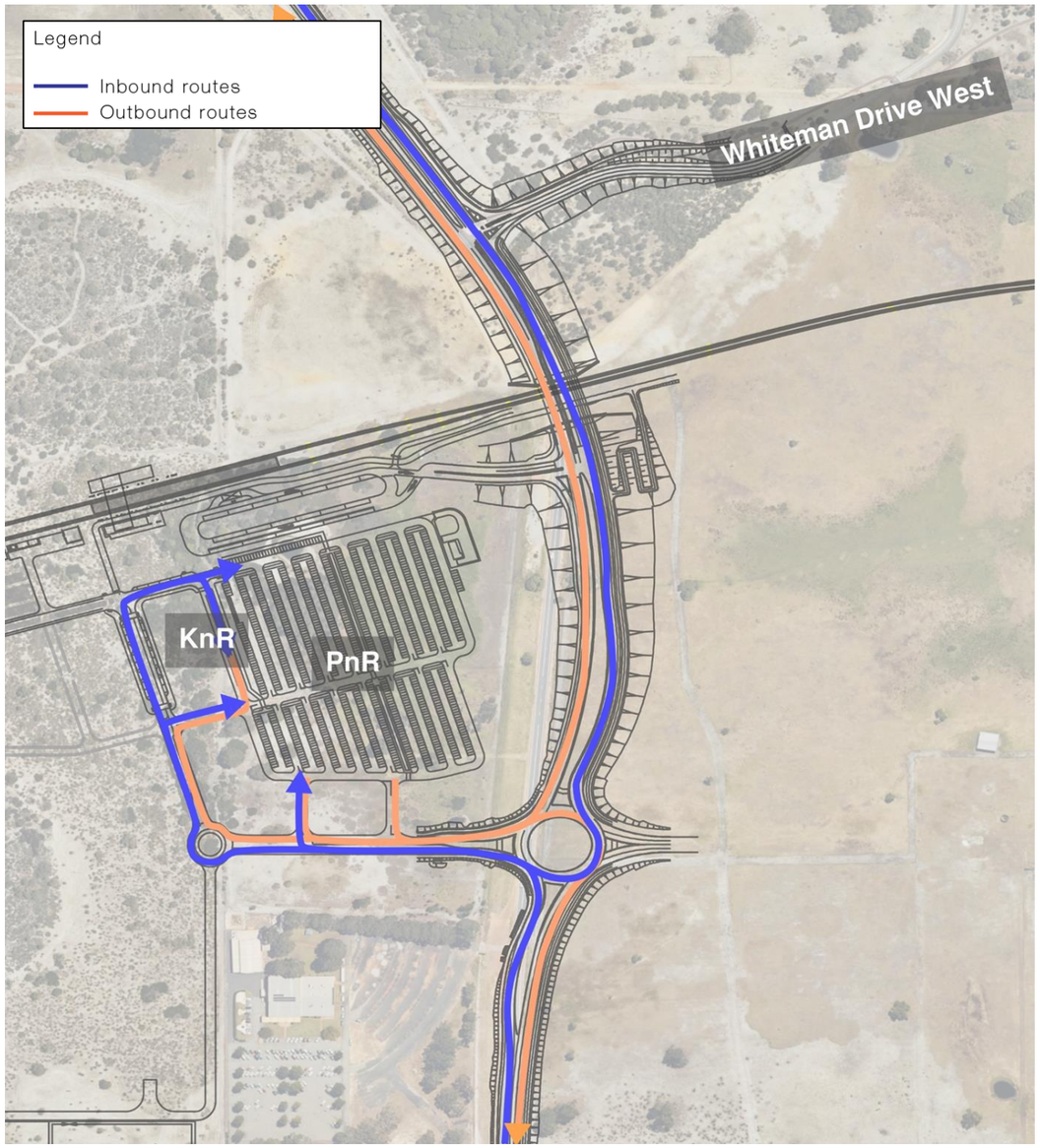


Figure 15: Primary Inbound and outbound routes for the PnR and KnR facilities

5 Traffic impact analysis

A local assessment of the surrounding network performance has been undertaken to assess the planned configuration of the future network with the proposed station access arrangements for each precinct, including Park n Ride, Kiss n Ride, and bus interchange access points. This analysis will also demonstrate high-level accessibility and safety considerations for active transport modes.

5.1 Assumptions and parameters

5.1.1 Proposed site plan

Traffic modelling for Malaga has been undertaken based on the proposed station configuration, as described in previous sections, and the likely impacts station generated traffic will have on the surrounding road network.

5.1.2 Assessment years

The scenarios that have been investigated for the transport assessment on the proposed surrounding road network have included the following:

- 2019 AM/ PM peaks – Base modelling year

Project cases – completed as part of the base modelling assessment

- 2024 AM/ PM peaks – Opening year of Malaga Station
- 2029 AM/ PM peaks – Opening of Malaga Station +5 years
- 2034 AM/ PM peaks – Opening of Malaga Station +10 years.

5.1.3 Background future trip growth

Background traffic demands have been based on STEM link volumes on an all-day level. These all-day STEM link volumes have been provided for the following years:

- 2016 (Base)
- 2021
- 2026
- 2031
- 2041.

Based on the all-day STEM link volumes the Main Roads WA Urban Road Planning (URP) approach has been utilised to assess peak hour forecast volumes from all-day STEM forecasts. The step-by-step process used to determine the background traffic growth for each relevant year is detailed as follows:

1. Compare the all-day STEM 2016 and 2021 outputs using linear growth to create an all-day STEM 2020 demand (on a link level), adopted from STEM (MULFS v1.6.1)
2. Compare calculated all-day STEM 2020 to the all-day observed traffic volumes obtained from the video survey (on a link level) to identify the all-day flow differences for each link volume to obtain the calibrated STEM adjustment factor
3. Apply the calibrated STEM adjustment factor to the provided all-day STEM demands (on a link level). This creates an all-day project demand (on a link level)
4. Apply the identified peak one-hour factors (on a link level) based on 2020 video survey* to the all-day project demands to create link volume AM and PM peak hour project demands
5. Apply the turning distribution as defined in the 2020 video survey, to the link AM and PM peak project demands, resulting in the AM and PM peak hour turning movements by approach.

*Base modelling was completed utilising existing counts retrieved for December 2019. As part of the forecast assessment, these counts were considered more reflective of 2020 conditions, hereafter referred to as 2020 video survey counts.

Following consultation with the METRONET team, the traffic forecasts for the Malaga Station precinct were endorsed on the 7th September 2020. These final demand forecasts have been provided within **Appendix A.**

5.2 Trip generation and distribution

5.2.1 Park n Ride (PnR)/ Kiss and Ride (KnR) traffic generation and distribution

The anticipated PnR and KnR traffic has been calculated based on the benchmarking of existing stations. Surveyed information collected for Murdoch Station on the 4th April 2011 between 5am – 10:00pm has been sourced as a comparison. This station profile was utilised to understand the anticipated peak hour demand attributed to the Malaga Station PnR and KnR due to the similar number of bays assumed at both stations and the similar distance to the Perth CBD.

The profile indicates that PnR demand rapidly increases in the morning, remains relatively unchanged between 8am and 2pm, and drops significantly in the evening between 3pm – 6pm. The findings of the benchmarked station profile analysis are described as follows:

- During the morning peak hour, the PnR facility is indicated to fill by approximately 66% of total capacity
- During the evening peak hour, the PnR facility is indicated to empty by approximately 44% of total capacity.

As conservative assumption, the PnR peak inbound and outbound movements will coincide with the commuter peak and the facility will operate at capacity from opening day.

For KnR traffic, the profile for the benchmarked station has been utilised for the number of KnR traffic movements within each 15-minute time period between 5am-10pm.

Analysis of the KnR morning and evening peaks have been calculated as a function of the benchmarked station PnR capacity. The findings of this analysis have been shown below.

- During the morning peak hour, the total trips within the KnR is indicated to represent approximately 22% of the Park n Ride capacity.
- During the evening peak hour, the total trips within the KnR is indicated to represent approximately 16% of the Park n Ride capacity.

Based on the benchmarked profile analysis, the additional PnR and KnR traffic for Malaga Station is shown within Table 2. This demand is assumed to be consistent for all future modelling scenarios.

Table 2: Generated traffic demand – PnR and KnR facilities

	PnR demand (veh/ %)		KnR demand (veh/ %)		Total (veh)	
Peak	Inbound	Outbound	Inbound	Outbound	Inbound	Outbound
AM peak hour	792 (66%)	0	264 (22%)	264 (22%)	1,056	264
PM peak hour	0	540 (45%)	192 (16%	192 (16%)	192	732

The traffic attributed to the station PnR and KnR facility has then been distributed based on all-day STEM Turning Volume Diagrams (TVDs) supplied by METRONET on 3rd August 2020. This allows an understanding of where inbound and outbound traffic come from and go to within the peak period. This assumed station traffic distributions are shown within Table 3.

Table 3: PnR and KnR traffic distribution

	Distribution of Inbound traffic		Distribution of Outbound traffic	
Associated STEM year	From North	From South	To the North	To the South
2026 onwards	53%	47%	64%	36%