

Volume 1 – Main Environmental Impact Statement

Contents

Volume 1A

Certification i

Executive summary iii

Part A Introduction and background

| | | |
|-----|--|------|
| 1. | Introduction..... | 1.1 |
| 1.1 | Background | 1.1 |
| 1.2 | The project for which approval is sought | 1.3 |
| 1.3 | Project need and benefits | 1.9 |
| 1.4 | Purpose and structure of the Environmental Impact Statement | 1.11 |
| 2. | Location and setting | 2.1 |
| 2.1 | Definitions used in this Environmental Impact Statement | 2.1 |
| 2.2 | Location of the project and the project area | 2.2 |
| 2.3 | General biophysical environment..... | 2.9 |
| 2.4 | General social and cultural environment | 2.10 |
| 3. | Planning and assessment process | 3.1 |
| 3.1 | NSW environmental planning approvals..... | 3.1 |
| 3.2 | Requirements under other legislation | 3.4 |
| 3.3 | Summary of approval and notification requirements | 3.8 |
| 4. | Stakeholder and community consultation | 4.1 |
| 4.1 | Consultation approach and objectives | 4.1 |
| 4.2 | Consultation and engagement activities to date | 4.2 |
| 4.3 | Results of consultation relevant to this Environmental Impact Statement..... | 4.7 |
| 4.4 | Future consultation and engagement | 4.9 |

Part B The project

| | | |
|-----|--|-----|
| 5. | Project need | 5.1 |
| 5.1 | Need for the project | 5.1 |
| 5.2 | Strategic context | 5.7 |
| 5.3 | Project benefits | 5.9 |
| 6. | Project alternatives and options | 6.1 |
| 6.1 | Strategic transport alternatives | 6.1 |
| 6.2 | Rail network alternatives..... | 6.3 |
| 6.3 | Rail line conversion options | 6.6 |

| | | |
|------|--|------|
| 6.4 | The ‘do nothing’ alternative..... | 6.10 |
| 6.5 | Station design, location and upgrade options..... | 6.11 |
| 6.6 | Possession options | 6.12 |
| 6.7 | Preferred project | 6.14 |
| 6.8 | Potential future network expansion opportunities | 6.14 |
| 7. | Design development and place making | 7.1 |
| 7.1 | Design development | 7.2 |
| 7.2 | Understanding place | 7.3 |
| 7.3 | Design | 7.8 |
| 7.4 | Responses to stakeholder and community feedback | 7.18 |
| 7.5 | Impacts avoided | 7.24 |
| 7.6 | Summary of key design outcomes..... | 7.25 |
| 7.7 | Detailed design guidelines | 7.29 |
| 8. | Project description – operation..... | 8.1 |
| 8.1 | Project infrastructure and features..... | 8.1 |
| 8.2 | Property requirements | 8.46 |
| 8.3 | Operation of the project | 8.49 |
| 9. | Project description – construction | 9.1 |
| 9.1 | Overview | 9.2 |
| 9.2 | Enabling works..... | 9.8 |
| 9.3 | Station works..... | 9.10 |
| 9.4 | Corridor works..... | 9.12 |
| 9.5 | Associated infrastructure | 9.14 |
| 9.6 | Finishing, testing and commissioning | 9.15 |
| 9.7 | Construction program and timing..... | 9.16 |
| 9.8 | Construction compounds, work sites and access..... | 9.20 |
| 9.9 | Workforce and construction resources | 9.28 |
| 9.10 | Utilities management | 9.31 |
| 9.11 | Alternative transport arrangements..... | 9.32 |

Volume 1B

Part C Environmental impact assessment

| | | |
|------|---|-------|
| 10. | Construction traffic, transport and access..... | 10.1 |
| 10.1 | Assessment approach | 10.2 |
| 10.2 | Existing environment..... | 10.5 |
| 10.3 | Basis for the construction phase assessment | 10.33 |
| 10.4 | Potential impacts..... | 10.46 |
| 10.5 | Mitigation measures..... | 10.79 |
| 11. | Operational traffic, transport and access | 11.1 |
| 11.1 | Assessment approach | 11.2 |
| 11.2 | Existing environment..... | 11.2 |

| | | |
|------|--|--------|
| 11.3 | Design approach | 11.3 |
| 11.4 | Impact assessment | 11.6 |
| 11.5 | Mitigation measures | 11.38 |
| 12. | Construction noise and vibration | 12.1 |
| 12.1 | Assessment approach | 12.1 |
| 12.2 | Construction noise and vibration criteria | 12.4 |
| 12.3 | Existing environment | 12.13 |
| 12.4 | Basis of the construction noise assessment | 12.15 |
| 12.5 | Potential impacts | 12.19 |
| 12.6 | Mitigation measures | 12.105 |
| 13. | Operational noise and vibration | 13.1 |
| 13.1 | Assessment approach | 13.1 |
| 13.2 | Operational noise and vibration criteria | 13.5 |
| 13.3 | Existing environment | 13.9 |
| 13.4 | Potential impacts | 13.10 |
| 13.5 | Mitigation measures | 13.25 |
| 14. | Non-Aboriginal heritage | 14.1 |
| 14.1 | Assessment approach | 14.2 |
| 14.2 | Existing environment | 14.7 |
| 14.3 | Impact assessment | 14.17 |
| 14.4 | Mitigation measures | 14.71 |
| 15. | Aboriginal heritage | 15.1 |
| 15.1 | Assessment approach | 15.1 |
| 15.2 | Existing environment | 15.3 |
| 15.3 | Impact assessment | 15.5 |
| 15.4 | Mitigation measures | 15.7 |
| 16. | Land use and property | 16.1 |
| 16.1 | Assessment approach | 16.1 |
| 16.2 | Existing environment | 16.2 |
| 16.3 | Future land use | 16.7 |
| 16.4 | Impact assessment | 16.12 |
| 16.5 | Mitigation measures | 16.19 |
| 17. | Socio-economic impacts | 17.1 |
| 17.1 | Assessment approach | 17.1 |
| 17.2 | Existing environment | 17.2 |
| 17.3 | Impact assessment | 17.11 |
| 17.4 | Mitigation measures | 17.27 |
| 18. | Business impacts | 18.1 |
| 18.1 | Assessment approach | 18.1 |
| 18.2 | Existing environment | 18.2 |

| | | |
|------|---|-------|
| 18.3 | Impact assessment | 18.7 |
| 18.4 | Mitigation measures | 18.19 |
| 19. | Landscape character and visual amenity..... | 19.1 |
| 19.1 | Assessment approach | 19.1 |
| 19.2 | Existing environment..... | 19.5 |
| 19.3 | Impact assessment | 19.13 |
| 19.4 | Mitigation measures | 19.34 |
| 20. | Soils and contamination | 20.1 |
| 20.1 | Assessment approach | 20.1 |
| 20.2 | Existing environment..... | 20.2 |
| 20.3 | Impact assessment | 20.7 |
| 20.4 | Mitigation measures | 20.10 |
| 21. | Hydrology, flooding and water quality | 21.1 |
| 21.1 | Assessment approach | 21.2 |
| 21.2 | Existing environment..... | 21.5 |
| 21.3 | Impact assessment | 21.17 |
| 21.4 | Mitigation measures | 21.33 |
| 22. | Biodiversity | 22.1 |
| 22.1 | Assessment approach | 22.1 |
| 22.2 | Existing environment..... | 22.9 |
| 22.3 | Impact assessment | 22.15 |
| 22.4 | Mitigation measures | 22.23 |
| 23. | Air quality..... | 23.1 |
| 23.1 | Assessment approach | 23.1 |
| 23.2 | Existing environment..... | 23.2 |
| 23.3 | Impact assessment | 23.4 |
| 23.4 | Mitigation measures | 23.6 |
| 24. | Sustainability and climate change..... | 24.1 |
| 24.1 | Assessment approach | 24.1 |
| 24.2 | Context for the assessment | 24.4 |
| 24.3 | Assessment results | 24.7 |
| 24.4 | Mitigation measures | 24.11 |
| 25. | Hazards, risks and safety..... | 25.1 |
| 25.1 | Assessment approach | 25.1 |
| 25.2 | Existing environment..... | 25.2 |
| 25.3 | Impact assessment | 25.2 |
| 25.4 | Mitigation measures | 25.8 |
| 26. | Waste management | 26.1 |
| 26.1 | Assessment approach | 26.1 |
| 26.2 | Impact assessment | 26.3 |

| | | |
|-----------------------------|---|-------|
| 26.3 | Mitigation measures | 26.8 |
| 27. | Cumulative impacts | 27.1 |
| 27.1 | Assessment approach | 27.1 |
| 27.2 | Potential cumulative impacts | 27.4 |
| 27.3 | Mitigation measures | 27.7 |
| Part D Conclusion | | |
| 28. | Synthesis of the Environmental Impact Statement | 28.1 |
| 28.1 | Description of the project for which approval is sought | 28.1 |
| 28.2 | Project uncertainties and approach to design refinements..... | 28.5 |
| 28.3 | Compilation of impacts..... | 28.6 |
| 28.4 | Approach to environmental management..... | 28.10 |
| 28.5 | Compilation of mitigation measures..... | 28.13 |
| 28.6 | Compilation of performance outcomes | 28.34 |
| 28.7 | Project justification | 28.37 |
| 28.8 | Conclusion | 28.41 |
| 29. | Reference list, definitions and abbreviations | 29.1 |
| Reference list | | 29.1 |
| Abbreviations | | 29.7 |
| Definitions | | 29.9 |

Table index

Volume 1A

| | | |
|-----------|--|------|
| Table 2.1 | Secretary's environmental assessment requirements – location and setting..... | 2.1 |
| Table 3.1 | Secretary's environmental assessment requirements - planning and assessment..... | 3.1 |
| Table 3.2 | Consideration of requirements under relevant NSW legislation | 3.5 |
| Table 4.1 | Secretary's environmental assessment requirements – consultation..... | 4.1 |
| Table 4.2 | Community contact and information points available during the planning and approval process..... | 4.4 |
| Table 4.3 | Summary of key community issues raised relating to the Environmental Impact Statement..... | 4.8 |
| Table 4.4 | Ongoing consultation and engagement activities | 4.10 |
| Table 5.1 | Secretary's environmental assessment requirements – project need | 5.1 |
| Table 5.2 | Relevant strategies and plans..... | 5.7 |
| Table 5.3 | Estimates of indicative travel time savings | 5.11 |
| Table 6.1 | Secretary's environmental assessment requirements – alternatives and options..... | 6.1 |
| Table 6.2 | Summary of rail network alternatives considered | 6.3 |
| Table 6.3 | Criteria for assessment of rail network alternatives | 6.4 |

| | | |
|------------|---|------|
| Table 6.4 | Summary of the rail network alternatives assessment | 6.5 |
| Table 6.5 | Summary of the options assessment..... | 6.7 |
| Table 6.6 | Preferred conversion options – comparative assessment findings | 6.9 |
| Table 6.7 | Possession and programming options considered | 6.13 |
| Table 7.1 | Secretary's environmental assessment requirements – design development, urban design and place making | 7.1 |
| Table 7.2 | Design objectives and principles..... | 7.9 |
| Table 7.3 | Overview of heritage based design changes | 7.16 |
| Table 7.4 | Examples of community enhancements and positive contributions to place making..... | 7.17 |
| Table 7.5 | Project responses to stakeholder feedback..... | 7.19 |
| Table 7.6 | Project responses to community feedback | 7.23 |
| Table 7.7 | Construction impacts avoided or minimised through design | 7.24 |
| Table 7.8 | Operational impacts avoided or minimised through design..... | 7.25 |
| Table 7.9 | Key design outcomes..... | 7.25 |
| Table 8.1 | Secretary's environmental assessment requirements – project description | 8.1 |
| Table 8.2 | Marrickville Station key design elements..... | 8.8 |
| Table 8.3 | Dulwich Hill Station key design elements | 8.11 |
| Table 8.4 | Hurlstone Park Station key design elements | 8.14 |
| Table 8.5 | Canterbury Station key design elements | 8.17 |
| Table 8.6 | Campsie Station key design elements..... | 8.20 |
| Table 8.7 | Belmore Station key design elements | 8.23 |
| Table 8.8 | Lakemba Station key design elements | 8.26 |
| Table 8.9 | Wiley Park Station key design elements..... | 8.29 |
| Table 8.10 | Punchbowl Station key design elements | 8.32 |
| Table 8.11 | Bankstown Station key design elements | 8.35 |
| Table 8.12 | Works to overbridges and underbridges | 8.41 |
| Table 8.13 | Location and sizing of proposed detention basins..... | 8.45 |
| Table 8.14 | Land acquisition requirements for the project..... | 8.46 |
| Table 8.15 | Public land requirements for the project | 8.47 |
| Table 9.1 | Secretary's environmental assessment requirements – project description | 9.1 |
| Table 9.2 | Number of trees at stations with the potential to be impacted..... | 9.11 |
| Table 9.3 | Construction compound locations..... | 9.21 |
| Table 9.4 | Work sites located outside of the rail corridor | 9.22 |
| Table 9.5 | Estimated construction traffic volumes during possession periods | 9.26 |
| Table 9.6 | Indicative construction workforce estimates | 9.28 |
| Table 9.7 | Indicative material and water usage estimates..... | 9.28 |

| | |
|---|-------|
| Table 9.8 Indicative construction plant and equipment..... | 9.30 |
| Volume 1B | |
| Table 10.1 Secretary's environmental assessment requirements – construction traffic, transport and access..... | 10.1 |
| Table 10.2 Level of service criteria | 10.4 |
| Table 10.3 Transport facilities at Marrickville Station | 10.7 |
| Table 10.4 Parking facilities at Marrickville Station..... | 10.10 |
| Table 10.5 Existing weekday traffic volumes – Marrickville Station..... | 10.11 |
| Table 10.6 Transport facilities at Dulwich Hill Station..... | 10.12 |
| Table 10.7 Parking facilities at Dulwich Hill Station | 10.12 |
| Table 10.8 Existing weekday traffic volumes – Dulwich Hill Station..... | 10.13 |
| Table 10.9 Transport facilities at Hurlstone Park Station..... | 10.14 |
| Table 10.10 Parking facilities at Hurlstone Park Station..... | 10.15 |
| Table 10.11 Existing weekday traffic volumes – Hurlstone Park Station..... | 10.15 |
| Table 10.12 Transport facilities at Canterbury Station..... | 10.16 |
| Table 10.13 Parking facilities at Canterbury Station | 10.17 |
| Table 10.14 Existing weekday traffic volumes – Canterbury Station..... | 10.17 |
| Table 10.15 Transport facilities at Campsie Station | 10.18 |
| Table 10.16 Parking facilities at Campsie Station..... | 10.19 |
| Table 10.17 Existing weekday traffic volumes – Campsie Station | 10.19 |
| Table 10.18 Transport facilities at Belmore Station | 10.21 |
| Table 10.19 Parking facilities at Belmore Station | 10.21 |
| Table 10.20 Existing weekday traffic volumes – Belmore Station | 10.22 |
| Table 10.21 Transport facilities at Lakemba Station..... | 10.23 |
| Table 10.22 Parking facilities at Lakemba Station..... | 10.24 |
| Table 10.23 Existing weekday traffic volumes – Lakemba Station..... | 10.24 |
| Table 10.24 Transport facilities at Wiley Park Station | 10.25 |
| Table 10.25 Parking facilities at Wiley Park Station..... | 10.26 |
| Table 10.26 Existing weekday traffic volumes – Wiley Park Station | 10.27 |
| Table 10.27 Transport facilities at Punchbowl Station | 10.28 |
| Table 10.28 Parking facilities at Punchbowl Station ¹ | 10.28 |
| Table 10.29 Existing weekday daily traffic volumes – Punchbowl Station | 10.29 |
| Table 10.30 Transport facilities at Bankstown Station | 10.30 |
| Table 10.31 Parking facilities at Bankstown Station | 10.31 |
| Table 10.32 Existing weekday daily traffic volumes – Bankstown Station | 10.32 |
| Table 10.33 Potential changes to pedestrian and cycle facilities | 10.33 |

| | |
|--|-------|
| Table 10.34 Indicative modifications to public transport facilities during construction..... | 10.35 |
| Table 10.35 Potential changes to road network for station works | 10.36 |
| Table 10.36 Bridge works – indicative closures and road network changes | 10.37 |
| Table 10.37 Potential road modifications required for construction vehicles..... | 10.42 |
| Table 10.38 Indicative on and off-street car parking changes during construction | 10.49 |
| Table 10.39 Indicative car parking changes at other stations..... | 10.50 |
| Table 10.40 Marrickville Station intersection performance | 10.51 |
| Table 10.41 Dulwich Hill Station intersection performance | 10.53 |
| Table 10.42 Hurlstone Park Station intersection performance | 10.55 |
| Table 10.43 Canterbury Station intersection performance | 10.57 |
| Table 10.44 Campsie Station intersection performance..... | 10.59 |
| Table 10.45 Belmore Station intersection performance..... | 10.61 |
| Table 10.46 Lakemba Station intersection performance | 10.63 |
| Table 10.47 Wiley Park Station intersection performance | 10.65 |
| Table 10.48 Punchbowl Station intersection performance | 10.66 |
| Table 10.49 Bankstown Station intersection performance | 10.68 |
| Table 10.50 Level of service F intersection performance as a result of bridge works..... | 10.72 |
| Table 10.51 Cumulative intersection performance at Sydenham Station..... | 10.79 |
| Table 10.52 Mitigation measures – construction traffic and transport | 10.80 |
| Table 11.1 Secretary's environmental assessment requirements – operational traffic, transport and access | 11.1 |
| Table 11.2 Existing and proposed station facilities | 11.5 |
| Table 11.3 Existing and forecast station travel volumes ¹ | 11.12 |
| Table 11.4 Station servicing arrangements | 11.13 |
| Table 11.5 Potential changes to travel patterns to key centres | 11.14 |
| Table 11.6 Indicative parking changes at stations | 11.16 |
| Table 11.7 Mitigation measures – operational traffic and transport..... | 11.38 |
| Table 12.1 Secretary's environmental assessment requirements – noise and vibration | 12.1 |
| Table 12.2 Construction NMLs for other sensitive receivers | 12.10 |
| Table 12.3 Construction NMLs for residential receivers | 12.11 |
| Table 12.4 Noise criteria for construction vehicles on public roads..... | 12.11 |
| Table 12.5 Vibration dose value ranges which may result in adverse comments from occupants within residential buildings..... | 12.12 |
| Table 12.6 Minimum safe working distances for vibration intensive plant..... | 12.12 |
| Table 12.7 Summary of unattended noise monitoring (June/July 2016) | 12.14 |
| Table 12.8 Typical duration of construction activities and noise intensive plant | 12.16 |

| | |
|---|-------|
| Table 12.9 Predicted maximum noise level at the most exposed residential receiver during the daytime..... | 12.21 |
| Table 12.10 Predicted maximum noise level at the most exposed residential receiver during the evening..... | 12.22 |
| Table 12.11 Predicted maximum noise level at the most exposed residential receiver during the night-time | 12.23 |
| Table 12.12 Predicted maximum noise level at the most exposed commercial receiver during the daytime..... | 12.24 |
| Table 12.13 Duration of noise intensive works resulting in greatest number of 'highly noise affected' residential receivers | 12.26 |
| Table 12.14 Road traffic noise exceedances for construction traffic and buses - summary | 12.28 |
| Table 12.15 Activities and durations which result in 'highly noise affected' residential receivers in Marrickville | 12.33 |
| Table 12.16 Activities which result in sleep disturbance exceedance in Marrickville - all receivers..... | 12.36 |
| Table 12.17 Heritage buildings and structures within the minimum recommended offset to avoid cosmetic damage | 12.38 |
| Table 12.18 Activities and durations which result in 'highly noise affected' residential receivers in Dulwich Hill..... | 12.41 |
| Table 12.19 Activities which result in sleep disturbance exceedance in Dulwich Hill - all receivers..... | 12.43 |
| Table 12.20 Road traffic noise exceedances from construction traffic and buses – Dulwich Hill.... | 12.44 |
| Table 12.21 Heritage buildings and structures within the minimum recommended offset to avoid cosmetic damage | 12.45 |
| Table 12.22 Activities and durations which result in 'highly noise affected' residential receivers in Hurlstone Park..... | 12.49 |
| Table 12.23 Activities which result in sleep disturbance exceedance in Hurlstone Park - all receivers..... | 12.52 |
| Table 12.24 Heritage buildings and structures within the minimum recommended offset to avoid cosmetic damage | 12.54 |
| Table 12.25 Activities and durations which result in 'highly noise affected' residential receivers in Canterbury..... | 12.57 |
| Table 12.26 Activities which result in sleep disturbance exceedance in Canterbury - all receivers..... | 12.58 |
| Table 12.27 Road traffic noise from construction traffic and buses – Canterbury..... | 12.59 |
| Table 12.28 Heritage buildings and structures within the minimum recommended offset to avoid cosmetic damage | 12.60 |
| Table 12.29 Activities and durations which result in 'highly noise affected' residential receivers in Campsie | 12.64 |
| Table 12.30 Activities which result in sleep disturbance exceedance in Campsie - all receivers ... | 12.67 |

| | |
|---|--------|
| Table 12.31 Heritage buildings and structures within the minimum recommended offset to avoid cosmetic damage | 12.69 |
| Table 12.32 Activities and durations which result in ‘highly noise affected’ residential receivers in Belmore | 12.73 |
| Table 12.33 Activities which result in sleep disturbance exceedance in Belmore - all receivers | 12.75 |
| Table 12.34 Heritage buildings and structures within the minimum recommended offset to avoid cosmetic damage | 12.77 |
| Table 12.35 Activities and durations which result in ‘highly noise affected’ residential receivers in Lakemba..... | 12.80 |
| Table 12.36 Activities which result in sleep disturbance exceedance in Lakemba - all receivers... | 12.82 |
| Table 12.37 Heritage buildings and structures within the minimum recommended offset to avoid cosmetic damage | 12.84 |
| Table 12.38 Activities and durations which result in ‘highly noise affected’ residential receivers in Wiley Park | 12.87 |
| Table 12.39 Activities which result in sleep disturbance exceedance in Wiley Park - all receivers | 12.88 |
| Table 12.40 Heritage buildings and structures within the minimum recommended offset to avoid cosmetic damage | 12.90 |
| Table 12.41 Activities and durations which result in ‘highly noise affected’ residential receivers in Punchbowl..... | 12.93 |
| Table 12.42 Activities which result in sleep disturbance exceedance in Punchbowl - all receivers | 12.95 |
| Table 12.43 Heritage buildings and structures within the minimum recommended offset to avoid cosmetic damage | 12.97 |
| Table 12.44 Activities and durations which result in ‘highly noise affected’ residential receivers in Bankstown..... | 12.100 |
| Table 12.45 Activities which result in sleep disturbance exceedance in Bankstown - all receivers | 12.102 |
| Table 12.46 Number of buildings within the minimum recommended offset from a hydraulic breaker to avoid cosmetic damage | 12.103 |
| Table 12.47 Predicted noise levels from traction power cable works..... | 12.104 |
| Table 12.48 Mitigation measures – construction noise and vibration | 12.106 |
| Table 13.1 Secretary’s environmental assessment requirements – noise and vibration | 13.1 |
| Table 13.2 Train volume estimates..... | 13.3 |
| Table 13.3 Definition of noise related terms | 13.4 |
| Table 13.4 Airborne rail noise trigger levels for residential land use | 13.5 |
| Table 13.5 Airborne rail noise trigger levels for sensitive land uses other than residential..... | 13.5 |
| Table 13.6 Amenity criteria for industrial noise sources | 13.6 |
| Table 13.7 Industrial Noise Policy criteria for substation operation | 13.6 |
| Table 13.8 Industrial Noise Policy criteria for station noise | 13.7 |
| Table 13.9 Acceptable maximum vibration dose values for intermittent vibration..... | 13.8 |
| Table 13.10 Groundborne noise trigger levels..... | 13.8 |

| | |
|--|-------|
| Table 13.11 Predicted 2024 and 2034 airborne noise levels at most exposed receiver – residential receivers | 13.12 |
| Table 13.12 Predicted 2024 and 2034 airborne noise levels at most exposed receiver – non-residential receivers | 13.14 |
| Table 13.13 Summary of locations eligible for consideration of mitigation | 13.22 |
| Table 13.14 Predicted noise levels from substations at the most potentially affected receiver | 13.23 |
| Table 13.15 Receivers in Marrickville where the groundborne noise criteria is exceeded | 13.24 |
| Table 13.16 Preliminary reasonable and feasible noise mitigation options | 13.26 |
| Table 13.17 Mitigation measures – operational noise and vibration..... | 13.26 |
| Table 14.1 Secretary's environmental assessment requirements – non-Aboriginal heritage | 14.1 |
| Table 14.2 Terminology for assessing the magnitude of heritage impact | 14.5 |
| Table 14.3 Historical development of stations within the project area..... | 14.8 |
| Table 14.4 State heritage listed items and station listings | 14.10 |
| Table 14.5 Listed and proposed heritage conservation areas..... | 14.11 |
| Table 14.6 Marrickville Station – heritage items | 14.19 |
| Table 14.7 Summary of direct impacts to significant elements within the Marrickville Railway Station Group | 14.20 |
| Table 14.8 Potential vibration impacts | 14.23 |
| Table 14.9 Dulwich Hill Station – heritage items..... | 14.24 |
| Table 14.10 Summary of direct impacts to significant elements within the Dulwich Hill Railway Station Group | 14.25 |
| Table 14.11 Potential vibration impacts | 14.27 |
| Table 14.12 Hurlstone Park Station – heritage items | 14.29 |
| Table 14.13 Summary of direct impacts to significant elements within the Hurlstone Park Railway Station Group | 14.29 |
| Table 14.14 Potential vibration impacts | 14.32 |
| Table 14.15 Canterbury Station – heritage items | 14.33 |
| Table 14.16 Summary of direct impacts to significant elements within the Canterbury Railway Station Group | 14.33 |
| Table 14.17 Potential vibration impacts | 14.36 |
| Table 14.18 Campsie Station – heritage items | 14.39 |
| Table 14.19 Summary of direct impacts to significant elements within the Campsie Railway Station Group | 14.39 |
| Table 14.20 Potential vibration impacts | 14.42 |
| Table 14.21 Belmore Station – heritage items..... | 14.44 |
| Table 14.22 Summary of direct impacts to significant elements within the Belmore Railway Station Group | 14.44 |
| Table 14.23 Potential vibration impacts | 14.46 |

| | |
|---|-------|
| Table 14.24 Lakemba Station – heritage items | 14.49 |
| Table 14.25 Summary of direct impacts to significant elements within the Lakemba Railway Station Group | 14.49 |
| Table 14.26 Potential vibration impacts | 14.52 |
| Table 14.27 Wiley Park Station – heritage items..... | 14.53 |
| Table 14.28 Summary of direct impacts to significant elements within the Wiley Park Railway Station Group | 14.53 |
| Table 14.29 Potential vibration impacts | 14.55 |
| Table 14.30 Punchbowl Station – heritage items..... | 14.57 |
| Table 14.31 Summary of direct impacts to significant elements within the Punchbowl Railway Station Group | 14.57 |
| Table 14.32 Potential vibration impacts | 14.59 |
| Table 14.33 Bankstown Station – heritage items..... | 14.60 |
| Table 14.34 Summary of direct impacts to significant elements within the Bankstown Railway Station Group | 14.61 |
| Table 14.35 Potential vibration impacts | 14.63 |
| Table 14.36 Mitigation measures – non-Aboriginal heritage | 14.71 |
| Table 15.1 Secretary's environmental assessment requirements – Aboriginal heritage..... | 15.1 |
| Table 15.2 Aboriginal heritage assessment findings | 15.6 |
| Table 15.3 Mitigation measures – Aboriginal heritage..... | 15.7 |
| Table 16.1 Secretary's environmental assessment requirements – land use and property | 16.1 |
| Table 16.2 Draft Urban Renewal Corridor Strategy – key proposals | 16.10 |
| Table 16.3 Property acquisition requirements | 16.13 |
| Table 16.4 Public land requirements | 16.13 |
| Table 16.5 Impacts of temporary construction sites and ancillary facilities on land use | 16.15 |
| Table 16.6 Key potential land use changes at stations | 16.16 |
| Table 16.7 Mitigation measures – land use and property | 16.19 |
| Table 17.1 Secretary's environmental assessment requirements – social impacts | 17.1 |
| Table 17.2 Community facilities potentially affected by the project | 17.15 |
| Table 17.3 Social benefits at each station | 17.25 |
| Table 17.4 Mitigation measures – socio-economic impacts | 17.28 |
| Table 18.1 Secretary's environmental assessment requirements – business impacts | 18.1 |
| Table 18.2 Business and employment profile of local business precincts..... | 18.5 |
| Table 18.3 Business precinct resident and employee preferred travel modes..... | 18.6 |
| Table 18.4 Potential impacts of station and track closures..... | 18.11 |
| Table 18.5 Sensitivity to road network changes | 18.11 |
| Table 18.6 Potential impacts as a result of bridge works | 18.12 |

| | |
|---|-------|
| Table 18.7 Mitigation measures – business impacts | 18.20 |
| Table 19.1 Secretary's environmental assessment requirements – visual and landscape | 19.1 |
| Table 19.2 Sensitivity level definitions | 19.3 |
| Table 19.3 Modification level definitions | 19.3 |
| Table 19.4 Environmental zone sensitivity – night-time..... | 19.4 |
| Table 19.5 Landscape character areas and sensitivity..... | 19.5 |
| Table 19.6 Daytime viewpoint locations and sensitivity..... | 19.6 |
| Table 19.7 Marrickville Station – landscape character impacts..... | 19.16 |
| Table 19.8 Marrickville Station – daytime visual amenity impacts..... | 19.16 |
| Table 19.9 Marrickville Station – night-time visual amenity impacts..... | 19.17 |
| Table 19.10 Dulwich Hill Station – landscape character impacts | 19.17 |
| Table 19.11 Dulwich Hill Station – daytime visual amenity impacts | 19.18 |
| Table 19.12 Dulwich Hill Station – night-time visual amenity impacts | 19.18 |
| Table 19.13 Hurlstone Park Station – landscape character impacts | 19.19 |
| Table 19.14 Hurlstone Park Station – daytime visual amenity impacts | 19.19 |
| Table 19.15 Hurlstone Park Station – night-time visual amenity impacts | 19.20 |
| Table 19.16 Canterbury Station – landscape character impacts | 19.21 |
| Table 19.17 Canterbury Station – daytime visual amenity impacts | 19.21 |
| Table 19.18 Canterbury Station – night-time visual amenity impacts | 19.22 |
| Table 19.19 Campsie Station – landscape character impacts..... | 19.22 |
| Table 19.20 Campsie Station – daytime visual amenity impacts..... | 19.23 |
| Table 19.21 Campsie Station – night-time visual amenity impacts | 19.23 |
| Table 19.22 Belmore Station – landscape character impacts | 19.24 |
| Table 19.23 Belmore Station – daytime visual amenity impacts | 19.24 |
| Table 19.24 Belmore Station – night-time visual amenity impacts | 19.25 |
| Table 19.25 Lakemba Station – landscape character impacts | 19.25 |
| Table 19.26 Lakemba Station – daytime visual amenity impacts | 19.26 |
| Table 19.27 Lakemba Station – night-time visual amenity impacts | 19.27 |
| Table 19.28 Wiley Park Station – landscape character impacts..... | 19.27 |
| Table 19.29 Wiley Park Station – daytime visual amenity impacts..... | 19.28 |
| Table 19.30 Wiley Park Station – night-time visual amenity impacts | 19.28 |
| Table 19.31 Punchbowl Station – landscape character impacts | 19.29 |
| Table 19.32 Punchbowl Station – daytime visual amenity impacts | 19.29 |
| Table 19.33 Punchbowl Station – night-time visual amenity impacts | 19.30 |
| Table 19.34 Bankstown Station – landscape character impacts | 19.30 |
| Table 19.35 Bankstown Station – daytime visual amenity impacts | 19.31 |

| | |
|--|-------|
| Table 19.36 Bankstown Station – night-time visual amenity impacts..... | 19.31 |
| Table 19.37 Rail corridor – landscape character impacts..... | 19.32 |
| Table 19.38 Corridor and ancillary development – daytime visual amenity impacts | 19.33 |
| Table 19.39 Rail corridor – night-time visual amenity impacts | 19.34 |
| Table 19.40 Mitigation measures – landscape and visual amenity | 19.35 |
| Table 20.1 Secretary's environmental assessment requirements – soils..... | 20.1 |
| Table 20.2 Geology along the project alignment | 20.2 |
| Table 20.3 Registered contamination sites..... | 20.6 |
| Table 20.4 Areas with a medium to high contamination risk in the project area | 20.7 |
| Table 20.5 Mitigation measures – soils and contamination | 20.11 |
| Table 21.1 Secretary's environmental assessment requirements – hydrology, flooding and water quality | 21.1 |
| Table 21.2 Summary of other drainage and flooding conditions – rest of project area | 21.14 |
| Table 21.3 Culverts with high flow velocities | 21.14 |
| Table 21.4 Water quality trigger values for aquatic ecosystems | 21.16 |
| Table 21.5 Performance against flood criteria in Marrickville | 21.23 |
| Table 21.6 Proposed water quality treatment measures | 21.31 |
| Table 21.7 Mitigation measures – hydrology, flooding and water quality | 21.34 |
| Table 22.1 Secretary's environmental assessment requirements – biodiversity..... | 22.1 |
| Table 22.2 Vegetation in the study area | 22.11 |
| Table 22.3 Key threatening processes relevant to the project..... | 22.20 |
| Table 22.4 Ecosystem credits required to offset impacts of the project | 22.22 |
| Table 22.5 Mitigation measures – biodiversity..... | 22.24 |
| Table 23.1 Background air quality data | 23.3 |
| Table 23.2 Mitigation measures – air quality impacts..... | 23.7 |
| Table 24.1 Secretary's environmental assessment requirements – sustainability | 24.1 |
| Table 24.2 Sustainability initiatives and targets | 24.8 |
| Table 24.3 Potential greenhouse gas sources and categorisation | 24.10 |
| Table 24.4 Estimated construction phase greenhouse gas emissions..... | 24.10 |
| Table 24.5 Mitigation measures – sustainability and climate change | 24.12 |
| Table 25.1 Dangerous goods volumes and thresholds | 25.4 |
| Table 25.2 Mitigation measures – hazards, risks and safety | 25.9 |
| Table 26.1 Indicative types of waste generated during construction | 26.3 |
| Table 26.2 Indicative waste estimates for the main waste streams..... | 26.4 |
| Table 26.3 Spoil management hierarchy (uncontaminated spoil)..... | 26.5 |
| Table 26.4 Management of construction waste | 26.5 |

| | | |
|------------|---|-------|
| Table 26.5 | Indicative types of waste generated during operation | 26.6 |
| Table 26.6 | Management of operational waste..... | 26.7 |
| Table 26.7 | Mitigation measures – waste management | 26.8 |
| Table 27.1 | Secretary's environmental assessment requirements – cumulative impacts | 27.1 |
| Table 27.2 | Projects with the potential for cumulative impacts | 27.2 |
| Table 27.3 | Indicative construction programs for Chatswood to Sydenham and Sydenham to Bankstown upgrade | 27.5 |
| Table 27.4 | Cumulative impacts of the Sydenham to Bankstown upgrade with the Chatswood to Sydenham project..... | 27.5 |
| Table 27.5 | Mitigation measures – cumulative impacts | 27.7 |
| Table 28.1 | Secretary's environmental assessment requirements – synthesis..... | 28.1 |
| Table 28.2 | Project uncertainties | 28.5 |
| Table 28.3 | Summary of key potential construction impacts | 28.7 |
| Table 28.4 | Summary of key potential operation impacts..... | 28.9 |
| Table 28.5 | Compilation of project specific mitigation measures..... | 28.14 |
| Table 28.6 | Compilation of environmental performance outcomes | 28.34 |

Figure index

Volume 1A

| | | |
|------------|---|------|
| Figure 1.1 | Sydney Metro Northwest and City & Southwest | 1.2 |
| Figure 1.2 | The Sydney Metro network – status | 1.3 |
| Figure 1.3 | Location of the project..... | 1.4 |
| Figure 1.4 | Overview of the project | 1.6 |
| Figure 2.1 | The project area | 2.3 |
| Figure 3.1 | The assessment and approval process for critical State significant infrastructure | 3.3 |
| Figure 5.1 | Overview of the project's effect on the City Circle | 5.4 |
| Figure 5.2 | Benefits of removing the T3 Bankstown Line from the existing heavy rail network..... | 5.10 |
| Figure 5.3 | Indicative travel time improvements with Sydney Metro..... | 5.13 |
| Figure 6.1 | Sydney's Rail Future alternatives decision process | 6.4 |
| Figure 7.1 | Station access hierarchy..... | 7.6 |
| Figure 7.2 | Urban design strategies for station areas and the corridor..... | 7.11 |
| Figure 7.3 | Key architectural design strategies for stations | 7.12 |
| Figure 8.1 | Project infrastructure and features..... | 8.2 |
| Figure 8.2 | Marrickville Station – indicative layout of key design elements | 8.9 |
| Figure 8.3 | Marrickville Station – artist's impression..... | 8.10 |
| Figure 8.4 | Dulwich Hill Station – indicative layout of key design elements | 8.12 |

| | |
|--|------|
| Figure 8.5 Dulwich Hill Station – artist's impression | 8.13 |
| Figure 8.6 Hurlstone Park Station – indicative layout of key design elements | 8.15 |
| Figure 8.7 Hurlstone Park Station – artist's impression | 8.16 |
| Figure 8.8 Canterbury Station – indicative layout of key design elements | 8.18 |
| Figure 8.9 Canterbury Station – artist's impression | 8.19 |
| Figure 8.10 Campsie Station – indicative layout of key design elements | 8.21 |
| Figure 8.11 Campsie Station – artist's impression..... | 8.22 |
| Figure 8.12 Belmore Station – indicative layout of key design elements..... | 8.24 |
| Figure 8.13 Belmore Station – artist's impression..... | 8.25 |
| Figure 8.14 Lakemba Station – indicative layout of key design elements | 8.27 |
| Figure 8.15 Lakemba Station – artist's impression | 8.28 |
| Figure 8.16 Wiley Park Station – indicative layout of key design elements..... | 8.30 |
| Figure 8.17 Wiley Park Station – artist's impression..... | 8.31 |
| Figure 8.18 Punchbowl Station – indicative layout of key design elements | 8.33 |
| Figure 8.19 Punchbowl Station – artist's impression | 8.34 |
| Figure 8.20 Bankstown Station – indicative layout of key design elements | 8.36 |
| Figure 8.21 Bankstown Station – artist's impression | 8.37 |
| Figure 8.22 Indicative cross section of corridor..... | 8.39 |
| Figure 8.23 Property acquisition near Marrickville and Punchbowl stations | 8.48 |
| Figure 8.24 Indicative Sydney Metro train interior | 8.51 |
| Figure 9.1 Project area – construction activities | 9.3 |
| Figure 9.2 Indicative construction program for the project..... | 9.17 |
| Figure 9.3 Indicative construction program for station works..... | 9.17 |
| Figure 9.4 Indicative layout for work sites 2 and 8 | 9.23 |
| Figure 9.5 Indicative hoarding to be used at compounds and work sites | 9.25 |
| Figure 9.6 Preliminary haulage routes | 9.27 |
| Figure 9.7 Temporary transport management plan components..... | 9.35 |

Volume 1B

| | |
|---|-------|
| Figure 10.1 Sydney Trains network | 10.6 |
| Figure 10.2 Road network and transport facilities..... | 10.8 |
| Figure 10.3 Existing transport facilities at Marrickville Station | 10.11 |
| Figure 10.4 Existing transport facilities at Dulwich Hill Station | 10.14 |
| Figure 10.5 Existing transport facilities at Hurlstone Park Station | 10.16 |
| Figure 10.6 Existing transport facilities at Canterbury Station | 10.18 |
| Figure 10.7 Existing transport facilities at Campsie Station..... | 10.20 |
| Figure 10.8 Existing transport facilities at Belmore Station..... | 10.23 |

| | |
|---|-------|
| Figure 10.9 Existing transport facilities at Lakemba Station | 10.25 |
| Figure 10.10 Existing transport facilities at Wiley Park Station..... | 10.27 |
| Figure 10.11 Existing transport facilities at Punchbowl Station | 10.30 |
| Figure 10.12 Existing transport facilities at Bankstown Station | 10.32 |
| Figure 10.13 Location and types of bridge closures | 10.40 |
| Figure 10.14 Process for developing a temporary transport plan | 10.44 |
| Figure 10.15 Indicative routes for rail replacement bus services..... | 10.45 |
| Figure 11.1 Station access hierarchy | 11.3 |
| Figure 11.2 Indicative location of an active transport corridor | 11.7 |
| Figure 11.3 Metro integration with Sydney Trains services | 11.13 |
| Figure 11.4 Marrickville Station transport interchange arrangement | 11.18 |
| Figure 11.5 Dulwich Hill Station transport interchange arrangement..... | 11.20 |
| Figure 11.6 Hurlstone Park Station transport interchange arrangement | 11.22 |
| Figure 11.7 Canterbury Station transport interchange arrangement | 11.24 |
| Figure 11.8 Campsie Station transport interchange arrangement..... | 11.26 |
| Figure 11.9 Belmore Station transport interchange arrangement..... | 11.28 |
| Figure 11.10 Lakemba Station transport interchange arrangement | 11.30 |
| Figure 11.11 Wiley Park Station transport interchange arrangement | 11.32 |
| Figure 11.12 Punchbowl Station transport interchange arrangement | 11.34 |
| Figure 11.13 Bankstown Station transport interchange arrangement | 11.36 |
| Figure 12.1 Noise catchment areas, sensitive receivers and ambient noise monitoring locations.... | 12.5 |
| Figure 12.2 Number of night-time noise exceedances from corridor works, ground and track, trackform with ballast tamper | 12.31 |
| Figure 12.3 Number of night-time noise exceedances from corridor works, ground and track, trackform without ballast tamper | 12.32 |
| Figure 12.4 Location of highly noise affected residential receivers – Marrickville and Dulwich Hill | 12.34 |
| Figure 12.5 Number of night-time noise exceedances from corridor works, ground and track, trackform with ballast tamper | 12.39 |
| Figure 12.6 Number of night-time noise exceedances from corridor works, ground and track, trackform without ballast tamper | 12.40 |
| Figure 12.7 Number of night-time noise exceedances from corridor works, ground and track, trackform with ballast tamper | 12.47 |
| Figure 12.8 Number of night-time noise exceedances from corridor works, ground and track, trackform without ballast tamper | 12.47 |
| Figure 12.9 Location of highly noise affected residential receivers – Hurlstone Park and Canterbury | 12.50 |

| | |
|--|-------|
| Figure 12.10 Number of night-time noise exceedances from corridor works - track support systems, overhead wiring modifications | 12.55 |
| Figure 12.11 Number of night-time noise exceedances from corridor works, ground and track, trackform with ballast tamper | 12.62 |
| Figure 12.12 Number of night-time noise exceedances from corridor works, ground and track, trackform without ballast tamper | 12.62 |
| Figure 12.13 Location of highly noise affected residential receivers – Campsie and Belmore | 12.65 |
| Figure 12.14 Number of night-time noise exceedances from corridor works, ground and track, trackform with ballast tamper | 12.71 |
| Figure 12.15 Number of night-time noise exceedances from corridor works, ground and track, trackform without ballast tamper | 12.71 |
| Figure 12.16 Number of night-time noise exceedances from corridor works, ground and track, trackform with ballast tamper | 12.78 |
| Figure 12.17 Number of night-time noise exceedances from corridor works, ground and track, trackform without ballast tamper | 12.78 |
| Figure 12.18 Location of highly noise affected residential receivers – Lakemba and Wiley Park | 12.81 |
| Figure 12.19 Number of night-time noise exceedances from corridor works - track support systems, overhead wiring modifications | 12.85 |
| Figure 12.20 Number of night-time noise exceedances from corridor works, ground and track, trackform with ballast tamper | 12.91 |
| Figure 12.21 Number of night-time noise exceedances from corridor works, ground and track, trackform without ballast tamper | 12.92 |
| Figure 12.22 Location of highly noise affected residential receivers – Punchbowl and Bankstown. | 12.94 |
| Figure 12.23 Number of night-time noise exceedances from corridor works - track support systems, overhead wiring modifications | 12.99 |
| Figure 13.1 Location of receivers potentially affected by operational noise exceeding RING criteria | 13.17 |
| Figure 14.1 Heritage listed items and areas | 14.12 |
| Figure 14.2 Impacts on heritage at Marrickville and Dulwich Hill stations | 14.28 |
| Figure 14.3 Impacts on heritage at Hurlstone Park and Canterbury stations | 14.38 |
| Figure 14.4 Impacts on heritage at Campsie and Belmore stations | 14.48 |
| Figure 14.5 Impacts on heritage at Lakemba and Wiley Park stations..... | 14.56 |
| Figure 14.6 Impacts on heritage at Punchbowl and Bankstown stations | 14.64 |
| Figure 16.1 Land uses..... | 16.3 |
| Figure 17.1 Community infrastructure..... | 17.4 |
| Figure 18.1 Local business precincts..... | 18.3 |
| Figure 19.1 Impact ratings for the landscape and visual amenity (daytime) assessments | 19.4 |
| Figure 19.2 Impact ratings for the night-time visual amenity assessment | 19.4 |
| Figure 19.3 Representative viewpoints | 19.8 |

| | |
|---|-------|
| Figure 20.1 Soil types along the project alignment | 20.4 |
| Figure 20.2 Salinity potential and acid sulfate soils risk..... | 20.5 |
| Figure 21.1 Catchment areas and watercourse locations..... | 21.7 |
| Figure 21.2 Marrickville and surrounds – existing flood depth and extent – one per cent AEP plus climate change | 21.10 |
| Figure 21.3 Marrickville and surrounds – existing flood depth and extent – probable maximum flood | 21.11 |
| Figure 21.4 Marrickville and surrounds – existing provisional flood hazard – one per cent AEP plus climate change | 21.12 |
| Figure 21.5 Marrickville and surrounds – existing provisional flood hazard – probable maximum flood | 21.13 |
| Figure 21.6 Marrickville and surrounds – change in flood depth and extent with the project – one per cent AEP plus climate change | 21.25 |
| Figure 21.7 Marrickville and surrounds – change in flood velocity – one per cent AEP plus climate change | 21.26 |
| Figure 21.8 Marrickville and surrounds – flood hazard– one per cent AEP plus climate change... | 21.27 |
| Figure 21.9 Marrickville and surrounds – change in flood depth and extent– probable maximum flood | 21.28 |
| Figure 21.10Marrickville and surrounds – change in flood velocity – probable maximum flood..... | 21.29 |
| Figure 21.11Marrickville and surrounds – flood hazard – probable maximum flood | 21.30 |
| Figure 22.1 Biodiversity study area, vegetation and threatened species | 22.4 |
| Figure 24.1 Sydney Metro sustainability governance structure | 24.5 |
| Figure 24.2 Sydney Metro environmental and sustainability management system..... | 24.6 |
| Figure 28.1 Approach to environmental mitigation and management during construction..... | 28.11 |

Appendices

Volume 1B

Appendix A - Secretary's environmental assessment requirements

Appendix B - Environmental Planning and Assessment Regulation 2000 checklist

Volume 1C

Appendix C – Sydenham to Bankstown Design Guidelines

Appendix D – Construction Environmental Management Framework

Appendix E – Construction Noise and Vibration Strategy

Appendix F – Sustainability Strategy

Appendix G – Temporary Transport Strategy

Appendix H – Urban Design and Place Making Paper

Appendix I – Utilities Management Framework

Volumes 2 to 6 – Technical papers

The following technical papers informed preparation of the Environmental Impact Statement

Volume 2

Technical Paper 1 – Traffic, transport and access assessment

Volume 3

Technical Paper 2 – Noise and vibration assessment

Volume 4

Technical Paper 3 – Non-Aboriginal heritage impact assessment

Technical Paper 4 – Aboriginal heritage assessment

Technical Paper 5 – Social impact assessment

Volume 5

Technical Paper 6 – Business impact assessment

Technical Paper 7 – Landscape and visual impact assessment

Volume 6

Technical Paper 8 – Hydrology, flooding and water quality assessment

Technical Paper 9 – Biodiversity assessment report