

## 7.0 Issues and potential impacts

The following section draws upon information provided in **Chapter 5** and **Chapter 6** to address the issues and potential impacts on identified heritage items during the construction and operation of the project. These impacts would need to be reviewed during detailed design.

During the concept design of the project, every attempt has been made to reduce the short and long-term impacts to heritage values through a cascading method of:

- Avoidance by planning and design;
- Reduction in footprint or scale;
- Mitigation by modification of the construction methodology or other means; and
- Archival documentation prior to loss as a final resort.

### 7.1 Potential impact areas

For the purpose of the non-Aboriginal heritage impact assessment, the potential areas of impact have been divided into the following components:

- The **western surface works**, including:
  - The M5 South West Motorway and M5 East Motorway integration works during construction and operation.
  - The Kingsgrove North construction compound (C1), the Kingsgrove South construction compound (C2) and the Commercial Road construction compound (C3) during construction.
  - The Kingsgrove motorway operations complex (MOC1) during operation.
- **The main alignment tunnels.**
- The **Kingsgrove Road surface works**, which would be associated with the installation of tolling infrastructure.
- The **Bexley Road surface works**, including:
  - The Bexley Road North construction compound (C4), the Bexley Road South construction compound (C5) and the Bexley Road East construction compound (C6) during construction.
  - The Bexley Road South motorway operations complex (MOC2) during operation.
- The **Arncliffe surface works**, including:
  - The Arncliffe construction compound (C7) during construction.
  - The Arncliffe motorway operations complex (MOC3) during operation, including the Arncliffe ventilation facility.
- The **St Peters interchange and local road upgrade surface works**, including:
  - The St Peters interchange works during construction and operation.
  - The Canal Road construction compound (C8), the Campbell Road construction compound (C9), the Landfill Closure construction compound (C10), the Burrows Road construction compound (C11), the Campbell Road bridge construction compound (C12), the Gardeners Road Bridge construction compound (C13) and the Sydney Park construction compound (C14) during construction.
  - The St Peters motorway operations complex and Burrows Road motorway operations complex, including the motorway control centre and maintenance facility and the interchange ventilation facility, during operation.
  - Local road upgrade works during construction and operation.

Potential impact areas are shown in **Figure 26** to **Figure 31**, with more detailed descriptions of activities that would be undertaken at each of the sites listed above provided in Chapter 5 and Chapter 6 of the EIS for the project. More detailed figures are provided in **Appendix A**.

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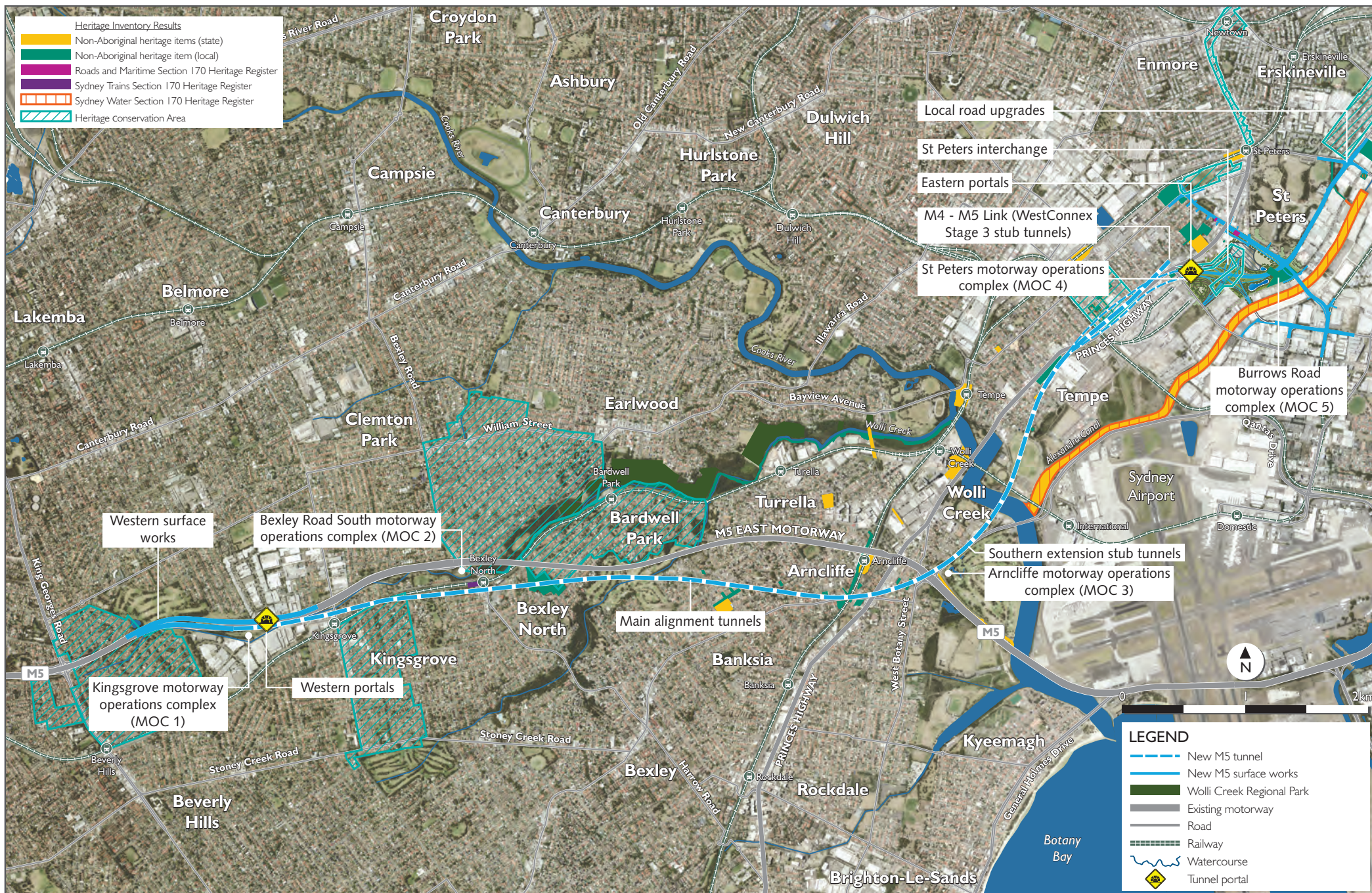


Figure 26 The project and heritage inventory results



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Figure 27 Construction disturbance footprint and heritage inventory results - Map 1 (Western surface works)



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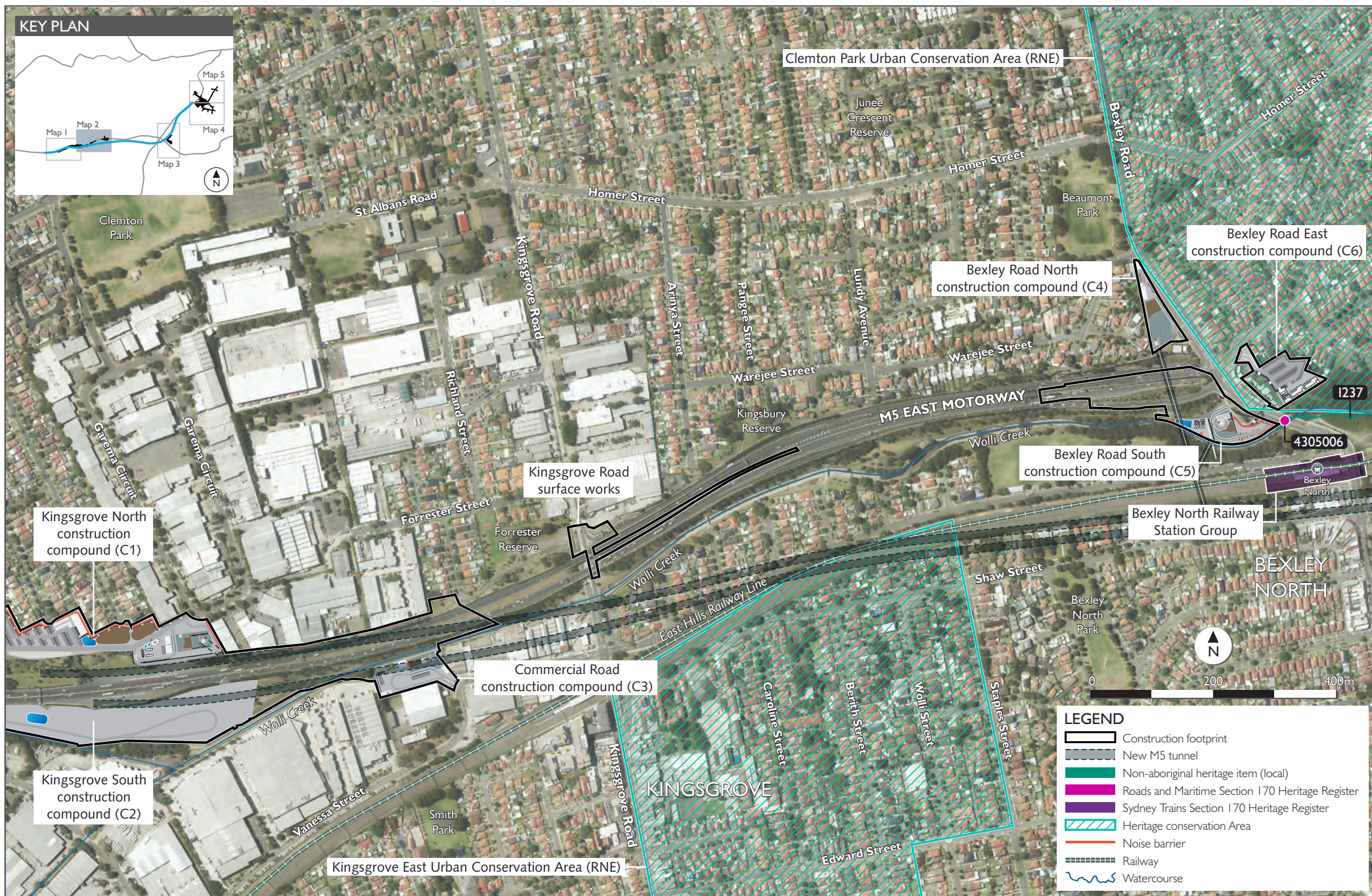


Figure 28 Construction disturbance footprint and heritage inventory results - Map 2 (Kingsgrove and Bexley Road surface works)



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Figure 29 Construction disturbance footprint and heritage inventory results - Map 3 (Arncliffe surface works)

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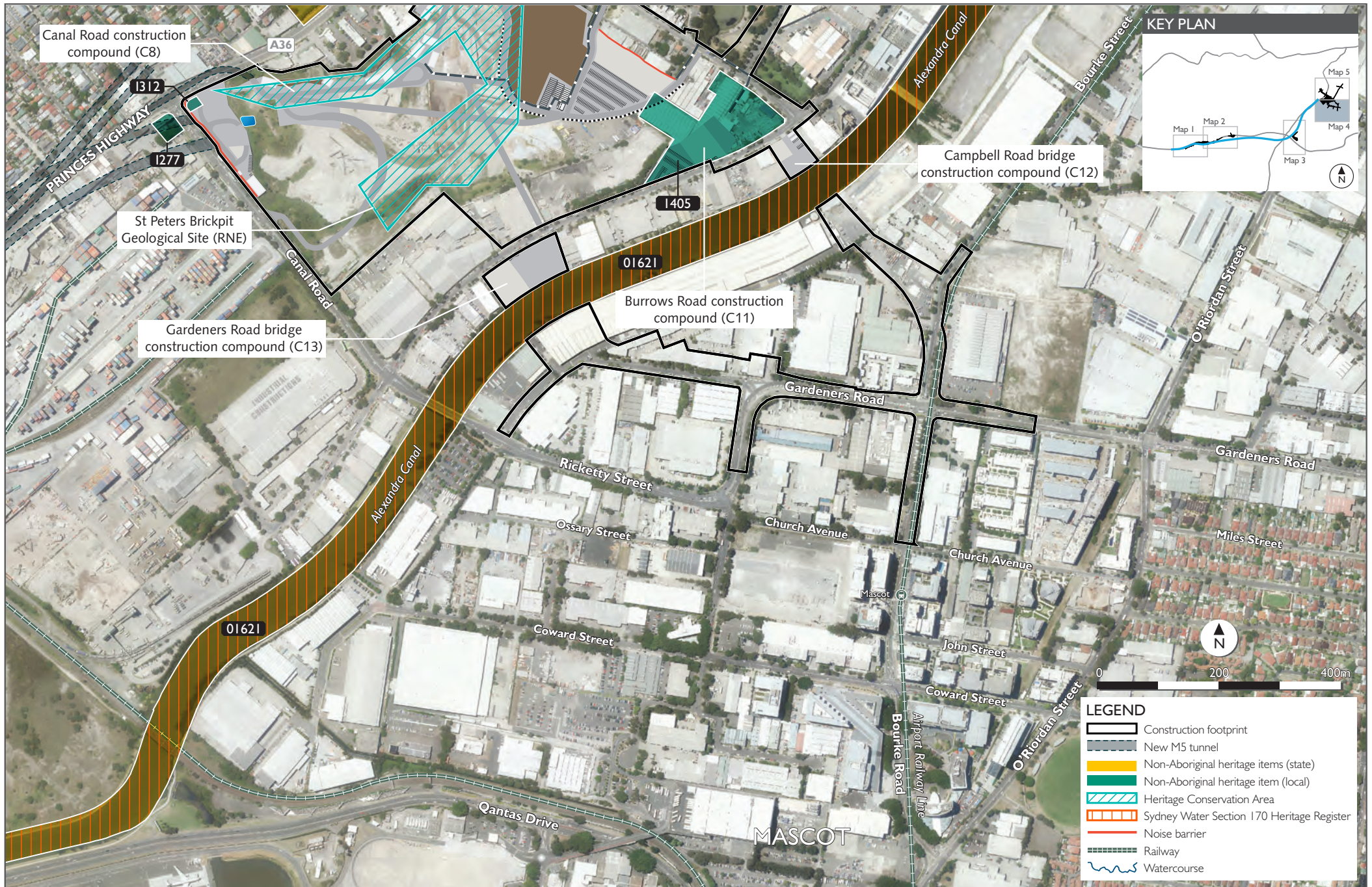


Figure 30 Construction disturbance footprint and heritage inventory results - Map 4 (St Peters interchange and local roads)



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Figure 31 Construction disturbance footprint and heritage inventory results - map 5 (St Peters interchange and local roads)



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## 7.2 Potential impact types

Impacts on non-Aboriginal heritage items have been categorised as follows:

- **Primary Direct** – where the project would be located within the curtilage of the heritage item and / or involve the demolition or modification of the heritage item or its heritage significance.
- **Secondary Direct** – where the project may impact on the heritage item or its significance subject to the condition of the item, more detailed investigation, construction methodologies and / or the implementation of mitigation and management measures.
- **Indirect** – where the project would change the visual context and surroundings of a heritage item with the potential to affect its heritage significance.

Table 56 Potential impact types

| Impact                                                               | Description                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
|----------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Primary Direct</b>                                                |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
| Demolition                                                           | Demolition of structures.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
| Modification                                                         | Modification to a heritage item or the elements that provide its heritage significance to cater for the project.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
| Acquisition                                                          | Impacts resulting from the full or partial acquisition of properties that contain heritage items, but where acquisition would <b>not</b> result in the demolition of the heritage item. An example of heritage impact arising from acquisition would be a change from original use.                                                                                                                                                                                                                                                                                                                                                                                                                       |
| Change in heritage conservation area values                          | Construction of a new element within a heritage conservation area.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
| <b>Secondary direct</b>                                              |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
| Acoustic treatment                                                   | Properties, some of which may be listed heritage items, may qualify for at-property acoustic treatment. This may impact on the fabric or the significance of the heritage item.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
| Vibration, settlement and groundwater drawdown from tunnelling works | The area of potential impact for the main alignment tunnels, on-ramp and off-ramp tunnels includes a zone on the surface equal to a distance of 50 metres from the outer edge of the underground tunnels. The potential impacts on non-Aboriginal heritage items would be a potential indirect impact by virtue of: <ul style="list-style-type: none"> <li>- construction vibration as the road headers pass underneath properties;</li> <li>- the settlement of land if tunnelling activities are conducted underneath or within a 50 metre buffer of heritage features; or</li> <li>- impacts on tree roots, in the case of street trees, depending on the depth of the tunnelling activity.</li> </ul> |
| Vibration from surface works                                         | Depending on the setback of buildings from the construction footprint, there is the potential for vibration impacts associated with surface road works, building construction and / or the cut-and-cover sections of the main alignment tunnels, and on and off-ramps.                                                                                                                                                                                                                                                                                                                                                                                                                                    |
| Dust                                                                 | Construction activities may result in the generation of dust where works are at the surface or during the handling of spoil. Spoil handling would be in part undertaken inside acoustic sheds at compounds. Air quality impacts during construction would be managed by implementing standard and best practice mitigation measures. As such, this potential impact has not been considered further.                                                                                                                                                                                                                                                                                                      |

| Impact          | Description                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
|-----------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Indirect</b> |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
| Visual          | <p>There may be temporary and permanent visual impacts as result of the project. These may include:</p> <ul style="list-style-type: none"> <li>- construction of new road infrastructure or ancillary facilities;</li> <li>- alterations to surface roads;</li> <li>- new noise walls or modifications to existing noise walls, including changes to the height of noise walls;</li> <li>- removal of vegetation; or</li> <li>- establishment and use of construction compounds.</li> </ul> |

### 7.2.1 Vibration

Technical working paper: Noise and vibration (AECOM, 2015c) provides an assessment of potential construction vibration impacts as a result of works at surface and below ground (tunnelling).

The extent of potential vibration impacts to structures would be dependent on the type of equipment, the activity being undertaken and the separation distances. Earthworks, tunnelling and bridge works are expected to be the major vibration causing activities, given the activity and the type of equipment being used.

In summary, the noise and vibration assessment for the project concludes that:

- for tunnelling activities, the predicted maximum vibration levels at any building or structure (including heritage items) has been predicted to be 0.26 millimetres per second, which is well below three millimetres per second due to the depth of the tunnelling activities below ground level. Three millimetres is below the recommended maximum level of vibration that would be applicable to heritage structures set within the German Standard DIN 4150 - Part 3 - Structural Vibration in Buildings – Effects on Structures (refer to **Table 57**). These levels are designed to minimise the risk of cosmetic surface cracks and are set well below the levels that have the potential to cause damage to the main structure. Examples of threshold or cosmetic cracking include minor non-structural effects such as superficial cracking in cement render or plaster.
- Blasting would be undertaken along the length of the alignment during the excavation of the tunnel. Impacts created by blasting are largely dependent on the blast methodology. The size of the charge, spaces between charge and timing between charges results in a large variability in the vibration generated by a blast. This variability necessitates the use of a specialised blast consultant to design blasts to achieve compliance with the applicable vibration criteria for heritage structures (refer to **Table 57**). for surface works, such as at the local road surface works, cosmetic damage to buildings would be unlikely where the building is distanced from the project by two metres to 25 metres (depending on the vibration-generating equipment being used and the location of that equipment within each construction area). The recommended safe working distances are provided in **Table 58**, which are presented in Technical Working Paper: *Noise and vibration* (AECOM, 2015c). Depending on the construction equipment that is used, the safe working distances outlined in **Table 58** may be encroached. The primary form of mitigation of vibration would be ensuring vibration intensive works do not occur within the safe working distances. If vibration intensive works are planned within the safe working distances identified, alternative equipment would be identified and vibration monitoring would be implemented. Further mitigation of vibration would not be required where the safe working distances are adhered to. In some circumstances, construction activity within the safe working distance cannot be avoided due to the work required and the prevalent geological site conditions. These conditions may not be fully understood until work has commenced, resulting in a potential change in operating equipment. Approaches to manage such circumstances are detailed in Technical Working Paper: *Noise and vibration* (AECOM, 2015c) for the New M5.



Table 57 Structural damage vibration limits relevant to heritage structures

| Type of structure                                                                                                                                                                                                            | Vibration Velocity (mm/s)       |               |               |                                                        |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------|---------------|---------------|--------------------------------------------------------|
|                                                                                                                                                                                                                              | At Foundation at a Frequency of |               |               | Vibration at the Horizontal Plane of the Highest Floor |
|                                                                                                                                                                                                                              | Less than 10Hz                  | 10Hz to 50 Hz | 50Hz to 100Hz | All frequencies                                        |
| Structures that because of their particular sensitivity to vibration, do not correspond to commercial, industrial, or residential building types and have intrinsic value (e.g. buildings that are under a heritage listing) | 3 mm/s                          | 3 to 8 mm/s   | 8 to 10 mm/s  | 8 mm/s                                                 |

Table 58 Recommended safe working distances for vibration intensive plant

| Plant                   | Rating/description             | Safe working distance        |                              |
|-------------------------|--------------------------------|------------------------------|------------------------------|
|                         |                                | Cosmetic damage (metres)     | Human response (metres)      |
| Vibratory roller        | < 50 kN (Typically 1-2 t)      | 5                            | 15-20                        |
|                         | < 100 kN (Typically 2-4 t)     | 6                            | 20                           |
|                         | < 200 kN (Typically 4-6 t)     | 12                           | 40                           |
|                         | < 300 kN (Typically 7-13 t)    | 15                           | 100                          |
|                         | > 300 kN (Typically 13-18 t)   | 20                           | 100                          |
|                         | > 300 kN (> 18 t)              | 25                           | 100                          |
| Small hydraulic hammer  | (300 kg – 5-12 t excavator)    | 2                            | 7                            |
| Medium hydraulic hammer | (900 kg – 12-18 t excavator)   | 7                            | 23                           |
| Large hydraulic hammer  | (1,600 kg – 18-34 t excavator) | 22                           | 73                           |
| Vibratory pile driver   | Sheet piles                    | 2–20                         | 20                           |
| Pile boring             | ≤ 800 mm                       | 2 nominal                    | N/A                          |
| Jack hammer             | Handheld                       | Avoid contact with structure | Avoid contact with structure |

Note: More stringent conditions may apply to heritage or other sensitive structures. Any heritage property would need to be considered on a case by case basis.

### 7.2.2 Ground settlement

The ground settlement as a result of the project, and its potential impacts on heritage structures would be dependent on the geotechnical conditions, the depth of the tunnelling activity, the number of storeys of the building, and the position, condition and masonry of the structure itself.

Settlement of the surface can create tensile strains in buildings. The strain calculated within representative buildings was used to allocate a damage category. Damage categories negligible to slight are considered acceptable as they represent aesthetic damage only. The moderate to very severe categories are related to serviceability and stability damage and are therefore considered not acceptable.

Chapter 19 (Groundwater) of the EIS for the project provides an assessment of the potential impacts of ground settlement on structures. The calculated settlement for the project is generally less than 20 millimetres for the majority of the tunnel alignment. Locations of peak settlement are at the portals and at the Y-junction caverns. It is expected that settlement would stabilise within two months of the roadheader passing under a structure.

All heritage structures have a predicted settlement of less than 20 millimetres and are assessed as having a building damage category of "negligible". Examples of visible potential impacts would only be cosmetic and could include hairline cracks.

However, it is noted that these results are preliminary and do not take into account the specifics of the property itself. Further assessments and property condition reports would be undertaken during detailed design to determine the level of potential impact on structures and to identify what mitigation and management measures would be required to minimise potential ground settlement impacts. A monitoring program would also be undertaken to ensure that settlement has stabilised before monitoring is completed.

### 7.2.3 Acoustic treatment

*Technical working paper: Noise and vibration* (AECOM, 2015c) identifies properties that may be eligible for at-property acoustic treatment, due to the potential for exceedances of applicable noise criteria at these locations. Depending on the level of noise exceedance, at-property treatment may include for example, sealing of wall vents or upgrading of window and door seals.

The properties eligible for consideration of at-property acoustic treatment that are heritage items are as follows:

- St Peters Public School (Marrickville LEP 2011, I271)
- Terrace Group, 2 – 34 Campbell Road (Sydney LEP 2012, I12).

The need for acoustic treatment at each property would be confirmed during detailed design, in consultation with the relevant landowners, and with consideration of potential impacts to heritage values.

Should at-property acoustic treatment be required for the above listed heritage items, this should be done in such a way as to minimise heritage impacts, while preserving owner amenity. Treatment would be sympathetic to the heritage values of each item and would be undertaken in accordance with the Burra Charter, which stipulates that changes which reduce cultural significance should be reversible. Where this involves incorporating noise-proofing within heritage structures the advice of a conservation architect would be sought.

### 7.2.4 Visual impacts

**Table 59** provides a summary of the aesthetic significance, the project and provides an indication as to whether the heritage significance would be impacted.



Table 59 Summary of visual impacts against aesthetic significance

| Item name and ID                                                                                | Aesthetic significance summary                 | Visual impact summary                                                                                                                                                                                                                                                                                                                            | Impact to significance?                                                                                                                                                                                                                                                                                                                                                                                                                          |
|-------------------------------------------------------------------------------------------------|------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Pallamanna Parade Urban Conservation Area RNE #102089,                                          | Streetscape integrity and uniformity of design | The project is located within the curtilage of the conservation area, which was determined prior to the construction of the M5 East Motorway. Changes in this area as a result of the project including removal of vegetation, construction compounds, changes to noise barriers and a motorway operations complex.                              | No.<br><br>Impacts to heritage values within the conservation area would be localised to specific areas already associated with major transport network infrastructure.<br><br>However, there would be no direct impacts in the sense that there would be no demolition of houses or structures in the urban conservation area.<br><br>Landscaping would provide screening of the project from the heritage conservation area, once established. |
| Kingsgrove East urban conservation area (non-statutory Register of the National Estate #102106) | Streetscape integrity and uniformity of design | The conservation area is located over 100 metres from temporary and permanent infrastructure.                                                                                                                                                                                                                                                    | No. The complexes would be obscured by distance and by the screening effect of surrounding industrial developments.                                                                                                                                                                                                                                                                                                                              |
| Clemton Park Urban Conservation Area (non-statutory Register of the National Estate #102071)    | Streetscape integrity and uniformity of design | The Bexley Road surface works, including compounds would be within and adjacent to the conservation area.<br><br>Works within the conservation area would be temporary and in areas previously disturbed by the M5 East Motorway.<br><br>Permanent infrastructure would be placed within the existing motorway corridor and would be landscaped. | No.<br><br>Works within the conservation area would be temporary and in areas previously disturbed by the M5 East Motorway.<br><br>Works adjacent to the conservation area would be temporary and permanent. However, these would be placed within the existing motorway corridor and would be landscaped.                                                                                                                                       |

| Item name and ID                                                                                                               | Aesthetic significance summary                                                                                                                                                                                                                                                                                                                                                     | Visual impact summary                                                                                                                                                                                                  | Impact to significance?                                                                                                                                                                                                                                                    |
|--------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Bexley North Railway Station Group                                                                                             | Representative example of a small Inter-War period suburban railway                                                                                                                                                                                                                                                                                                                | Glimpses of the surface works may be possible.                                                                                                                                                                         | No. The views to the station would be maintained.                                                                                                                                                                                                                          |
| Wolli Creek Valley (Rockdale LEP #I237)                                                                                        | The Wolli Creek Valley is integral to the protection of the riparian corridor of Wolli Creek and is today an essential green recreation corridor buffering the densely urban areas surrounding it.                                                                                                                                                                                 | Construction activities would occur directly adjacent to the item and the Bexley Road South motorway operations complex would be located in proximity to the item.                                                     | No. The works would not occur within the curtilage of the item and in areas previously disturbed by construction activity. The motorway operations complex would sit on the western side of Bexley Road and would not alter the views to or from the Valley substantially. |
| <i>Western Outfall Main Sewer, SHR #1647, Sydney Water s170 #4572728</i>                                                       | The listing assessment states: "Item does not have any notable outstanding aesthetic values."                                                                                                                                                                                                                                                                                      | The temporary and permanent activities would be located within 50 metres of the item. This includes the Arncliffe motorway operations complex which would be a smaller footprint to construction stage of the project. | No. No aesthetic significance identified.                                                                                                                                                                                                                                  |
| Alexandra Canal (RNE #103889, SHR #01621, Sydney Water Section 170 #4571712, Sydney LEP I13, Marrickville LEP I270);           | Sections of the canal exhibit relatively intact sections of ashlar stonework which are excellent examples of late 19 <sup>th</sup> century coastal engineering works that provide a pleasantly textured and coloured finish to the canal. The canal is a major visual landmark in the area and has strong landmark appeal, particularly as viewed from the Ricketty Street Bridge. | Two road bridge and one pedestrian/cycle bridge crossings and modification of the landscape at the crossing sites, being the demolition of warehouses that currently line the canal.                                   | Yes. Sections of the sandstone embankments are proposed for removal and reinstatement following the insertion of stormwater outlets. Additional crossings of the canal have also been identified as a visual impact.                                                       |
| Waugh and Josephson industrial buildings, former, showroom, offices and workshops, including interiors (Marrickville LEP I275) | The main Inter-war Functionalist style industrial administration building and showroom which fronts Unwins Bridge Road is of aesthetic significance as an exemplar of the style and the manner in which it forms an important industrial streetscape on a major intersection.                                                                                                      | The local road upgrades (Campbell Street, Unwins Bridge Road/May Street/ Bedwins Road) would be widened and upgraded.                                                                                                  | No. The building would retain its landmark qualities and location on the intersection as no part of it would be obscured by the project.                                                                                                                                   |



| Item name and ID                                                                                                                                                                                   | Aesthetic significance summary                                                                                                                                                                                                                                                                                             | Visual impact summary                                                                                                 | Impact to significance?                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Town and Country Hotel (Marrickville LEP I281)                                                                                                                                                     | Of aesthetic significance as a good example of an Inter war Free Classical style hotel on a prominent corner site.                                                                                                                                                                                                         | The local road upgrades (Campbell Street, Unwins Bridge Road/May Street/ Bedwins Road) would be widened and upgraded. | No. The building would retain its landmark qualities and location on the intersection as no part of it would be obscured by the works. Additional separation to Campbell Street would also assist in minimising visual impacts                                                                                                                                                                                                                                                                                                                                                                         |
| Group of Victorian filigree and Italianate terrace houses (Marrickville LEP 2011 I282)                                                                                                             | Of aesthetic significance as a prominent row of 2 storey Victorian Italianate/Victorian Filigree style terraces, unusual in the manner that the terraces are built to respond to the curve of the road. Along with neighbouring Town & Country Hotel, the terraces form a unifying corner treatment to Unwins Bridge Road. | The local road upgrades (Campbell Street, Unwins Bridge Road/May Street/ Bedwins Road) would be widened and upgraded. | No. The terraces would retain their prominent corner location.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
| Terrace Group Including Interiors, 2-34 Campbell Road (Sydney LEP I12)                                                                                                                             | The terraces are a good example of mid Victorian workers housing which date from the early period of development for the Alexandria area.                                                                                                                                                                                  | The local road (Campbell Road) would be widened and upgraded.                                                         | The aesthetic significance of the terraces would not be impacted and the removal of the trees has the potential to positively impact on the aesthetic appeal from the street with greater visibility. Views from the terraces are currently of industrial/commercial buildings ( <b>Plate 92</b> ). This would be altered to be green parkland and the elevated pedestrian/cycleway ( <b>Figure 32</b> ). Architectural and landscape measures to mitigate the potential visual and noise impacts would be tailored to the individual terraces and their heritage significance during detailed design. |
| Sewerage Pumping Station No. 39 (SP0039) (Sydney Water Section 170 Heritage and Conservation Register #4571730; Sydney LEP 2012 I18 as Water Board Pump House Including Interior and Substructure) | SP0039 is a representative example of a small scale late Federation Free style utility building. It has strong streetscape appeal in its location on the corner of two streets.                                                                                                                                            | The local road (Huntley Street) would be widened and upgraded.                                                        | No. The station would retain its landmark qualities and location on the intersection as no part of it would be obscured by the project.                                                                                                                                                                                                                                                                                                                                                                                                                                                                |

| Item name and ID                                                                                     | Aesthetic significance summary                                                                                                                                                                                        | Visual impact summary                                                                                                                                                              | Impact to significance?                                                                                                                                |
|------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------|
| Industrial Building "Frank G Spurway" (Sydney LEP 2012 I20)                                          | The building represents a good example of the Inter-War Functionalist architectural style showing Dudock influences.                                                                                                  | The local road (Euston Road) would be widened and upgraded.                                                                                                                        | No. The building would retain its representative heritage features and would remain a corner landmark as no part of it would be obscured by the works. |
| Cooper Estate Conservation Area (Sydney LEP 2012 C2)                                                 | The area has a diverse array of working class housing, warehouses and industrial development from the Victorian, Federation and Interwar periods.                                                                     | The intersection of Huntley Street and Euston Road at the south eastern corner of the Conservation Area, would be widened and upgraded. Huntley Street is included in the listing. | No. The intersection is not visible from within the conservation area and the works do not constitute a significant impact.                            |
| Former Alexandria Spinning Mills<br>(Sydney LEP 2012 proposed amendment)                             | Industrial complex fronting Euston Road                                                                                                                                                                               | Tie in works associated with the local roads upgrade would be undertaken in the vicinity of the item consisting of line marking                                                    | No. The works are of a minor nature (tie in works) and would not alter views or setting of the item.                                                   |
| Terrace housing, including interiors (105-119 May Street, St Peters)<br>(Marrickville LEP 2011 I273) | The terraces contribute to the streetscape                                                                                                                                                                            | Tie in works associated with the local roads upgrades                                                                                                                              | No. The terraces would continue to contribute to the streetscape.                                                                                      |
| Macdonaldtown Stormwater Channel (Sydney LEP 2012 proposed amendment)                                | Concrete and brick stormwater drain. No assessed aesthetic significance.                                                                                                                                              | The works would have no impact on the aesthetic/visual significance of the channel                                                                                                 | No.                                                                                                                                                    |
| Southern Cross Hotel<br>(Marrickville LEP 2011 I277)                                                 | Of aesthetic significance as an architect designed example of the Inter war Free Classical style on a prominent corner site.                                                                                          | The St Peters motorway operations complex, including ventilation facility, would be positioned to the east of the heritage item that may alter the visual setting of the hotel.    | No. The hotel would continue to be located on a prominent corner and there are no direct impacts to the architectural design.                          |
| Service Garage (Marrickville LEP #I312)                                                              | The detailing and architectural style of the Garage is unusual as applied to a mechanical workshop. Paired with the prominent location on a busy intersection, the Service Garage is of local aesthetic significance. | The St Peters interchange would alter the visual setting of the Service Garage.                                                                                                    | Minor. A statement of heritage impact is provided in <b>Section 9.5</b> .                                                                              |



| Item name and ID                                                                          | Aesthetic significance summary                                                                                                                                                             | Visual impact summary                                                                                                 | Impact to significance?                                                                                              |
|-------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------|
| St Peters Brickpit Geological Site (non-statutory Register of the National Estate #16240) | No aesthetic significance                                                                                                                                                                  | Site of the St Peters interchange                                                                                     | The brickpit does not hold aesthetic significance to be impacted by the project and has been subject to landfilling. |
| Goodsell Estate Heritage Conservation Area (Marrickville LEP C16)                         | Aesthetically significant for its narrow and dense streetscape development that establishes a tightly described street wall which creates a sense of intimacy and privacy within the area. | The local road upgrades (Campbell Street, Unwins Bridge Road/May Street/ Bedwins Road) would be widened and upgraded. | No. There would be no impact to the heritage conservation area, which is located to the north east of the project.   |



**Plate 92** Prospect from 2-34 Campbell Road terraces across Campbell Road.



**Figure 32** Photomontage of the view from 2-34 Campbell Road terraces ten years after opening of the project (AECOM, 2015d)

The Former Bedford Brickworks Group Including Chimneys, Kilns and Grounds, as described in **Section 6.12.2**, sits outside the study area of the project. Given the visual prominence of the item, additional consideration has been undertaken for this assessment.

The closest point of the project (being local road upgrades along Sydney Park Road, and the Princes Highway and Campbell Street intersection) to the heritage item would be around 400 metres. This would involve intersection works, road widening and line marking. It is not anticipated that this would impact the heritage significance or visual curtilage of the Former Brickworks. Similarly, further minor works would be undertaken at the intersection of Barwon Park Road and Campbell Road. These works would not be visible from the Former Brickworks as the view lines between the two points are screened by structures and mature vegetation. It is therefore concluded that there would be no impacts to the Former Brickworks.

The Technical Working Paper: Landscape and visual impact assessment (AECOM 2015d) for the project has assessed the visual impacts of the construction compounds. The visual impacts have been assessed against the heritage significance of the area in **Table 60**.



Table 60 Heritage assessment of visual impacts

| Construction compound                                       | Identified visual impacts                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             | Assessment of heritage impact                                                                                                                                                                                                                                                                                                                                                                                              |
|-------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Kingsgrove North construction compound                      | The residents adjoining the Kingsgrove North construction compound site to the north would be the most affected by the visual changes during the construction period. Existing outlook from their properties to vegetated open space would be blocked by tall noise walls, seen at close proximity. Further, pedestrians and cyclists would be directed past the back / side boundary to their properties and lighting would be brought adjacent to their properties for the safety of these users.                                                                                                                                                                                                                                                                                                   | The Kingsgrove North construction compound is not located adjacent to or near statutory listed heritage items. The temporary visual impacts identified in the visual assessment would not have an impact to heritage.                                                                                                                                                                                                      |
| Kingsgrove South and Commercial Road construction compounds | Few receiver groups would see the changes to the Kingsgrove South construction compound and Commercial Road construction compound, as the site is visually contained to the north by the M5 East Motorway, and is bounded to the south by industrial development. Users of the M5 Linear Park at this location would be redirected to the northern park pathway / cycleway so would not see the changes to the site during construction. The workers in the industrial compound to the south of the Kingsgrove South construction compound would be the most affected by the visual changes to the site during the construction period.                                                                                                                                                               | The Kingsgrove South construction compound is not located adjacent to or near statutory listed heritage items, being fronted by modern commercial properties. The temporary visual impacts identified in the visual assessment would not have an impact to heritage.                                                                                                                                                       |
| Bexley Road North construction compound                     | Residents with adjoining boundaries were also assessed as having a higher sensitivity to visual changes that may occur along their common boundaries, or be affected by overshadowing from the built elements of the site. As such, residents of Flatrock Road and Jones Avenue who share a common boundary with Bexley Road North construction compound were assessed as having a High impact rating.                                                                                                                                                                                                                                                                                                                                                                                                | The Bexley Road North construction compound is located across Bexley Road from the non-statutory Register of the National Estate listed Clemton Park Urban Conservation Area. The temporary visual impacts identified in the visual assessment would not have an impact to the identified heritage significance.                                                                                                           |
| Bexley Road South construction compound                     | The Bexley Road South construction compound is more visually isolated than the Bexley Road North construction compound, as it is bounded by Bexley Road to the east, Wolli Creek to the south and the M5 East Motorway to the North. The receivers who would be most impacted by visual changes to the site would be pedestrians and cyclists using the existing pathway at the entry to the M5 Linear Park. This user group would pass a construction compound / site where the existing view is to a mature vegetated park and riparian corridor beyond. Some residential neighbours would view the changes to the site, but the receiver number is low and receivers would see the changes from a moderate distance away, and with a major road and pedestrian overpass between them and the site. | The Bexley Road South construction compound is not located adjacent to or near statutory listed heritage items, being fronted by modern commercial properties and the existing M5 East Motorway. No views to or from the non-statutory Register of the National Estate listed Clemton Park Urban Conservation Area, located across the M5 have been identified. There would be no visual impacts to heritage significance. |
| Bexley Road East construction compound                      | The Bexley Road East construction compound is visually isolated within the landscape due to landform, existing mature vegetation within and surrounding the site, and the existing sandstone walling along the western edge of the site fronting Bexley Road. The only receivers that may obtain views of built element within the compound are residential neighbours that front onto Johnston Street and Wolli                                                                                                                                                                                                                                                                                                                                                                                      | The Bexley road East construction compound is located within the curtilage of the non-statutory Register of the National Estate listed Clemton Park Urban Conservation Area. The construction compound is limited to previously cleared areas, with visual impacts being contained to a small number of residences in                                                                                                      |

| Construction compound               | Identified visual impacts                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | Assessment of heritage impact                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
|-------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                                     | Avenue, whose properties sit at a higher level and may have views into the site. These views may be framed or limited by existing mature vegetation within the back gardens of properties, or on the compound site itself. Further, the built elements within the compound are low (site offices and ablutions blocks), with a majority of the site used for parking. A four to 4.5 metre noise barrier / hoarding would surround the site and may block some views for these residents.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | Johnston Street and Wolli Avenue. Views would be minimally impacted with no long-term impact to the identified heritage significance. As the impacts are temporary, no mitigation is considered to be warranted.                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
| Arncliffe construction compound     | The significant change in character of this site from a green open space to a construction compound with associated construction activity and removal of mature vegetation, coupled with the sensitivity of residents to change in views to their environment has resulted in a number of High / High – Moderate ratings for visual impact at this location. Further study into the possible retention of mature trees, particularly along the boundary of the golf course, would assist in mitigating the visual impact for surrounding neighbours and users of the Cook Park Trail.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | The Arncliffe construction compound is located around 65 metres from the State Heritage Register and Sydney Water Section 170 Heritage and Conservation Register listed Western Outfall Main Sewer (Rockdale to Homebush). The views to and from the item have not been identified as contributing to the heritage significance of the sewer. As such, the Arncliffe construction compound would not impact on the significance of the sewer. While there will be visual impacts to other receivers in the vicinity, these items are not of heritage significance. There would be no visual impacts to heritage items as a result of the Arncliffe construction compound. |
| Canal Road construction compound    | The Canal Road construction compound would be located on the north-eastern side of Canal Road and the southern side of the Princes Highway; St Peters. Identified receivers adjacent to the compound consist of road users, commercial complexes, the Southern Cross Hotel and St Peters Anglican Church. The visual assessment determined that, at worst, there would be glimpses from the Church towards the compound, due to vegetation, distance and angles. The Canal Road construction compound lies within an area of low scenic value due to the surrounding land use of industrial and commercial enterprise, and flanked by two major roads. The sensitivity of visitors to local heritage items is reduced due to the utilitarian character of the surrounding area. Parts of the site on which the compound is situated is an enclosed, visually inaccessible area with a high level of existing construction activity, due to its existing use as a landfill. All these factors influence the low visual impact ratings for changes occurring on the site. | The Southern Cross Hotel is listed on Marrackville LEP 2011 as an item of local significance. An item listed on the State Heritage Register, St Peters Anglican Church is located around 90 metres north east of the compound. The visual assessment indicated that there would not be a substantial change in the visual outlook from either heritage item. It is therefore considered that there would be no visual impacts to the heritage items as a result of the Canal Road construction compound.                                                                                                                                                                  |
| Campbell Road construction compound | The Campbell Road construction compound would be located on the southern side of Campbell Road between Woodley Street and Harber Street, St Peters. Receivers include a small portion of fringing residential development, recreational users of Sydney Park and road users. Although the Campbell Road construction compound                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | The terraces located at 2-34 Campbell Road are identified as items of local heritage significance on the Sydney LEP 2012. Views from the terraces currently consist of views towards industrial and commercial premises. Noise walls and hoarding                                                                                                                                                                                                                                                                                                                                                                                                                         |

| Construction compound                      | Identified visual impacts                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | Assessment of heritage impact                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
|--------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                                            | is situated back from Campbell Road, the industrial buildings fronting the road would be demolished, which would allow views to the compound from the road and land beyond it. Two sensitive receiver groups are present: residents in a row of heritage listed terrace homes opposite the compound, and visitors to Sydney Park. Although residents would get uninterrupted views to the compound from their homes, views from the internal areas of Sydney Park are substantially screened by mature vegetation and landform. | would limit views into the compound. The impacts to the visual outlook should be minimised, where possible, by maintaining vegetation, where feasible and reasonable.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
| Landfill Closure construction compound     | The Landfill Closure construction compound would be located on the southern side of Campbell Road, west of the Campbell Road construction compound, St Peters. Views of the construction compound would be possible from the industrial complexes accessed from the Princes Highway. The compound would be partially located within the non-statutory Register of the National Estate listing of the St Peters Brickpit Geological Site                                                                                         | The industrial complexes have no heritage significance. The Landfill Closure construction compound would partially located within the St Peters Brickpit Geological Site, although it is noted that this item is currently not available for the public to appreciate, being within an active landfill site.                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
| Burrows Road construction compound         | The Burrows Road construction compound would be located on the northern side of Burrows Road, west of the intersection with Campbell Road, St Peters. Receivers comprise industrial neighbours and road users. The Burrows Road construction compound is situated within an existing industrial area with low visual amenity and a low sensitivity of surrounding receivers. It has a limited visual impact on its surrounds, and would be in keeping with the character of the area.                                           | There are no statutory or non-statutory listed heritage items in the vicinity of the Burrows Road construction compound. There would have no adverse visual impacts to heritage items as a result of the Burrows Road construction compound.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
| Campbell Road bridge construction compound | The Campbell Road bridge construction compound would be located on the southern side of Burrows Road, opposite the intersection with Campbell Road, St Peters. Receivers comprise industrial neighbours and road users.                                                                                                                                                                                                                                                                                                         | The Campbell Road bridge construction compound is situated within an existing industrial area with low visual amenity and a low sensitivity of surrounding receivers. It has a limited visual impact on its surrounds, and would be in keeping with the character of the area. However, the compound does front the Alexandra Canal, which is listed on the State Heritage Register, Sydney Water Section 170 Heritage and Conservation Register and LEPs. Views to and from this section of the canal are currently obscured by the industrial complexes. The construction of the bridge, coupled with the proposed interpretation, would enhance the public views of the canal and increase public understanding and appreciation of the heritage significance of the canal. |



| Construction compound                      | Identified visual impacts                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | Assessment of heritage impact                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
|--------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Gardners Road bridge construction compound | The Gardeners Road bridge construction compound would be located on the southern side of Burrows Road in St Peters. Receivers comprise industrial neighbours and road users. The Gardeners Road bridge construction compound is situated within an existing industrial area with low visual amenity and a low sensitivity of surrounding receivers. It has a limited visual impact on its surrounds, and would be in keeping with the character of the area.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | The Gardners Road bridge construction compound is situated within an existing industrial area with low visual amenity and a low sensitivity of surrounding receivers. It has a limited visual impact on its surrounds, and would be in keeping with the character of the area. However, the compound does front the Alexandra Canal, which is listed on the State Heritage Register, Sydney Water Section 170 Heritage and Conservation Register and LEPs. Views to and from this section of the canal are currently obscured by the industrial complexes. The construction of the bridge, coupled with the proposed interpretation, would enhance the public views of the Canal and increase public understanding and appreciation of the heritage significance of the canal. |
| Sydney Park construction compound          | The Sydney Park construction compound would be located on the northern side of Campbell Road in Sydney Park, St Peters. Receivers comprise residential neighbours, road users and passive recreational users of the park. The Sydney Park construction compound lies within an existing, regionally important parkland surrounded by a number of sensitive receiver groups. Overall, the visual impact ratings for Receiver Locations associated with this compound are relatively high, which in part is due to receiver sensitivity, but also due to the significant change in character of views to the site, from an established parkland corner to a construction compound. Receivers who would experience the greatest change to the views and lighting levels are residents living in the apartments on the corner of Campbell Road and Barwon Park Road. These receivers currently have views into Sydney Park that would change to views to the construction compound. These changes are temporary, and the site would be returned to park on completion of the project. | Sydney Park is not identified as an item of heritage significance, although it has been determined to contain potential for archaeological relics (refer to <b>Section 5.2.6</b> ). The receivers with views towards the compound are not identified heritage items. It is noted that the compound is located adjacent to the terraces at 2-34 Campbell Road, which are identified as items of local heritage significance on the Sydney LEP 2012. However, due to the viewlines from the terraces, which are confined to views directly across Campbell Road and directly north from the rear of the terraces, this construction compound would not be visible.                                                                                                               |
| Western surface works                      | Motorists along the M5 would be subject to road construction works over a period of up to around three years. Visual impacts will be limited to the M5 corridor.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | There would be no or limited views from Pallamanna Parade Urban Conservation Area of the construction works within the existing M5 East Motorway. These works would have no impacts to visual heritage significance.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |

### 7.2.5 Archaeological heritage

In addition to listed items with known archaeological potential identified within existing heritage registers (refer to **Chapter 6**), a review of historical parish maps and plans was undertaken for the study area to gain an understanding and appreciation of the potential archaeological heritage present within the identified impact areas. The review in **Section 5.2.3** identified the potential to impact on archaeological relics associated with a potential air raid shelter and two former brickworks along Euston Road, St Peters. Management measures that would be implemented prior to construction are provided in **Section 8.4**. It was determined that archaeological investigations were not required at this stage to inform the impacts of the project for the following reasons:

- The local roads upgrade along Euston Road has been designed to minimise acquisition and demolition impacts to the existing commercial and industrial complexes located along the eastern side of Euston Road by maximising the use of the existing road reserve along Euston Road.
- If impacts were to be avoided, the impacts would result in unacceptable acquisition and demolition impacts to the existing commercial and industrial complexes located along the eastern side of Euston Road.
- It is unclear to what extent the landscaping and rehabilitation of the former brick pits adjacent to these structures may have impacted on their archaeological survival.

The archaeological relics, if extant, can be mitigated through investigation and/or *in situ* preservation, but advanced knowledge would not allow for a redesign of the project due to the impacts identified above. Mitigation and management of this potential is discussed further in **Section 8.8**.

Elsewhere, there remains the potential to encounter deposits or relics in any context. The works in the St Peters interchange area retains the potential to encounter late 19<sup>th</sup> and early 20<sup>th</sup> century refuse deposits and brick wasters (bricks that did not fire properly or were faulty in some way) from the surrounding bricks works. Within road reserves there is potential to encounter earlier road surfaces beneath the current asphalt or evidence of the dismantled tram network in the vicinity of the Princes Highway and Campbell Street intersection. Should such deposits or relics be encountered they are unlikely to be of archaeological significance due to their ubiquitous nature and lack of provenance, making their ability to contribute to archaeological research minimal. Uncovering such finds would not trigger the unexpected finds procedure as they are anticipated and are unlikely to be of archaeological significance.

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### 7.3 Assessment of potential impacts

For the purposes of comparative assessment, the criteria in **Table 61** have been established for ranking the degree of impact from the construction and operation of the project.

**Table 61** Non-Aboriginal heritage impact criteria

| Impact assessment  | Criteria                                                                                                                                                                                                                                                                                                                          |
|--------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Negligible         | - Impacts to the heritage item in question or its significance would be negligible and would not affect the overall heritage significance of the item.                                                                                                                                                                            |
| Minor impact       | - Minor impacts may occur to the listed item, typically with respect to its reported curtilage as opposed to the listed item itself.<br>- These impacts would be minimal in nature and would not affect the overall heritage significance of the item.<br>- Impacts that can be repaired or rectified, such as repair of cracking |
| Significant impact | - Impacts to the heritage item are unavoidable with the current project design.<br>- The heritage significance of the item would be impacted.                                                                                                                                                                                     |

### 7.4 Identified impacts to listed heritage items

Identified impacts to heritage items, both direct and indirect, are detailed in **Appendix B**.

In summary, 57 heritage items would be directly or indirectly impacted by the project. In some instances, an item would be directly and indirectly impacted by the project. Of the 58 heritage items:

- Three items would be demolished, being:
  - Warehouse 'Rudders Bond Store' (Sydney LEP I405);
  - Terrace group – 28-44 Campbell Street, St Peters (RMS Section 170 #4305629); and
  - House – 82 Campbell Street, St Peters (RMS Section 170 #4305643).
- Modifications ranging from a minor to a significant level of assessment would be required at three items, being:
  - Alexandra Canal (RNE # 4571712, SHR #01621, Sydney LEP 2012 I3, Marrickville LEP 2011 I270, Botany LEP I1);
  - St Peters Brickpit Geological Site (RNE #16240); and
  - Goodsell Estate Conservation Area (Marrickville LEP 2011 C16).
- The project includes the full or partial acquisition of two items, which would result the permanent loss of this curtilage or would result in a change in use:
  - Service Garage – 316 Princes Highway (Marrickville LEP 2011 I312); and
  - Goodsell Estate Heritage Conservation Area (Marrickville LEP 2011 C16) (partial).

- The heritage values of seven heritage conservation areas would be partially and directly impacted, being:
  - Pallamanna Parade Urban Conservation Area (non-statutory Register of the National Estate #102089);
  - Kingsgrove East Urban Conservation Area (non-statutory Register of the National Estate #102106);
  - Clemton Park Urban Conservation Area (non-statutory Register of the National Estate #102071);
  - Bardwell Park Urban Conservation Area (non-statutory Register of the National Estate #102101);
  - Goodsell Estate Heritage Conservation Area (Marrickville LEP 2011 C16);
  - Cooper Estate Heritage Conservation Area (Sydney LEP 2012 C2); and
  - Sydenham Village (ID No 100061 under the Register of the National Estate).

Landscaping of the project near to some heritage conservation areas would minimise the potential impacts. Some of these conservation areas would be impacted by secondary direct impacts (as the tunnel passes under these heritage conservation areas). The overall heritage value of the heritage conservation areas would not be significantly impacted by the project.

- Twenty three items would be directly impacted due to construction vibration from surface works. These impacts are anticipated to have a negligible to minor risk of affecting the significance of the heritage items. The overall heritage value of the heritage items would not be significantly impacted by the project.
- Thirty four items would be directly impacted due to vibration, settlement and groundwater drawdown as a result of tunnelling works. These items are primarily located within the preferred project corridor and include items consisting of mainly residential houses. Impacts to these items are anticipated to be minor to negligible. Four of these items would also be directly impacted by construction vibration due to surface works. The overall heritage value of the heritage items would not be significantly impacted by the project.

Of the 57 heritage items, 21 items (including heritage conservation areas) may also be indirectly impacted by the project, due to temporary and / or permanent visual impacts. Of the 21 items, 20 items would also be directly impacted as outlined above. Impacts to the heritage items as a result of visual effects are anticipated to be minor to moderate. The overall heritage value of the heritage items would not be significantly impacted by the project.

There is also the potential for direct impacts due to potential eligibility for at-property acoustic treatment. Two of the 57 items have also been identified as being potentially eligible for consideration of property acoustic treatment. This would be confirmed during detailed design, in consultation with landowners, and with consideration of potential impacts to heritage values.

The cumulative impact of the project to heritage values would be moderate. These potential impacts are to be managed to reduce the risk of actual impacts to the identified items.

Table 62 Summary of impacts by heritage item identification number (*italics denote an item that may potentially be subject to more than one impact type and therefore appears twice in the table*)

| Type of impact                              | Negligible impact                                                                                                                                                                                                                                                                                                                                                           | Minor impact                                                                                                               | Significant impact                                                                                                                                                                                                                                  |
|---------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Primary Direct</b>                       |                                                                                                                                                                                                                                                                                                                                                                             |                                                                                                                            |                                                                                                                                                                                                                                                     |
| Demolition                                  |                                                                                                                                                                                                                                                                                                                                                                             |                                                                                                                            | <ul style="list-style-type: none"> <li>– Warehouse 'Rudders Bond Store', Sydney LEP 2012 I405</li> <li>– Terrace group – 28-44 Campbell Street RMS S170 #4305629</li> <li>– House – 82 Campbell Street, RMS Section 170 #4305643</li> </ul>         |
| Modification                                |                                                                                                                                                                                                                                                                                                                                                                             | <ul style="list-style-type: none"> <li>– Goodsell Conservation Area, Marrickville LEP 2011 C16</li> </ul>                  | <ul style="list-style-type: none"> <li>– Alexandra Canal, State Heritage Register #01621, Sydney LEP 2012 I3, Marrickville LEP 2011 I270, Botany Bay LEP I1 and RNE # 4571712,</li> <li>– St Peters Brickpit Geological Site, RNE #16240</li> </ul> |
| Acquisition                                 |                                                                                                                                                                                                                                                                                                                                                                             | <ul style="list-style-type: none"> <li>– Goodsell Conservation Area (<i>partial</i>), Marrickville LEP 2011 C16</li> </ul> | <ul style="list-style-type: none"> <li>– Service Garage, Marrickville LEP 2011 I312</li> </ul>                                                                                                                                                      |
| Change in heritage conservation area values | <ul style="list-style-type: none"> <li>– Pallamanna Parade Urban Conservation Area RNE #102089,</li> <li>– Kingsgrove East Urban Conservation Area RNE #102106</li> <li>– Clemton Park Urban Conservation Area RNE #102071</li> <li>– Bardwell Park Urban Conservation Area RNE #102101</li> <li>– Cooper Estate Heritage Conservation Area (Sydney LEP 2012 C2)</li> </ul> | <ul style="list-style-type: none"> <li>– Goodsell Estate Heritage Conservation Area, Marrickville LEP 2011 C16</li> </ul>  |                                                                                                                                                                                                                                                     |



| Type of impact                                                             | Negligible impact                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             | Minor impact                                                                                                                                                                                                  | Significant impact |
|----------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------|
| <b>Secondary Direct</b>                                                    |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |                                                                                                                                                                                                               |                    |
| Acoustic treatment<br><br>(subject to confirmation during detailed design) |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | <ul style="list-style-type: none"> <li>– <i>St Peters Public School, including interiors, Marrickville LEP 2011 I271</i></li> <li>– <i>Terrace group – 2-34 Campbell Road, Sydney LEP 2012 I12</i></li> </ul> |                    |
| Vibration, settlement and groundwater drawdown from tunnelling works       | <ul style="list-style-type: none"> <li>– <i>Kingsgrove East Urban Conservation Area RNE #102106</i></li> <li>– <i>Bexley North Railway Station Group Sydney Trains #4801898</i></li> <li>– <i>Bardwell Park Urban Conservation Area RNE #102106</i></li> <li>– <i>Western Outfall Main Sewer, SHR #1647, Sydney Water s170 #4572728</i></li> <li>– <i>Southern Cross Hotel, Marrickville LEP 2011 I277</i></li> <li>– <i>Bard of Avon – 39 Eden Street, Rockdale LEP I13</i></li> <li>– <i>Californian bungalow house – 7 Fairview Street, Rockdale LEP I15</i></li> <li>– <i>Californian bungalow house – 21 Fairview Street, Rockdale LEP I16</i></li> <li>– <i>Street plantings – Firth Street, Rockdale LEP I18</i></li> <li>– <i>Arncliffe Post Office, Rockdale LEP 2011 I19 and RNE#19170</i></li> <li>– <i>Glenevie Lane, Rockdale LEP 2011 I20</i></li> <li>– <i>Victorian shop and dwelling – 45 Firth Street, Rockdale LEP 2011 I21</i></li> </ul> | <ul style="list-style-type: none"> <li>– <i>Service Garage, Marrickville LEP 2011 I312</i></li> </ul>                                                                                                         |                    |

| Type of impact | Negligible impact                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | Minor impact | Significant impact |
|----------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------|--------------------|
|                | <ul style="list-style-type: none"> <li>– St Francis Xavier Church Group, Rockdale LEP 2011 I22</li> <li>– St Francis Xavier Catholic Presbytery, Rockdale LEP 2011 I23</li> <li>– Rosslyn hospital, Rockdale LEP 2011 I24</li> <li>– House (31 Kyle Street), Rockdale LEP 2011 I35</li> <li>– Victorian House – 16 Stanley Street, Rockdale LEP I48</li> <li>– Victorian House – 20 Stanley Street, Rockdale LEP I49</li> <li>– Victorian House – 22 Stanley Street, Rockdale LEP I50</li> <li>– Victorian semi-detached dwelling – 26 Stanley Street, Rockdale LEP I51</li> <li>– House (73 West Botany St)Rockdale LEP 2011 I56</li> <li>– House – 148 Wollongong Road, Rockdale LEP I61</li> <li>– Stotts Reserve Rockdale LEP 2011 I165</li> <li>– Stone Federation House – 15 East Street, Rockdale LEP 2011 I81</li> <li>– Arncliffe (Forest Rd) Overbridge Sydney Trains s170 #4805728</li> <li>– Moreton Bay Fig Tree, Marrickville LEP 2011 I303</li> <li>– Timber Slab Cottage, including interiors, SHR #01412, Marrickville LEP 2011 I294</li> </ul> |              |                    |

| Type of impact               | Negligible impact                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | Minor impact                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | Significant impact                                                                                                                                                                                                                     |
|------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                              | <ul style="list-style-type: none"> <li>Part of Westpac stores department and Penfolds wine cellar (former), including interiors, Marrickville LEP 2011 I299</li> <li>Brick Kerb and sandstone kerb guttering, Marrickville LEP 2011 I284</li> <li>Victorian filigree style sandstone faced residence, including interiors, Marrickville LEP 2011 I288</li> <li>St Mary / St Mina Coptic Orthodox Church, Marrickville LEP 2011 I289 (Note: to be demolished by Marrickville Council)</li> <li>Sydenham Village, RNE #100061</li> <li>Arncliffe Railway Station Group SHR #01076, Rockdale LEP 2011 I1 and Sydney Trains Section 170 register #4801150</li> </ul> |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |                                                                                                                                                                                                                                        |
| Vibration from surface works | <ul style="list-style-type: none"> <li><i>Pallamanna Parade Urban Conservation Area RNE #102089,</i></li> <li><i>Bexley North Railway Station Group Sydney Trains #4801898</i></li> <li><i>Western Outfall Main Sewer, SHR #1647, Sydney Water s170 #4572728</i></li> <li>Remaining brick road and footpath paving and stone guttering, Marrickville LEP 2011 I283</li> <li><i>St Peters Public School, including interiors, Marrickville LEP 2011 I271</i></li> <li><i>St Peter's Anglican Church and Graveyard, RNE #1716, SHR#00032, Marrickville LEP 2011 I275</i></li> </ul>                                                                                | <ul style="list-style-type: none"> <li><i>Clemton Park Urban Conservation Area RNE #102071</i></li> <li><i>Wolli Creek Culvert, RMS Section 170 #4305006</i></li> <li><i>Terrace housing, including interiors - 105-119 May Street, Marrickville LEP 2011 I273</i></li> <li><i>Waugh and Josephson industrial buildings, former, showroom, offices and workshops, including interiors, Marrickville LEP 2011 I280</i></li> <li><i>Town and Country Hotel, including interiors, Marrickville LEP 2011 I281</i></li> <li><i>Group of Victorian Filigree and Victorian Italianate terrace houses – Narara, including interiors, Marrickville LEP 2011 I282</i></li> </ul> | <ul style="list-style-type: none"> <li><i>St Peters Brickpit Geological Site, RNE #16240</i></li> <li><i>Alexandra Canal, RNE # 4571712, SHR #01621, Sydney LEP 2012 I3, Marrickville LEP 2011 I270, Botany Bay LEP I1)</i></li> </ul> |



| Type of impact  | Negligible impact                                                                                                                                                                                                                                                                                                                                                                                                                                                        | Minor impact                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | Significant impact                                                                                                                                                                                                      |
|-----------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                 | <ul style="list-style-type: none"> <li>– Southern Cross Hotel, Marrickville LEP 2011 I277</li> <li>– Cooper Estate conservation area, Sydney LEP 2012 C2</li> </ul>                                                                                                                                                                                                                                                                                                      | <ul style="list-style-type: none"> <li>– Service Garage, Marrickville LEP 2011 I312</li> <li>– Goodsell Estate Heritage Conservation Area, Marrickville LEP 2011 C16</li> <li>– Terrace group – 2-34 Campbell Road, Sydney LEP 2012 I12</li> <li>– Water Board pump house, including Interior and substructure, Sydney LEP 2012 I18, Sydney Water Section 170 #4571730</li> <li>– Industrial Building, 'Frank G Spurway', Sydney LEP 2012 I20</li> <li>– Macdonaldtown Stormwater Channel, Proposed amendment to Sydney LEP 2012 (Industrial and warehouse buildings) #3</li> <li>– Former Alexandria Spinning Mills, Proposed amendment to Sydney LEP 2012 (Industrial and warehouse buildings) #14</li> </ul> |                                                                                                                                                                                                                         |
| <b>Indirect</b> |                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |                                                                                                                                                                                                                         |
| Visual          | <ul style="list-style-type: none"> <li>– Wolli Creek Valley, Rockdale LEP I237</li> <li>– Bexley North Railway Station Group Sydney Trains #4801898</li> <li>– Former Alexandria Spinning Mills, Proposed amendment to Sydney LEP 2012 (Industrial and warehouse</li> <li>– Pallamanna Parade Urban Conservation Area RNE #102089,</li> <li>– Kingsgrove East Urban Conservation Area RNE #102106</li> <li>– Clemton Park Urban Conservation Area RNE #102071</li> </ul> | <ul style="list-style-type: none"> <li>– Terrace housing, including interiors - 105-119 May Street, Marrickville LEP 2011 I273</li> <li>– Waugh and Josephson industrial buildings, former, showroom, offices and workshops, including interiors, Marrickville LEP 2011 I280</li> <li>– Town and Country Hotel, including interiors, Marrickville LEP 2011 I281</li> <li>– Group of Victorian Filigree and Victorian Italianate terrace houses – Narara, including interiors, Marrickville LEP 2011 I282</li> <li>– Service Garage, Marrickville LEP 2011 I312</li> </ul>                                                                                                                                       | <ul style="list-style-type: none"> <li>– St Peters Brickpit Geological Site, RNE #16240</li> <li>– Alexandra Canal, RNE # 4571712, SHR #01621, Sydney LEP 2012 I3, Marrickville LEP 2011 I270, Botany LEP I1</li> </ul> |

| Type of impact | Negligible impact                                                                                                                                                                                                                                                      | Minor impact                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | Significant impact |
|----------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------|
|                | <ul style="list-style-type: none"> <li>– <i>Cooper Estate Conservation Area (Sydney LEP 2012 C2)</i></li> <li>– <i>Western Outfall Main Sewer, SHR #1647, Sydney Water s170 #4572728</i></li> <li>– <i>Southern Cross Hotel, Marrickville LEP 2011 I277</i></li> </ul> | <ul style="list-style-type: none"> <li>– <i>Terrace group – 2-34 Campbell Road, Sydney LEP 2012 I12</i></li> <li>– <i>Water Board pump house, including Interior and substructure, Sydney LEP 2012 I18, Sydney Water Section 170 #4571730</i></li> <li>– <i>Industrial Building, 'Frank G Spurway', Sydney LEP 2012 I20</i></li> <li>– <i>Macdonaldtown Stormwater Channel, Proposed amendment to Sydney LEP 2012 (Industrial and warehouse buildings) #3</i></li> <li>– <i>Goodsell Estate Heritage Conservation Area, Marrickville LEP 2011 C16</i></li> </ul> |                    |