

5 Project description

This chapter provides a detailed description of the construction and operation of the project. It defines the project scope and describes each of the project elements, the design standards and criteria used in the development of the concept design, and the proposed construction process.

5.1 Project scope

RMS proposes to replace the existing Windsor bridge over the Hawkesbury River. The Windsor bridge replacement project would involve:

- Construction of a new bridge over the Hawkesbury River at Windsor, around 35 metres downstream of the existing Windsor bridge.
- Construction of new approach roads and intersections to connect the new bridge to existing road network.
- Modifications to local roads and access arrangements, including changes to the Macquarie Park access and connection of The Terrace.
- Construction of pedestrian and cycling facilities, including a shared pedestrian/cycle pathway for access to and across the new bridge.
- Removal and backfilling of the existing bridge approach roads.
- Demolition of the existing Windsor bridge.
- Urban design and landscaping works, including within the parkland area of Thompson Square and adjacent to the northern intersection of Wilberforce Road, Freemans Reach Road and the Macquarie Park access road.
- Ancillary works such as public utility adjustments, water management measures and scour protection works.

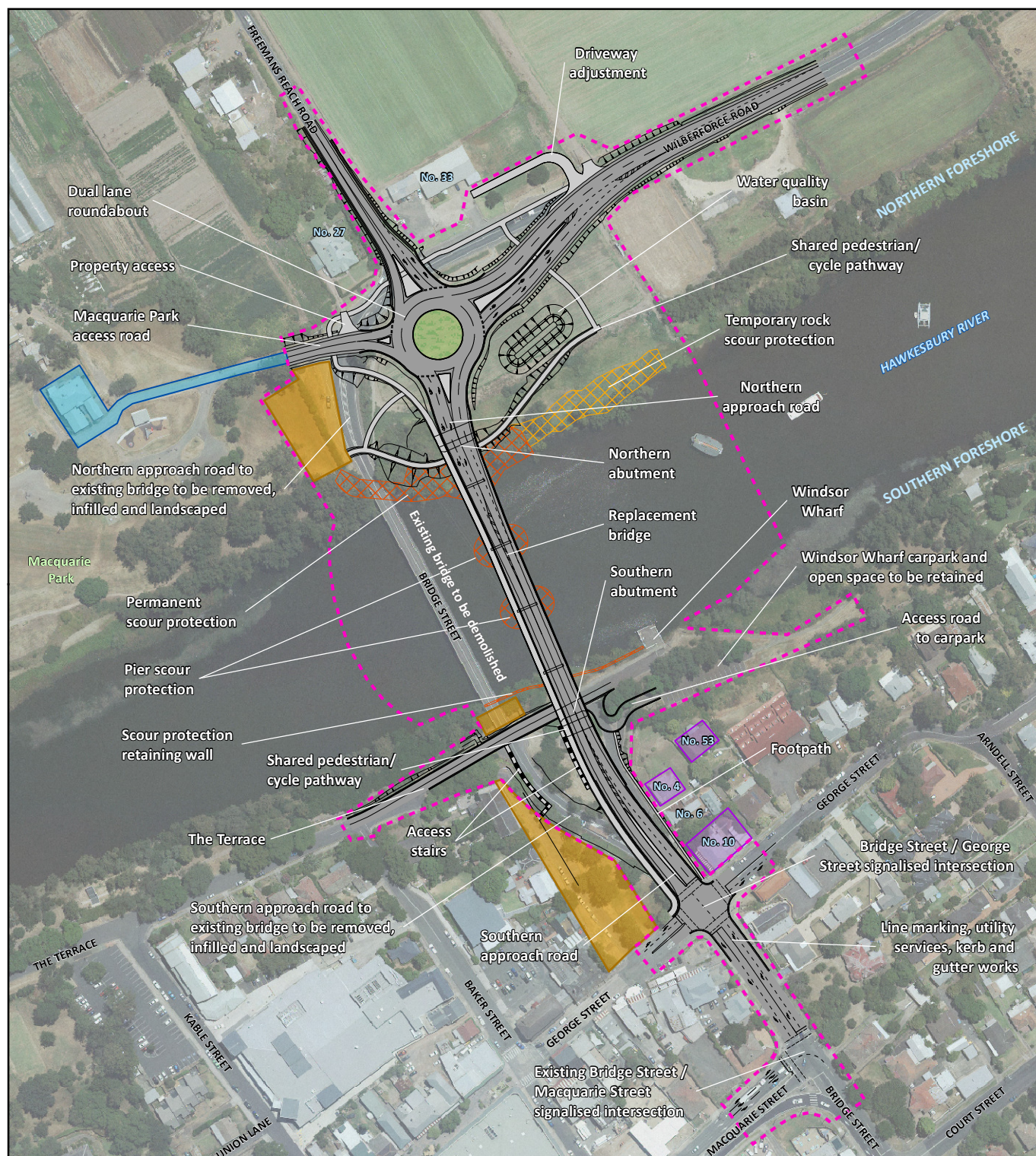
This EIS seeks approval for the project elements described above. The EIS has been prepared based on a concept design. If approved, a further detailed design process will follow which may include variations to the concept design. This approach is consistent with the approach taken in other environmental assessments of major infrastructure projects. In this EIS, however, the level of project detail described in the subsequent sections is substantially greater than would normally be provided. The reason for this detail is to assist with understanding and conveying the potential impacts of the project on heritage views and vistas.

The detailed design process will seek to further minimise impacts and optimise traffic efficiency. In doing so it is likely to necessitate changes to a number of project elements but will not affect the key project elements described. These design changes would consider the principles of ESD.

Figure 5-1 and **Figures 5-1a to Figure 5-1c** shows the key elements of the project concept design as well as the total indicative project boundary anticipated for construction and operation of the works. The design of the project presented in the figures is indicative and would be subject to further refinement during detailed design. **Figure 5-2** shows indicative locations of the temporary construction and compound sites.

Further details of the various work elements are provided in **Section 5.2**. Refinements to design features may be made during the detailed design phase (if the project is approved) to further reduce environmental impacts.

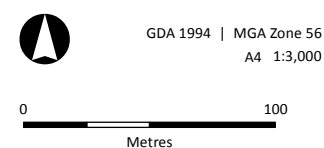
Figure 5-1 | Key project elements



LEGEND

- Concept design
- Construction work zone
- Permanent rock scour protection (if required)
- Temporary rock scour protection (if required)
- Properties requiring flood mitigation works. Works subject to further consultation with and agreement from affected property owners.
- Properties requiring noise mitigation works. Works that are feasible and reasonable would be subject to further consultation with and agreement from affected property owners.
- Works subject to further council and stakeholder consultation

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Indicative only – subject to detailed design

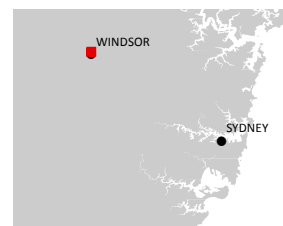
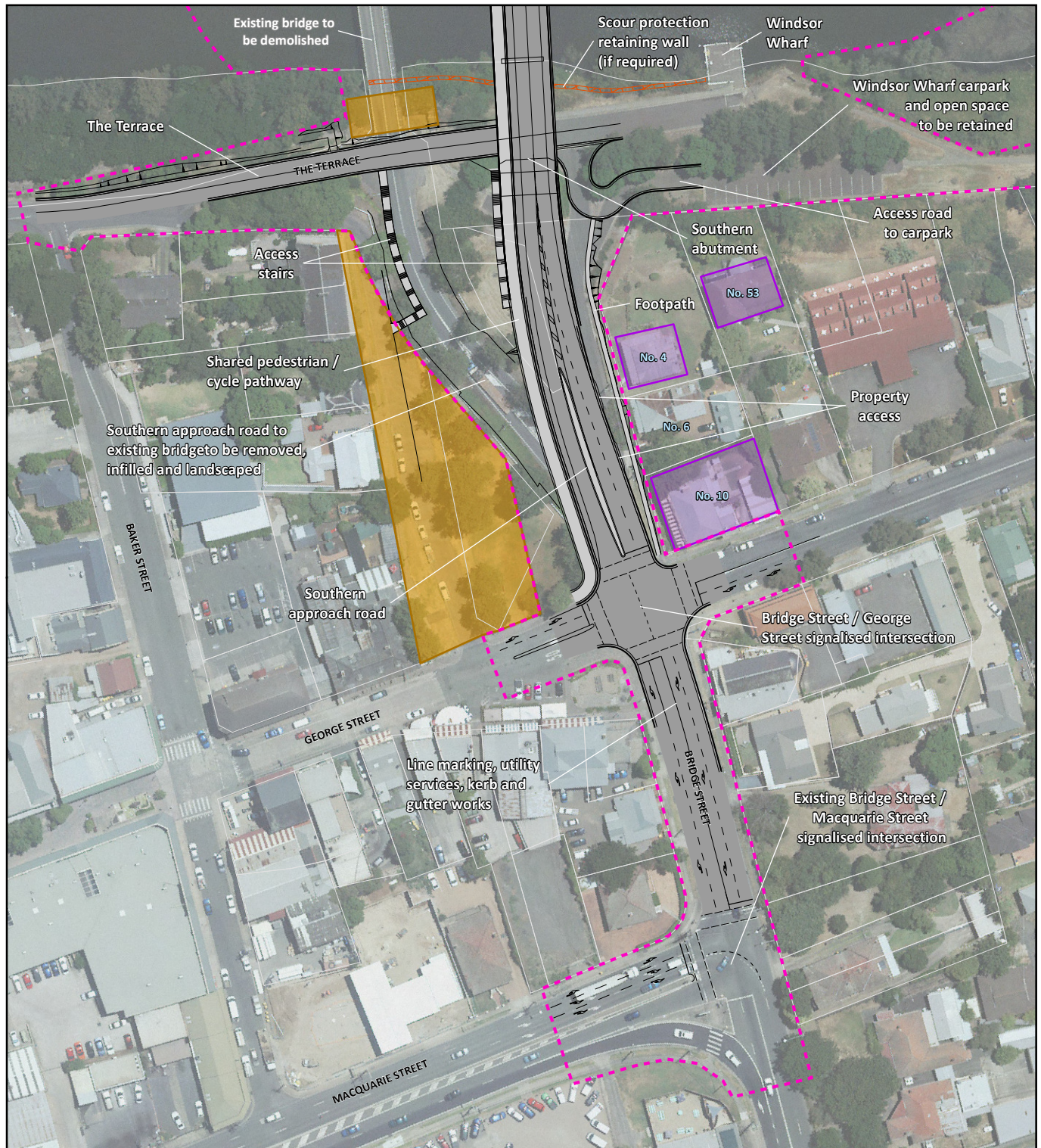


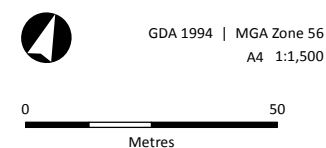
Figure 5-1a | Key project elements - Southern Approach



LEGEND

- Concept design
- Construction work zone
- Permanent rock scour protection (if required)
- Temporary rock scour protection (if required)
- Cadastral boundary
- Properties requiring flood mitigation works. Works subject to further consultation with and agreement from affected property owners.
- Properties requiring noise mitigation works. Works that are feasible and reasonable would be subject to further consultation with and agreement from affected property owners.
- Works subject to further council and stakeholder consultation

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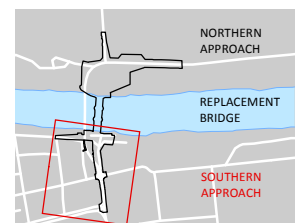
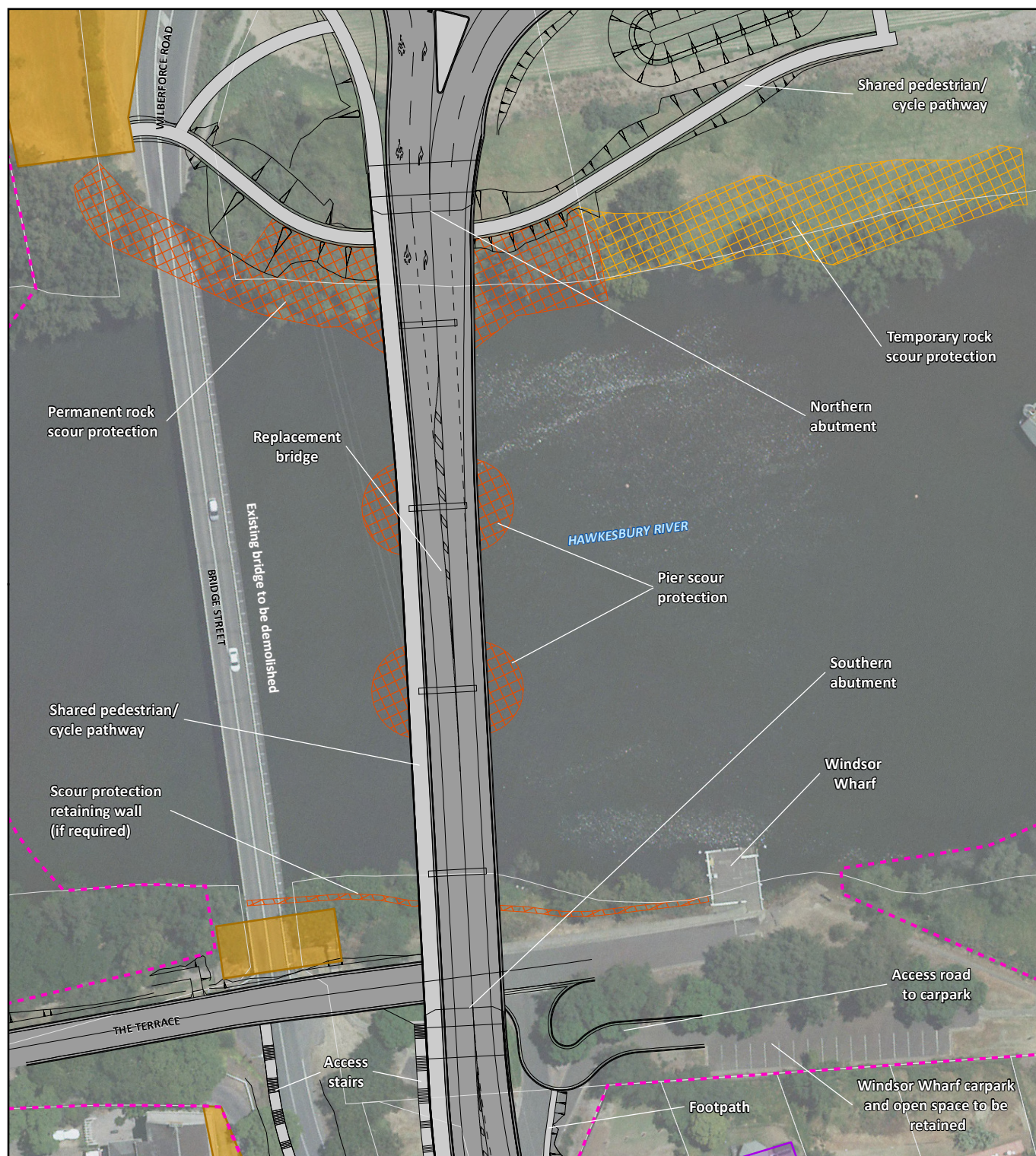


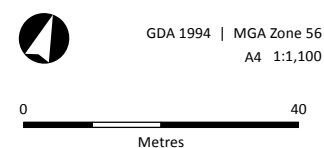
Figure 5-1b | Key project elements - Replacement Bridge



LEGEND

- Concept design
- Construction work zone
- Permanent rock scour protection (if required)
- Temporary rock scour protection (if required)
- Cadastral boundary
- Properties requiring flood mitigation works. Works subject to further consultation with and agreement from affected property owners.
- Properties requiring noise mitigation works. Works that are feasible and reasonable would be subject to further consultation with and agreement from affected property owners.
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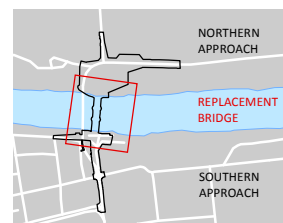
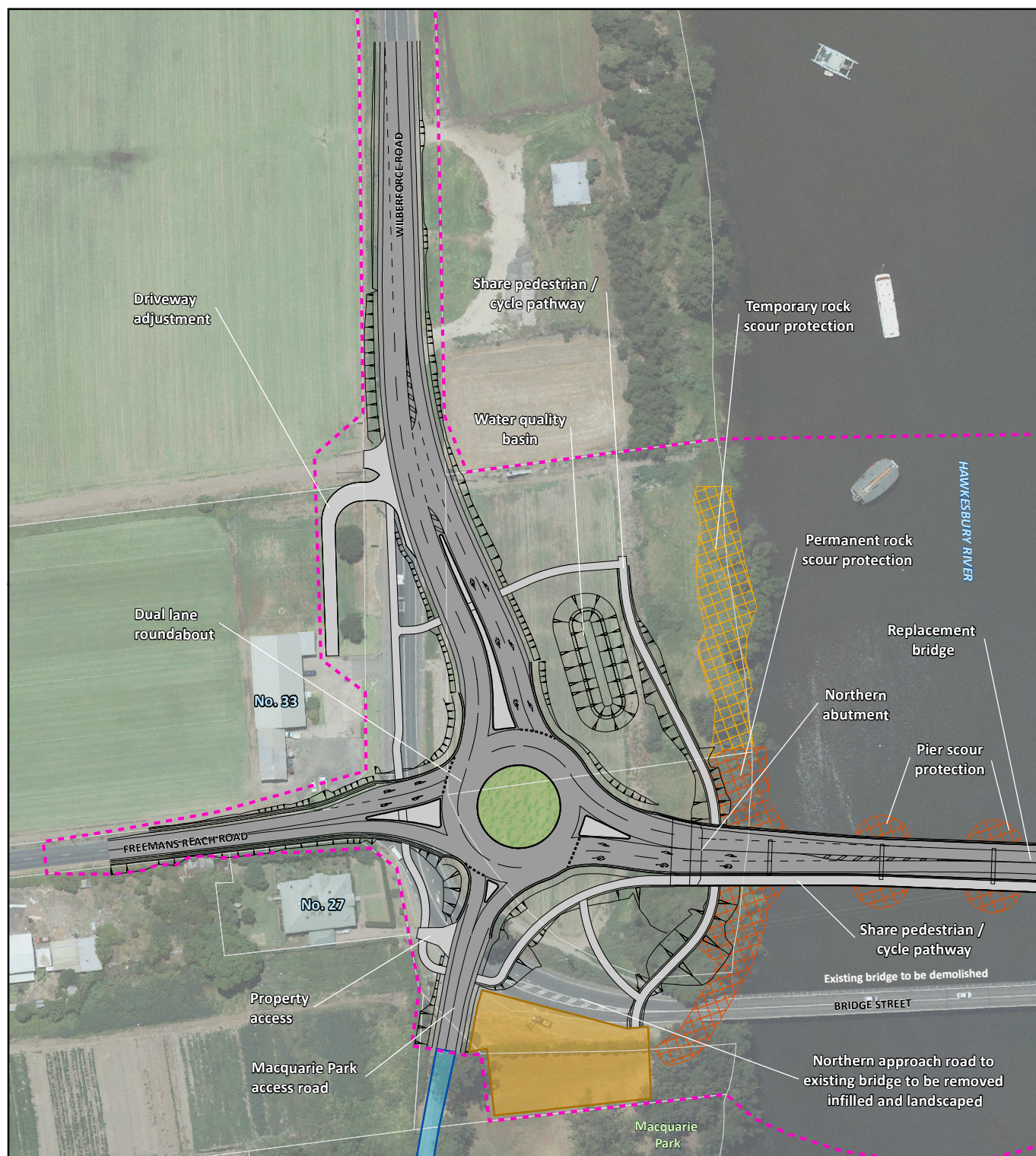


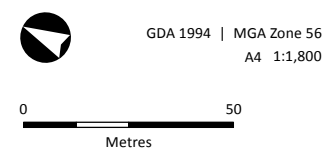
Figure 5-1c | Key project elements - Northern Approach



LEGEND

- Concept design
- Construction work zone
- Permanent rock scour protection (if required)
- Temporary rock scour protection (if required)
- Cadastral boundary
- Properties requiring flood mitigation works. Works subject to further consultation with and agreement from affected property owners.
- Properties requiring noise mitigation works. Works that are feasible and reasonable would be subject to further consultation with and agreement from affected property owners.
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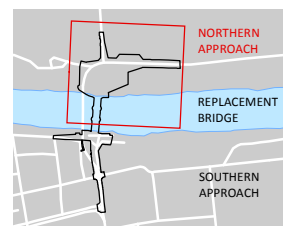
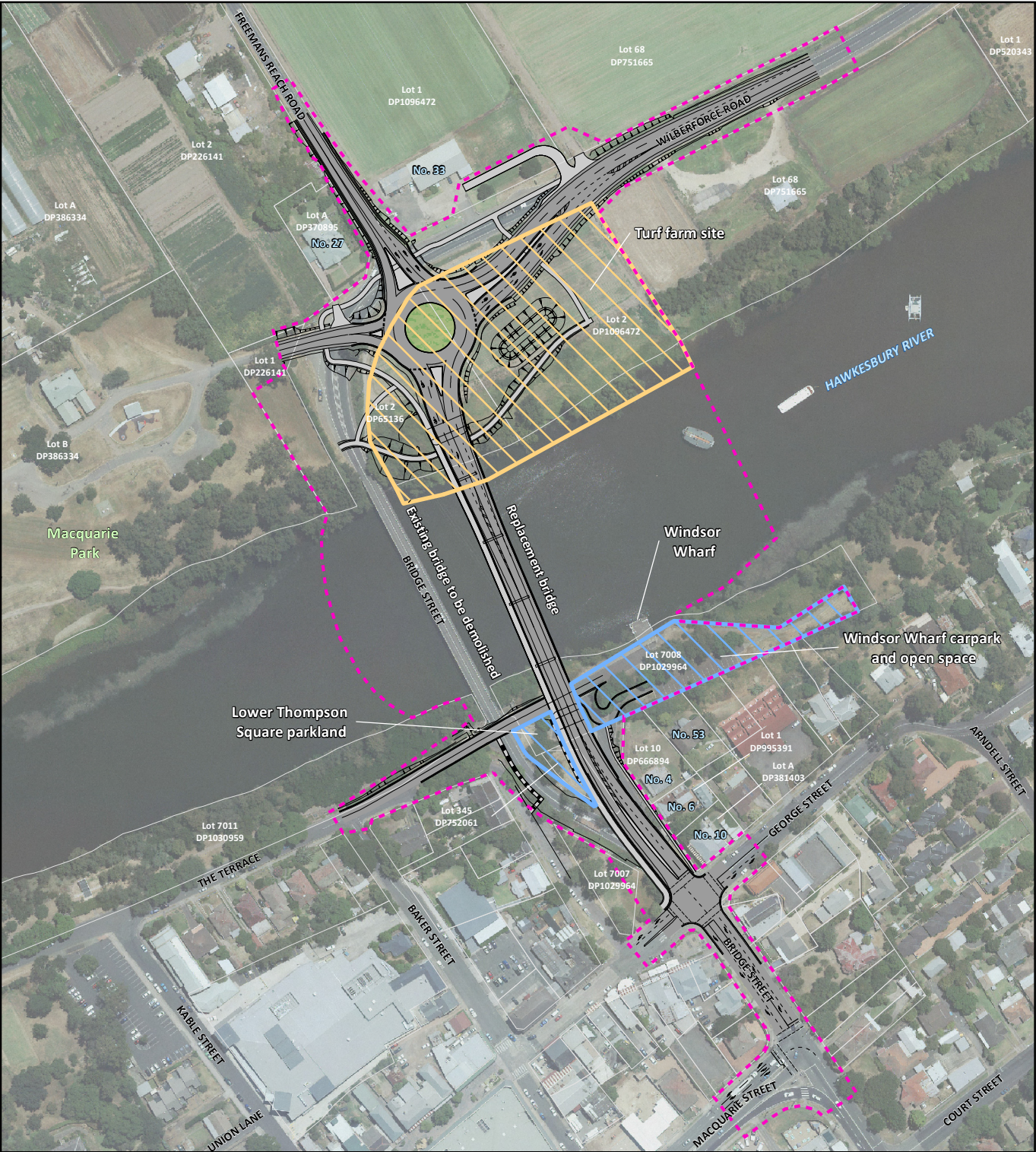


Figure 5-2 | Indicative areas for temporary construction compounds



Indicative only – subject to detailed design

- LEGEND**
- Concept design
 - Construction work zone
 - Areas for temporary construction and secondary compound sites
 - Main construction compound site
 - Cadastral boundary

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5.2 Project elements

5.2.1 The replacement bridge

The replacement bridge would be located around 35 metres downstream of the existing Windsor bridge. The southern approach to the replacement bridge would be via a new realigned section of Bridge Street, which would start at the existing intersection of George Street and Bridge Street and head generally north-westwards along the alignment of Old Bridge Street on the eastern side of the Thompson Square parkland. On the northern side of the river, the replacement bridge would connect with the junction of Wilberforce Road, Freemans Reach Road and the Macquarie Park access road at a new roundabout intersection (to be constructed as part of the project). Bridge approach roads and intersection modifications are described in **Section 5.2.2**.

The replacement bridge would be constructed using the incrementally launched method. The bridge would comprise of five spans and would be constructed of reinforced concrete. The bridge deck would be about 15.2 metres wide and supported on up to four piers within the river. It would have an overall length of about 159 metres, spanning both the river and The Terrace. The clearance under the bridge where it spans The Terrace would be about 3.6 metres, which would allow a range of service and emergency vehicles to pass under the bridge and access Windsor Wharf. The minimum clearance under the bridge where it spans the river would be about 7.5 metres at the average high tide level. An illustration of the proposed replacement bridge is provided in **Figure 5-3** and a cross section is presented in **Figure 5-4a** and **Figure 5-4b**.

The replacement bridge would initially comprise two traffic lanes (one in each direction), each 3.5 metres wide and with an adjacent two metre wide shoulder. There would also be a three metre wide shared pedestrian/cycle path on the western side of the bridge.

The wide road shoulders of the replacement bridge would allow the bridge to be re-configured to a three lane bridge in the future, when required. This would be achieved by reducing the road shoulder width to 0.5 metres and changing the lane markings, without the need for additional construction. The change in lane configuration would not affect the width of the pedestrian/cycle path. The introduction of the three lane configuration would occur when growth in traffic results in unacceptable levels of service. The three traffic lanes would consist of two southbound lanes and one northbound lane. All three lanes would be about 3.3 metres wide.

The low point of the replacement bridge at deck level would be around 9.8 metres Australian Height Datum (AHD), making it around 2.8 metres higher than the lowest point of the existing bridge. This would give the replacement bridge a slightly higher level of flood immunity than the existing bridge. Specifically, while the existing bridge is overtopped in a one in two year flood, the replacement bridge is predicted to remain above water for the one in two year flood but be overtopped in an event just smaller than the one in three year flood.

FIGURE 5-3 | Western Elevation of replacement bridge

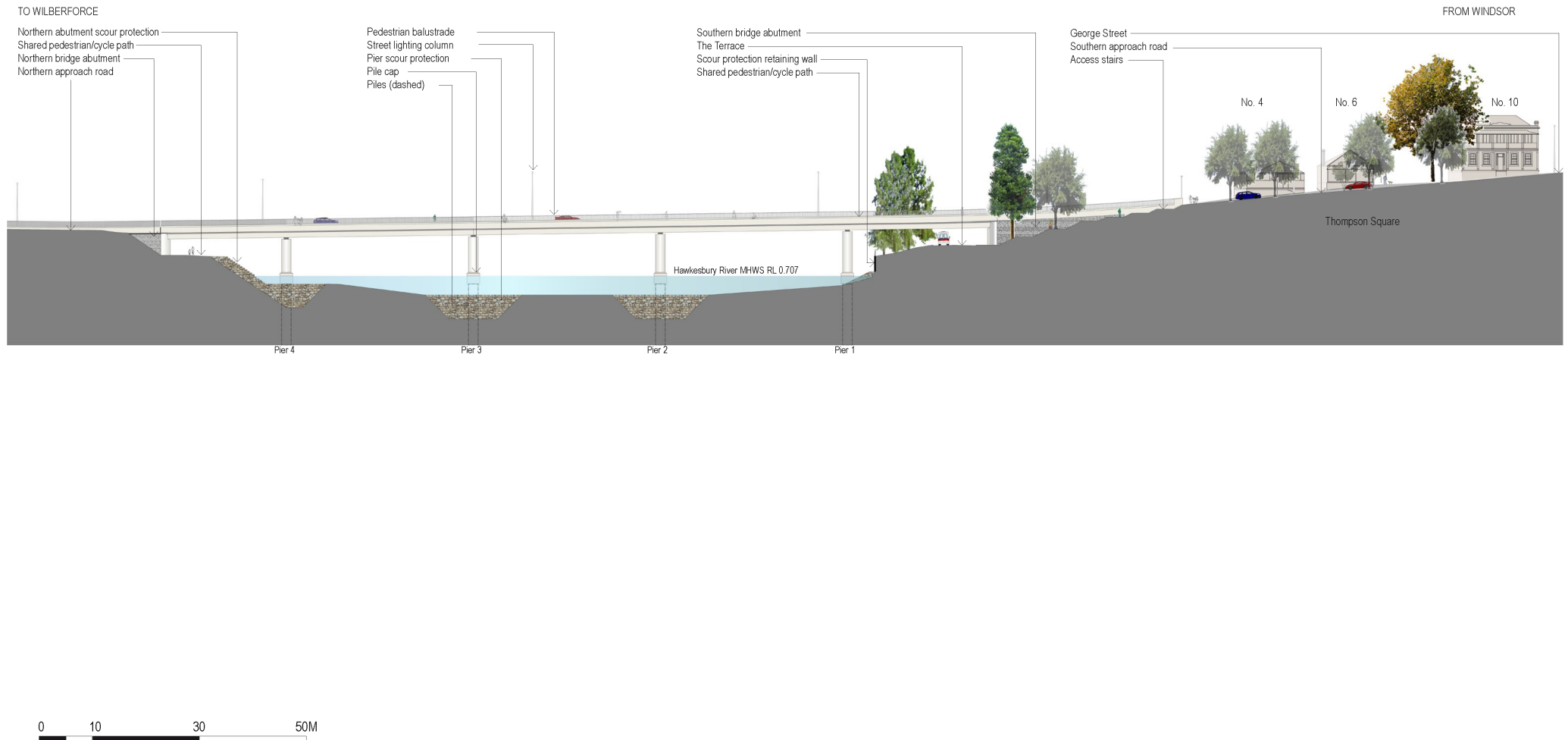
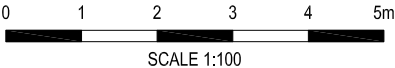
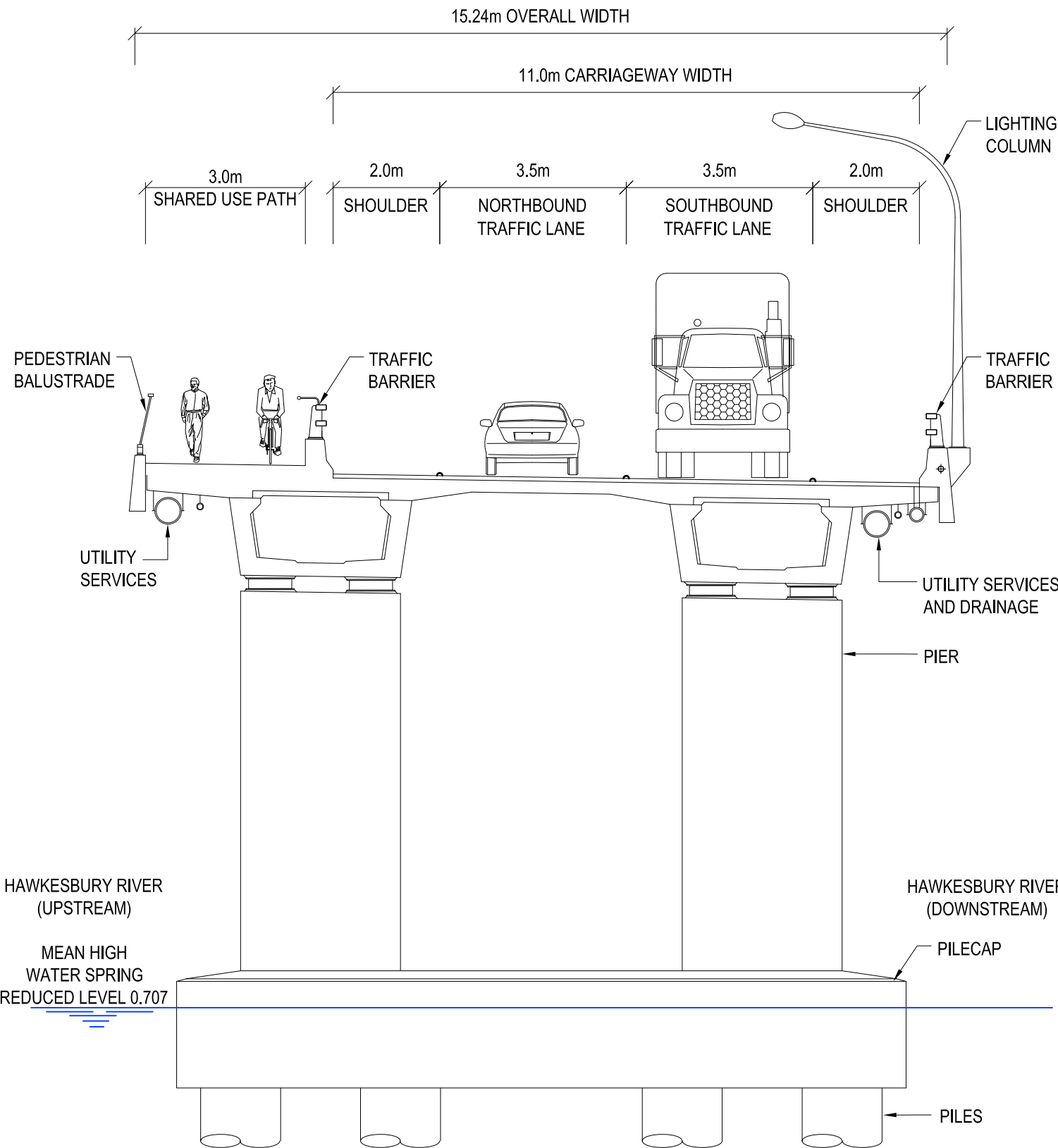


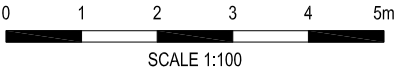
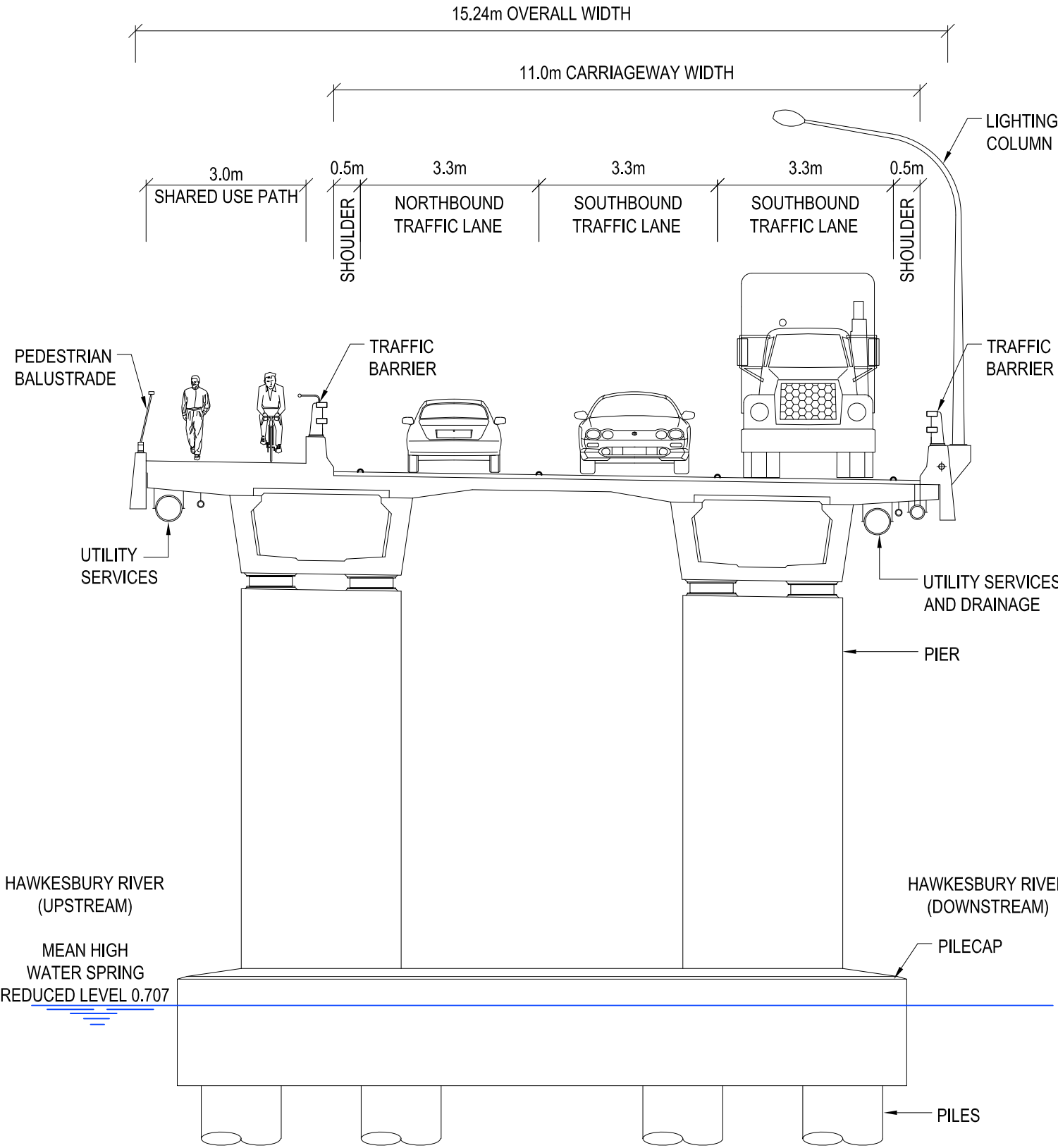
FIGURE 5-4a | Typical cross section of bridge - two lane configuration (at time of opening)



INDICATIVE ONLY - SUBJECT TO DETAILED DESIGN



FIGURE 5-4b | Typical cross section of bridge - three lane configuration (future option)



This level of flood immunity is consistent with that of the immunity of the roads on the northern side of the Hawkesbury River i.e. Wilberforce Road and Freemans Reach Road, which have a flood immunity that lies about midway between the one in two year and one in three year flood levels. The replacement bridge would be marginally above minimum road levels along Wilberforce Road and Freemans Reach Road, and thus may improve flood access into Windsor from the north. It is important to note that the frequency and depth of flooding in the Windsor area is expected to increase under climate change scenarios (refer to Chapter 7, **Section 7.7**).

5.2.2 Reconstruction of existing bridge approach roads and intersections

Modifications would be made to existing bridge approach roads and intersections to accommodate the change in bridge location and provide improvements in traffic safety and flow. The locations of these works are shown on **Figure 5-1** and **Figures 5-1a to c** and would include:

- Construction of a new southern approach road, involving realignment of Bridge Street north of its intersection with George Street so that it follows the existing alignment of Old Bridge Street and connects to the replacement bridge.
- Removal of the existing section of Bridge Street that runs diagonally through Thompson Square, backfilling the cutting and reinstatement of this area as open space.
- Replacement of the existing roundabout at the intersection of George Street and Bridge Street with a new signalised intersection.
- Construction of a new northern bridge approach road.
- Construction of a new dual lane roundabout at the junction of Freemans Reach Road, Wilberforce Road, Macquarie Park access road and the new northern bridge approach road.
- Upgrade of the Freemans Reach Road, Wilberforce Road and Macquarie Park access road approaches to the new dual lane roundabout.

5.2.3 Additional modifications to local roads and access arrangements

Changes to property access

Under the new bridge approach arrangements, vehicles would no longer be able to turn right into (or out of) two existing properties on the eastern side of Old Bridge Street (Number 4 and Number 6 Old Bridge Street). Vehicle access to these properties would be available via the southbound carriageway of the southern approach road through 'left-in' / 'left-out' turning movements. Drivers travelling from the south would need to cross the bridge, circle the roundabout and re-cross the bridge from the northern side to gain access to these properties. Drivers exiting these two properties and wanting to travel north would first need to turn left and make a right turn into George Street and make their way to Macquarie Street before turning left into Bridge Street and travelling north.

Access to Number 33 Wilberforce Road would also be altered under the new traffic arrangements. For safety, the existing driveway would be removed and a new driveway constructed further to the east (away from the proposed dual lane roundabout) to a point where all turning movements onto and off Wilberforce Road could be maintained.

Connection of The Terrace

The Terrace is a minor local road on the southern side of the river and is currently split into two sections by the existing Windsor bridge and approach road through Thompson Square. The removal of the existing bridge and approach road through Thompson Square and the raised height of the replacement bridge would allow the two sections of The Terrace to be connected to provide continuous access along the southern bank of the river and access to Windsor Wharf for pedestrians, cyclists and vehicles.

Vehicle access along The Terrace to Windsor Wharf would be limited by the clearance under the new bridge, which would provide for a clearance of about 3.6 metres. This would allow for light vehicles, buses, a range of service vehicles and emergency vehicles. The clearance would prevent large trucks and coaches (which are about 4.3 metres high) from accessing Windsor Wharf.

Additional road modifications

A number of additional minor modifications would be made to existing roads and footpaths as part of the project. These would include:

- Construction of new road pavement on Bridge Street between Macquarie Street and George Street to allow the required road pavement levels at the new signalised intersection of Bridge Street and George Street to be achieved.
- Alteration of linemarking on Bridge Street between Macquarie Street and George Street to safely direct traffic through the new signalised intersection that would replace the roundabout at George Street and Bridge Street.
- Shortening the length of the central concrete median in Macquarie Street (at the intersection with Bridge Street) to allow the width of the existing pedestrian crossing to be increased from three metres to 3.5 metres in order to meet current design standards.
- Providing additional conduits below the existing footpath along the eastern side of Bridge Street (between Macquarie Street and George Street) via trenching methods to connect the two signalised intersections together such that both sets of traffic signals can be coordinated.
- The existing 33kV (overhead) electricity cable may also be buried underground within the Bridge Street alignment between the Macquarie Street and George Street intersections.

The need for other additional minor modifications may be identified during detailed design.

5.2.4 Pedestrian and cycling facilities

The project would incorporate facilities for pedestrians and cyclists as shown in **Figure 5-5**. The facilities would include a shared pedestrian/cycle pathway constructed from the corner of George and Bridge Streets to Wilberforce Road. It would go along the western side of the southern bridge approach road, across the western side of the replacement bridge to the new dual lane roundabout where Freemans Reach Road and Macquarie Park access road intersect. Pedestrian and cyclist access along the southern bank of the river would also be improved with the connection and redevelopment of The Terrace. The following pedestrian and cyclist facilities would be constructed:

- A 2.4 metre wide shared pedestrian and cyclist path from the intersection of Bridge Street and George Street, to the southern abutment of the replacement bridge.
- A three metre wide shared pedestrian and cyclist path across the western side of the replacement bridge.
- A 2.4 metre wide shared pedestrian path north of the replacement bridge to a point near the entrance to Macquarie Park as shown in **Figure 5-5** and **Figure 5-5a–c**.
- Construction of a new 1.2 metre wide footpath adjacent to properties fronting the realigned Bridge Street. The footpath would extend from the intersection of Bridge Street and George Street and connect to The Terrace on the eastern side of the realigned Bridge Street.
- Construction of a new signalised pedestrian crossing on all four approaches to the intersection of Bridge Street and George Street.
- Construction of new pedestrian footpaths for safe access around and across the proposed dual lane roundabout at the junction of Freemans Reach Road, Wilberforce Road and the Macquarie Park access road, connecting to the path across the replacement bridge.
- Other paths and stairs in Thompson Square parkland (see **Section 5.2.8**).

5.2.5 Removal and backfill of the existing bridge approach roads

Removal and backfill of the existing bridge approach roads would occur following commissioning of the new bridge and would include:

- Removal of the existing section of Bridge Street that runs through the Thompson Square open space area, including the road pavement, kerb and guttering, traffic barriers, signage, street lighting, redundant services and road drainage infrastructure.
- Infilling, regrading and landscaping of the road cutting through Thompson Square and reinstatement of the area as part of the Thompson Square parkland.
- Infilling, regrading and landscaping the northern approach road to the existing bridge.

Landscaping would be a key element of this component of the works and is discussed further in **Section 5.2.8**.