

## 2 THE EXISTING CONTEXT OF WINDSOR

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## 2.1 LOCATION

### REGIONAL CONTEXT

Windsor lies within the Sydney Basin about 57 kilometres northwest of the Sydney Metropolitan area and 20 kilometres northeast of Penrith, within the Hawkesbury City Council Local Government Area (LGA). The area is bounded by the Blue Mountains and Nepean valley floodplain to the west and is defined by the Hawkesbury River (refer to Figure 2.1).

The historic rural town of Windsor is located on a ridge above the southern bank of the Hawkesbury River. The bridge crossing at Windsor is the oldest existing structure in use, crossing the Hawkesbury River. It also provides an important through route to the north and north west, including to the Hunter Valley via Putty Road, for the greater Sydney region, in particular for the North West Growth Centres.

### LOCAL CONTEXT

The northwest area includes the town centres of Richmond and Windsor; villages of North Richmond, Vineyard, South Windsor; and small villages including Mulgrave/McGraths Hills, Glossodia, Wilberforce and Pitt Town.

Three major access roads run north-south through the region. These are Windsor Road, which provides connections to Parramatta, Sydney and the Blue Mountains; Richmond Road, connecting Richmond and areas between to Blacktown and to the Westlink M7 Motorway, and Londonderry Road/ The Northern Road, connecting Richmond to Penrith. These connections are illustrated in Figure 2.2.

The bridge crossing at Windsor provides one of only two permanent river crossings for the local population and visitors to the local area, the other being the Richmond Bridge at North Richmond.

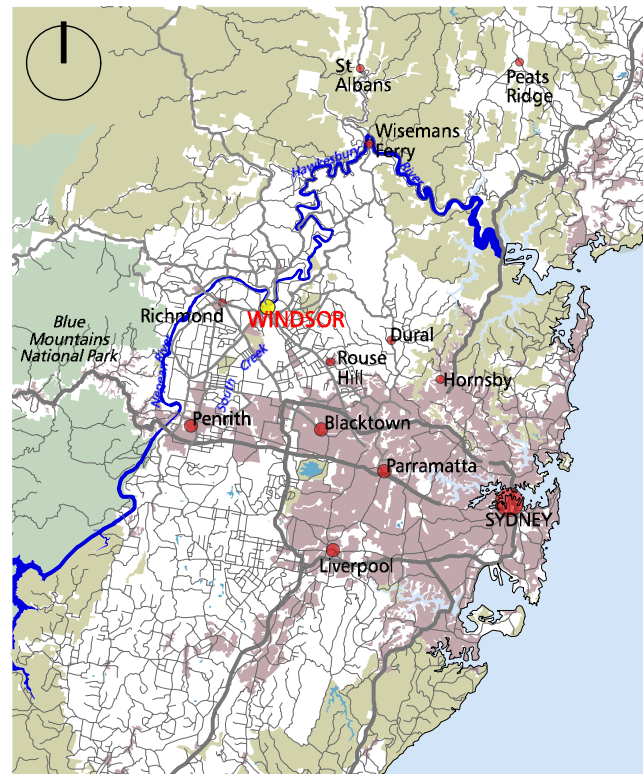


Figure 2.1: Regional context of Windsor on the Hawkesbury River.

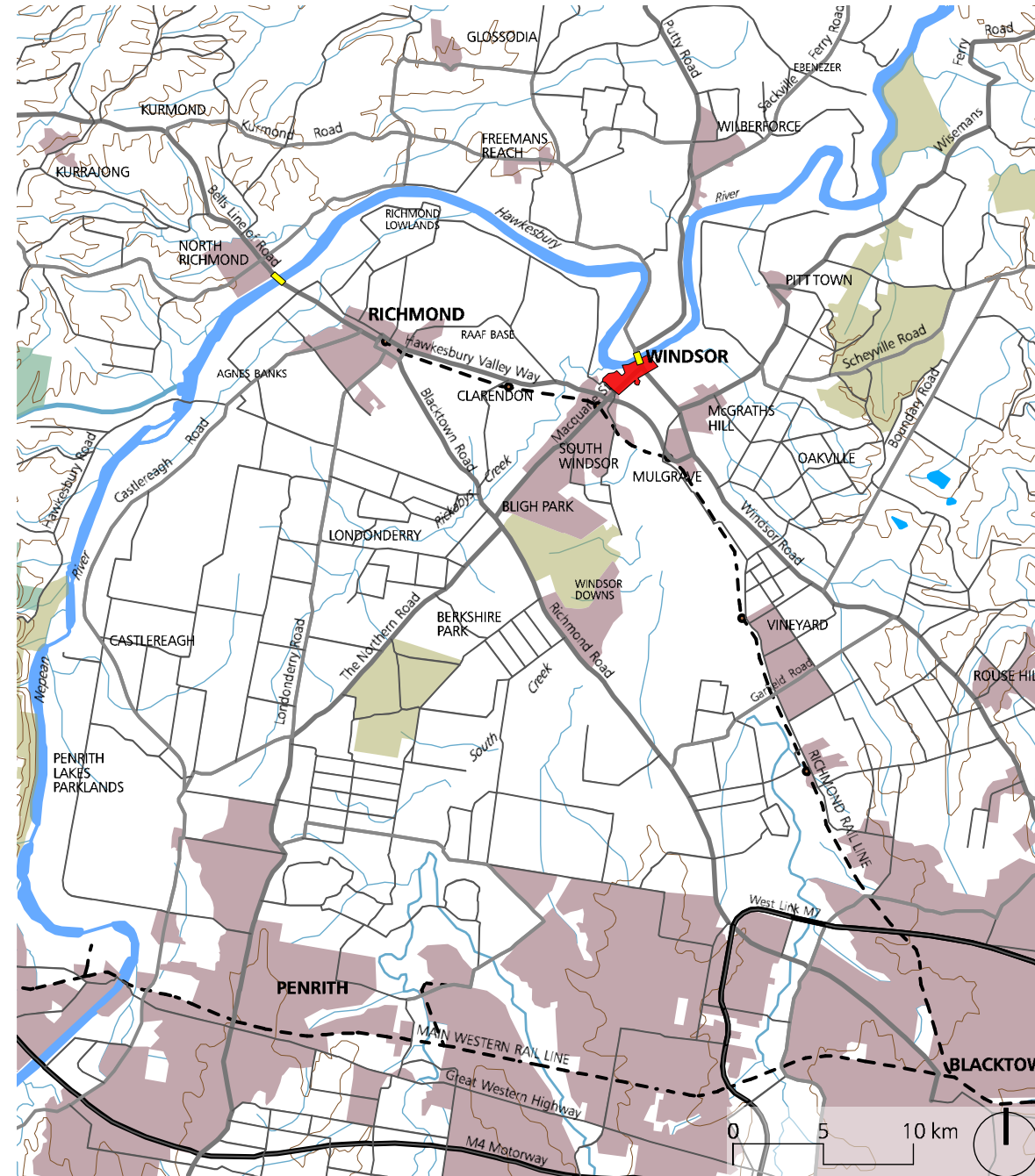


Figure 2.2: The local context of Windsor.



## 2.2 HAWKESBURY-NEPEAN RIVER CROSSINGS

The Hawkesbury River has its origin at the confluence of the Nepean River and the Grose River, to the north of Penrith. Once formed, the Hawkesbury River proper generally flows with a significant number of meanders northwards. Initially the river passes the towns of Richmond and Windsor, which are the largest settlements on the river and as it flows north, it enters a more rural area, with only small settlements on the river as it makes its way to the coast at Brooklyn.

There are a limited number of bridge crossings along the length of the Hawkesbury-Nepean River. The bridge crossing at Windsor is one of the oldest of the river crossings.

The existing bridge crossings between Brooklyn and Penrith are identified in Figure 2.3 and Plates 2.1 to 2.7 and noted as follows;

1. Hawkesbury River Railway Bridge, Brooklyn (1889 and 1946).
2. Peats Ferry Bridge, Brooklyn (1945).
3. Hawkesbury River Freeway Bridge, Brooklyn (1977).
4. Windsor bridge, Windsor (1874).
5. Richmond Bridge, Richmond (1905).
6. Victoria Bridge, Penrith (1867 & 1907).
7. M4 bridge, Penrith (1971 & 1986).

In addition to these railway and road bridges a number of ferry crossing points also exist on the Hawkesbury River (refer to Figure 2.3). These ferry crossings are:

- Wisemans ferry.
- Webbs Creek ferry.
- Colo River ferry.
- Sackville ferry.

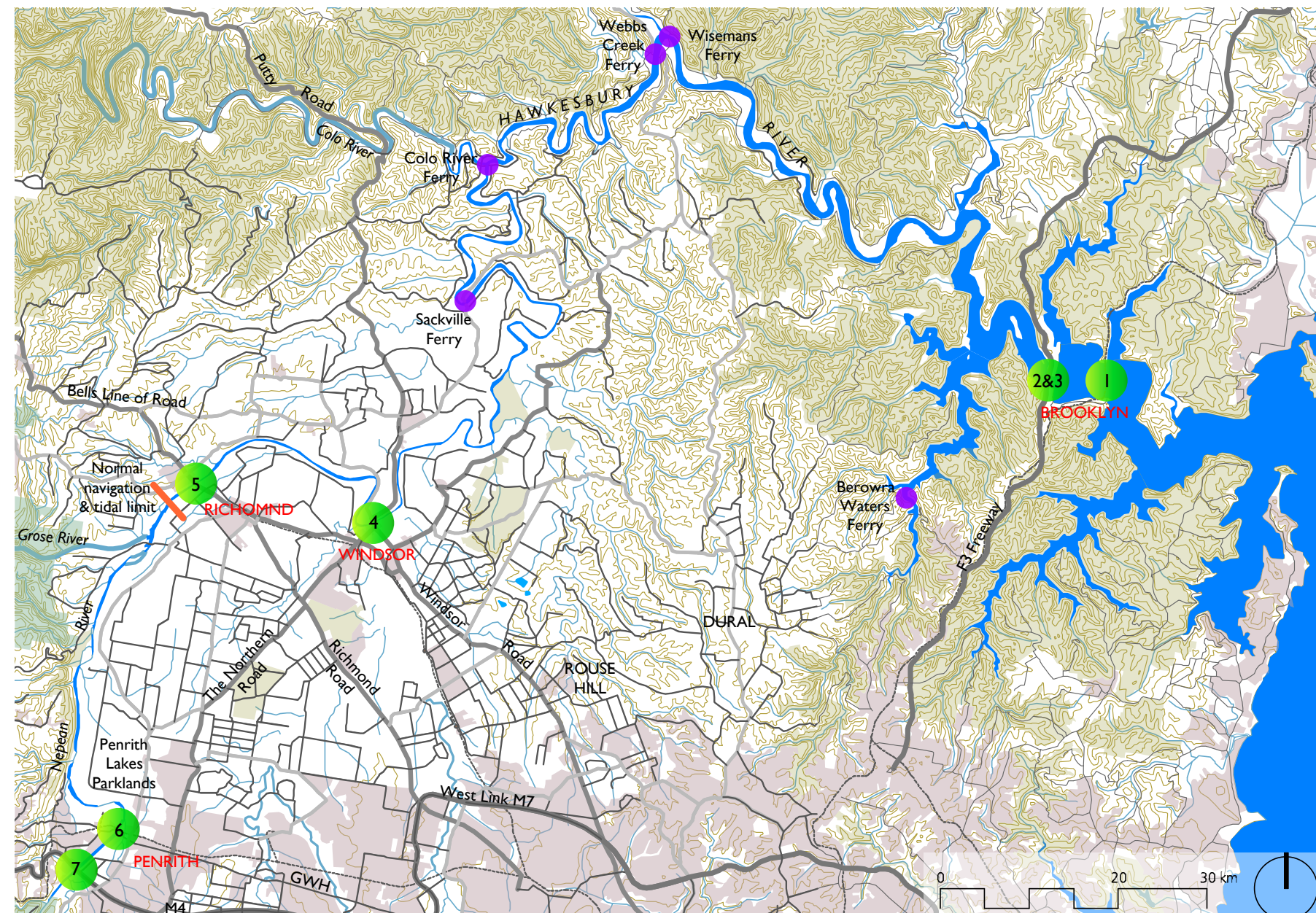


Figure 2.3: Hawkesbury-Nepean River crossings (Source: NSW Transport Maritime Hawkesbury River/Broken Bay Boating maps).





Plate 2.1: Hawkesbury River Railway bridge.



Plate 2.2: Peats Ferry bridge, Old Pacific Highway and F3 Freeway bridge (behind).



Plate 2.3: F3 Freeway bridge and Peats Ferry bridge, Old Pacific Highway (behind), Brooklyn.



Plate 2.4: Windsor bridge, Bridge Street, Windsor.



Plate 2.5: Richmond bridge, Kurrajong Road, Richmond.



Plate 2.6: Victoria bridge, Great Western Highway, Penrith.



Plate 2.7: M4 bridge, Penrith.



## 2.3 SETTLEMENT PATTERNS OF THE REGION

Settlement patterns within the area comprise the town centres of Richmond and Windsor; villages of North Richmond, Vineyard, South Windsor; and small villages including Mulgrave/McGraths Hills, Glossodia, Wilberforce and Pitt Town, as illustrated in Figure 2.4.

The land use of the study area around Windsor comprises an extensive amount of pastoral landscapes and agricultural land which provides a significant resource, as it has in the past, to the Hawkesbury LGA and the Sydney Metropolitan Region.

### FUTURE DEVELOPMENT

According to the Hawkesbury City Council's *Hawkesbury Residential Land Strategy 2011*, the LGA will need to accommodate approximately 5,000 additional dwellings by 2031, primarily within the existing urban areas as prescribed in the Department of Planning's North West Subregional Strategy. Urban growth is severely limited by the existing natural environment including, state and national parks, bushfire prone areas, aircraft noise, high value agricultural lands, flooding issues along the Hawkesbury River and limited development capacity within existing centres.

The population growth is generally stable, as identified in the 2001 and 2006 population census. However, there have been considerable changes to the age structure which indicates an ageing population. This may generate substantial additional demand for services and facilities for older people as well as influencing housing types in the future.

Car dependency is high within the Hawkesbury LGA with 86.3 per cent of households owning at least one car, while many have two or more vehicles.

### DESIGN CONSIDERATIONS

Council's *Hawkesbury Residential Land Strategy 2011* provides the guideline for the future development of the area and this is to take place primarily south of the Hawkesbury River and within existing centres.

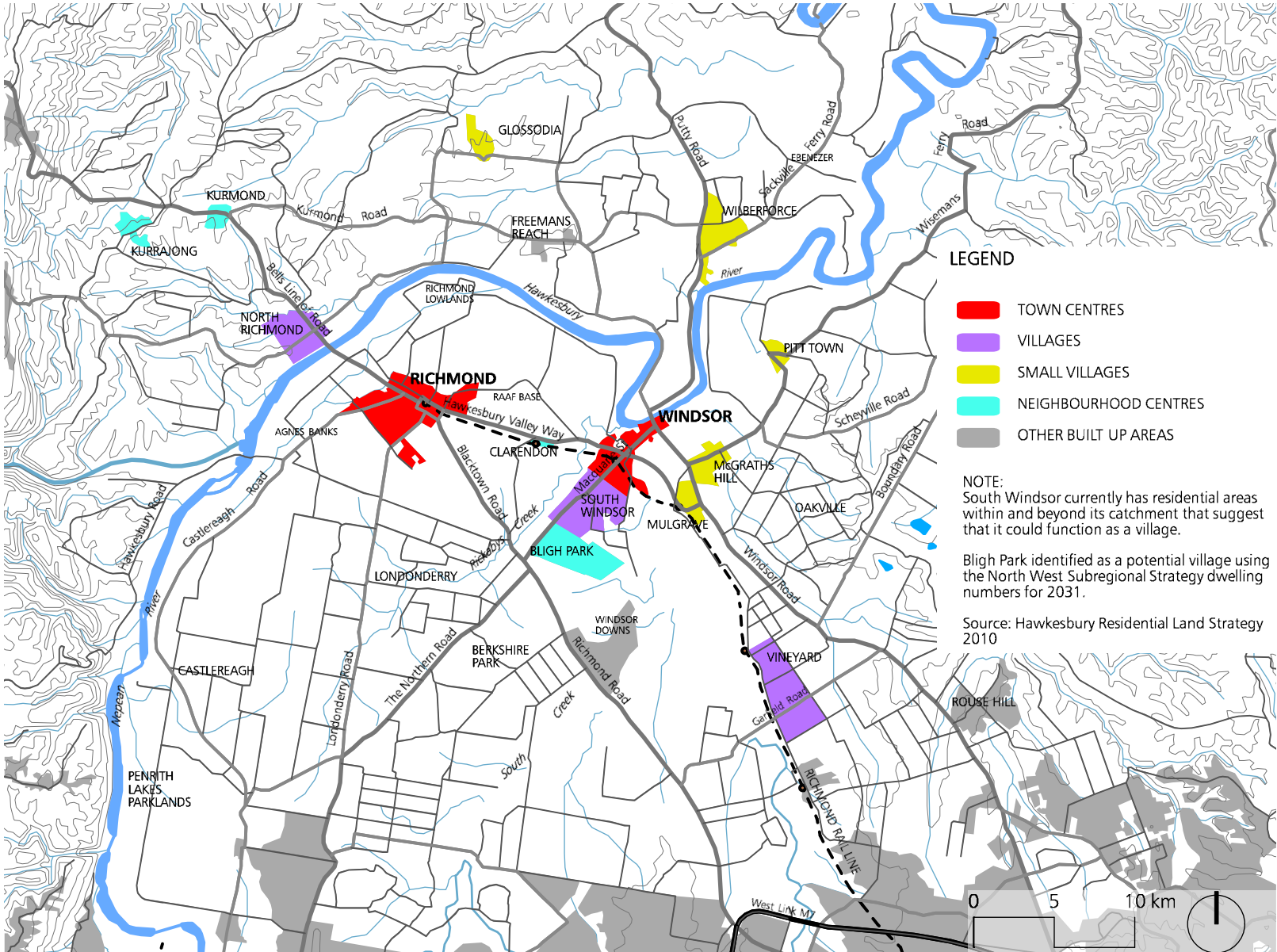


Figure 2.4: Settlement Patterns. (Source: Hawkesbury City Council *Hawkesbury Residential Land Strategy 2011*).

## 2.4 TRANSPORT & LOCAL CONNECTIONS

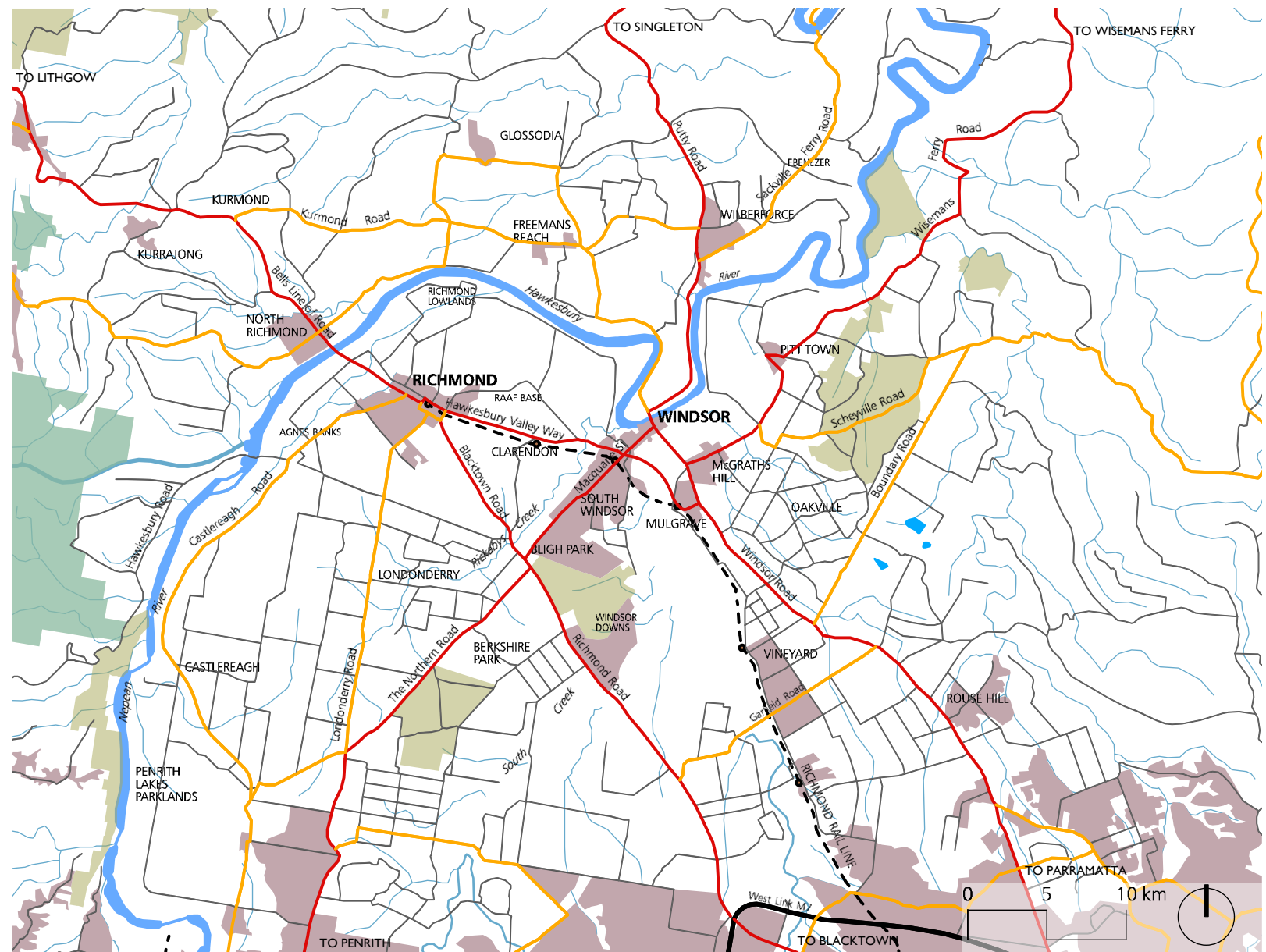


Figure 2.5: Transport and local connections.

The existing regional road network with links to Windsor include Windsor Road, Richmond Road, and The Northern Road to the south with the Bells Line of Road, Putty Road and Wisemans Ferry Road providing the key arterial connections north of the river. Within this arterial network, Windsor bridge connects Windsor Road to Putty Road. This regional network is also supported by a sub arterial and a local road network, as illustrated in Figure 2.5.

The single track railway Blacktown to Richmond Line, part of the CityRail network, serves the Windsor area with stations at Vineyard, Windsor, East Richmond and Richmond. Duplication of the Richmond Line is currently underway.

Windsor, East Richmond and Richmond Stations are all serviced by buses, providing interchange opportunities between public transport modes.

Bus services within the Hawkesbury LGA are operated by Westbus and Hawkesbury Valley Bus Services.

### DESIGN CONSIDERATIONS

The township of Windsor is strategically located on the Hawkesbury River and over time has become a convergence point for parts of the regional arterial road network as one of the key points crossing the river in the north west region of Sydney. It is also noted that there are only two river bridge crossing points for the area and any potential changes to the road networks serving the area are likely to have an impact on these.



## 2.5 HYDROLOGY & DRAINAGE

The Hawkesbury-Nepean Valley includes the floodplain area downstream of Warragamba Dam including the Windsor area. Over time the pattern of surrounding development has contributed to the unique flood behaviour of this valley, which can have an adverse impact on its surroundings during flood periods. Flood levels in the local area are generally controlled by water releases upstream from the Warragamba Dam and inflow from the Colo River – and downstream by a series of gorges at Wilberforce. Generally flooding is initially contained in the within the river banks however, for flood events greater than the 1 in 2 year event, floodwaters spill into the floodplain inundating large areas.

As shown in Figure 2.6 the majority of the urban area south of the Hawkesbury River is prone to at least 1 in 100 year flood event. Flooding is particularly prevalent in the south eastern area around North Richmond, Richmond, Windsor, South Windsor, Blight Park, Wilberforce and Pitt Town areas

Much of the township of Windsor is built on a ridge above the 100 year ARI flood level, however, low lying areas have suffered from a number of major floods over the past two hundred years. The surrounding landscape is generally inundated in a one in five year flood event. It is note worthy that all of Wilberforce Road and sections of Freemans Reach Road are subject to flooding during a 1 in 5 year flood event (Refer to the Hydrology working paper for further details of flooding events).

Land uses have impacted upon the quality of the water both within the Hawkesbury River and its tributary South Creek. Within the Windsor area, land uses such as rural activities, grazing, market gardens, intensive farming and both urban and industrial land uses have impacted on the water quality of the Hawkesbury River. Also a number of major wastewater treatment plants discharge treated effluent into South Creek. The results of water quality assessments generally demonstrate that pollutant levels at Windsor are close to or above levels recommended by the Healthy Rivers Commission Guidelines.

### DESIGN CONSIDERATIONS

As the area around Windsor is prone to flooding, the robustness of any new infrastructure and safety will be important considerations to take into account. Due to the highly erodible soils, existing bank erosion near the bridge and the relatively high flow velocities, substantial scour protection would be required around the abutments and piers of the replacement bridge.

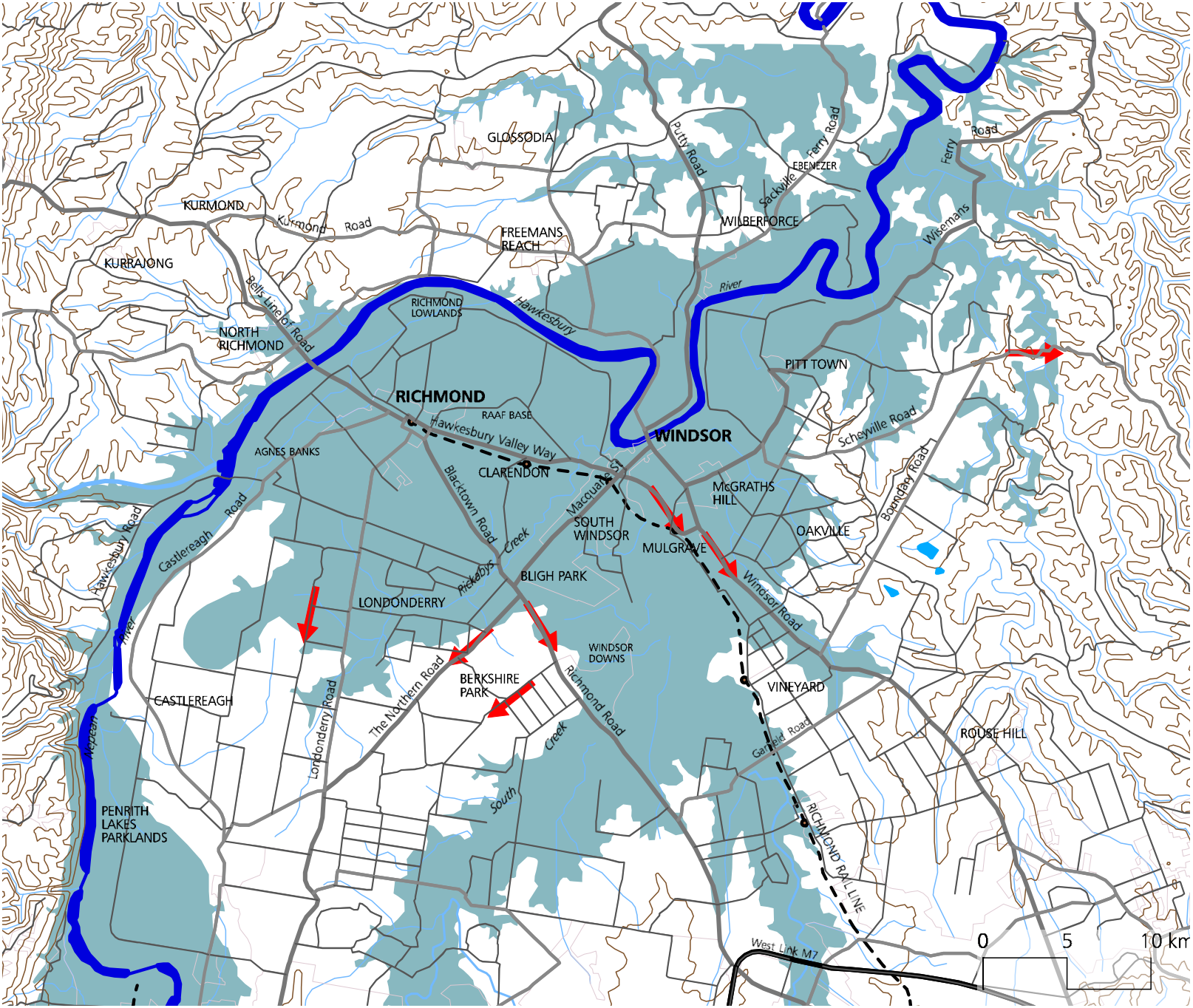
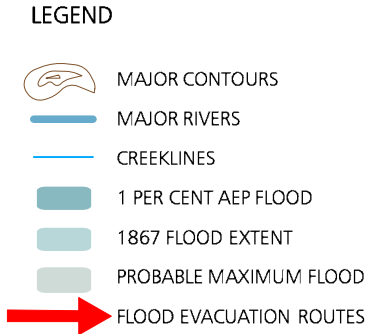


Figure 2.6: Hydrology, drainage and flood zones (Refer to hydrology for more detailed mapping and discussion on flood events).



## 2.6 LANDFORM & TOPOGRAPHY

The Hawkesbury River valley generally comprises a flat undulating floodplain that is subject to regular flooding. However, at Windsor a ridge exists on the southern bank of the river on which much of the township sits. The existing southern bridge approach through the township descends steeply to the north and down to the river. The northern approach is less distinct being almost level with the existing bridge crossing.

The topography of the area surrounding the township, as illustrated in Figure 2.7, is generally characterised by a gently sloping alluvial plain with occasional terraces or levees providing low relief. River beds and banks are common in the area, which in many parts is active floodplain. Local relief is mainly level and less than 10 metres with slopes generally less than 5 per cent.

### DESIGN CONSIDERATIONS

Much of the township of Windsor itself is located on a ridge above the river. These steep grades down to the river at this crossing point provide a physical challenge within the existing built fabric of the area.

## 2.7 CLIMATE

Existing climatic conditions within the area have been determined from the Richmond weather station about 3.5 kilometres west of Windsor. The annual average maximum temperature is 30 degrees celsius recorded in January and the annual average minimum temperature is 3.4 degrees celsius recorded in July. February is the wettest month with mean rainfall of 122 millimetres and July is the driest month with mean rainfall of 34 millimetres.

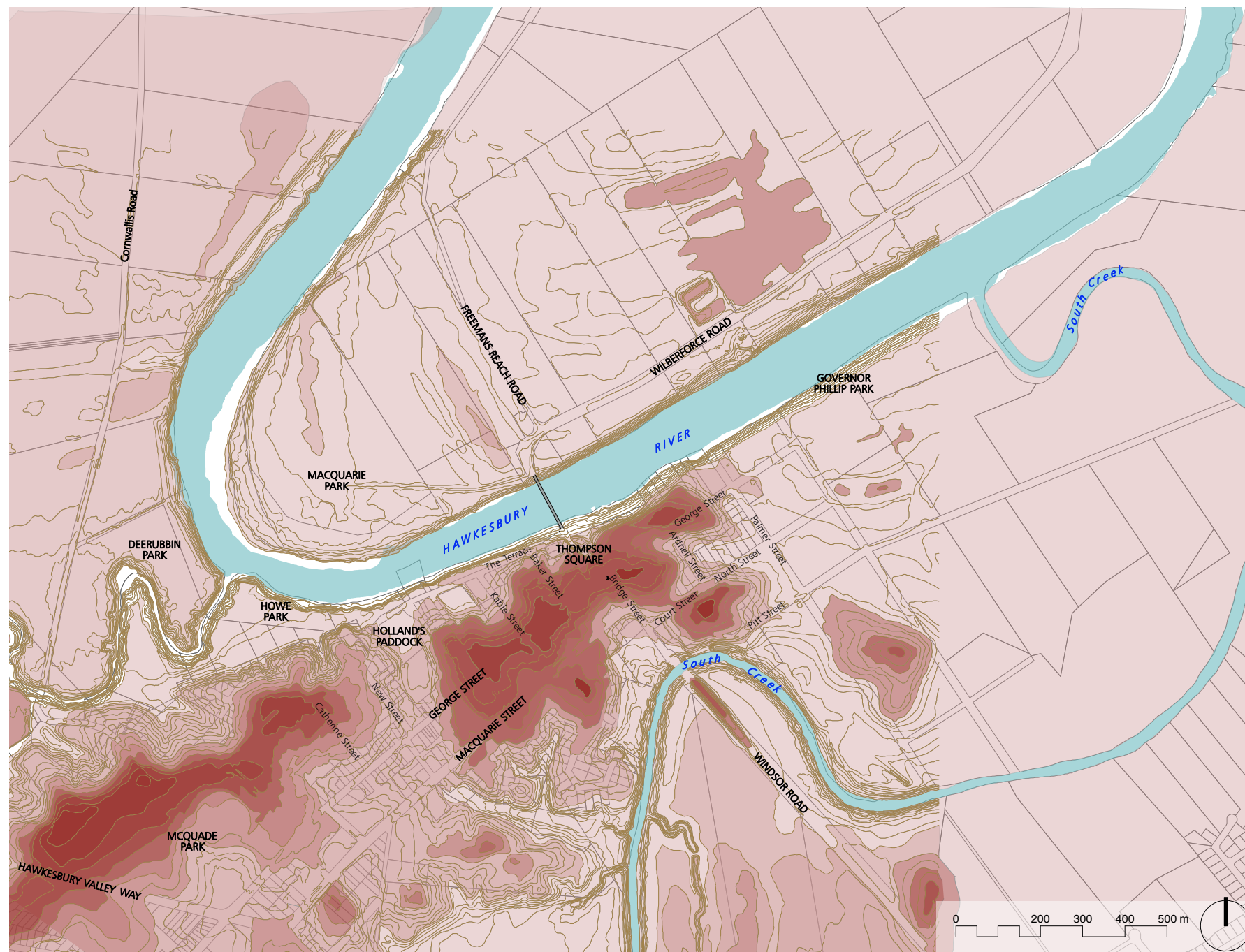


Figure 2.7: Landform and topography of the area.

## 2.8 BIODIVERSITY

Since European settlement almost all of native flora and the natural habitat for fauna species within the local area has been cleared for development and agricultural purposes. Minimal remnant native vegetation exists along the Hawkesbury River, its tributaries and creek / drainage lines. The riparian vegetation is generally restricted to exotic grasslands, disturbed woodlands and Casuarina woodland, and is generally degraded by flooding, weed invasion and monocultures of species planted to protect the river bank from erosion.

The aquatic habitats in the area have long been degraded through water pollution, the introduction of aquatic weed species and introduced fauna species, bank erosion, riparian zone modification and flooding. Native flora and fauna species however continue to inhabit the Hawkesbury River. One endangered species, the Trout Cod (*Maccullochella macquariensis*) has been identified as potentially existing in this section of the Hawkesbury River.

Many species of declared noxious weeds have been identified in the area, many of which are aquatic species and therefore occur within the river or on adjacent banks within the study area. (Refer to the Biodiversity Assessment working paper for further details relating to existing habitats of the area).

### DESIGN CONSIDERATIONS

Although the study area does not have any significant vegetation communities present retention of existing vegetation and weed management will be particularly important along the river foreshore in order to maintain river bank stability and reduce any adverse impacts to planting in parklands and open spaces.

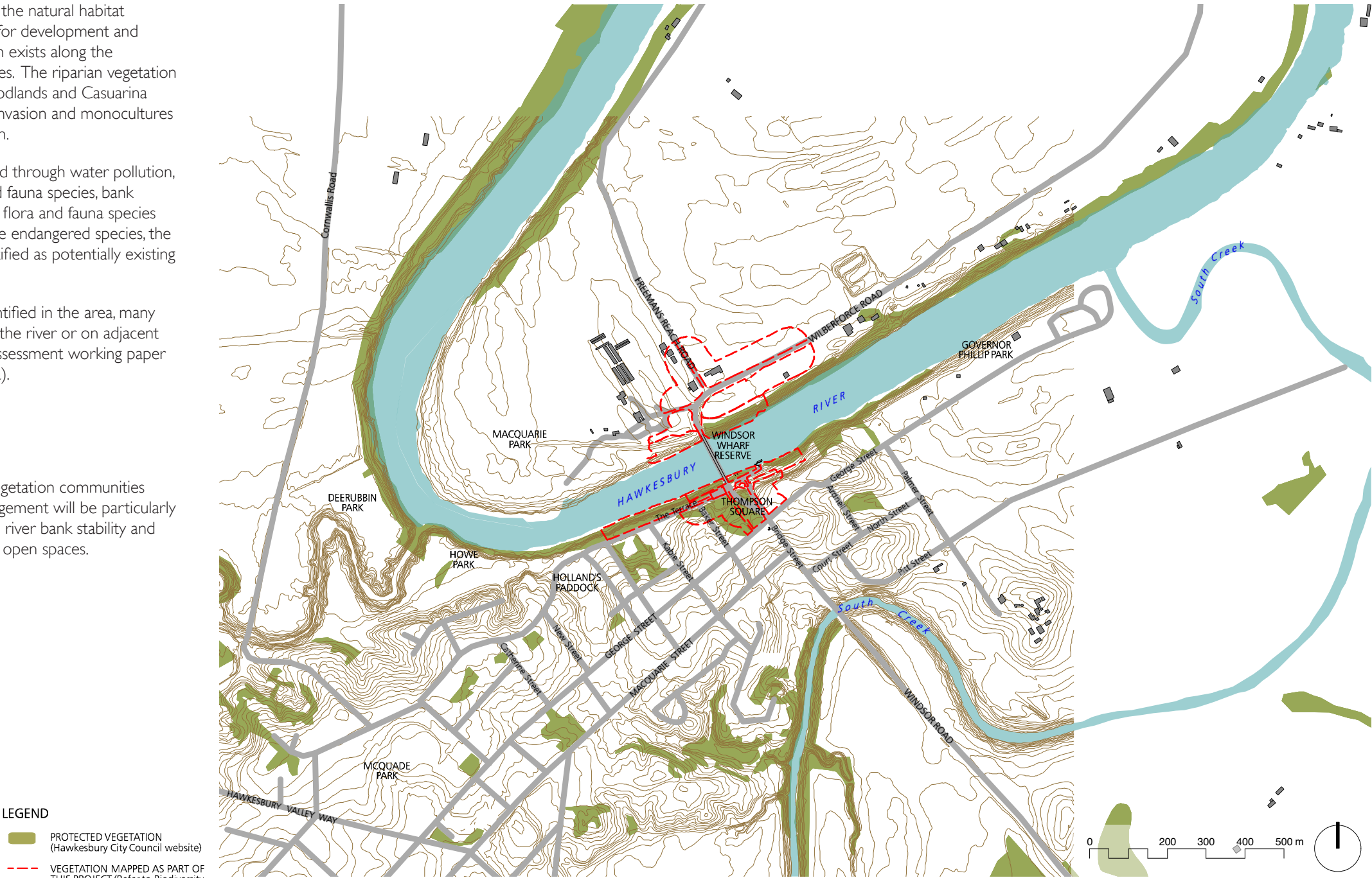


Figure 2.8: Biodiversity values (Source: Hawkesbury City Council) and vegetation communities surveyed as part of this project.



WINDSOR AND WINDSOR BRIDGE TIMELINE					
1795	1810	1814	1874	1896	1934
Green Hills settlement established	Macquarie Town Plan	Windsor Wharf reconstructed	Low level bridge constructed	Bridge deck raised, bridge approach via Old Bridge Street	Current bridge approach established

2.9 HERITAGE VALUES OF WINDSOR

ABORIGINAL HERITAGE

Aboriginal people have probably resided in the Windsor area for tens of thousands of years. These people who spoke the Darug language were believed to have lived in bands or communities of around 50 members each, and were highly mobile across the Cumberland Plain. Foods were gathered from the land and the rivers provided a rich variety of resources to the local community. Food was cooked lightly on open fires or in underground ovens.

NON ABORIGINAL HERITAGE

Windsor is a “Macquarie town” that was established at an existing village settlement known as Green Hills on the Hawkesbury River. The area was first visited by Europeans in 1789 as part of an expedition led by Governor Philip to find land suitable for growing food for the colony at Sydney Cove. Goods from the farmlands in the Windsor area were transported down the Hawkesbury River to the colony well into the nineteenth century. The village of Green Hills developed on higher ground near one of the landing places along the Hawkesbury River in 1795. In 1810 Governor Macquarie named five towns in the Hawkesbury area, namely Windsor, Castlereagh, Wilberforce, Pitt Town and Richmond. Macquarie designed the town centre of each town including the street layout, a public square, church, school and burial ground.

Over the decade following the town being laid out, Macquarie oversaw the establishment of many buildings near the river in Windsor and Thompson Square, which had been the commercial centre of Green Hills, was cleared of its buildings. A punt was used to cross the river from the earliest days of the Green Hills settlement which was accessed through Thompson Square. Thompson Square continued to have an important function for the town of Windsor, as it remained the town’s primary connection to the river.

This importance of Windsor as a crossing point on the river was reinforced by the construction of Windsor bridge in 1874 and subsequent raising of the bridge deck level in 1896.



Figure 2.9: Heritage values of the Windsor area.