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Background research and mapping have identified a range of key issues that will influence the future sustainable development of housing in Hawkesbury LGA. These issues include:

- Natural Environment;
- Centres and Employment;
- Transport;
- Open Space and Recreation;
- Community Services and Facilities;
- Utilities Infrastructure;
- Heritage and Character; and
- Sustainable Development.

An overview of these issues and their implications (constraints and opportunities) on the Residential Strategy is provided in the following section. The development opportunities for Hawkesbury LGA in response to these issues are assessed through an opportunity and constraints analysis, discussed in Chapter 5.

Maps are presented throughout the chapter showing the location of the issues discussed. The maps focus on the southern part of the LGA as this is where 94% of the population is located and where, as will be discussed, the potential to develop is highest.
Natural Environment

Figure 4.1: Hawkesbury Residential Strategy Vegetation Communities

(Source: Hawkesbury City Council GIS, October 2009)
Natural Environment

4.1 Natural Environment

Hawkesbury LGA is unique in the Sydney Metropolitan context, with its character being strongly influenced by the natural environment and rural qualities that make up its diverse landscape. Hawkesbury LGA is centred on the upper reaches of the Hawkesbury River.

The key elements shaping the Hawkesbury LGA natural environment include its:
- Biodiversity and Vegetation;
- Bushfire Prone Areas;
- Slope;
- Acid Sulphate Soils,
- Flooding;
- Wetlands; and
- Agricultural Land.

4.1.1 Biodiversity and Vegetation

Two thirds of the LGA is located in National Parks, including, Wollemi National Park, Parr State Conservation Area, Cattai and Scneyville National Parks Yengo National Parks and Blue Mountains National Park. This provides a total of approximately 1,930 square kilometres of national park areas within the LGA. Hawkesbury LGA also includes a part of the Greater Blue Mountains World Heritage Area to the west containing a wide and balanced representation of eucalypt habitats as well as localised swamps, wetlands, and grassland.

The Hawkesbury LGA comprises a range of vegetation communities that contribute to the biodiversity in the LGA, as shown in Figure 4.1. The location of these communities corresponds with the extensive areas within national parks, state forests and nature reserves. The vegetation communities identified (and shown in Table 4.1) contribute to the biodiversity in the LGA as well as the landscape character of the LGA. As such these areas are not considered suitable for extensive future urban development.

<table>
<thead>
<tr>
<th>CSA Value</th>
<th>Priority Order</th>
<th>Classification</th>
</tr>
</thead>
</table>
| W, C1, C2, C3, C4 | 1 | W = Wetlands  
C1-C3 = Regional Core  
C4 = Local Core |
| URT, O1, O2, O3 | 2 | URT = Urban Remnant Trees  
O1-O3 =Other Remnant Vegetation |
| S1, S2 | 3 | S1-S2 = Support for Core |

Implications for the Hawkesbury Residential Strategy

- Vegetation communities contribute to the biodiversity, character and landscape setting of the Hawkesbury LGA and are therefore not suitable for urban development.
- Future urban development to occur in areas where there are limited impacts on significant vegetation communities.
- Future urban development in the Greater Blue Mountains World Heritage Area or in National Parks, State Forests, State Conservation Areas, Recreation Areas or nature reserves is inappropriate.
Figure 4.2: Hawkesbury Residential Strategy Bushfire Category 1 and 2 Areas  
(Source: Hawkesbury City Council GIS, October 2009)
4.1.2_Bushfire Prone Areas

Hawkesbury LGA contains significant areas of bushland which are important for biodiversity and also prone to bushfire. It is recognised that these areas provide strong landscape character and rural settings, however given the high risk of bushfire, these areas are generally not appropriate for intensive residential development.

The extent of bushfire risk is identified and categorised to determine where urban development may be appropriate with minimal risk of bushfire, subject to meeting the requirements of the NSW Rural Fire Service Planning for Bush Fire Protection, (Version 3), June 2006.

As a result of the high number of national park areas, Figure 4.2 shows that:
- The vast majority of the Hawkesbury LGA is categorised as Category 1 high risk and not suitable for future extensive urban development;
- The main urban areas, including the town centres of Windsor and Richmond, have been cleared of classified vegetation for the existing development and therefore are not subject to bushfire legislation; and
- Category 2 vegetation is found surrounding the outskirts of Wilberforce, North Richmond, Bligh Park and Vineyard.

Development in these areas must comply with the requirements of Planning for Bushfire Protection, prepared by the NSW Rural Fire Service in co-operation with the Department of Planning and may include further bushfire investigations.

Implications for the Hawkesbury Residential Strategy
- Large areas of the LGA are at high risk of bushfire and therefore not suitable for future urban development.
- Some areas in proximity to Wilberforce, North Richmond and Vineyard are at risk of bushfire, which may make them unsuitable for residential development.
- Detailed site specific studies should be carried out on areas identified as being within a vegetation category before urban development can occur.
- Future urban and other development is subject to meeting the requirements of the NSW Rural Fire Service Planning for Bushfire Protection (Version 3), June 2006.
Natural Environment

Figure 4.3: Hawkesbury Residential Strategy Slope

(Source: Hawkesbury City Council GIS, October 2009)
Natural Environment

4.1.3_Slope
The terrain of Hawkesbury LGA is influenced by the Blue Mountains and Great Dividing Range to the north west as well as some of Sydney’s significant river systems associated with the Hawkesbury Nepean Catchment.

The topography varies widely throughout the Hawkesbury LGA from slopes of less than 1:20 (5% slope) increasing to 1:8 (12.5% slope), with the majority of the current urban areas predominantly located on areas below 15 degree slope (1:6.5 slope). These slopes are often associated with the river and creek systems in the north of the LGA, as shown in Figure 4.3.

The Draft Residential Strategy 1997 Sustainable Development Threshold stated that a slope of 15% is generally considered to be the upper limit for urban development. Beyond this, soil erosion becomes an increasingly difficult problem to manage and may even expose development to landslip and mass movement hazards.

It is important to acknowledge that the State Environmental Planning Policy (Housing for Seniors or People with a Disability) 2004 states that access pathways should be no more than 1:14. Mindful of the ageing population of Hawkesbury future residential development areas should be aware of this restriction.

Implications for the Hawkesbury Residential Strategy
- Slope is a constraint on residential development within the LGA.
- Future urban development in areas with a slope of 15% or more is not considered appropriate.
- Future urban development must address slope stability and associated issues such as soil erosion.
Natural Environment

Figure 4.4: Hawkesbury Residential Strategy Acid Sulphate Soils

(Source: Hawkesbury City Council GIS, October 2009)
Natural Environment

4.1.4 Acid Sulphate Soils
Acid sulphate soils are sediments and soils containing iron sulphates that are usually found in low-lying parts of coastal floodplains, rivers and creeks. As the LGA comprises an extensive river system, acid sulphate soils are common throughout the area, which, depending on their classification, can be a constraint to development.

The extent of acid sulphate soils in the Hawkesbury LGA is portrayed in Figure 4.4 and described in Table 4.2. These soils are categorised from being Class 1 where any development is constrained, to Class 5 where development is less constrained. Soils in other categories have varying levels of constraints associated with future development.

Table 4.2: Acid Sulphate Soil Classifications

<table>
<thead>
<tr>
<th>Class of land</th>
<th>Works</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Any work</td>
</tr>
<tr>
<td>2</td>
<td>Works below the natural ground surface</td>
</tr>
<tr>
<td>3</td>
<td>Works by which the watertable is likely to be lowered</td>
</tr>
<tr>
<td></td>
<td>Works beyond 1 metre below the natural ground surface</td>
</tr>
<tr>
<td>4</td>
<td>Works by which the watertable is likely to be lowered beyond 1 metre below natural ground surface</td>
</tr>
<tr>
<td></td>
<td>Works beyond 2 metres below the natural ground surface</td>
</tr>
<tr>
<td>5</td>
<td>Works by which the watertable is likely to be lowered beyond 2 metres below natural ground surface</td>
</tr>
<tr>
<td></td>
<td>Works within 500 metres of adjacent Class 1, 2, 3 or 4 land which are likely to lower the watertable below 1 metre AHD on adjacent Class 1, 2, 3 or 4 land</td>
</tr>
</tbody>
</table>

Hawkesbury Local Environmental Plan 1989

Development on land identified in the table is required to seek consent for works proposed.

As shown in Figure 4.4, there is a significant amount of land identified as containing Class 5 acid sulphate soils. Class 4 is found along the rivers and creeks namely the Hawkesbury River running through Windsor. This includes Clarendon and Pitt Town but also affecting the agricultural land to the north of Richmond. Class 3 acid sulphate soils are found in small isolated areas close to urban centres but also in the rural northern creeks where Class 2 acid sulphate soils are also present.

Appropriate planning and management of development on acid sulphate soils is required. While the maps do not describe the severity of acid sulphate soils in an area, they provide an initial indication that acid sulphate soils could be present on land. Further investigation and management of acid sulphate soils should be carried out in one or two stages:

- A preliminary assessment; and
- An Acid Sulphate Soils management plan.

Implications for the Hawkesbury Residential Strategy

- Large areas of the LGA, particularly around existing townships are impacted by acid sulphate soils.
- Location of future urban development should be cognisant of acid sulphate soil classifications.
- Site specific studies should be carried out on areas identified as subject to an Acid Sulphate Soil Classification before urban development is approved.
- Appropriate construction methods must be used for urban development in areas identified as at risk of acid sulphate soils, in line with Hawkesbury Local Environmental Plan 1989.
Natural Environment

Figure 4.5: Hawkesbury Residential Strategy 1 in 100 Year Flood

(Source: Hawkesbury City Council GIS, October 2009)
Natural Environment

4.1.5 Flooding

The Hawkesbury LGA is dominated by several river systems associated with the Hawkesbury–Nepean Catchment and the sub catchments of:

- Hawkesbury River;
- Cattai Creek;
- South Creek;
- MacDonald River;
- Grose River; and
- Colo River.

As Figure 4.5 shows, the majority of the urban area of Hawkesbury LGA is prone to at least 1:100 year flooding, making flooding a significant issue in both established and undeveloped areas and effectively divides the LGA into north and south of the Hawkesbury River. Flooding is particularly prevalent in the south eastern area around North Richmond, Richmond, Windsor, South Windsor, Blight Park, Wilberforce and Pitt Town areas, South Windsor and Bligh Park.

The North West Subregional Strategy identifies that the areas north of the Hawkesbury River are predominantly above the Probable Maximum Flood level and are therefore more suitable for future urban development.

The North West Subregional Strategy states that future housing growth in Hawkesbury LGA is substantially constrained by the capacity within the evacuation network. The growth potential in Windsor and Richmond is restricted by high flooding occurrence.

The Subregional Strategy also notes that strong partnerships should be sought with Hawkesbury–Nepean Catchment Management Authority and the North West councils to:

- Ensure aims and objectives of Catchment Action Plans are considered in the future management and planning of LGA;
- Coordinate a regional approach to riverine values and wetlands, including identifying priority areas for management;
- Undertake stream mapping to enable councils to develop planning controls to protect regionally significant riparian corridors; and
- Undertake broad-scale stream mapping at a strategic level to determine the significance of riparian lands and their management requirements in areas that are potentially being developed or redeveloped.

Council recognised in their Draft Residential Strategy 1997, that new development is to avoid high risk flood prone areas and wetlands. Council’s Floodplan Risk Management Advisory Committee has commenced work on a Flood Risk Management Study and Plan for the LGA.

It is increasingly important that the impacts of climate change are considered in development and for Hawkesbury LGA the increased risk of flooding is a fundamental issue. The principle of climate change and ecologically sustainable development is evolving to a point where, in the future, it would be a mandatory legal consideration for Council in development decisions. A recent case in the Land and Environment Court (Walker v Minister for Planning [2007] NSWLEC 741) found that the Minister was obliged to consider whether the risk of coastal flooding from climate change was relevant to the development before the application was determined.

**Implications for the Hawkesbury Residential Strategy**

- Flooding is a significant issue within Hawkesbury LGA and future urban development must avoid high risk flood prone areas.
- Flood Risk Management Plan should be prepared for all new urban development occurring in flood prone areas.
- Appropriate construction methods must be used for existing urban development in areas identified as at risk of flooding.
- The impacts of climate change and increased flooding on future development must be considered in future development.
- Infill development is dependant on flood evacuation upgrading.
Natural Environment

Figure 4.6: Hawkesbury Residential Strategy Probably Maximum Flood

(Source: Hawkesbury City Council GIS, October 2009)
Natural Environment

Figure 4.7: Hawkesbury Residential Strategy Waterways

(Source: Hawkesbury City Council GIS, October 2009)
Natural Environment

4.1.6 Wetlands
Wetlands include important and productive plant communities and bird habitats and play a significant role as flood storage areas. There are a number of wetlands within the Hawkesbury LGA and several of these are protected by Sydney Regional Environmental Plan No. 20 - Hawkesbury Nepean River 1997.

The North West Subregional Strategy recommends that Council coordinate a regional approach to riverine values and wetlands, including identifying priority areas for management.

As identified in the Draft Residential Strategy 1997 Sustainable Development, threshold and wetlands should be protected in the environmental and economic interests of the catchment by ensuring that any potentially harmful development is carefully considered before approval for development is given.

Implications for the Hawkesbury Residential Strategy
_ There is a need to continue to protect wetlands within the Hawkesbury LGA.
_ Future urban development in wetland areas should be avoided.
_ Hawkesbury City Council to work with other LGAs within the region to develop an approach to riverine values and wetlands, including identifying priority areas for management.

4.1.7 Agricultural and Rural Land
Hawkesbury LGA also has an extensive amount of agricultural land which provides a significant resource to the LGA and the Sydney Metropolitan Region. Rural landscapes contribute to the pastoral industry as well as the rural character of the LGA. Protection of these productive and landscape areas is essential to maintain a significant economic resource in terms of primary production as well as tourism.

As identified in the Sydney Metropolitan Strategy, agriculture in the Sydney region represents up to 12 percent of NSW’s total agricultural production and contributes $1 billion to the Sydney economy. The market proximity a suitable climate are the major reasons why agriculture is in the fringe of Sydney. Agriculture provides for a large proportion of the fresh affordable food that is consumed in Sydney (http://www.ruralplanning.com.au/ruralplanning/).

The external benefits of a proximate and accessible food supply (future cost savings from reduced need to transport food) are increasingly important in considering the merits of urban development versus protecting agricultural production. Consequently there will be a need for food to be produced as close as possible to population concentrations. Agricultural and rural industries in the Hawkesbury, which already plays a significant economic contributor, will therefore be increasingly important and in demand.

As identified in the Hawkesbury Employment Lands Strategy 2008, Hawkesbury contains 16 percent of vegetable and other crop establishments in the Sydney Basin (ABS, 2006). There has also been international demand for the Hawkesbury Harvest Farm Gate Trail and its products. As food security becomes a more pressing issue and demand increases, management of Hawkesbury’s agricultural lands will gain in importance. This will require forward planning to assess the scale and nature of land that would become more valuable for food production for the Sydney Basin in the future.

Challenges for agriculture include water sources for irrigation and availability of agricultural land in future as competition from other rural and ancillary uses demands high quality agricultural locations. As such, urban development in proximity to agricultural land needs to be buffered to avoid impacts on future residents of agricultural uses, such as noise, odour, hours of operation and pesticides. While agricultural land needs to be buffered from urban land uses to minimise impacts such as run off, loss of viable holdings and loss of production potential.

Implications for the Hawkesbury Residential Strategy
_ Agriculture is important to the local and regional economy and should not be impacted by future urban or rural residential development.
_ Urban and rural residential development in rural and agricultural areas should avoid conflicts between uses and maintain economic and tourism resources for the LGA.
_ Future urban and rural residential development on prime agricultural land should be clearly assessed for its benefits before approval.
_ Land auditing and an assessment of the scale and nature of land food production is required.
Centres and Employment

Figure 4.8: Hawkesbury Residential Strategy Centres Map

(Source: Hawkesbury City Council GIS, October 2009)
Centres and Employment

4.2 Centres and Employment

4.2.1 Key Centres
The Hawkesbury LGA contains a range of centres that service the area as shown on Figure 4.8. While Council does not have a centres hierarchy, this Residential Land Strategy has adopted the North West Sub Region Centres and Corridors Hierarchy. This has been used to identify the following hierarchy for the key centres in the Hawkesbury LGA shown in Table 4.3:

Table 4.3: Key Centres Hierarchy

<table>
<thead>
<tr>
<th>Town Centres:</th>
<th>Neighbourhood Centres</th>
</tr>
</thead>
<tbody>
<tr>
<td>Richmond</td>
<td>Bligh Park</td>
</tr>
<tr>
<td>Windsor</td>
<td>Kurmond</td>
</tr>
<tr>
<td>Villages</td>
<td>Kurrajong</td>
</tr>
<tr>
<td></td>
<td>Clarendon</td>
</tr>
<tr>
<td>North Richmond</td>
<td></td>
</tr>
<tr>
<td>Vineyard *</td>
<td></td>
</tr>
<tr>
<td>South Windsor *</td>
<td></td>
</tr>
<tr>
<td>Mulgrave/McGraths Hill</td>
<td></td>
</tr>
<tr>
<td>Glossodia</td>
<td></td>
</tr>
<tr>
<td>Wilberforce</td>
<td></td>
</tr>
<tr>
<td>Pitt Town</td>
<td></td>
</tr>
</tbody>
</table>

*Vineyard is not identified in the North West Sub Region Centres but has been identified as a potential village using the North West Subregional Strategy dwelling numbers for 2031.

*South Windsor currently has residential areas within and beyond its catchment that suggest it could function as a village.

The village of North Richmond and small villages of South Windsor and Mulgrave are located just outside these main centres and provide a range of smaller scale retail, educational, commercial and community services. South Windsor also provides for industrial land uses. Neighbourhood centres provide local retail and commercial services and in some instances provide local educational and community facilities.

Implications for the Hawkesbury Residential Strategy

- Hawkesbury LGA has a hierarchy of centres which includes town centres, villages, small villages and neighbourhood centres. The established centres hierarchy defined in the Subregional Strategy is supported however; the local centres hierarchy that defines the role and function of all centres on the LGA is required to be investigated.
- The State Government’s position of consolidating growth is recognised and identifies centres as the focus of future urban development.
- Future urban development is to locate within existing or proposed centres where a range of services and facilities are currently available or are planned to be available by 2031.
- “Out of centre” development is generally discouraged unless it can be justified satisfactorily using the Sustainable Development Framework. This is particularly relevant for rural residential development that must meet the Neighbourhood Centre requirements in the Sustainable Development Framework.

The major centres of Richmond and Windsor are the primary retail and commercial centres for Hawkesbury LGA. Windsor provides the historic, civic and health focus for the LGA while Richmond provides significant educational and defence uses and associated employment.

The Draft North West Subregional Strategy Centre Classifications is shown in Table 4.4. The centres classification gives an indication as to what the function of the centre was at the time of preparing the strategy and is not intended to be a set classification to limit the growth or expansion of these centres, and may be modified slightly as long as it is part of a sustainable strategy for the LGA. It is noted that Vineyard has been identified as a village by 2031 due to its projected population and location on the railway line and its position in the North West Growth Centre. It is recommended that the role and function of centres be revised at each review of the Residential Strategy.
### Centres and Employment

Table 4.4: Draft North West Subregional Strategy Centre Classifications for Town Centres, Villages, Small Villages and Neighbourhood Centres

<table>
<thead>
<tr>
<th>Centre Type</th>
<th>Catchment</th>
<th>Description</th>
<th>EXISTING HIERARCHY</th>
<th>2031 HAWKESBURY LGA*</th>
</tr>
</thead>
<tbody>
<tr>
<td>Town Centre</td>
<td>800m</td>
<td>Town Centres have one or two supermarkets, community facilities, medical centre, schools, etc. Contains between 4,500 and 9,500 dwellings. Usually a residential origin than employment destination.</td>
<td>Richmond Windsor</td>
<td>Richmond Windsor</td>
</tr>
<tr>
<td>Village</td>
<td>600m</td>
<td>A strip of shops and surrounding residential area within a 5 to 10 minute walk contains a small supermarket, hairdresser, take-away food shops. Contains between 2,100 and 5,500 dwellings.</td>
<td>North Richmond Vineyard</td>
<td>North Richmond Vineyard South Windsor</td>
</tr>
<tr>
<td>Small Village</td>
<td>400m</td>
<td>A small strip of shops and adjacent to residential area within a 5 to 10 minute walk. Contains between 800 and 2,700 dwellings.</td>
<td>South Windsor Mulgrave/McGrath Hill***</td>
<td>Mulgrave/McGrath Hill Pitt Town Glossodia Wilberforce</td>
</tr>
<tr>
<td>Neighbourhood Centre</td>
<td>150m</td>
<td>One or a small cluster of shops and services. Contains between 150 and 900 dwellings.</td>
<td>Bligh Park Kurmond Kurrajong Glossodia Wilberforce** Pitt Town**</td>
<td>Bligh Park Kurmond Kurrajong Glossodia Clarendon</td>
</tr>
<tr>
<td>Rural town, village or</td>
<td>As above</td>
<td>Located in rural zones outside metropolitan urban areas with similar roles to towns, villages and neighbourhoods but rural in character with a wider driving catchment.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>neighbourhood centre</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*As proposed by the Hawkesbury Residential Land Strategy.

** It is considered that these centres are currently Small Villages not Neighbourhood Centres and based on their current population size should be able to grow to the upper limit of the Small Village category by 2031.

*** Mulgrave is predominantly employment lands and has a lesser role in accommodating residential growth.

**NOTE:** The catchment distances and dwelling numbers in Table 4.4 are indicative only of the centre types and should not be considered as absolute limits.
**Centres and Employment**

### 4.2.2 Employment Sectors

The North West Sub Region Strategy identified that the Hawkesbury LGA has capacity to provide an additional 3,000 jobs by 2031. This will increase local employment from 24,000 jobs in 2001 to 27,000 jobs in 2031. Currently within the LGA, employment is focused on key sectors such as:

- **Education** – University of Western Sydney (UWS) Hawkesbury Campus and the Richmond College TAFE;
- **Defence** – Richmond Air Base;
- **Industrial** – Large land holdings provide for local and more regional/industrial uses;
- **Agricultural and Pastoral** – river floodplains have extensive market gardens, while the more undulating terrain accommodates a range of grazing, pastoral and horse related industries; and
- **Commercial and Retail** – within the key centres.

Tourism and other “out of centre” employment as identified for further investigation in Hawkesbury Employment Strategy.

Existing vacant industrial areas are predominantly unserviced, with threshold costs and/or poor access to key transport routes limiting development. In commercial/business areas existing lot configurations, heritage and existing development constrains the potential for renewal and reinvestment.

The following employment areas and their intended industry type in Hawkesbury LGA correlate with the key centres that are identified for potential employment development by the Hawkesbury Employment Lands Strategy 2008:

- **Mulgrave/Vineyard** (Manufacturing Light/Manufacturing Heavy/Urban) The industrial area is land zoned 3(b) Special Business occupied by a range of fast food restaurants and an automotive sales business.
- **North Richmond** (Local Industry, Utilities/Urban Services) This is an industrial area with a number of small pockets of industrial land comprising light industry and smaller industrial strata units supporting local service providers. Two industrial precincts adjoin residential land, a school and community centre.
- **Richmond** (Local Industry, Utilities/Urban Services) This industrial area falls within two precincts, the largest of which is located at the eastern edge of the Richmond Town Centre around 300 m from the East Richmond Station on the Richmond branch of the Western Line. To the west is the Richmond RAAF Base and to the south the Richmond Golf Course.
- **Windsor/South Windsor** (Manufacturing–Light, Manufacturing–Heavy, Urban Services) This industrial area is the largest within Hawkesbury LGA. It supports a broad mix of industrial uses and adjoins the residential area of Windsor. The recently completed Windsor Flood Evacuation Route passes through this industrial area.

- **Wilberforce** (Utilities/Urban Services, Local Industry) The area adjoins rural lands and open space to the south and is not serviced by reticulated sewer. There are also a number of local service providers within the area.

The Employment Lands Strategy 2008 also identifies the following gateway areas which should be investigated for development and design treatments.

- **George Street and Blacktown Road**
- **Windsor Road, Mulgrave**
- **Bells Line of Road, North Richmond**
- **Land on western side of George Street, South Windsor.**

**Implications for the Hawkesbury Residential Strategy**

- Hawkesbury LGA has a high level of job self-containment with local employment sectors in education, industry, agriculture, commerce and retail and this should be maintained or improved.
- The North West Sub Regional Strategy seeks to increase local employment by 3000 jobs by 2031.
- The Hawkesbury Employment Lands Strategy (December 2008) also identifies Mulgrave and Clarendon as having potential to accommodate future employment growth.
- Key sectors and potential employment areas identified in the Employment Lands Strategy 2008 are to be promoted to ensure employment assets are utilised.
Transport

Figure 4.9: Hawkesbury LGA Residential Strategy: Transport Networks Services

(Source: Hawkesbury City Council GIS, October 2009)
Transport

4.3_Transport

Hawkesbury LGA is serviced by a range of transport options including train, bus and private vehicles. Figure 4.9 identifies the key transport infrastructure in the LGA.

4.3.1_Train services

Train services are an important feature of the LGA as they provide facilities for the community to reach employment destinations and other centres within and outside the area. Hawkesbury LGA is located on the Western Railway Line to Richmond, and is within easy commuter distance to employment nodes located within the Hawkesbury as well as those located elsewhere, within the Sydney region at Parramatta and Blacktown.

Hawkesbury LGA is serviced by the following CityRail stations on the Western Line:
- Vineyard;
- Mulgrave;
- Windsor;
- Clarendon;
- East Richmond; and
- Richmond.

The line terminates at Richmond but provides access south east into Sydney CBD and also joins the Blue Mountains Line heading west at Blacktown. Services between Richmond and Blacktown operate at only a moderate frequency with a half-hourly service for all stops during peak hour and an hourly service for all stops during off-peak times.

4.3.2_Road Infrastructure

Key roads providing access to Hawkesbury LGA include:
- Windsor Rd connecting with Westlink M2 at Baulkham Hills and towards Parramatta and the Sydney LGA to the south east; and
- Richmond Rd/ The Northern Rd providing a north south link into Windsor.

Other public roads include:
- Londonderry Rd and Castlereagh Rd both leading to Penrith in the South;
- Wilberforce Rd leading to Parr State Conservation Area to the north;
- Pitt Town Rd leading to Hornsby in the south east;
- Blacktown Rd leading Blacktown and Parramatta in the south east; and
- Bells line of Rd leading to Lithgow and the Blue Mountains to the North West.

Hawkesbury City Council’s Community Strategic Plan identified the need to link the LGA more effectively with the surrounding areas. The following have been identified:
- A community provided with facilities and services efficiently linked by well maintained roads;
- Accessible and integrated transport and communication;
- Connect surrounding regions;
- To enable these visions, the integration of a transport network and development of a hierarchy of roads will need to be facilitated; and
- Road infrastructure was also identified in the Hawkesbury City Council Community survey results where improving local roads was rated the most important for both rural and urban residents.

Existing road capacity issues should be addressed in consultation with the Roads and Traffic Authority prior to or as part of the development for any development within the Hawkesbury LGA.
Figure 4.10: Hawkesbury Residential Strategy Bus Routes

(Source: Region 1 Proposed Network Map, Department of Planning, October 2009)
4.3.3_Bus Services
Like train services, bus services provide links to main centres and employment areas and are an important facility for communities and also tourists visiting the area.

Most suburbs within the southern section of Hawkesbury LGA are serviced by bus routes provided by:
- West Bus
- Hawkesbury Valley bus company Route 661: (weekdays and Saturdays)
  - Riverstone - McGraths Hill – Windsor
- Route 662: (weekdays only)
  - Oakville - Maraylya – Riverstone
- Route 663/4: (weekdays and Saturdays)
  - Route663: Wisemans Ferry - Pitt Town - Oakville - Windsor
  - Route 664: Maraylya - Oakville – Windsor
- School Services
- Busabout

NSW Transport and Infrastructure (formally the Ministry of Transport) proposed changes to bus routes (portrayed in Figure 4.10) which include Hawkesbury LGA and the proposed changes came into effect in October 2009. These include the following routes which between centres:
- 682 Richmond to Berambing via Bells Line of Rd and Kurrajong;
- 680 Richmond to Bowen Mountain via Grose Wold and Grose Vale;
- 678 Richmond to Penrith via Agnes Bank, Castlereagh and Cranebrook;
- 677 Richmond to Penrith via Londonderry Rd and the Northern Rd;
- 676 South Windsor Loop;
- 675 Richmond, Windsor, Bligh Park Loop;
- 674 Windsor to Mt Druitt;
- 673 Windsor to Penrith via Llandilo and Cranebrook;
- 661 Windsor to Reiverstone via McGraths Hills, Vineyard & Darkville;
- 663 Windsor to Wisemans Ferry via Pitt Town; and
- 662 Riverstone to Oakville via Maraylya.
- 669 Windsor to Sackville Wilberforce;
- 668 Windsor to Richmond via Glossodia;
- 608 Windsor to Rouse Hill via Windsor Rd;

4.3.4_Car Use
Due to limited public transport services and the expansive area that is the Hawkesbury LGA there is significant reliance on the private motor car for transport. In 2006 86.3% of the households owned at least one car compared with 81.5% in the WSROC Region. The percentage of people with no cars in Hawkesbury (5.6%) is considerably lower than that in the WSROC region (11%).

The road networks are described in Section 4.3.2 of this report. However due to the rural nature of much of the LGA, residents are required to travel on the major regional and arterial road networks to access services and facilities resulting in potential conflicts between residential and heavy vehicle traffic.

4.3.5_Cycleways
There are dedicated local cycle routes within the Hawkesbury LGA, as shown in Figure 4.11. The cycle routes follow the existing road networks and run along open space networks, providing key links through local residential areas. The majority of the cycle networks are on-street. There are proposed extensions to the existing cycle routes through Kurmond and Vineyard as well as an off-street cycleway extending from Windsor, along Windsor Road to the M2.

The Draft North West Subregional Plan promotes an increase in the number of cycleways, in conjunction with walking routes, to promote cycling as an alternative and legitimate form of transport to cars. Cycleways should therefore not just be used within urban areas for recreational purposes but also to connect centres. The Hawkesbury Mobility Plan (adopted 11 May 2010) outlines future cycle and other mobility facilities.
Transport

Figure 4.11: Hawkesbury Residential Strategy Cycle Networks
(Source: Hawkesbury City Council Cycle ways map, October 2009)
Transport

4.3.6 Pedestrian Facilities
In May 2010 Council adopted the Hawkesbury Mobility Plan. The plan consists of not only a new bicycle network, but a new Pedestrian Access and Mobility Plan. The comprehensive plan assists in the development of pedestrian policies and facilities. The needs of people who require special access are also considered.

In Hawkesbury City Council’s Community Survey Results 2007 footpaths were identified as a high priority area for services.

Additionally, the Sydney Metropolitan Strategy- City of Cities: A Plan for Sydney’s Future 2005 identified the need for easier walking access from nearby areas to shops and facilities to improve the health problems of local residents and reduce the use of cars for short trips while making centres more accessible.

Implications for the Hawkesbury Residential Strategy

_ Existing road capacity issues should be addressed in consultation (where appropriate) with the Roads and Traffic Authority (RTA) prior to or as part of the planning for any development within the Hawkesbury LGA.
_ Future urban development is to concentrate in proximity to CityRail Train Stations within the Hawkesbury LGA
_ Future urban development is to locate in proximity to areas which are linked into the existing train network and provide services to outlying centres
_ Future urban development should be serviced by adequate road networks with links to key centres.
_ Future urban development is to concentrate in proximity to regular and reliable bus networks and services.
_ Regular and reliable bus services should be in place to key destinations and further transport links.
_ Future urban development is to focus on existing and proposed centres to encourage greater access and therefore use of public transport options as well as proximity to services and facilities.
_ Cycle links to other centres and key destinations should be considered
_ Extending cycleways should be considered to connect expanding centres as a result of increased dwelling densities
_ Increased access and usage of paths should be encouraged.
_ Future urban development should provide universally accessible pedestrian facilities.
Open Space and Recreation

Figure 4.12: Hawkesbury Residential Strategy Local Open Space

(Source: Hawkesbury City Council GIS, October 2009)
Open Space and Recreation

4.4_Open Space and Recreation

4.4.1_Distribution of Open Space
As shown in Figure 4.12, the majority of open space within the Hawkesbury LGA is associated with the natural landscape areas within National Parks, State Forests, recreation and nature reserves and conservation areas. Of the almost 2,800 square kilometres of land within the Hawkesbury LGA, 71% is located within National Parks, Nature Reserves and Recreational Areas.

Open space areas provide a range of recreation opportunities for residents and tourists to the Hawkesbury. Within the LGA there are approximately 200 parks and 23 ovals.

While some of these areas provide for recreational use, some areas contain sensitive bushland and habitat and are relatively remote from the urban centres, and as such, they provide limited resources for everyday passive and active recreational use.

In order to use the available park space to its full potential, Council is currently undertaking a playground replacement program to upgrade existing sites and improve the amenities for the community.

Implications for the Hawkesbury Residential Strategy
- Open space is a significant asset for Hawkesbury LGA that contribute to character and amenity of the LGA.
- Existing park and recreation areas are to be maintained.
- To promote healthy communities, future urban development should be located close to a range of existing or proposed passive and active public open spaces where possible.
Open Space and Recreation

Figure 4.13: Hawkesbury Residential Strategy Recreation Facilities

(Source: HASSELL GIS, October 2009)
Open Space and Recreation

4.4.2 Recreation Facilities

Recreational facilities are a valuable resource for residents and tourists. Streams and water courses associated with the Hawkesbury Nepean River Catchment form part of the public open space and recreation system within or around the edges of urban development. They hold high recreational value and attract people from both inside and out of the LGA. The natural vegetation and fauna and geological features are also part of the recreational experience.

In addition to the natural recreation facilities and resources within Hawkesbury LGA, there is a range of formal recreation facilities. Figure 4.13 identifies the numerous recreational facilities provided near or within the LGA. These include:

- Swimming centres;
- Clubs (including bowling clubs);
- Community centres;
- Golf courses;
- Conference centres; and
- Art schools.

Within the Hawkesbury LGA, there are approximately 15 tennis courts, 37 playing fields, four golf courses, and two swimming pools including an indoor aquatic centre.

As Figure 4.13 shows, the majority of these are located in urban areas surrounding existing centres such as Windsor and Richmond. They are located close to the main road infrastructure namely Richmond Road and Putty Road.

Table 4.5 identifies indicative benchmarks for open space and recreation facilities and applies these benchmarks to the Hawkesbury LGA to identify current and future potential levels of provision. These benchmarks are a guide only and more detailed investigations are required to ascertain better the condition, use and demand on recreational facilities.

This table indicates that the LGA provides a strong level of open space and recreational facilities for existing residents.

Future residential numbers are anticipated to increase marginally and therefore suggests future residents will have adequate provision of open space and recreation. Detailed investigations on these areas, the level of service, and the appropriateness of facilities for future population is required.

Table 4.5: Recreational Facilities Infrastructure Provision

<table>
<thead>
<tr>
<th>Infrastructure</th>
<th>Benchmark Service Provision (Indicative Only)</th>
<th>2009 Facilities/ Current provision</th>
<th>Anticipated future demand 2031</th>
</tr>
</thead>
<tbody>
<tr>
<td>Open Space and Recreation</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Regional Park (20ha+)</td>
<td>LGA Catchment</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>District Park (3-10ha)</td>
<td>1 per 25,000-50,000 residents</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>Local Park (1-4ha)</td>
<td>1 per 3,000-5,000 residents</td>
<td>15</td>
<td>17</td>
</tr>
<tr>
<td>Neighbourhood Park</td>
<td>1 per 1,000-2,000 residents</td>
<td>41</td>
<td>47</td>
</tr>
<tr>
<td>Sporting Open Space (2ha)</td>
<td>2ha per 1,000 residents</td>
<td>37</td>
<td></td>
</tr>
</tbody>
</table>

Implications for the Hawkesbury Residential Strategy

- Centres should provide a level of recreational facilities which meet the needs of the local community.
- Future urban development should maximise the use of existing recreation assets.
- Open space and recreation facilities provide high amenity to residential areas. Future urban development is to focus on areas with open space and recreational facilities.
- Detailed investigations of the level of service, and the appropriateness of facilities for future population is required.
Figure 4.14: Hawkesbury Residential Strategy Community Facilities

(Source: Hawkesbury City Council GIS, October 2009)
Community Services and Facilities

4.5 Community Services and facilities

Hawkesbury LGA currently contains a large range of community facilities including community centres, schools and tertiary institutions and facilities for young and older people. These facilities, identified in Figure 4.14, are primarily located in the southern part of the Hawkesbury LGA which aligns with the key population centres where the majority of the Hawkesbury LGA population (94%) live. The remaining 6% of the population live in the more rural and remote parts of the LGA with limited access to facilities and services. It is worth noting that there are numerous mobile community services to cater for the more remote populations.

A high level review of the existing community facility provision has been undertaken against indicative benchmarks, provided in Table 4.6 to determine how the number of the existing community facilities may meet existing and future community needs. The community service review identified that the Hawkesbury LGA currently provides:

- 18 Community centres and halls;
- 1 community health centre in Windsor; and
- 2 Council Libraries (Central Library in Windsor and Branch Library in Richmond)

Youth services in the Hawkesbury LGA include:

- 2 mobile youth centres (Colo Wilderness Mobile Resource Unit and Forgotten Valley Mobile Resource Unit);
- A youth information service;
- A Youth Transport Service; and
- Youth centres and services in Glossodia, Bligh Park and North Richmond

Community facilities specifically for older people and people with a disability are provided by both Council and not for profit organisations and include:

- 2 respite day centre (Richmond and Windsor);
- Support & Resource Centres (Windsor);
- Retirement villages; and
- Nursing homes;

Hawkesbury LGA contains a variety of education establishments including:

- 9 public preschools;
- 6 community or Council operated long day care centres;
- 18 privately operated long day care centres;
- 2 mobile preschools (for remote and more isolated regions of the Hawkesbury);
- 35 public primary schools;
- 9 other primary schools (independent, religious, private, etc);
- 6 public high schools; and
- 5 other secondary schools (independent, religious, private, etc).

In addition, Hawkesbury LGA provides:

- 1 occasional care centre; and
- 5 before and after school facilities.

The LGA also offers a range of tertiary education opportunities including the University of Western Sydney Hawkesbury Campus, Richmond College of TAFE and a regional community college.
## Community Services and Facilities

Table 4.6: Community Infrastructure Provision

<table>
<thead>
<tr>
<th>Infrastructure</th>
<th>Benchmark Service Provision (Indicative Only)</th>
<th>2009 facilities/places /beds</th>
<th>Current Demand 2006</th>
<th>Anticipated Future Demand 2031</th>
<th>Capacity to Meet Future Demand</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Community Centre</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Local (Small)</td>
<td>1 facility per 5,000-10,000 residents</td>
<td>19</td>
<td>8</td>
<td>9</td>
<td>✓</td>
</tr>
<tr>
<td>Neighbourhood/District (large)</td>
<td>1 facility per 30,000 residents</td>
<td></td>
<td>2</td>
<td>3</td>
<td>✓</td>
</tr>
<tr>
<td><strong>Education</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Preschool</td>
<td>1 facility per 5,000-10,000 residents</td>
<td>9</td>
<td>8</td>
<td>9</td>
<td>✓</td>
</tr>
<tr>
<td>Primary School (Public)</td>
<td>1 facility per 2,000-2,500 dwellings</td>
<td>35 facility</td>
<td>27 facility</td>
<td>31 facility</td>
<td>✓</td>
</tr>
<tr>
<td>Primary School (Private)</td>
<td>1 facility per 20,000 residents</td>
<td>9 facility</td>
<td>3 facility</td>
<td>4 facility</td>
<td>✓</td>
</tr>
<tr>
<td>Secondary School (Public)</td>
<td>1 facility per 6,000-7,000 dwellings</td>
<td>6 facility</td>
<td>12 facility</td>
<td>14 facility</td>
<td>X</td>
</tr>
<tr>
<td>Secondary School (Private)</td>
<td>1 facility per 35,000 residents</td>
<td>5 facility</td>
<td>2 facility</td>
<td>2 facility</td>
<td>✓</td>
</tr>
<tr>
<td>Local TAFE</td>
<td>1 facility per 30,000-50,000 residents</td>
<td>2 facility</td>
<td>2 facility</td>
<td>2 facility</td>
<td>✓</td>
</tr>
<tr>
<td>University</td>
<td>1 facility per 220,000</td>
<td></td>
<td>1 facility</td>
<td>0</td>
<td>✓</td>
</tr>
<tr>
<td><strong>Health</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Public Hospital</td>
<td>2-3 beds per 1,000 residents</td>
<td>-</td>
<td>183 beds</td>
<td>210 beds</td>
<td>X</td>
</tr>
<tr>
<td>Private Hospital</td>
<td>1-2 beds per 1,000 residents</td>
<td>127</td>
<td>122 beds</td>
<td>140 beds</td>
<td>X</td>
</tr>
<tr>
<td>Neighbourhood Community Health Centre</td>
<td>1 per 10,000 residents</td>
<td>6</td>
<td></td>
<td>7</td>
<td></td>
</tr>
<tr>
<td><strong>Child Care and Youth</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Long Day Centre</td>
<td>1 place per 10 children aged 0-4 years</td>
<td>24 centres</td>
<td>429 places</td>
<td>459 places</td>
<td>✓</td>
</tr>
<tr>
<td>Family Day Care (home base)</td>
<td>1 place per 200 children aged 0-5 years*</td>
<td></td>
<td>22 places</td>
<td>23 places</td>
<td>X</td>
</tr>
<tr>
<td>Occasional Care</td>
<td>1 place per 100 children aged 0-5 years*</td>
<td>1 centre</td>
<td>43 places</td>
<td>46 places</td>
<td>✓</td>
</tr>
<tr>
<td>Outside of School Hours (OOSH)</td>
<td>1 place per 80 children aged 5-12 years*</td>
<td>5 centres</td>
<td>83 places</td>
<td>89 places</td>
<td>✓</td>
</tr>
<tr>
<td>Vacation Care</td>
<td>1 place per 75 children aged 5-12 years*</td>
<td>6 centres</td>
<td>87 places</td>
<td>95 places</td>
<td>✓</td>
</tr>
<tr>
<td>Youth Centre</td>
<td>1 facility per 20,000 residents</td>
<td>4 centres</td>
<td>3 centres</td>
<td>4 centres</td>
<td>✓</td>
</tr>
<tr>
<td><strong>Aged Care Facilities</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Residential High Care Beds</td>
<td>44 beds per 1,000 residents over 70 years</td>
<td></td>
<td>175 beds</td>
<td>196 beds</td>
<td>X</td>
</tr>
<tr>
<td>Residential Low Care Beds</td>
<td>44 beds per 1,000 residents over 70 years</td>
<td></td>
<td>175 beds</td>
<td>196 beds</td>
<td>X</td>
</tr>
<tr>
<td>Community Care Spaces</td>
<td>25 beds per 1,000 over 70 years</td>
<td></td>
<td>100 beds</td>
<td>111 beds</td>
<td>X</td>
</tr>
<tr>
<td><strong>Libraries</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Branch Library</td>
<td>1 facility per 20,000-30,000</td>
<td>2</td>
<td>2</td>
<td>3</td>
<td>X</td>
</tr>
</tbody>
</table>

~This is a Private Hospital; however, it does have the facilities for Public Health Care.  
Population projection data only available for groups 0-4 years and 5-11 years
Community Services and Facilities

4.5.1_Community Needs Analysis
The future community facility needs for the Hawkesbury LGA in 2031 can in part be determined by a review of the future community and social infrastructure needs against a range of indicative benchmarks. In addition to utilising benchmarks there is a need to undertake consultation with key service providers and the wider community to more accurately determine future community facility needs. Benchmarks have been used as a high level tool to determine a level of service provision to meet population needs. These benchmarks do not identify the level or quality of service provision. The Residential Strategy has relied on these benchmarks purely to ascertain if levels of service provision are being met however further investigations are required to more accurately determine Hawkesbury LGA’s community facility needs to 2031.

4.5.2_Service and Infrastructure Requirements
Table 4.7 outlines the current on-ground provision of community facilities in the LGA plus benchmark standards for the provision of community facilities based on the population from the 2006 ABS Census Data (60,921 persons) and a population growth of approximately 9,000 by 2031.

As previously noted, Hawkesbury LGA is anticipated to have a steady incline in population growth. There are substantial shifts in the age structure, with particular growth in older age groups, which will lead to an increase in demand for more specialised types of services such as aged care and support. It is recommended that a more detailed Community Needs Analysis be undertaken and updated every 5 years in line with ABS Census releases and Council’s LEP review.

It can be noted from Table 4.7 that currently the on-ground provision of services is generally meeting that required for the current population. Given the steady incline in population growth, it is anticipated that there may be a marginal increase in the demand for the number of facilities and services, however the type and service delivery models is subject to further review, particularly in consideration of key target groups.

4.5.3_Facilities for Older People to 2031
Traditionally the Hawkesbury LGA has accommodated young families and therefore has had limited services for older people or people with a disability. With the ageing population there is a need to ensure that service provision is reviewed and demands are met in a timely manner. Future provision of services for older people needs to ensure that these services are well located in key centres, in proximity to a range of wider transport, commercial and community services and facilities.

4.5.4_Health Facilities to 2031
Hawkesbury LGA currently contains a private hospital which provides 127 beds (Hawkesbury District Health Service), and provides public health services with the Sydney West Area Health Service. Whilst this analysis does not take into account hospital beds outside of the LGA boundary, based on the benchmark service provision there is evidently an under supply of both public and private hospital beds to meet both the current and future requirements.

4.5.5_Child Care and Youth Facilities to 2031
Hawkesbury LGA has significant numbers of childcare and educational facilities and services, which appear to meet the current levels of demand, as identified in the benchmarks.

There is a wide range of services for young people provided in the Hawkesbury, reflecting the young nature of the population, which also appears to meet current and future needs.

More detailed analysis and research is required to ascertain whether the services currently available are adequately servicing the population. Analysis would also need to consider the appropriateness of the location of services and facilities based on where future growth and development may occur, such as that in Vineyard, associated with the North West Growth Centre area.

4.5.6_Libraries to 2031
There are currently 2 libraries provided in the LGA as illustrated in Table 4.7. Based on the benchmark provision of 1 per 20,000-30,000 residents, there is a potential demand for 2 libraries in 2006, and 3 libraries for 2031 (one additional library).

4.5.7_Social Considerations
Key social trends currently influencing the Hawkesbury population include:
_ An ageing population;
_ Declining household size with increasing lone person households; and
_ Loss of young people.

Overall, the Hawkesbury LGA appears to rate well against the community facility benchmarks, however the current provision of community services and facilities have been based on past demands and needs. The Hawkesbury Residential Strategy provides an opportunity to identify future population trends, needs and locations to better plan for future community facility provision.

4.5.8_Other Considerations
Hawkesbury LGA has high levels of public transport and road infrastructure.

It can be seen that the Hawkesbury LGA is well equipped to meet future needs.
Community Services and Facilities

Implications for the Hawkesbury Residential Strategy

As the focus of community facilities in the Hawkesbury is in the southern parts of the LGA future urban development should focus where there is a strong provision of community facilities.

Future provision of all community facilities is to be encouraged to locate in town centres, villages, small villages and neighbourhood centres.

Community facilities and services should be accessible by all residents of the LGA in future urban development.

Community service planning needs to review population growth and encourage collocation of services and facilities in key centres of the LGA.

The ageing of the population may result in increased demand on services for older people and people with a disability.

Education and childcare facilities are to be accessible to all residents of the LGA in future urban development, particularly in areas with families with children.
Utilities Infrastructure

4.6 Utilities Infrastructure

4.6.1 Sewerage
Providing adequate sewerage is one of the main issues in terms of infrastructure for Hawkesbury LGA. Reticulated sewerage is currently available to the following areas: North Richmond, Richmond, Windsor, South Windsor and Bligh Park, McGraths Hill, Windsor Downs and Pitt Town.

Treatment plants are located at North Richmond, Richmond (both of which are operated by Sydney Water) South Windsor and McGraths Hill (owned and operated by Hawkesbury City Council).

There is also treatment plants located at Blaxlands Ridge servicing pump out facilities in rural areas during flood emergencies, RAAF base at Richmond, and small local plants at Wilberforce and Scheyville.

Currently there are three common systems of sewage treatment, storage and disposal being used in the three towns area.
- Septic tank plus on-site soil absorption.
- Septic tank and road tanker pump-out.
- Aeration plus on-site irrigation.

4.6.2 Electricity
Integral Energy serves all of the Hawkesbury area and connections to residential properties are carried out on application. It is noted that some outer lying rural areas of Hawkesbury LGA may have no lines or have very old lines which may need additional supply.

Solar power has been an option for houses in the LGA where it has been too expensive to connect to the power grid such as at Kurrajong Hills.

4.6.3 Telecommunications
Telstra has provided network modernisation for most of Hawkesbury City Council area and the (0245) area has recently been digitised. In addition to local and international calls, a variety of additional telecommunication services are available. Some of the online facilities are not yet available to all areas, but Telstra is systematically providing them on request.

Implications for the Hawkesbury Residential Strategy
- Investigations are required to determine the ability of all existing utilities infrastructure.
- Investigations are required to determine the capacity of infrastructure to meet the needs of future urban development.
- Infrastructure to meet the capacity of new urban growth.
- Sewage options should be explored for future dwelling demand.
- Urban development in town centres to be limited to areas serviced by reticulated sewerage.
- Urban development in villages, small villages and neighbourhood centres where no reticulated sewer system is available to be limited to areas capable for onsite disposal.
- Major infrastructure and evacuation route upgrades to be considered for further growth.
Utilities Infrastructure

Figure 4.15: Hawkesbury Residential Strategy ANEF

(Source: Hawkesbury City Council GIS, October 2009)
4.6.4 Noise exposure

The RAAF Base at Richmond is a vital and integral part of the Hawkesbury LGA in terms of its social and economic contributions to the area. This area has therefore been excluded from consideration for future urban development. The noise generated by aircraft associated with the RAAF also restricts development in the surrounding areas due to excessive noise exposure.

Table 4.7: ANEF Classifications

<table>
<thead>
<tr>
<th>Building Type</th>
<th>ANEF zone of site</th>
<th>Acceptable</th>
<th>Conditional</th>
<th>Unacceptable</th>
</tr>
</thead>
<tbody>
<tr>
<td>House, home unit, flat, caravan park</td>
<td>Less than 20 ANEF</td>
<td>20 to 25 ANEF</td>
<td>Greater than 25 ANEF</td>
<td></td>
</tr>
<tr>
<td>Hotel, motel, hostel</td>
<td>Less than 25 ANEF</td>
<td>25-30 ANEF</td>
<td>Greater than 30 ANEF</td>
<td></td>
</tr>
<tr>
<td>School, university</td>
<td>Less than 20 ANEF</td>
<td>20-25 ANEF</td>
<td>Greater than 25 ANEF</td>
<td></td>
</tr>
<tr>
<td>Hospital, nursing home</td>
<td>Less than 20 ANEF</td>
<td>20-25 ANEF</td>
<td>Greater than 25 ANEF</td>
<td></td>
</tr>
<tr>
<td>Public building</td>
<td>Less than 20 ANEF</td>
<td>20-30 ANEF</td>
<td>Greater than 30 ANEF</td>
<td></td>
</tr>
<tr>
<td>Commercial building</td>
<td>Less than 25 ANEF</td>
<td>25-35 ANEF</td>
<td>Greater than 35 ANEF</td>
<td></td>
</tr>
<tr>
<td>Light industrial</td>
<td>Less than 30 ANEF</td>
<td>30-40 ANEF</td>
<td>Greater than 40 ANEF</td>
<td></td>
</tr>
<tr>
<td>Other industrial</td>
<td>Acceptable in all ANEF zones</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

The Australian Standard 2021-2000 gives the above listing for acceptable ANEF levels against development. The table identifies residential development is to be located in a less than 20 ANEF zone.

As Figure 4.15 identifies, the area immediately surrounding Richmond from approximately McGraths Hill to North Richmond is affected by aircraft noise exposure forecast (ANEF) ranging from 20-35 and therefore not suitable for future urban development.

Implications for the Hawkesbury Residential Strategy

- Urban development should occur in areas with noise exposure contour less than 20.
- The Australian Standard criteria should be adopted as a measure of appropriate noise zones for future development.
- Development in areas with noise exposure contour between 20-25 will require special noise assessment and mitigation measures.
- Development in area above 25+ANEF is considered unacceptable.
Heritage and Character

Figure 4.16: Hawkesbury Residential Strategy Heritage  
(Source: Hawkesbury City Council GIS, October 2009)
Heritage and Character

4.7 Heritage and Character

The Hawkesbury LGA is an area rich with heritage character, with over 500 items being identified as places of local heritage significance. The character of Hawkesbury has been influenced by its indigenous, European and natural heritage. The future character of the Hawkesbury LGA will need to build on these significant and unique elements that will contribute to this character and seek to create high quality urban development in both public spaces and urban design.

4.7.1 Indigenous Heritage

The Darug People comprised the largest group of Aboriginal people in the Sydney region, extending from the Coast to the Blue Mountains. The Darug People of the Hawkesbury, the Marramarra Clan, subsided around the rich and diverse Hawkesbury River, known as the Deerubbin.

The Hawkesbury River played a significant role in the Darug People’s day to day subsidence and ceremonies, as such there are:

- 193 known indigenous heritage sites; and
- 4000 potential sites within the Hawkesbury LGA.

4.7.2 European Heritage

The Hawkesbury was originally explored and settled to provide a food source for the Sydney colony. The late Cr Rex Stubbs, Mayor of Hawkesbury City Council 2000 and President of The Hawkesbury Historical Society prepared a history of the Hawkesbury (undated), which stated:

Governor Phillip first explored the Hawkesbury River by boat in July 1789 reaching as far as an area now known as Yarramundi Falls at the junction of the Grose and Nepean Rivers. He planted crops on Richmond Hill before returning to Sydney.

Governor Phillip returned to the Hawkesbury by foot in April 1791. He was accompanied by Captain Watkin Tench who recorded in his journal the first meeting in the Hawkesbury between Europeans and the Darug people. The party met and stayed overnight with Gombeeree, Yellomundi and Deeimba at Bardenarang Creek. Tench’s accounts shows the beginnings of understanding between the two peoples but also just how little was actually known about Aboriginal culture.

Settlement of the Hawkesbury by Europeans first occurred in January 1794 when twenty two families were granted farms on Pitt Town Bottoms, then known as Bardenarang.

European settlers first came to the Hawkesbury River in 1788 and shortly after began to establish farms to feed the Sydney colony.

The Hawkesbury LGA is considered to be one of the oldest European settlement areas in Australia. During the latter half of 1810, Governor Macquarie made a tour of the colony surrounding Sydney, taking in the Hawkesbury Nepean Rivers. During this tour Macquarie named the five towns of Richmond, Castlereagh, Pitt Town, Wilberforce and Windsor. With the exception of Castlereagh, these towns are all found within the Hawkesbury LGA.

They are now referred to as the five Macquarie towns and are settlements he laid out on higher ground after serious flooding of the district's plains.

Governor Macquarie had a profound influence on the development and landscape of the City of Hawkesbury. Therefore, the Hawkesbury LGA contains a character that is dominated by the legacy of early colonial times. The heritage significance not only refers to the built form, but also the adjoining farmlands. It is vital that developments in and around the identified Macquarie Towns adhere to development controls (http://www.hawkesburyhistory.org.au/ accessed 11/09/09)

Figure 4.16 shows that the majority of local heritage items are located within these Macquarie Towns, particularly Richmond and Windsor. State heritage items are located in Wilberforce, Richmond and Windsor.

Being within existing settlements, new development will most likely occur in proximity to heritage items. This should not be seen as a constraint, as heritage items contribute to the character of the area. However, any design near a heritage item should be treated sensitively. Controls are enforced to protect heritage items. New developments should be designed to minimise visual impact on the surrounding heritage.

Hawkesbury City Council has identified the following European heritage items situated within the LGA:

- 530 Local Sites;
- 44 State Sites;
- 139 on register of the National Estate; and
- 1 listed place on Commonwealth heritage list.

4.7.3 Natural Heritage

As identified in Section 4.1.1, the Blue Mountains World Heritage Area provides a significant natural heritage resource to the Hawkesbury LGA.
**Heritage and Character**

Rural lands within the subregion also attract visitors and tourists to the areas. A farm gate trail through Hornsby, Baulkham Hills and Hawkesbury LGA is promoted by Hawkesbury Harvest, a community based organisation established to promote rural industries in the Hawkesbury LGA.

The rural character of Hawkesbury is seen as attractive to visitors and the local community. Best practice guidelines and performance standards have been implemented to protect the rural character of the area.

*Implications for the Hawkesbury Residential Strategy*

- Design proximate to heritage items should be treated sensitively in new development.
- Urban development in close proximity to heritage items should be assessed for its impact on the heritage environment.
Sustainable Development

4.8_Sustainable Development

Hawkesbury City Council is committed to sustainable development and has key aims to minimise the environmental footprint of future development, protecting and enhancing biodiversity, and ensuring future development is sustainable (Hawkesbury Community Strategic Plan 2010-2030). The Residential Strategy is central to achieving these aims, as outlined below.

4.8.1_Enhance Biodiversity

Sustainable development should protect existing flora and fauna assets and minimise new development within existing environmentally sensitive areas. The Sydney Metropolitan Strategy 2005 has adopted a consolidated form for future urban growth, which promotes locating additional growth within existing urban areas. This therefore minimises new development in natural and conservation areas.

4.8.2_Preserve High Quality Agricultural Land

The Draft Hawkesbury City Residential Strategy 1997 identified the need to preserve prime agricultural land from urban development. Agricultural lands are also a key part of the local and regional economy (Draft North West Subregional Strategy). The State Government policy direction of containment of urban growth assists in preserving agricultural land and is upheld by this Strategy.

4.8.3_Environmentally Responsive Design

The Hawkesbury Community Strategic Plan recognises that existing character of the LGA must be preserved by ensuring future development responds to the unique environmental landscape setting of the LGA. It recognises that residents of Hawkesbury LGA have a close relationship with the natural environment and the standard of living in Hawkesbury is benefited by the amenity and healthy lifestyle aspects of living within such a landscape. As such, it is important that the natural aspects of the LGA are preserved and impact on the environment as a whole is minimised, by ensuring future development is environmentally responsive and based on principles of sustainable design.

Improved housing design can also significantly reduce the amount of water and energy consumed by households. Dwelling design can reduce the demand for energy sources through appropriate design and use of alternate energy sources such as solar power. Demand for water can also be reduced through use of rainwater tanks and systems, on site detention and recycling as well as household appliances and fixtures which reduce usage of water.

4.8.4_Urban Design Principles for Future Dwellings

All new dwellings within NSW are required by BASIX to meet a minimum criterion for sustainable design. However, there is an opportunity to encourage dwelling controls in Hawkesbury LGA that go beyond the requirements of BASIX to provide the highest standards of environmentally sustainable design whilst being mindful of cost implications and impacts on housing affordability. Therefore, a higher level than BASIX is strongly encouraged.

Dwelling types have been developed for the Hawkesbury Residential Strategy that are responsive to the environmental and landscape context, demonstrate environmental design principles and reflect the types of housing required to accommodate households in Hawkesbury as identified by the Population and Housing Needs analysis in Chapter 3. The typologies are outlined on the following pages.
Sustainable Development

4.8.5 Urban Design Principles for Rural Residential Lots

Rural residential dwellings have historically been a popular housing option within Hawkesbury LGA. However, rural residential dwellings also utilise large amounts of land and promote a sprawled urban form. Rural residential dwellings also have additional costs with providing services and infrastructure to remote areas. Whilst this Strategy acknowledges rural residential dwellings are a part of the Hawkesbury residential fabric, rural residential dwellings will play a lesser role in accommodating the future population.

Key principles for Rural Residential Lots:
- Dwelling should be designed and located on the lot to maximise solar access into living areas of dwelling;
- Dwellings should be sited in a manner which preserves existing trees and bushland areas;
- Dwellings should be design to respond to the natural topography and reduce the overall amount of disturbance to the site;
- Building materials should be responsive to the local microclimate;
- Pitched roofs, skillion roofs and eaves should be incorporated to contribute to passive heating and cooling of the dwelling;
- Each lot should be independently serviced for energy, water and sewage;
- Use of water tanks should be considered;
- Rural residential lots should be located on the fringe of centres or existing urban areas; and
- Rural residential lots should not be located in areas with high risk to bushfire or flooding.

Figure 4.16 Layout of Rural Residential Dwelling responding to topography and slope
Source: HASSELL 2009
Sustainable Development

4.8.6 Urban Design Principles for Low Density Dwellings

The majority of dwelling stock within Hawkesbury LGA is low density, detached dwellings. There is an opportunity to improve both design and sustainability outcomes for future low density dwellings.

Key principles for low density dwellings:
- Dwelling should be sited to provide good access to the northern sun and to allow for passive heating and cooling for the main living areas, as shown in Figure 4.17;
- Ensure passive solar gains to the rooms which are the most used, such as living areas;
- Bedrooms should be located on the side of the building which receives little sunlight;
- Layout to allow all breezes to pass through the dwelling and ventilate the main living areas;
- Utility, service areas and garages can be located on the western side of a dwelling to act as a buffer to the afternoon sun;
- Open space should be located on the north or northeastern elevations to maximise solar access to the dwelling;
- Minimise site coverage to allow stormwater to infiltrate naturally into the ground and reduce increased overflow;
- Dwellings should be designed to respond to the natural topography and reduce the overall amount of disturbance to the site;
- Building materials should be responsive to the local microclimate; and
- Pitched roofs, skillion roofs and eaves should be incorporated to contribute to passive heating and cooling of the dwelling.
- Subdivision controls should encourage/require lot design/layouts that provide that allotment layout that will facilitate more sustainable dwelling design/siting.

Figure 4.17 Dwelling Layouts for Solar Access
Source: HASSELL 2009
Sustainable Development

4.8.7_Urban Design Principles for Medium Density Dwellings
Medium density dwellings are playing an ever increasing role in the urban areas of the Hawkesbury LGA. They provide an important smaller housing format suited to the increasing number of smaller households such as couples without children and lone person households. Medium density dwellings should also provide housing options for older people and therefore it is important that they are designed to be accessible and a single level.

Key principles for medium density dwellings:
- Dwellings should be arranged on the lot to maximise solar access to main living areas of dwellings;
- Open space should be located on the north or northeastern elevations to maximise solar access to the dwelling;
- Dwellings should be designed to minimise overshadowing and loss of privacy to neighbouring dwellings;
- Setbacks and heights of medium density dwellings should respect existing patterns within the street;
- ‘Gun barrel’ driveways should be avoided where possible;
- Integrate garages, parking and access into the overall building design;
- Utilise CPTED (Crime Prevention Through Environmental Design) Principles for all communal areas;
- Ensure all dwellings implement principles of Accessible Design;
- Minimise site coverage to allow stormwater to infiltrate naturally into the ground and reduce increased overflow;
- Dwellings should be designed to respond to the natural topography and reduce the overall amount of disturbance to the site;
- Building materials should be responsive to the local microclimate; and
- Pitched roofs, skillion roofs and eaves should be incorporated to contribute to passive heating and cooling of the dwelling.

4.8.8_Urban Design Principles for High Density Dwellings
High Density Dwellings provide an important housing choice for smaller households and low-maintenance dwellings. However, the location and design of high density dwellings must respect the existing rural character of the Hawkesbury LGA. It is considered that there is limited demand for such dwellings and that they should generally be 3-6 storeys, in keeping with the surrounding urban character.

Key principles for high density dwellings:
- Buildings should be designed and located on the lot to maximise solar access into living areas of dwellings;
- Ensure the building fronts and addresses the street;
- Building should be highly articulated and have a defined base, middle and top sections;
- Heights and setbacks of high density dwellings should respect existing patterns within the street;
- Building should be designed to minimise overshadowing and loss of privacy to neighbouring dwellings;
- All high density dwellings to be constructed in accordance with SEPP 65;
- Provide a mix of dwelling sizes within a single building to provide housing choice.
- Utilise CPTED (Crime Prevention Through Environmental Design) principles for all communal areas;
- Ensure all dwellings implement principles of Accessible Design;
- Minimise site coverage to allow stormwater to infiltrate naturally into the ground and reduce increased overflow;
- Dwellings should be design to respond to the natural topography and reduce the overall amount of disturbance to the site;
- Building materials should be responsive to the local microclimate; and
- Pitched roofs, skillion roofs and eaves should be incorporated to contribute to passive heating and cooling of the dwelling.
Summary of Key Issues

4.9_Summary of Key Issues

The following provides a summary of background research and mapping of the key issues influencing the future sustainable development of housing in Hawkesbury LGA and their implications (constraints and opportunities) on the Residential Strategy.

4.9.1_Natural Environment

Biodiversity and vegetation
Two thirds of the LGA is located in National Parks providing a total of approximately 1,930 square kilometres. These comprise a range of vegetation communities that contribute to the biodiversity in the LGA and are therefore not suitable for urban development. Future urban development should occur in areas where there are limited impacts on significant vegetation communities away, from national parks and State Conservation Areas.

Flooding
The Hawkesbury LGA is dominated by several river systems with the majority of the urban area of Hawkesbury LGA prone to at least 1:100 year flooding. Flooding is prevalent in areas around the North Richmond, Richmond, Windsor, Wilberforce and Pitt Town areas. Future urban development must avoid high risk flood prone areas and appropriate construction methods must be used. Development must also be mindful of increasing potential for flooding as a result of climate change.

Bushfire
Hawkesbury LGA contains significant areas of bushland which are prone to bushfire. The vast majority of the LGA is categorised as vegetation Category 1 - High Risk except for the urban areas which have been cleared of classified vegetation. Further investigation should be carried out on areas identified before urban development can occur.

Terrain
Hawkesbury LGA is influenced by the Blue Mountains and Great Dividing Range to the north west as well as some of Sydney’s significant river systems. As a result, the topography varies widely from slopes of less than 1:20 (5% slope), increasing to 1:8 (12.5% slope). Future urban development must occur in areas with a slope of less than 15% (1:6.5) and must address slope stability and soil erosion.

Acid Sulphate Soils
Due to the extensive river system found throughout the LGA, acid sulphate soils are common and can be a constraint to development. There is significant amount of land identified as containing Class 5 acid sulphate soils with Class 4 found along the rivers and creeks. Class 3 acid sulphate soils are found in small isolated areas in the urban areas. Future urban development should be cognisant of acid sulphate soil classifications.

Wetlands
There are a number of wetlands within the Hawkesbury LGA including important and productive plant communities and bird habitats and therefore future urban development in wetland areas should be avoided. Hawkesbury City Council are to identify priority areas for management.

Agriculture and Rural Land
Hawkesbury LGA has an extensive amount of agricultural land which should be protected to maintain a significant economic resource. Future urban development on prime agricultural land should be restricted with any property clearly assessed in detail, with conflicts between urban development in rural and agricultural areas avoided. Agriculture in The Hawkesbury is already a significant economic contributor and will be increasingly important and in demand as transport costs rise.

4.9.2_Centres and Employment

Hawkesbury LGA contains a range of centres that service the LGA. The major centres of Richmond and Windsor are the primary retail and commercial centres with the village of North Richmond and small villages of South Windsor and Mulgrave located just outside these main centres. The established centres hierarchy defined in the Sydney Metropolitan Strategy is supported and future urban development should be located within existing or proposed centres.

Employment within the LGA is focussed on key sectors such as education, defence, industrial, agricultural and pastoral and commercial and retail within the key centres. Future urban development is to locate within existing or proposed centres to maximise collocation with employment sectors within the LGA.

4.9.3_Transport

Due to limited connectivity of public transport services, there is significant reliance on the private motor car for transport. Key roads providing access to Hawkesbury LGA include Windsor Road and Richmond Road. However, the LGA is located on the Western Railway Line to Richmond and is within easy commuter distance to employment nodes. Regular and reliable bus services should also be in place to key destinations and further transport links.

Adequate road networks with links to key centres and services and facilities is also important for future development.
Summary of Key Issues

4.9.4_Open space and recreation
Hawkesbury has a number of natural and formal recreation facilities. The majority of these are located in urban areas surrounding existing centres such as Windsor and Richmond. Future urban development should focus on areas with open space and recreational facilities and centres should provide a level of recreational facilities, which meet the needs of the local community.

4.9.5_Community services and facilities
Hawkesbury LGA currently contains a large range of community facilities including community centres, schools and tertiary institutions and facilities for young people and older people primarily located in the southern part of the LGA. Currently the LGA rates well against general community facility benchmarks but future provision of all community facilities is to be encouraged to locate in town centres, villages, small villages and neighbourhood centres.

4.9.6_Utilities infrastructure
Providing adequate sewerage is one of the main issues in terms of infrastructure for Hawkesbury LGA. Reticulated sewerage is currently available in North Richmond, Richmond, Windsor, South Windsor and Bligh Park, McGraths Hill, Windsor Downs and Pitt Town. Integral Energy serves all of the Hawkesbury area, however some outer lying rural areas of Hawkesbury LGA may have no electricity lines or have very old lines which may need additional supply. Telstra has provided network modernisation for most of LGA and has recently been digitised.

Further investigations are required to determine the ability of all existing utilities infrastructure for future development. Infrastructure to meet the capacity of new urban growth is required with sewage options explored for future dwelling demand.

4.9.7_Noise exposure
Aircraft associated with the RAAF generates noise which restricts development in the surrounding areas due to excessive noise exposure. Areas immediately surrounding Richmond from approximately McGraths Hill to North Richmond are affected by air craft noise exposure forecast (ANEF) ranging from 20-35 and therefore development not occur.

4.9.8_Heritage and character
The Hawkesbury LGA is an area rich with character, with over 500 items having been identified as places of local heritage significance and 55 as state significant. Urban development in close proximity to heritage items should be assessed for its impact on the heritage environment with the Urban design of the heritage item treated sensitively.

4.9.9_Sustainable Development
Hawkesbury City Council is committed to sustainable development and has key aims to minimise the environmental footprint of future development and this can be done through enhancing biodiversity, preserving high quality agricultural land, providing an environmentally responsive design and urban design principles for future dwellings.

Dwelling typologies for urban design principles for low density dwellings, medium density dwellings, high density dwellings and rural residential lots have been developed that reflect the responsive to the environmental and landscape context and demonstrate environmental design principles.