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## 2 CATCHMENT DESCRIPTION

### 2.1 OVERVIEW

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Figure 3 shows the location of the Upper Parramatta River catchment in relation to the Sydney region. The local government areas for the region are shown. The catchment includes the cities of Parramatta and Blacktown at the perimeter; Parramatta Central Business District being located at the catchment outlet, and Blacktown located at the western extremity of the catchment. The suburban centres of Carlingford and Castle Hill are also contained within the catchment.

The catchment area is 107 km<sup>2</sup>, containing approximately 80,000 occupied dwellings and a population of 234,403 (Australian Bureau of Statistics, 2001). The Local Government areas in the catchment are Baulkham Hills Shire (36%), Blacktown City (22%), Holroyd City (19%) and Parramatta City (23%). Figure 4 shows the catchment, its main creeks, local government boundaries, suburbs and main roads.

#### Demography

The Australian Bureau of Statistics provided data for the catchment based on the 2001 Census of Population (see ABS, 2001). The following demographic data is useful for comprehending the social characteristics of the catchment, customising potential stormwater education and awareness programs and consulting the community:

Median <sup>2</sup> Age	34 years
Median weekly individual income	\$400-\$499
Median weekly household income	\$1,000-\$1,199
Average household size (no. of persons)	2.9
Proportion of catchment speaking English only	70%
Proportion of catchment that does not speak English well or at all	17%
Proportion of catchment with birthplace other than Australia	38%
Proportion of catchment with language spoken at home other than English	30%
Proportion of catchment travelling to work by car (as driver)	64%
Ratio of low to medium to high density housing in catchment <sup>3</sup>	14:3.5:1

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<sup>2</sup> The median is the middle of a distribution: half the scores are above the median and half are below the median. The median is less sensitive to extreme scores than the mean (average) and this makes it a better measure than the mean for highly skewed distributions. The median income is usually more informative than the mean income, for example.

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## 2.2 WATERWAYS

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The two major tributaries of the Upper Parramatta River are Toongabbie Creek and Darling Mills Creek. The creeks converge to form the Parramatta River upstream of the Cumberland Hospital, North Parramatta. The sub-catchments of Toongabbie Creek and Darling Mills are approximately 70 km<sup>2</sup> and 30 km<sup>2</sup> respectively.

Toongabbie Creek and its tributaries drain the southwest area of the catchment, which is about two-thirds of the total catchment area. The surrounding area adjacent to the creek and main tributaries is heavily urbanised with many of the creeks constituted as concrete channels.

Darling Mills Creek and its tributaries drain the northeast area of the catchment. The majority of the creek has remained in a natural or semi-natural state and, owing to the steep topography, proximate areas have remained undeveloped.

In the upper reaches of the catchment the creeks are mainly ephemeral (temporary). The tributaries are characterised generally by low base flows. The flatness of the creek bed in the lower portion of Toongabbie Creek creates an area of shallow ponds. Water is stored in the Upper Parramatta River by a number of artificial weirs. An artificial water body, Lake Parramatta, is the only significant water body in the catchment located on Hunts Creek, upstream of James Ruse Drive at North Parramatta. Originally intended as a water supply for Parramatta, the lake has been used over the last century for recreation.

The downstream boundary of the catchment is a weir located in the Parramatta River at the end of Charles Street, Parramatta. The catchment drains into the tidal estuaries of the Parramatta River, and eventually into Port Jackson and the Tasman Sea.

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<sup>3</sup> Low density = separate house. Medium density = semi-detached, row or terrace house, townhouse and flat, unit or apartment up to three storeys. High density = flat, unit or apartment with four or more storeys.

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## 2.3 LAND USE

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The majority of land use (94%) within the catchment is urban; 72% being residential, 10% commercial and industrial zoning, and 12% infrastructure. 5% of the catchment is open space and bushland, and the remaining 1% is zoned rural. Table 1 provides a summary of the land uses in the catchment.

**Table 1: Summary of Land Use in the Upper Parramatta River Catchment (1999)**

Land Use	Zoning	Total Area (ha)	% of Catchment
Rural	1	68.4	0.7
Low Density Residential	2a/2b	6380.1	68.5
High Density Residential	2c/2d	315.3	3.4
Commercial	3	248.0	2.7
Industrial	4	689.7	7.4
Special Users Institutional	5a	1148.0	12.3
Special Uses Commercial	5b	10.7	0.1
Bushland & Open Space	6	456.9	4.9

Open space and bushland areas include 14 regionally significant parks, 4 golf courses and some small natural and semi-natural areas of open forested land totalling approximately 600 hectares and occurring predominantly in the northeast of the catchment. Major transport corridors traverse the catchment, and industries have embraced this opportunity, developing along the perimeters. A large industrial area is located at Seven Hills along Toongabbie Creek adjacent to the McCoy Park Basin, Toongabbie. In addition, industrial areas are located at Girraween and North Rocks. The transport corridors within the catchment include the M4 and M2 motorways, Great Western Highway, James Ruse Drive, Cumberland Highway and Windsor Road.

## 2.4 TOPOGRAPHY

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The south and west of the catchment is gently undulating, producing slow moving creeks and broad flat floodplains. These floodplains are part of the Cumberland Lowlands.

The north and east of the catchment is a contrasting area of hilly and steep topography with deep incised gullies and creeks resulting from the Hawkesbury sandstone geology and located on the edge of the Hornsby Plateau. The maximum elevation of this area (and the catchment) is approximately 190 metres (AHD) at Castle Hill. Considering the distance is 8.5 kilometres from this point to sea level at Charles Street Weir at Parramatta,

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the rise in elevation is significant. The second highest elevation in the catchment occurs at Prospect, which is 100 metres.

Figure 5 shows the contours of the Upper Parramatta River catchment at ten (10) metre intervals.

## **2.5 GEOLOGY AND SOILS**

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The underlying geology of Toongabbie Creek and its tributaries is typically Bringelly Shale in the Middle Triassic Wianamatta Group of the Cumberland Plain (Bannerman and Hazelton, 1990). In contrast, the Darling Mills Creek sub-catchment overlays Hawkesbury Sandstone with caps of Wianamatta Group Ashfield Shales along some of the ridge tops such as in West Pennant Hills. Discontinuous beds of the Mittagong Formation (alternating bands of shale and sandstone) also occur between the Hawkesbury Sandstone and overlying Ashfield Shale. The varying geology is expressed in the contrasting topography of the two sub-catchments. Sparsely distributed igneous rocks occur as diatremes, such as Prospect Reservoir. Quaternary alluvium occurs along the major watercourses.

It is difficult to delineate the boundary between the Hornsby Plateau and the Cumberland Plain. Analysis of soil landscapes, topography and vegetation indicates that the Plateau occurs north of the Parramatta River, west of Windsor Road, then east of Old Northern Road to Castle Hill. The transition zone is between Old Northern and Windsor Roads in the east and Old Windsor Road in the west.

The soil landscapes are indicated on Figure 6 based on Chapman et al (1989) and Hazelton, Bannerman and Tille (1989). Reflective of the underlying geology, the principal difference in soil types in the catchment is between the two major tributaries, Darling Mills Creek and Toongabbie Creek. The Toongabbie Creek sub-catchment soils are generally fine-grained silts and clays. The Darling Mills Creek sub-catchment soils are generally coarser grained sands and sandy loams.

The predominant soil landscapes are Blacktown and Luddenham which have been formed respectively by residual and erosional geomorphic processes. These soil landscapes occur mainly within the Toongabbie Creek sub-catchment. The soil landscapes occurring in the Darling Mills Creek sub-catchment include Hawkesbury, Gynea, Glenorie and Lucas Heights. Table 2 lists the soil landscapes within the catchment, their characteristics, depth, erosion hazard and fertility based upon Chapman and Murphy (1989) and Bannerman and Hazelton (1990).

**Table 2: Soil Landscapes occurring in the Upper Parramatta River Catchment  
(Sources: Chapman & Murphy, 1989; Bannerman and Hazelton, 1990)**

Soil Landscape (Geomorphic Process)	Soil Depth	Erosion Hazard		Fertility
		Concentrated Flows	Non-concentrated Flows	
Birrong (Fluvial)	>250 cm	Low – Moderate	-	Low; topsoil: Moderate
Blacktown (Residual)	<100 cm	Moderate –High	Slight - Moderate	Low
Glenorie (Erosional)	<100 cm	Moderate - Very high	High	Low – Moderate
Hawkesbury (Colluvial)	<50 cm	Very high	High – Extreme	Very low
Lucas Heights (Residual)	50-150 cm	Moderate	High	Low
Luddenham (Erosional)	<100 cm	Moderate - very high	High - Very high	Low – Moderate
Picton (Colluvial)	50-200 cm	High	High - Very high	Moderate – Low
South Creek (Fluvial)	Very deep	Very high	Extreme	Low
West Pennant Hills (Colluvial)	>200 cm	High – Extreme	Very high – Extreme	Moderate
Disturbed terrain	<100 cm	Varies	Varies	Varies

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## 2.6 CLIMATE

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The Upper Parramatta River Catchment Trust maintains a network of 16 rain gauges in or just outside the catchment. The Bureau of Meteorology operates a number of daily rainfall stations throughout the catchment. The nearest monitoring station for pan evaporation rates<sup>4</sup> is the Prospect Reservoir.

Table 3 provides the average monthly rainfall based on continuous data collected from 1969 to 1996 at the following stations:

- Welsford Street, Merrylands (#67070);
- Wilson Avenue, Winston Hills (#67080);
- Masons Drive, North Parramatta (#66124);
- Prospect Dam, Prospect (#67019).

Average total monthly pan evaporation rates from Prospect Reservoir from 1965 to October 1998 are included in Table 3.

There is significant variation in both the rainfall intensity and average rainfall in the catchment. The average rainfall is highest in the northeast of the catchment and least in the southwest of the catchment.

Pan evaporation shows a typical trend with high evaporation occurring during summer. The peak evaporation occurs in December.

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<sup>4</sup> Pan evaporation: A pan of standard dimension and installation is used to measure the rate of evaporation. Evaporation is calculated as the difference in the surface-water levels in the pan on a daily basis and adjusting for any precipitation measured in a nearby rain gauge.

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**Table 3: Average Rainfall and Pan Evaporation Rates for the Upper Parramatta River Catchment**

<b>Month</b>	<b>Average Rainfall (mm)</b>	<b>Average Pan Evaporation (mm)</b>
January	110.6	169.0
February	119.2	138.7
March	120.3	125.4
April	92.6	90.3
May	74.3	64.0
June	80.6	51.5
July	43.0	57.7
August	55.0	81.2
September	55.6	107.1
October	70.1	135.4
November	96.5	149.4
December	71.3	182.8
Total	989.1	1352.5