Appendix 1: Membership of the Upper Parramatta River Catchment Stormwater Taskforce

Bob Brimble[37]	Manager Environment & Health	Holroyd City Council
Nad Balgunan[38]	Acting System Manager (Stormwater)	Sydney Water
Susan Bestwick[39]	Infrastructure Planner	Parramatta City Council
Nigel Bosworth[40]	Environmental Trainee	Roads and Traffic Authority
Monic Bulfill[41]	Program Manager Stormwater	Sydney Water
John Carse[42]	Operations Engineer	Upper Parramatta River Catchment Trust
Brian Chapman	Senior Flooplain Engineer	Blacktown City Council
Victoria Critchley[43]	Environmental Management Plan Co-ordinator	Baulkham Hills Shire Council
Robert Dennis[44]	Manager Environmental Protection	Baulkham Hills Shire Council
David Dunkerley[45]	Stormwater Officer	Sydney Water
Joseph Fanous[46]	Environmental Officer	Roads and Traffic Authority
Frank Gasparre[47]	Environmental Officer	Upper Parramatta River Catchment Trust
Les Green	Team Leader – Environment and Health	Parramatta City Council
Melanie-Anne Holland[48]	Environmental Health Officer	Blacktown City Council
Geoff Hunter[49]	Stormwater Management Engineer	Blacktown City Council
Stephen Lees	Executive Officer	Upper Parramatta River Catchment Trust

[37] Ceased membership July 1999

[38] Ceased membership April 1999.

[39] Ceased membership July 1999

[40] Member from October 1998 replacing Phil Mahoney; ceased membership February 1999.

[41] Member from February 2000, replaced David Dunkerley

[42] Alternative Trust representative

[43] Ceased membership August 1999

[44] Ceased membership July 1999

[45] Member from April 1999 replacing Nad Balgunan. Ceased membership February 2000.

[46] Member from March 1999 replacing Nigel Bosworth.

[47] Ceased membership January 2002

[48] Member from October 1998 replacing Janine Percy. Ceased membership July 1999.

[49] Ceased membership August 2000

Phil Mahoney[50]	Senior Environmental Advisor - Sydney Operations	Roads and Traffic Authority
Peter Morison	Environmental Programs Officer	Upper Parramatta River Catchment Trust
Janine Percy[51]	Environmental Health Officer	Blacktown City Council
Robert Peterson[52]	Asset & Drainage Engineer	Holroyd City Council

[50]Ceased membership October 1998.

[51]Ceased membership October 1998.

Neville Prior	Stormwater Manager	Baulkham Hills Shire Council
Paul Richardson[53]	Stormwater Engineer	Baulkham Hills Shire Council
Paul Ritchie	Assistant Director, Operations	Holroyd City Council
Rolyn Sario[54]	Stormwater Engineer	Holroyd City Council

[52] Ceased membership February 2000

[53] Ceased membership March 2000

[54] Commenced membership September 1999

Appendix 2: Requirements for Stormwater Management Plans in the Direction to Councils under Section 12 of the Protection of the Environment Administration Act 1991

[From EPA Direction:]

Each plan must be prepared in accordance with the following conditions:

1) The Plan must be prepared in cooperation with other Stormwater Managers within the catchment;

2) The Plan must be prepared in consultation with all relevant stakeholders, including the community, any relevant Catchment Management Committees or Trust, the Environment Protection Authority and the Department of Land and Water Conservation;

3) The Plan must take into consideration the findings and recommendations of any relevant catchment, estuary or floodplain management plan, or Healthy Rivers Commission report;

4) The Plan must contain, but need not be limited to, the following:

    a) A brief description of the catchment, including climate, topography, water quality, streamflow, aquatic ecosystems and habitats, riparian vegetation, point sources of pollution, major sewer overflows, and urban bushland areas;

    b) Clearly defined stormwater management objectives for both existing and proposed urban areas;

    c) Identification of stormwater management problems and issues;

    d) An evaluation of potential stormwater management practices (both non-structural and structural) to address the identified problems and issues;

    e) An Implementation Strategy, which includes prioritisation of specific management actions to be implemented by each stormwater manager in the catchment and a tentative timeframe for their implementation;

    f) A monitoring program to assess the effectiveness of the Plan, and identify any necessary refinements;

    g) A mechanism for reporting the effectiveness of the Plan to stakeholders, including the community; and

    h) A program for revising the Plan and linking its implementation and future review to the process of Council state of the environment reporting and council management planning prescribed in the Local Government Act 1993 and related regulations.

5) The Plan must be submitted to the EPA by no later than 24 July 1999.

Appendix 3: Explanation of Physico-Chemical Water Quality Monitoring Parameters

Parameter	Description
Bio-chemical Oxygen Demand (BOD)	A standard measure of the amount of oxygen respired or consumed by organisms in a water sample of a 5 day period at a set temperature (generally room temperature). A high BOD denotes a large number of organisms present in the sample, generally indicating a bacteriological or algal imbalance in the aquatic system.
Chlorophyll-*a*	Chlorophyll-*a* is a photosynthetic pigment found in plants and algae. The abundance of phytoplankton, the minute algae which exist in the water column, is estimated by extracting and measuring the chlorophyll-*a* in a known volume of water. Chlorophyll-*a* concentrations vary in natural waters, depending on the availability of light for photosynthesis and nutrients for growth. Excessive numbers of phytoplankton will upset the sensitive ecological balance in an aquatic system.
Dissolved Oxygen	All respiring organisms require oxygen to live and, as a result, the dissolved oxygen concentration is probably the most important single parameter to be measured. Dissolved oxygen concentrations in water undergo seasonal changes caused by annual temperature changes, and relate to the solubility of oxygen at each temperature. Daily dissolved oxygen changes are mainly caused by biological processes; bottom-dwelling and floating algae and plants produce oxygen during the day by photosynthesis, and both aquatic flora and fauna respire, consuming dissolved oxygen both day and night. Hence, daily cycles in natural waters may vary enormously according to the diversity and extent of the organisms present. Dissolved oxygen monitoring must be undertaken with this in mind, and thus climatic conditions and the time of day must be taken into account.
Faecal Coliforms	Faecal coliforms are a group of bacteria which naturally exist in the guts of mammals (including humans) and birds. Being passed in faeces, they are therefore used to indicate the presence of human or animal faecal contamination of a body of water. The presence of large numbers of faecal coliforms may indicate the presence of pathogens (disease-causing organisms). This parameter is measured for public health purposes.
pH	Measures the alkalinity or acidity of the water. pH influences the chemistry of the aquatic system and therefore the biology within the system. The pH of fresh water will change throughout the day as a result of photosynthesis and respiration. The surrounding and underlying geology of a creek or water body also influences pH. The presence of submerged concrete pipes and structures may also alter pH (Laxton and Gittins, 2003). Fresh water plants and animals generally accept a pH range of 6-9.

Parameter	Description
Salinity	Salinity in water increases with the amount of dissolved solids ('salts'). The salinity of fresh water is very low (less than 1 part per thousand), and the salinity of marine waters is about 35 parts per thousand. The salinity of water determines what types of flora and fauna may exist. Salinity in creeks and other water ways is affected by rainfall, and will decrease following a storm event. Conversely, drought periods will cause an increase in ambient salinity. Organisms have different tolerances of extremes in salinity. Great extremes of salinity may cause migration and succession of organisms, or mortality if extensive. Salinity has been altered artificially in the Upper Parramatta River catchment by construction of a weir to prevent the influence of tidal saline waters. Increasing salinity will cause sediments to settle at the bottom of a waterbody. Atlhough clear water will result, saline waters will still remain.
Temperature	Measuring temperature can detect any sources of thermal pollution from industry or significantly depressed temperatures as a result of direct stormwater connections and other impacts. Alteration of the natural water level by weirs and other structures can cause greater extremes in temperatures. Temperatures outside of the acceptable range within the aquatic system can deplete the flora and fauna which depend on narrow temperature ranges.
Total Suspended Solids	Suspended solids cause turbidity in water. They are composed of particles of organic matter, both living and dead, and inorganic substances such as soil particles. High levels of suspended solids cause waters to become highly turbid, reducing the extent of light penetration in the water column. This can reduce photosynthesis, thereby upsetting the balance of ecology. Sediments themselves may destroy bottom-dwelling organisms and habitat for insects and fish spawning areas. High levels of turbidity also reduce recreational opportunities. Sources of sediments include roads, construction sites, landscaping works and eroded lands. 'Total suspended solids' are measured by passing a known volume of sample water through a dried and weighed glass fibre filter. The filter is then dried to a constant weight and re-weighed. The difference in weight is the dry weight of total suspended solids (otherwise known as non-filtrable residue) present in the original water sample.

Parameter	Description
Total Nitrogen	Nitrogen is a nutrient essential to the growth of plants. It occurs in water naturally as dissolved gas, complexes with organic molecules and ions. Blue-green algae (Cyanobacteria) can fix nitrogen gas for energy and as an alternative to oxygen. Green plants can use simple ionic forms of nitrogen to form complex organic molecules. Animals obtain their energy by consuming the plants or eating animals that eat plants; the complex molecules being metabolised. Excessive levels of nitrogen can over-stimulate the growth of algae and other aquatic plants, resulting in an imbalance in the diversity of flora, and consequently, an imbalance in the ecology. Submerged and emergent aquatic plants, and filamentous and free-floating algae are favoured. Effects such as unsightly scums, over-abundance of nuisance plants and toxic blue-green algae, and offensive odours caused by reduced dissolved oxygen levels can occur with excessive nitrogen levels. Nitrogen can also be toxic in various forms. Human-based sources of nitrogen include fertilisers, animal wastes, failing sewerage systems, motor vehicle emissions, and organic matter such as lawn clippings and leaves. 'Total Nitrogen' measures all non-gaseous forms of nitrogen in the aquatic system, including ammonia, organic nitrogen, and oxidised nitrogen.
Total Phosphorus	Phosphorus, like nitrogen, is a plant nutrient. It occurs in natural waters in an ionic form known as orthophosphate, or is bound up in complex organic molecules. Similarly to nitrogen, when phosphorus levels exceed the ambient levels in an aquatic system plant growth can be stimulated, causing an imbalance in the ecology of the system. The main human-based sources of phosphorus are detergents, fertilisers, sewerage, organic matter, and animal faeces. 'Total Phosphorus' is the sum of orthophosphate and organically bound phosphorus.

Appendix 4: Objectives for New Urban Developments – List of Contributors (1999)

Organisation	Contributor(s)
Holroyd City Council	Mr. R. Peterson
Penrith City Council	Ms. C. Kinsey
Blacktown City Council	Mr. G. Hunter, Mr. P. Morison, Mr. R. Parsell, Mr. D. Favotto
Upper Parramatta River Catchment Trust	Dr. Stephen Lees
Rocla Concrete Products	Mr. S. Baker
Streamguard Environmental Services	Mr. A. Wilson
CSR - Humes	Mr. I. Bryant
CDS Technologies	Mr. M. Powell
Petrolink Pty Ltd	Mr. B. Boné
Graeme Greenup & Associates	Mr. G. Greenup