North Central Waterwatch and Community Stream Sampling Project -

Data Confidence Plan

WATERWATCH
North Central
Communities Caring for Catchments

NORTH CENTRAL
Catchment Management Authority

Supported by:

Ecowise Environmental.

action Salinity & Water AUSTRALIA

Australian Government
Department of Agriculture, Fisheries and Forestry
Bureau of Rural Sciences
Department of the Environment and Heritage

Rochester Campaspe Water Services Committee

Lower Murray Water

City of Greater Bendigo

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North Central Waterwatch
(Project Name)

North Central Catchment Management Authority
(Responsible Agency)

December 2005
(Date)

Project Manager Signature	
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Project QA Officer Signature	
	Name/Date
CMA Project Manager Signature	
	Name/Date

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1. Waterwatch in the North Central Region

1.1 The Region

The North Central region is one of ten Catchment Management Authority (CMA) regions in Victoria. It comprises an area of almost three million hectares and covers approximately 13% of the State of Victoria. The region extends from the Great Dividing Range in the south, to the Murray River in the north, a distance of up to 280km. It is around 150km wide and extends from the Mt Camel Range in the east to the western boundary of the Avon-Richardson Catchment beyond Donald. Approximately 200,000 people live in the catchment.

The North Central CMA region is geographically diverse with water availability variable. The Loddon, Campaspe, Avoca, and Avon-Richardson river systems are the major sub-catchment systems in the region. The Loddon and the Campaspe Rivers flow northwards into the Murray system. The Richardson River flows into a terminal lake (Lake Buloke) and the Avoca River flows into Lake Bael Bael which, in a wet year, flows into the Kerang Lakes and into the Murray.

Flow is variable across the catchment. Rainfall is usually dependable during the winter months in the southern areas, however the recent drought has seen poor seasonal rainfall. Flow is permanent in the Loddon and Campaspe as they are regulated systems. Flow is variable in the other unregulated systems.

1.2 North Central Waterwatch Program - Overview

North Central Waterwatch seeks to protect and enhance the health and improve community understanding of the four major river systems - the Loddon, Campaspe, Avoca and Avon-Richardson rivers and their tributaries - within the North Central Region through awareness raising and community monitoring activities along local waterways.

The Waterwatch program has operated in the North Central region since 1993. The program has been successful in attracting large numbers of individuals and groups to monitor local waterways and learn about water quality issues. Some of these groups and individuals have been monitoring for over nine years.

Waterwatch is only one of the organisations undertaking water quality monitoring in the North Central region of Victoria. Other groups undertaking significant surface water monitoring include Department of Sustainability and Environment, Goulburn Murray Water, Coliban Water, Lower Murray Water, Central Highlands Water, Wimmera Mallee Water, Bureau of Meteorology, Environmental Protection Authority (EPA) and Murray Darling Basin Commission. PIRVic regularly monitor groundwater. As a part of the Victorian Water Quality Monitoring Network (VWQMN), contractors (currently Ecowise Env, ALS Laboratory and Theiss) undertake surface water monitoring at permanent monitoring sites across the region.

The Waterwatch program is the only monitoring program in the region actively engaging a broad sector of the community in water quality and catchment health issues.

Four staff support and coordinate the Waterwatch program in the North Central region. Roles duties and time allocations vary for each position. Staff are located across the region with the Regional Coordinator (1 FTE) and the Loddon Campaspe facilitator (0.6 FTE) based at the North Central Catchment Management Authority (NCCMA) Huntly office. The Avoca Avon-Richardson facilitator (0.6 FTE) is located at the DPI office in St Arnaud. The Upper Catchment facilitator (0.2 FTE) is located at Central Highlands Water office in Ballarat.

Water quality monitoring is conducted with a predominantly educational focus, with the majority of participants being schools, landholders and community groups such as Landcare. Community monitors are usually individuals who have become aware of the program through Landcare groups. Most Waterwatch activities in urban environments have a stormwater focus.

1.3 North Central Community Stream Sampling Project

North Central Waterwatch received funding in 2006 through the Australian Government's "Community Stream Sampling and Salinity Mapping Project—in the Murray Darling Basin" to implement a community based salinity mapping project. This project will run over two years and is funded under the National Action Plan for Salinity and Water Quality (NAP). The project is administered by the Department of Agriculture, Fisheries and Forestry's Bureau of Rural Sciences.

The project aims to build on existing salinity data through new stream sampling and salinity mapping; to help communities within the Murray Darling Basin identify areas of high salinity risk and prioritise investments for future salinity management.

This project is an important part of efforts to deal with salinity and its impact on river health will allow a major expansion of the Waterwatch monitoring network within the region and create a strong focus on salinity monitoring. New and existing Waterwatch monitors will be offered the chance to participate in the North Central Community Stream Sampling Project. Participants will receive upgraded salinity monitoring equipment as well as increased technical support and training.

Participants in the program must obtain 'Standard 3' in electrical conductivity monitoring to ensure that their data is of a sufficiently high standard to be included on the Bureau of Rural Sciences database.

1.4 Strategic Relevance

The North Central Regional Catchment Strategy (RCS) has been developed by the NCCMA in consultation with its partner agencies and the community; it sets out a vision and an integrated planning framework for land, water and biodiversity management in the North Central Region. In a practical sense, the RCS is an investment guide for natural resource management funds from State and Commonwealth governments and other sources. North Central Waterwatch activities directly contribute to the achievement of several targets outlined in the RCS; furthermore, continued support of the North Central Waterwatch program is listed as one of the key actions within the 'Community' section of the strategy.

The Draft North Central River Health Strategy (RHS) is the key regional policy document providing direction in river health across the region. It focuses on the management and ecological condition of waterways within the region and covers activities in the catchment that may have an impact on the health of our rivers. The North Central RHS has been directed by the Victorian River Health Strategy (VRHS, 2002) which provides the statewide framework for the future management of Victorian waterways. The VRHS clearly recognises the education/participation and water quality monitoring roles of Waterwatch in riverine management. In addition to this, the following actions are also identified in the VRHS:

- Community monitoring programs such as the Victorian Waterwatch Program will continue to develop tools and training aimed at increasing the value and useability of the data collected by communities.
- Catchment Management Authorities (CMAs) will develop partnerships with regional community monitoring networks to provide additional monitoring to support regional management requirements.

North Central Waterwatch is also identified in the Avoca and Avon Richardson Nutrient Management Strategies as an important vehicle for public education and data supply.

1.5 On-ground monitoring

Water quality monitoring is performed on many of the diverse water systems found in the North Central region. The nature of the data collected is dependant upon the water quality issues relevant to that area and/or water type. Traditionally, surface water and stormwater systems have been the focus of North Central Waterwatch monitoring. Annual Saltwatch snapshots have captured some groundwater data, and there is the potential to increase monitoring of irrigation and drainage channels in the lower catchments.

Waterwatch monitors in the Avoca and Avon-Richardson catchments tend only to monitor the main river channels. Some tributaries are monitored; however, due to the ephemeral nature of many tributaries in this region, many are not regularly tested.

Monitoring in the Loddon and Campaspe systems focuses on the main river systems, with an increasing number of tributaries being monitored.

Monitoring is undertaken at various frequencies depending on the group and monitoring purpose. Some monitors test seasonally, with others monitoring sporadically or on an as-needs basis. With the recent focus on engaging and enthusing new monitors, an increasing number of groups and individuals are monitoring on a monthly basis.

The data collected by monitors is stored on the regional Waterwatch Database. On request, an annual report for the site/s they have been monitoring is provided to monitors. . Groups are encouraged to share this data and to use it to help determine on-ground actions that may lead to improvements in water quality.

In 2004 approximately 60 sites were monitored on a monthly basis (where possible) for the parameters: turbidity, electrical conductivity, temperature, reactive phosphorus, and pH.

North Central Waterwatch has a Steering Committee made up of community volunteers and other sponsor and interested organisations (DPI, Coliban Water, City of Greater Bendigo and Shire of Campaspe). The community members involved were part of the original Waterwatch funding application in 1993. Their role is currently being clarified.

1.6 Objectives of the Data Confidence Plan

Through producing a Data Confidence Plan, North Central Waterwatch aims to:

- Demonstrate data quality of a known integrity to program stakeholders, (data users, sponsors – actual and potential, community monitoring network, NCCMA – River Health and Floodplain units and Implementation Committees, Steering Committee, Local Government);
- Assist groups to develop effective monitoring programs that produce relevant data;
- Provide training opportunities which bring monitors to a high standard of competence in water testing;
- Provide satisfaction to volunteers by clearly highlighting the value of their data;
- Benchmark current practices, through the documentation of procedures to ensure continuity of program delivery and efficiency and instil proper scientific principles in all monitoring;
- Fill water quality information gaps for the NCCMA.

1.7 Waterwatch Data Confidence System

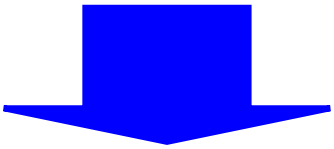
The objectives and direction of monitoring within the North Central region's Waterwatch program is driven by a number of local, regional and state natural resource management frameworks. The diagram below outlines the range of inputs that influence the Waterwatch program in the region.

Relevant Waterwatch Victoria Resources

- Waterwatch Victoria Equipment Manual
- Waterwatch Victoria Methods Manual
- Waterwatch Victoria Data Confidence Manual
- Waterwatch Victoria Data Confidence Guidelines

Relevant Regional NRM Strategies and Frameworks

- North Central Regional Catchment Strategy
- North Central Regional River Health Strategy
- Local Government Stormwater Management Plans (12 Plans in region)
- Catchment Nutrient Management Strategies (4 in region)
- Local Government Water Quality plans for Urban Lakes



North Central Waterwatch Program

- North Central Waterwatch Data Confidence Plan
- North Central Waterwatch Monitoring Methods Manual (including sampling, checklists and QC records)
- Watchman Database (group information, training records, equipment services/maintenance/calibration records)
- Waterwatch Database (group/site information, data storage/management)
- North Central Waterwatch Monitor Resource Manual
- River Detectives Resource - curriculum materials
- Environmental Education Resources – Urban Stormwater, Salinity and Waterways Manuals

1.8 Staff Roles and Responsibilities

The following list is of key personnel directly involved in the implementation of the North Central Waterwatch program.

Name	Position Title
Leigh Mitchell	Regional Waterwatch Coordinator
Melanie Barrot	Waterwatch Facilitator Avoca / Avon-Richardson
Jennelle Carlier	Waterwatch Facilitator (Irrigation) Loddon Campaspe
Britt Gregory	Waterwatch Facilitator (Dryland) Loddon Campaspe

Other personnel that play an important role in ensuring the continued success of North Central Waterwatch are:

- **CMA Catchment Managers -** The Loddon and Campaspe Dry Land Catchment Manager supervises the management of the Waterwatch program, ensuring the program meets the needs of the North Central CMA.

- **CMA River Health team leader** - The River Health Team Leader ensures that the Waterwatch team is meeting specific objectives on a regular basis. Feedback on specific data confidence issues can be sought here.

North Central Waterwatch staff have a number of duties specific to data confidence.

Waterwatch Facilitators are responsible for the on ground implementation of the program, including the:

- Training of new monitors in sample collection and testing, maintenance and operation of equipment;
- Regular training for all monitors in the use of equipment and data interpretation;
- Provision of standard solutions to monitoring groups for calibration of their equipment;
- Maintenance of North Central Waterwatch monitoring equipment (serial numbers, routine cleaning, servicing, repairs, calibration), and stock (calibration solutions, reagents);
- Maintenance of quality control logs (where required);
- Maintenance of volunteer records, including contact and training details;
- Collection of site information including GPS and photo records;
- Validation and maintenance of water quality data on regional Waterwatch database;
- Filing of hardcopy records/archives (datasheets/volunteer records/logs);
- Coordination and supervision of specialised activities including snapshot events and local projects;
- Stocktake of equipment;
- Collection and input of relevant information to be entered onto the Watchman Database;

- Preparation of reports (this may include data interpretation, project management, meeting minutes, milestone reporting, newsletter articles and/or notes).

The **Regional Waterwatch Coordinator** undertakes the above roles, but also has a number of additional data confidence responsibilities:

- Review the regional Data Confidence plan and local documentation with the Waterwatch Facilitators to ensure that on-ground monitoring activities are accurately documented and reflected;
- Identify training opportunities for Waterwatch staff;
- Publish data reports in conjunction with the Waterwatch Facilitators;
- Ensure Waterwatch data is being collected in a manner consistent with broader regional monitoring objectives (Regional River Health Strategy, Index of Stream Condition, NCCMA River Health unit, etc.);
- Integrate Waterwatch activities into other CMA activities;
- Purchase equipment and stock and maintain a log of equipment and identification numbers;
- Provide input into the development river health investment plans and policies;
- Human resource officer for Waterwatch facilitators.

1.9 Parameters monitored

Participants of the North Central Waterwatch Program monitor the following water quality parameters:

- Turbidity
- Electrical Conductivity
- Ammonia
- Reactive Phosphorus
- Total Phophorus
- Temperature
- pH

Note: Not all parameters are monitored at all sites.

It is envisioned that habitat surveys will be completed at all sites on the commencement of monitoring and will be revisited annually by monitors/facilitators.

Macroinvertebrates have been monitored at some sites, predominantly as an awareness exercise with community and school groups. Detailed macroinvertebrate training is available to all monitoring groups upon request.

1.10 Instrumentation

The Waterwatch program in the North Central region uses different types of monitoring equipment. The following list includes equipment used for monitoring physical and chemical parameters. Instrument specifications (instrument type/model, range, resolution and accuracy), parameters monitored (including units), and distributor/manufacturer details (company name, contact name, address and phone number) are noted. This list does not identify which types of instruments are used for different monitoring purposes.

Monitoring kits are inscribed with serial numbers for identification and to aid equipment tracking. The Watchman database is used to record purchase dates, calibration and servicing information.

Instrument type and model	**Parameters monitored** (eg. pH)	**Units of measurement** (pH units)	**Range** (eg. 0 – 14 pH)	**Resolution** (eg. 0.01 pH)	**Accuracy** (eg. ± 0.05 pH units)	**Distributor name and contact details for repairs/servicing/ enquiries** (name, address, phone, email)
Visocolor HE Ammonia test (DEV) – low range	Ammonium	mg/l NH4	0.00-0.5	Variable resolution increments: 0.02 – 0.1	Unspecified	WestLab PO Box 1630 Ballarat 3350 Phone 1800 358 101
pH Strips Machery Nagel pH fix 0-14	pH	pH units	0-14	1	Unspecified	WestLab PO Box 1630 Ballarat Phone 1800 358 101
Hanna HI98130 Combo	pH	pH units	0- 14	0.01	±0.01	Hanna Instruments PO Box 1005 Braeside 3195 Phone 9769 0666
LaMotte TRACER Combo pocket tester	pH	pH units	0-14	0.01	± 2% f.s	Vendart Pty Ltd 21 Hynds Rd, Box Hill NSW 2765 Phone 02 9679 1139
Eutech EcoScan pH5	pH	pH units	0-14	0.01	±0.01	Vendart Pty Ltd 21 Hynds Rd, Box Hill NSW 2765 Phone 02 9679 1139
Visocolor HE Phosphate	Reactive Phosphorus	mg/l PO4-P	0.01-0.25	Variable resolution	Unspecified	WestLab PO Box 1630

test (DEV) – low range				increments: 0.01 – 0.05		Ballarat 3350 Phone 1800 358 101
Visocolor HE Phosphate test (DEV) – high range	Reactive Phosphorus	mg/l PO4-P	0.25 – 1	Variable resolution increments: 0.05 – 0.2	Unspecified	WestLab PO Box 1630 Ballarat 3350 Phone 1800 358 101
Turbidity Tube	Turbidity	Tube NTU's	0-400	Variable increments along length of tube.	NTU scale on side of tube used as an approximation of true NTU measurement only.	Waterwatch Victoria DSE 240 Victoria Pde East Melbourne Phone 9412 4072
Hach 2100P Portable Turbidimeter	Turbidity	NTU's	0-1000 NTU (3 manual ranges)	0.01 NTU on lowest range	± 2% (0-500 NTU range), or ± 3% (500-1000 NTU range)	Biolab Locked Bag 24 Mulgrave 3170 Phone 1300 735 295
Hanna HI98130 Dist 6	Electrical Conductivity	µS/cm	0-20,000	10	± 2% f.s	Hanna Instruments PO Box 1005 Braeside 3195 Phone 9769 0666
Hanna HI98130 Combo	Electrical Conductivity	µS/cm	0-20,000	10	± 2% f.s	Hanna Instruments PO Box 1005 Braeside 3195 Phone 9769 0666
LaMotte TRACER EC pocket tester	Electrical Conductivity	µS/cm	0-19,999	0.1 µS on lowest range	± 2% f.s	Vendart Pty Ltd 21 Hynds Rd, Box Hill NSW 2765 Phone 02 9679 1139
LaMotte TRACER Combo pocket tester	Electrical Conductivity	µS/cm	0-19,999	0.1 µS on lowest range	± 2% f.s	Vendart Pty Ltd 21 Hynds Rd, Box Hill NSW 2765 Phone 02 9679 1139
Eutech CON 6/TDS 6	Electrical Conductivity	µS/cm	0-200,000	Dependent on range chosen 0.01µS, 0.1µS, 1µS,	± 1% f.s	Vendart Pty Ltd 21 Hynds Rd, Box Hill NSW 2765 Phone 02 9679 1139

				0.01mS, 0.1mS		
Hach senSION5 conductivity meter	Electrical Conductivity	µS/cm	0-200,000 (4 ranges)	Dep. On range chosen 0.1µS, 1µS, 0.01mS, 0.1mS	±0.5% FS (first three ranges), ±1% FS (upper range)	Biolab Locked Bag 24 Mulgrave 3170 Phone 1300 735 295
HACH DR890 – for total P test (test-n tube)	Total Phosphorus	mg/l PO4-P	0.00 – 1.14P	Unspecified.	Unspecified.	Biolab Locked Bag 24 Mulgrave 3170 Phone 1300 735 295
Hanna HI98130 Dist 6	Temperature	ºC	0.0 – 60.0ºC	0.1ºC	±0.5ºC (@20ºC)	Hanna Instruments PO Box 1005 Braeside 3195 Phone 9769 0666
Hanna HI98130 Combo	Temperature	ºC	0.0 – 60.0ºC	0.1ºC	±0.5ºC (@20ºC)	Hanna Instruments PO Box 1005 Braeside 3195 Phone 9769 0666
LaMotte TRACER EC pocket tester	Temperature	ºC	0 – 65.0ºC	0.1ºC	±1ºC (@20ºC)	Vendart Pty Ltd 21 Hynds Rd, Box Hill NSW 2765 Phone 02 9679 1139
LaMotte TRACER pH/EC pocket tester	Temperature	ºC	0 – 90ºC	0.1ºC	±1ºC (@20ºC)	Vendart Pty Ltd 21 Hynds Rd, Box Hill NSW 2765 Phone 02 9679 1139
LaMotte TRACER DO pocket tester	Dissolved oxygen	mg/L or % saturation	0-200%Sat or 0-20mg/L	0.1%Sat or 0.01mg/L	±2% both units	Vendart Pty Ltd 21 Hynds Rd, Box Hill NSW 2765 Phone 02 9679 1139

2. Monitoring Sites

Waterwatch monitoring sites listed on the regional database include a number of active and inactive sites. Most sites have been chosen by Waterwatch participants because of interest or custodial connection with the site and/or area, and easy access.

It is proposed that Waterwatch Coordinators and Facilitators will also undertake monitoring at more strategic sites, which will help fill information gaps for the North Central CMA and other agencies. Many of the strategic sites will be located near the end of streams to allow upstream-downstream comparisons, and/or to determine contributions of tributaries to rivers.

All sites are allocated a site code, which consists of a 3 letter and a 3 digit number sequence. Site codes are allocated by the Regional Coordinator. A detailed 'Site Description' sheet (see appendix) must be filled out prior to the allocation of a new site code. Site information is then entered into the Waterwatch Database and kept as a hardcopy.

All Waterwatch monitoring site locations are noted in the regional database. CFA fire maps and topographic maps have traditionally been used to identify site coordinates (easting/northing) for new monitoring sites (AMD66). New sites in the Avoca/Avon-Richardson catchment (April 2003 onwards) and Loddon Campaspe catchments (May 2004 onwards) have been, and will continue to be logged with GPS (WGS84, equivalent to GDA). Easting and northing grid coordinates (MGA) are provided for each site, along with a site description.

High quality data intended to go onto the Victorian Data Warehouse must have GDA coordinates (easting and northing).

2.1 Rivers and Creeks

The three-letter sequence refers directly to the name of the water source. Where there is a double up of names, a similar coding is applied and further information is provided in the site description.

For example:
LOD = Loddon River
CAM = Campaspe River
AVO = Avoca River
AVN = Avon River
RIC = Richardson River

Site numbers are allocated based on the site location in the sub-catchment with 001 located in the headwaters. Sites downstream of the headwaters are numbered chronologically in relation to the site's location along the river (sites located closest to junction of two streams are numbered 999).

For example: AVO500 is a site along the Avoca River, near Charlton, approximately half way along the river system.

2.2 Lakes, Reservoirs, Dams, Wetlands and Bores

Lakes, dams and wetlands are often monitored by landholders and the data is entered onto the database. The method for allocating codes for lakes, dams and wetlands are as follows:

2.21 Lakes

The first letter of the three letter sequence is always L for 'Lake'. The last two letters are always the first two letters of the lakes' name. For example: Lake Buloke = "LBU".

Three numeric digits are allocated in relation to the sites' location along the major feeding watercourse.

2.22 Reservoirs

The first letter of the three letter sequence is always "R" for 'Reservoir'. The last two letters are always the first two letters of the Reservoirs' name. For example: Kennington Reservoir = "RKE".

Three numeric digits are allocated in relation to the sites' location along the major feeding watercourse.

2.23 Dams and Wetlands

The first letter of the three letter sequence is always "D" for 'Dam' or "W" for 'Wetland'. The second letter is the first letter of the area, and the third letter is the first letter of the land owners' surname or first letter of the wetland name.

Therefore a dam (whether it be catchment or channel fed) in Goornong owned by the Howard's would have an alpha code of "DGH".

For dams and wetlands, the three numeric digits are coded in order of commencement of monitoring, with the first site for a particular dam or wetland coded 001.

2.24 Bores

The first letter of the three letter sequence is always "B" for 'Bore'. The second letter is the first letter of the area and the third letter is the first letter of the land owners surname.

Therefore a bore in Bendigo on the Smith's property would be: BBS.

The three numeric digits are always 001. If there is more than one bore being monitored on the same property, this increases in units of 001. For example: bore 2 would be BBS002, bore 3 would be BBS003 etc.

3. Regional Data Confidence Framework

3.1 Overview

Waterwatch Victoria has recently developed a State-wide Data Confidence Framework and Guidelines, identifying minimum data confidence standards for a range of monitoring purposes. The framework and guidelines were developed to ensure that river health data collected by Waterwatch groups is recognised, valued and utilised to the greatest degree possible. North Central Waterwatch has developed a Regional Data Confidence Framework based on the State-wide model.

Monitor data confidence standards are identified through discussions between Local Facilitators and the regional coordinator. The Local Facilitator maintains a complete list of local groups' standards, with the Regional Coordinator updating a regional list on a regular basis.

Deciding the data confidence standard of new and existing groups depends on five factors:

- monitoring frequency
- training
- quality controls (testing, QA/QC events)
- equipment used
- methodology

Training requirements, equipment servicing and QC for monitors collecting Standard 1-4 data in the North Central area are outlined in section 3.2.

Monitor data confidence standards can be allocated by parameter if deemed appropriate by the Local Facilitator or Regional Coordinator.

3.2 North Central Standards Framework

3.21 Standard 1 – Education focus

Data use:
The data collected is stored on the North Central Waterwatch database and is only weakly indicative of water quality conditions. Primary level data should be used only as an indication of water quality conditions. Pollution events or dramatic variations in water quality may be detected, but should be investigated further by a more qualified monitor. Primary level data should never be used for decision making purposes.

The data collected will not be placed on the State Data Warehouse.

Recommended Monitoring Groups:
- Primary Schools
- Secondary Schools

Training:
- Participants/monitors attend a single educational water quality monitoring session and will perform one or more of the water quality tests during the session.
- Teachers and students are shown best practice monitoring techniques and are taught what some of the different water quality parameters are, and how they link with environmental condition.

Quality Control:
- Minimal or no supervision on monitoring quality for each participant. No QA/QC checks are used.

Prior Water Testing Experience:
- Participants have little, if any, prior experience in water quality monitoring.

Monitoring Frequency:
- Variable, but normally very infrequent. There may not be any inclination for the group to become more regular water quality monitors.

Parameters Measured
Turbidity, Reactive Phosphate, EC, pH, Temperature,
(physical habitat, and macroinvertebrates may be monitored, but are not currently included in Waterwatch Victoria Data Confidence Framework/Guidelines.)

Recommended Equipment:
- Waterwatch Turbidity Tube, Visocolor HE Phosphate Test Kit, Hanna Dist 6 EC/Temperature meter, Machery Nagel pH strips.
- Interpretation information.

3.22 Standard 2 – Education "Indicative" Data

Data Use:
The data collected is stored on the Regional Waterwatch Database. This data can be used to form indicative long-term water quality trends and can be used to identify problem areas requiring additional follow-up monitoring by a Standard 3 or 4 monitor.

Recommended Monitoring Groups:
- Primary Schools
- Secondary Schools
- GreenCorps Groups
- Landcare Groups
- Adult Volunteers

Training:
- Monitors will be trained by a Waterwatch Coordinator/Facilitator on monitoring procedures
- A refresher training course is provided annually.

Quality Control:
- Monitors are tested throughout training to ensure their monitoring technique is correct. Monitors also participate in regional QA/QC events.
- Monitors may participate in yearly QA/QC tests.
- Equipment will be serviced at least annually by Waterwatch staff.

Prior Water Testing Experience:
- Monitors have little, if any, prior experience in water quality monitoring.

Monitoring Frequency:
- Can range from fortnightly to yearly.

Parameters Measured:
May include: Turbidity, Reactive Phosphate, EC, pH, Temperature and Ammonium. (physical habitat, and macroinvertebrates may be monitored, but are not currently included in Waterwatch Victoria Data Confidence Framework/Guidelines.)

Recommended Equipment:
- Waterwatch Turbidity Tube, Visocolor HE Phosphate Test Kit, Hanna Dist 6 EC/Temperature meter, Machery Nagel pH strips, Tracer EC or pH/EC meters, Visocolor HE Ammonium Test Kit.
- Interpretation information.

3.23 Standard 3 – "High Quality" Data Collection Focus, Educational Benefits

Data Use:
The data collected is stored on the Regional Waterwatch Database and will be uploaded to the Victorian Data Warehouse. Standard 3 data provides an accurate indication of water quality trends.

Recommended Monitoring Groups:
- Landcare Groups
- TAFE/Tertiary Students
- Adult Volunteers
- Waterwatch Coordinators/Facilitators

Training:
- Participants are trained by a Waterwatch Coordinator/Facilitator in correct QA/QC procedures.
- A refresher-training course is provided annually.
- Participants will be in close contact with Waterwatch Staff.

Quality Control:
- Participants are tested throughout training to ensure their monitoring technique is correct.
- Participants will undertake regular calibration and maintenance of equipment.
- Equipment will be serviced by Waterwatch staff at least annually.
- Calibration logs must be kept.
- Participants will participate in State-wide QA/QC tests annually.
- Participants will participate in Regional QA/QC and training refresher courses at least once per year.
- Monitors using Turbidity Tubes for Tertiary monitoring must annually check their technique against a well-calibrated turbidity meter for comparable results.

Prior Water Testing Experience:
- Monitors need little, if any, prior experience water quality monitoring.

Monitoring Frequency:
- Can range from weekly to quarterly.

Parameters Measured:
May include: Turbidity, Phosphates, EC, pH, Temperature and Ammonia.
(physical habitat, and macroinvertebrates may be monitored, but are not currently included in Waterwatch Victoria Data Confidence Framework/Guidelines.)

Recommended Equipment:
- Waterwatch Turbidity Tube, Visocolor Phosphate Test Kit, Hanna Dist 6, Hanna Combo pH/EC/Temperature meter, Tracer EC meter, Tracer pH/EC meter, Visocolor Ammonia test kit, Eutech CON 6 conductivity meter.
- Interpretation information.

3.24 Standard 4 –Data Warehouse focus

Data Use:
The data collected is stored on the Regional Waterwatch Database and uploaded to the Victorian Data Warehouse. This data will be offered to internal and external organisations wishing to access the information. This data is scientifically credible; comparable against other Agency collected data; and where required, it can be used to make important managerial decisions.

Recommended Monitoring Groups:
- Waterwatch Coordinators/Facilitators

Training:
- Monitors will be very well trained (training offered by State Waterwatch)
- Extra QA/QC training is available to participants – provided by State Waterwatch.
- Monitors will participate in refresher training courses at least annually or as often as they are offered by State Waterwatch.

Quality Control:
- Monitors are tested throughout training by State Waterwatch staff and peers to ensure their monitoring technique is correct.
- Monitors will undertake regular calibration and maintenance of equipment.
- Calibration logs must be kept.
- Monitors will participate in annual regional and state QA/QC tests.

Prior Water Testing Experience:
- Monitors will have prior water testing experience.

Monitoring Frequency:
- At least monthly.

Parameters Measured:
May include: Turbidity, Reactive Phosphate, EC, pH, Temperature, Ammonium.
(physical habitat, macroinvertebrates and flow may be monitored, but are not currently included in Waterwatch Victoria Data Confidence Framework/Guidelines.)

Recommended Equipment:
- Hach Nephelometric Turbidity Meter, Hach Colorimeter/Photometer (phosphorus), COD digester, Sension5 EC meter, Eutech CON 6 conductivity meter, Eutech EcoScan pH 5 meter, Tracer DO meter.

3.25 Further Standards information

The requirements of obtaining the QA/QC standards above are intended as a guide for monitors and Facilitators.

Much of the required sampling methodology has not been covered in this document. For further information regarding monitoring methods, please refer to the 'North Central Waterwatch Water Quality Monitoring – Methods and Interpretation Manual'. Please consult the North Central Waterwatch staff with any queries or requests for further training.

All data collected by Waterwatch monitors may be used in the future to some capacity. The QA/QC standard of the monitor collecting the data greatly influences the audience that is most likely to use the data and to what purpose they employ it. Below is a list of the possible audience and purpose of use, for North Central Waterwatch data:

Data Confidence Standard	Possible Users	Possible Purpose
Standard 1	Students, general public, other Waterwatch monitors, Waterwatch staff	School assignments, general information, basis for further study
Standard 2	Students, general public, other Waterwatch monitors, Waterwatch staff, NCCMA, EPA, DPI, DSE	School assignments, general information, basis for further study, indication of water quality issues
Standard 3	Waterwatch staff, NCCMA, EPA, DPI, DSE	Basis for further study, indication of water quality trends, EPA investigations, Catchment Conditions Reports
Standard 4	Waterwatch staff, NCCMA, EPA, DPI, DSE	Establishing water quality trends, EPA investigations, Catchment Conditions Reports

3.3 Monitoring plans

Developing a 'Monitoring Plan' is a key component of the regional data confidence development process.

Water quality 'Monitoring plans' are prepared in consultation with all community monitors. Not only do they help consolidate the reasons for the monitoring, but they also give a clearer picture of what technical support might be required, where monitoring data should be stored and how it should be used. Monitoring plans will also outline the data confidence level for each group. **Note: groups may have different data confidence levels for different parameters.**

In developing these plans, monitors are asked a range of questions to determine the most relevant parameters to monitor; the most appropriate frequency of monitoring; and their target data confidence 'Standard'.

In addition to the monitoring plan, a site description form is filled out to provide information on the site being monitored.

The local Waterwatch Coordinator/Facilitator retains individual/group Monitoring Plans at their office. Plans are reviewed annually.

A 'North Central Waterwatch Monitoring Plan' template can be found in Appendix 1.
A site description template can be found in Appendix 2.

4. Standard Operating Procedures

All sampling, preservation/storage, testing, calibration and preventative maintenance procedures have been collated into the North Central Waterwatch Monitoring Methods Manual (contact the Regional Coordinator for a copy). The manual contains methods for all parameters and instruments listed in the instrumentation table in Section 1.9. The manual is comprehensive and describes the specific steps and processes of establishing, documenting, recording, maintaining and performing monitoring activities.

4.1 Instrumentation Calibration, Repair and Servicing

Instruments including pH, EC, and turbidity meters, are calibrated according to the North Central Waterwatch Methods Manual. All Standard 3 and 4 monitors are provided with calibration log sheets during induction and are trained in their use.

Calibration buffers/solutions are prepared by a NATA accredited laboratory (WSL, Bendigo). These standard solutions include Electrical Conductivity 1413µS/cm and 12880 µS/cm and pH 7, 4 and 10. Main stock is stored at North Central CMA offices, with small quantities being distributed to monitors on a 6 monthly to yearly basis for calibration purposes. Calibration solutions are freshly prepared every 6 months, with the use-by-date clearly recorded on the label of every bottle distributed.

Community monitors are encouraged to maintain their equipment in good working order and to check for instrument deterioration before each use. Waterwatch facilitators and coordinators make formal checks for deterioration at half yearly individual visits and QA/QC training days. Instruments requiring repair or servicing are returned to the distributor or manufacturer.

Minimum Equipment Servicing Requirements (standard 1+2)

Equipment	Calibration Frequency	Inspection Frequency	Type of Inspection
Turbidity Tube	N/A	Annually	Visual
Conductivity Meters	Before use	Annually	Battery, cleanliness, electrode condition and calibration
pH Meters	Before use	Annually	Battery, cleanliness, electrode condition and calibration
Visocolor Reactive Phosphate Kit	N/A	Annually	Reagent deterioration, colour wheel fading
Turbidity Meter	Monthly, or more frequently if required	6 monthly	Battery, cleanliness and calibration
pH strips	N/A	Before use (volunteer) Annually	Liquid contamination and fade

See section 3.2 for further calibration and servicing requirements.

4.2 Training

4.21 Staff Training

All Coordinators and Facilitators attend training workshops in the chemical/physical and biological testing methodologies provided by the State Waterwatch Victoria team. Facilitators attended refresher courses at least every two years there after.

Other professional development opportunities are encouraged. The Regional Coordinator organises further training in adult learning tools, monitoring and evaluation, freshwater ecology and water quality monitoring. The Regional Coordinator maintains a training record log for North Central Waterwatch staff on the Watchman database kept on the North Central CMA network.

The Regional Coordinator and Local Facilitators must maintain at least a Standard 3 data confidence level and aim to achieve Standard 4.

4.22 Training provided by North Central Waterwatch

Primarily, North Central Waterwatch staff train volunteer monitors to undertake unsupervised water quality monitoring. Training involves a range of activities to ensure that basic protocols are followed when collecting and testing water samples. This training is undertaken prior to the commencement of any Waterwatch monitoring program, irrespective of the level of monitoring being planned. North Central

Waterwatch currently conducts training and refresher training with community monitors (landholders, etc) on an as-needs basis or at least annually.

4.23 New Individuals/ Groups

The training needs of new groups will be determined by a number of factors including the experience and knowledge of group members, the parameters being monitored by the group and the number of group members undertaking monitoring.

As a **guide,** new monitors will generally require the following initial training:

- an introduction, outlining background of the North Central Waterwatch program and the requirements of new monitors;
- correct sampling procedures;
- correct use of equipment;
- calibration of equipment;
- limitations and effectiveness of equipment.

This session will also help the group and North Central Waterwatch staff to develop a monitoring plan should the group decide to undertake regular monitoring.

A full training session should be conducted with those group members wishing to undertake monitoring. North Central Waterwatch staff will follow a training checklist to ensure all relevant topics and methods have been covered. It will generally be necessary for North Central Waterwatch staff to attend at least one (usually the first) in-field monitoring session with group members. This will ensure group members have the confidence to carry out sampling and analyses in the field.

The training checklist appears in Appendix 5

4.24 Established Groups

In-field training should be considered on an annual basis for established and experienced groups. This would act as a refresher session and provides an opportunity for North Central Waterwatch staff to check monitor technique, inspect and calibrate equipment, provide more detailed training (macroinvertebrates, habitat assessment, freshwater ecology etc), review testing results, inspect monitoring sites and review monitoring plans.

4.25 River Detectives Schools

Traditionally, many schools in the North Central region have monitored in an ad-hock and infrequent nature. Due to constraints in facilitator time and an increased focus on the collection of consistent and reliable Waterwatch data from the regional and state level, North Central Waterwatch developed the River Detectives program (adapted from the 'Catchment Capers' model used by Goulburn Broken Waterwatch). By incorporating monitoring activities into the school curriculum, this new program will help ensure schools submit regular data and that water testing equipment purchased by North Central Waterwatch is used in an effective manner.

The River Detectives program is designed to help school students learn about river health and water quality in relation to their local waterways in a 'hands on' and meaningful way. Upper primary and lower secondary students across the North Central catchment can participate in this eight month water quality monitoring program. Students perform chemical and physical tests each month on water collected from their nominated waterbody. They can also choose to participate in an extra monthly activity that compliments their monitoring program and is linked to their curriculum.

Each participating school receives a water testing kit capable of measuring: temperature, EC, turbidity, pH and reactive phosphate. The kit remains the property of North Central Waterwatch and must be returned at the end of the school year. Kits will be reassigned the following year, after facilitators have conducted full inspection and maintenance. Schools with poor monitoring records may forfeit access to a water testing kit if demand from new schools is high.

Waterwatch staff get many requests to visit schools and run activities – schools participating in the River Detectives program take priority when allocating facilitator time.

Participating teachers will be offered training at the beginning and middle of each school year.

As a **guide,** schools (teachers) wishing to become part of the River Detective program will generally require the following training:

- an introductory session outlining background of River Detectives (how often to monitor, what parameters to monitor, how it fits into the curriculum etc);
- correct sampling procedures;
- correct use of equipment;
- calibration of equipment;
- limitations and effectiveness of equipment;
- an introduction to the River Detectives manual and poster – how to use them and what to do with the results;

A full training session should be conducted with the teacher/s wishing to undertake high quality (Standard 3+4) monitoring. North Central Waterwatch staff will follow the training checklist to ensure all relevant topics and methods have been covered.

5. Data Management in the North Central Region

5.1 Waterwatch Database

Regional Waterwatch databases have recently been upgraded by Victoria Waterwatch. The new database is similar to the old database; however, it allows data to be electronically transferred from Waterwatch monitors (through the use of an Offline Data Entry Application or ODEA), to Regional Waterwatch Coordinators, then from Regional Coordinators to the Victorian Data Warehouse.

5.11 Data Validation

The new data management system has a number of advanced data validation tools to minimise data transcription and/or entry error, as well as improved statistical analysis and reporting features. From a quality control point of view, the database is able to identify any unusual data and tag data according to its quality, as outlined in the Regional Data Confidence Framework. This tagging system will be used to export high quality Waterwatch data for inclusion on the Victorian Water Quality Data Warehouse.

Data anomalies are questioned with the monitor who recorded the data. If the anomaly is resolved, the data is added to the database. Unverified data is not added to the database.

It is assumed that data anomalies are caused in most instances by human error, for example – transcription error or incorrect use of equipment. When verifying data, Waterwatch staff will provide feedback to the monitor in an attempt to rectify the problem.

Soft limits are a new feature of the Waterwatch Database. Water types are allocated soft limits; these are the expected range of values for each parameter. The Regional Coordinator sets these limits, drawing upon long term data sets and local knowledge. This feature flags possible transcription errors during data entry; any data sitting outside of these soft limits will not be automatically verified within the database.

North Central Soft Limits for River and Stream water types

Parameter	Low Soft Limit	High Soft Limit
Electrical Conductivity	0	20,000
Turbidity	<10	50
pH	6	9
Reactive Phosphorus	0.00	0.3
Temperature	2	20

5.12 Data Management

Hard copy datasheets forwarded to Waterwatch for inclusion onto the Waterwatch databases are filed per monitoring group and stored.

A back-up of the North Central Waterwatch database is made once every 3 months and burnt to CD. The database sits on the North Central CMA's network drive.
All raw data can be exported from the database upon request. Tertiary and Quaternary data will be available directly from the Victorian Data Warehouse by 2006. It is envisioned that the North Central CMA, Implementation Committees, other agencies such as DPI, TAFE, universities and other groups will continue to request Waterwatch data.

Data is interpreted and reported via a number of avenues in the North Central region. This includes Annual reports and PowerPoint presentations.

5.2 Watchman Database

Watchman is an internal, program management database, designed for management and evaluation of regional Waterwatch programs. It has the ability to store and report information related to program delivery, such as: education sessions and training (opportunities, histories and attendances), equipment (calibration, servicing, location), and media event records. It does not contain water quality data.

6. Performance Evaluation and Review

The North Central Waterwatch program will use a number of mechanisms to review the success of this Data Confidence Plan and its implementation. A number of regional and state QA/QC checks will be used as external checks of the program.

6.1 Statewide QA/QC

Waterwatch Victoria conducts an annual QA/QC week, where Waterwatch staff are required to test solutions of known value as a means of checking instrument and user accuracy. Volunteer monitors are also encouraged to participate in this activity. These results are reported in an annual report compiled by Waterwatch Victoria. Regions are encouraged to use the results to self-assess regional monitoring programs, especially Standard 3 and 4 monitoring.

6.2 Regional QA/QC

QA/QC events are designed to:

- assess proficiencies of training and accuracy of equipment;
- identify individual monitor's strengths and weaknesses and areas for follow-up training and/or advancement;
- provide monitors with a new challenge.

Regional events will be held on a bi-annual basis for Standard 1 & 2 monitors. More frequent events will be held for Standard 3 and 4 monitors.

Regional QA/QC events will be using **both** mystery samples and/or parallel monitoring with a second instrument in the field. The choice will depend on cost primarily – it is envisaged that more experienced monitors will participate in the mystery sample technique with the second instrument testing done with other less experienced monitors.

Parameters tested during QA/QC events will vary depending on the parameters tested by monitors. Field events will be organised by Waterwatch staff to compare instruments in areas relevant to monitors. Shadow testing will enable Waterwatch staff to assess the accuracy of monitors' equipment, while also assessing technique and methodology. Mystery samples may be used in conjunction with shadow testing at Regional events; however, it is envisaged that the use of mystery samples will be mainly restricted to Victoria Waterwatch QA/QC events.

Other CMA staff and interested parties will also be invited to these events to encourage their learning (especially for the mystery sample tests) and provide an opportunity for community members to communicate their findings and ask questions. These events will also be used to inspect monitors kits and ensure equipment is working correctly. Both accuracy and precision will be assessed. Accuracy is how close to the 'real' level the measurements are. Precision is how closely results are replicated when measuring identical samples. Accuracy is how close to the "bulls-eye" you are, while precision is how tightly grouped your hits are. Both aspects are extremely important in determining data confidence.

North Central Annual Quality Control activities

Activity	Type of Quality Control	Accuracy	Precision
Regional - cross-testing meters in field conditions	Calibration; method; equipment; precision.	✓	✓
Regional - QA/QC mystery samples.	Calibration; method; equipment.	✓	
Accuracy checks during training workshops	Calibration; method.	✓	
Individual monitor visits bi-annual (preferred). Check all equipment is working and clean and that the volunteer is calibrating and recording the correct information	Calibration; method; equipment; precision.	✓	✓

The activities in the above table are used to establish and maintain the quality of monitor data. Standard 3 and 4 monitors are required to participate in at least two QA/QC activities per year. Coordinators, Facilitators and monitors, who do not achieve the required quality limits, are required to re-train before their data is accepted for the Victorian Data Warehouse.

6.3 Data Confidence Plan review

The Regional Coordinator will undertake an annual review of the Data Confidence Plan and its implementation; the Victorian Waterwatch Science Coordinator will provide assistance and input. This is an opportunity to re-evaluate the monitoring competencies of groups, and to review whether or not monitoring standards (particularly Standard 3 and 4) are being maintained.

The regional review of the data confidence plan will coincide with an annual stock-take of Waterwatch equipment.

7. Quality Control Documentation

The following records have been developed for the North Central Waterwatch monitoring program. These logs allow the program to be tracked and continually assessed and improved to maintain a high level of data confidence. Copies of each of the following logs can be found in the North Central Monitoring Manual.

Instrument Identification Logs (refer to Instrumentation section)
This log identifies: location of instrument, date of purchase and supplier.

Calibration Logs (refer to Standard Operating Procedures section)

Calibration logs track the frequency of instrument calibration, and additional information such as pre and/or post calibration checks. These logs have been developed for EC and pH meters.

A calibration log appears in Appendix 4.

Repair and Servicing Logs (refer to Repair and Servicing section)
The repair and servicing log tracks the frequency of servicing for all Waterwatch monitoring equipment. It allows for identification and replacement of faulty equipment.

An equipment service log appears in Appendix 3.

North Central Staff Training Logs (refer to Training section)
This log allows North Central Waterwatch to keep a record of training undertaken by both North Central Waterwatch staff. This log is entered onto the Watchman Database.

North Central Waterwatch Training Checklist (refer to Training Section)
A training checklist for new groups is used along with the training log to identify training gaps for groups. The Watchman database is used to log this information at a regional level.

The training checklist appears in Appendix 5.

North Central Waterwatch Groups Logs (refer to Training section)
This log allows North Central Waterwatch staff to keep track of monitors training. The Watchman database is used to log this information at a regional level.

The Waterwatch group Training Log appears in Appendix 6.

Mystery Sample record sheet (refer to Performance Evaluation and Review section)
This record sheet records results from regional and statewide mystery sample events for EC, pH, reactive phosphorus and turbidity. It records variations between regional Waterwatch equipment measurements and mystery solution values.

The Mystery Sample record sheet appears in Appendix 7.

Shadow testing/cross testing Record sheet (refer to Performance Evaluation and review section)
This form records variations between a Waterwatch instrument value and a shadow testing instrument value when testing water samples.

The Shadow Testing record sheet appears in Appendix 8.

Appendices – Operational Record Documents

Appendix 1 Monitoring Plan

North Central Waterwatch
Monitoring Plan

Group Name _____ Date _____

Group Contact _____

1. Why are you monitoring?

The first step in planning is to ask why you want to monitor. Answers may vary, but often groups simply want to know what the stream is like. Record your answer below.

_____

_____

_____

_____

_____

_____

2 Who will use your data?

Potential users might include students and/or group members. Name the main groups you think will want to use your data.

_____

_____

_____

_____

_____

_____

3 How will the data be used?

Data could be used for more than one purpose, e.g. to educate students about the principles of ecology or to identify major trouble spots in the waterway. Knowing their main use will help determine the right kind of data to collect. Describe their intended use.

4 What will you monitor?

The things you choose will depend on the question(s) you are asking as well as the resources available. For example, if your group wants to learn about the general ecological health of the waterway, the main types of water bugs (macro-invertebrates) present could tell an interesting story. List the things you will monitor

5. What data quality do you want?

This depends on the question(s) you are asking and how you intend to use the data. At the very least, your data should be accurate enough to indicate the location of grossly contaminated sites. Depending on your findings, you may then choose to refine your monitoring program. For groups with a focus on education and awareness raising, the quality of the data is secondary to the actual process of collecting it.

6. What methods will you use?

This depends on your objective(s) and resources. There are often several ways of testing the same parameter. For example, for high precision turbidity readings from zero to 1000 NTU, a turbidity meter costing several thousand dollars is needed, but a turbidity tube (<$40) is suitable for less precise readings of between 10 and 400 NTU. Use the same methods at all sites to allow comparison of data. List the methods you will use.

_____

_____

_____

_____

_____

_____

_____

_____

7. Where will you monitor?

The location of monitoring sites depends on whether you are monitoring a river, lake or estuary, and also on the purpose of monitoring. For example, monitoring at a variety of typical sites in the catchment is good for providing information about its overall condition. On the other hand, sites located above and below a source of contamination are needed to indicate its effect. Your sites should be representative of the condition of the waterway. Use a map to show your sites.

_____

_____

_____

_____

_____

_____

8. When and how often will you monitor?

This depends on your resources and the purpose(s) of monitoring. For example, if you are interested in a snapshot of the waterway, monitor a number of sites on the same day; monitoring contamination events, e.g. discharges from pipes, depends on the timing of the discharge; surveying the physical form of the stream is best done during low flows for safety reasons. Describe when and how often you will monitor.

9. Who will be involved and how?

Indicate who will carry out surveys and/or test water samples, who will arrange transport to sites and back, who will prepare the water testing equipment to be used, who will photograph sites, etc.

10. How will the data be managed and reported?

It is important to record and present the data. It helps to raise awareness of the condition of the waterway amongst members and helps you to refine your monitoring activities. Name who will look after the data and describe how the data will be managed.

11. How will you ensure your data is credible?

Developing answers to the first ten questions is the first step to conducting an effective visit to the waterway. For all surveys and tests, make sure group members are adequately trained. For water quality tests, make sure any instruments used are calibrated and read correctly and any water samples from rivers are taken from the main current at about 20 centimeters below the surface. List what you will do to improve the credibility of your data.

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

Appendix 2 Site Description

Name of monitoring group:

Person (s) conducting survey:	
Date of survey:	**Time of survey or test:**
Site name:	**Site code:**
Name of map or directory used:	**Map number:**
Easting ☐☐☐☐	**Northing** ☐☐☐☐☐
Name of nearest town:	**Altitude:**

Brief description of site and/or comments:

_____
_____
_____
_____

Type of water body:

☐ River ☐ Large stream ☐ Small Stream ☐ Lake/reservoir

☐ Channel ☐ Pond/Wetland ☐ Bore ☐ Other_____

Position in catchment:

☐ Upper Catchment ☐ Middle Catchment ☐ Lower Catchment

Water use:

☐ Recreation ☐ Industrial ☐ Agricultural

☐ Domestic drinking supply ☐ Other _____

Location of drains:

Distance from drain to monitoring site:_____ meters ☐ Upstream ☐ Downstream

Type: ☐ Open drain ☐ Pipe

Drain size: Open drain width _____ Pipe diameter _____

Flow: ☐ Fast ☐ Slow ☐ Trickle ☐ Not flowing

Description of drain water:

Colour _____
Odour _____
Other (oils, scums, milky etc)_____

Weather conditions at time of sampling:

☐ Sunny ☐ Cloudy ☐ Overcast ☐ Raining ☐ Windy

Air temperature: _____ °C

Rainfall:

☐ More than a week ago ☐ During the last 3 days

☐ Raining now Amount of rainfall _____

Water conditions:

Water flow: ☐ Not flowing ☐ Slow ☐ Fast ☐ Rapid

☐ Temporary ☐ Permanent

Water appearance: ☐ Clear ☐ Muddy

☐ Smelly (describe) _____

☐ Frothy /foamy ☐ Scummy ☐ Oily ☐ Stained brown ☐ Milky

Other (describe)_____

Stream width and depth:
Measured from deepest section of the stream

Depth ☐ **Measured** ☐ **Estimated**

☐ Up to 5cm ☐ 5-40cm ☐ 40-100cm ☐ 1-2m ☐ over 10m ☐ Unknown

Average width of stream (m): _____

☐ **Measured** ☐ **Estimated**

Adjacent land use:

☐ Bushland area ☐ Forestry ☐ School ☐ Urban residential

☐ Rural residential ☐ Vacant land ☐ Construction site ☐ Mining site

☐ Landfill site ☐ Road ☐ Recreation ☐ Park/Garden

☐ Industrial (describe)_____

☐ Commercial (describe)_____

☐ Other (describe) _____

Agriculture:

☐ Cropping ☐ Orchard ☐ Piggery ☐ Dairy ☐ Grazing

☐ Unrestricted stock access ☐ Other (describe)_____

Litter/pollutants:
Tick type found and approximate number of examples found

☐ Cans _____ ☐ Paper _____ ☐ Clothing _____

☐ Oil _____(m^2) ☐ Food packets _____ ☐ Plastic _____

☐ Polystyrene _____ ☐ Car bodies _____ ☐ Waxed cardboard _____

☐ Bottles _____ ☐ Petrol/diesel_____(m^2)

☐ Other (describe) _____

Appendix 3 - Service Form

North Central Waterwatch
Equipment Service Form

Group Name_____

Contact Person_____ Phone _____

pH Strips/meter

□ Sufficient strips for 12 months. □ Meter Calibrated

□ Buffer solution checked/replaced □ Batteries checked/replaced

□ Probe cleaned

Conductivity Meter Number _____

❒ Cleaned ❒ Calibrated ❒ Batteries Replaced

❒ Standard Solution Replenished

Phosphorus Kit Number _____

❒ Glassware Cleaned ❒ Chemical Levels OK (If not report below)

❒ Filter Paper ❒ Syringe filter ❒ Safety Glasses present

Turbidity Tube Number_____

❒ Cleaned

Equipment Problems:

Serviced by: Date:

Appendix 4 - Calibration Record Sheet

North Central Waterwatch

Calibration Record (for EC or pH)

*** Record reading (measured value) before adjusting calibration ***

Group name:	**Coordinator:**
Equipment type:	**Supplier:**
Date purchased:	**Equipment number:**

Proposed calibration frequency:_____

The following table can be used to record up to a three-point calibration.

Date	Calibration standard expiry date	Calibration results					
		Expected value	Measured value	Expected value	Measured value	Expected value	Measured value

Appendix 5 Training Checklist

North Central Waterwatch
Training Checklist

The following topics should be covered in all training sessions for each level of monitoring.

Date:…….. Trainer……

Participants:……..
……
……..
……
……
……
……

Sampling and Storage of Samples
- Cleaning of sampling container;
- Labelling of sampling containers;
- Correct sampling procedures;
- Storage of samples not analysed in situ.

Testing Procedures
- Variety of parameters available for testing;
- Reasons for parameter selection;
- Methodologies for selected parameters;
- Safety;
- Quality control.

Equipment
- Cleaning of equipment;
- Servicing and maintenance of equipment;
- Storage of equipment;
- Limitations of equipment;
- Calibration of equipment.

Recording of Data
- Record sheets;
- Reporting units;
- Recording of equipment calibration;
- Catchment database.

Appendix 6 - Training Log

North Central Waterwatch
Monitor Training Log

Date	Name of trainer	Name of Individual	Training Aspect	Level

Appendix 7 Mystery Sample Record Sheet

North Central Waterwatch QA/QC Mystery Samples

Waterwatch Victoria QA/QC Mystery Samples

Region: _____ **Date**: _____

Name (and number of years Waterwatching): _____

QA/QC Code: _____

Parameter	**Equipment Type/No.**	***Mystery Sample 1*** ***Sample No.***	***Mystery Sample 2*** ***Sample No.***
pH			
EC (µS/cm)			
Turbidity (NTU)			
Reactive Phosphapte - as P (mg/L)			
Comments (eg. calibration notes, dilutions, suspect equipment)			

Return Sheet to: North Central Watewatch
PO Box 18
Huntly 3551
Phone 5440 1829 Fax 5448 7148

Appendix 8 - Shadow Testing Sample record sheet

North Central Waterwatch QA/QC Shadow Testing

Date: _____

Name of Monitor 1_____

Name of Shadow Monitor_____

Meter 1 (Monitor)		**Meter 2 (Shadow tester)**		**Comments: (Serviced etc.)**
Equipment Type and Code	Reading and unit	Equipment Type and Code	Reading and Unit	