

PRINCIPLE 9: THE TRANSDISCIPLINARY AND ADAPTIVE NATURE OF SOURCE WATER PROTECTION SHOULD BE ACKNOWLEDGED AND PRACTISED

TARWIN RIVER WATER SUPPLY CATCHMENT RISK MANAGEMENT PLAN AND CLASSIFICATION TOOL

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KEYWORDS

Drinking water supply catchment areas, Planning permit applications in open, potable water supply catchment areas, land use planning, source water protection, transdisciplinary working groups.

CASE STUDY DETAILS:

Year:

Operationalisation: 2016-present

Location:

South Gippsland, Victoria (South Gippsland Region Water Corporation)

Team:

South Gippsland Water (SGW), South Gippsland Shire Council (SGSC) Ecos Environmental Consulting

CASE STUDY OUTLINE:

Looking at the transdisciplinary approach to source water protection where boundaries between land use planning and catchment protection could be understood, accepted and organised among land use planners, water corporation objectives, community expectations and farming requirements.

Key drivers: Why did the project occur, and what issues were the project trying to address?

- *The Project occurred to protect as much as practicably possible the source water catchment for two drinking water supplies.*
- *The project was trying to balance protection of a source water and land use development in a highly agricultural intensified water supply catchment area.*
- South Gippsland Water (SGW) and South Gippsland Shire Council (SGSC) required a tool that could be used to assist with appropriate and relevant implementation of the Victorian Guidelines for Planning and Permit Applications in Open Potable Water supply Catchment Areas (DELWP 2012) (referred from here on as the “Minsters Guidelines”). This tool needed to address land use planning issues and the cumulative impact of land use development on-site wastewater/septic tank systems in the Tarwin River Water Supply Catchment Area (see Figure 1). The tool needed to allow strategic land use planning to occur based on identification of areas of risk and the appropriate implementation of risk-based management responses.
- The purpose of the Victorian “Ministers Guidelines” is to protect the quality of potable water supplies using a risk-based approach whilst facilitating appropriate development within the water supply catchments.

- The Tarwin River Water supply catchment is a 1500 square kilometre rural catchment consisting largely of cleared grazing land with some plantation forestry and small regional towns. Dairy farms, beef farms and sheep farms constitute 86% of the catchment with dairy farming the major industry in the regional area.
- A classification of property boundaries by size indicated that the average property size in the Tarwin river water supply catchment was between 30-100ha with many clusters of small properties less than 30ha with a dwelling density mostly of less than the 1 dwelling per 40ha as per the guideline for water supply catchments.
- It was understood according to SGSC's Domestic Wastewater Management Plan, that the majority of on-site wastewater treatment systems installed in the catchment were toilet only systems that *"treat only the toilet wastewater (i.e. blackwater). The remaining portion of wastewater from showers, baths, basins, etc, is discharged to local creeks, rivers and ground waters via the storm water system (SGSC 2012)"*.
- Discharge of greywater to the environment means that local stormwater can be expected to have a very high nutrient and pathogen loading. Research has shown greywater pathogen concentrations can be very high (Birks and Hills 2007).
- In 2013, SGSC introduced the Housing and Settlement Strategy (HSS) whereby land was to be allocated for low density residential living around the larger settlements and this is where any further development of unsewered housing is likely to be contained which also happened to be located largely in the Tarwin River Water Supply Catchment Area. It was estimated under this strategy that a further 1644 potential new unsewered dwellings could be developed. 1403 of these were potential small lot dwellings in the Farming Zone (>1000m² <4.1ha).
- However the "Ministers Guidelines" effectively could prohibited most of these potential new land use developments in the Tarwin River Catchment, with SGW having the authority to object to many land use applications as a referral authority under Section 55, Clause 66.02 and 66.04 under the Planning Scheme.
- SGW were objecting to planning applications mostly for land developments in where the dwelling density exceeded the guideline of no greater than one dwelling per 40 hectares.
- The SGSC and community members receiving these objections began their outrage with the Water Corporation in the firing range. Thus began a process of applying a transdisciplinary approach to land use planning and source water protection in the Tarwin River water supply catchment area.

Approach taken:

Approach developed to address the issue.

In 2016, South Gippsland Water developed a partnership with the Strategic and Statutory Planning Team and the Environmental Health Team at the South Gippsland Shire Council as well as a Land Use planning consultancy and an expert in pathogen transportation through the environment (Ecos Environmental).

It was firstly a training partnership for all those involved so that the relevant South Gippsland Shire Council employees could learn about source water and catchment health and in turn South Gippsland Water could learn about the planning strategies of SGSC. SGW learned about the legacy of smaller underdeveloped lots in the Tarwin River Catchment. In the past SGSC had permitted small lot subdivisions in the Farming Zone (FZ) many of which had yet to be developed. Many of these lots were less than 1000 m². Therefore, according to a recently adopted SGSC's Rural Land Use Strategy, all current lots > 1000 m² in the FZ could be developed and new dwellings on lots under 4 hectares were supported by the shire. However, this strategy conflicted with the Ministers Guidelines and protection of the Special Water Supply Catchment Areas.

SGW's Managing Director was asked by the then Water Minister to find a solution to this without upsetting too many potential property owners wanting to build homes on their properties and who had planning applications pending objection as they did not meet the Ministers Guidelines but DID meet the SGSC's rural land strategy policy. The community were confused.

Summary of activities undertaken

SGW and SGSC conducted several workshops involving many stakeholders from SGW, South Gippsland Shire Council, West Gippsland Catchment Management Authority, Dairy Australia, Department of Health, Department of Environment and Primary Industries, South Gippsland Landcare, Hancock Victorian Plantations, Environment Protection Authority, Beef and Farm Consultants, Catchment and source water consultants. There evolved from these workshops the Tarwin River Catchment Management Plan (TRCMP) where issues were addressed such as how to balance the increasingly intensive farming in the catchment, how to balance new land use developments against the requirement for source water protection.

The agreed TRCMP consisted of:

- A quantitative catchment process model; and
- Risk management planning (informed by the quantitative modelling)

Key Guiding Principles and Key Management Areas for the Plan was agreed upon by all participants of the workshops one of which was:

“for the Tarwin Water Supply Catchment to have productive and sustainable communities and healthy ecosystems that provide clean water. This vision is to be fulfilled by supporting and promoting a culture of sustainable development and cooperation and focussing on mutually beneficial outcomes through the implementation of the best and/or most appropriate management practices. We will identify and progressively work through the challenges to achieve our long-term goals.”

The modelling for the plan was developed taking into account:

- Grazing pasture and stock access to waterways;
- Point source discharges;
- Data on nutrients including Total phosphorus (TP), Total nitrogen (TN), Suspended solids, microbial pathogens and indicator organisms such as *Cryptosporidium* (protozoan pathogen), *Campylobacter* (bacterial pathogen), *E. coli* (bacterial indicator), and Adenovirus (viral pathogen) and pesticides and herbicides.
- Rainfall runoff information

Outcomes:

Summary of outcomes

A conclusion from the modelling undertaken for the Tarwin River Water Supply Catchment clearly indicated that implementation of riparian and land use best practice management gave a major reduction in annual transported loads of sediments and nutrients. Modelling of monthly averages of daily pathogen concentrations showed a marked seasonal pattern with highest average concentrations occurring during the low flow period encompassing January, February and March. Importantly modelling higher dwelling density land uses (e.g. Rural Living Zone) only make up a small percentage of the catchment compared to the high percentage of intensive farming and therefore the catchment-wide effects of changes in land use of additional new dwellings is attenuated.

A recommendation of implementation of riparian best practice management across all catchment waterways gave the largest reduction in average monthly *Cryptosporidium* concentrations.

In contrast implementation of Wastewater Management Best Practice scenarios (largely focused on on-site systems) gave the greatest reduction in *Campylobacter* concentrations. However, since *Cryptosporidium* is much more difficult to treat than *Campylobacter*, reductions in *Cryptosporidium* are more important from a drinking water supply perspective than reductions in *Campylobacter* or other bacterial pathogens. Bacteria as a whole are more readily removed by oxidative disinfection processes (e.g. chlorination) than encysted protozoa.

The management plan was endorsed and implemented by both boards of SGW and SGSC and agreed upon also by all parties that took part in creating actions for the Tarwin River Catchment Management Plan. The first priority was to ***emphasize improvement programs for riparian buffers and for stock health; and as a second priority support on-site wastewater management programs with an emphasis on treatment compliance programs over planning controls in relation to dwelling densities.***

Both SGW and SGSC now have a process whereby planning applications for land use developments are not automatically objected to according to the dwelling density as per the "Ministers Guidelines", one dwelling per 40 hectares. Instead a strong support network between the statutory and strategic planners and Environmental Health Officers of SGSC is aligned with SGW to provide the community a fair and reasonable process of allowing the greater dwelling density in the catchment with critical emphasis on the wastewater treatment compliance programs set up between the two organisations.

The farming and community groups are also much more aware and aligned with the process having been involved with the transdisciplinary nature of the process. The plan developed best management practice programs for riparian and land management, for animal production management, for horticulture management, for domestic wastewater management and for licenced discharges management,

The modelling also indicated areas of the catchment where land use development was of much higher risk and generally unsuitable due to soil composition, slope, distance to waterways and instances of where dwelling density was highly increased. This was also discussed and agreed upon by the transdisciplinary group.

Lessons learnt and critical success factors.

The first critical success factor was getting ordinance and mapping approved for the Tarwin River Drinking Water Supply Catchment in the South Gippsland Planning Scheme. This meant that the mapping would depict the water supply catchment and the ordinance provided the policy and written clauses of the water supply catchment overlay.

Positive learning communications and professional relationships between the water corporation, community members, farmers and farming consultants and the shire council was the most vital skill acknowledging, understanding and practicing the transdisciplinary and adaptive nature of source water protection. (Principle 9). These relationships have remained strong as we continue the ever-changing journey of developments in the Tarwin River Water Supply Catchment Area.

A good lesson learnt was not to assume that all parties recognise the others business objectives and that to provide a good understanding of these objectives is the start to a non-conflictual professional relationship.

Taking all relevant industries along in the journey was an important process in acknowledging source water protection and the research efforts conducted by staff from different disciplines working together to create new conceptual, theoretical, methodological ideas and to understand and to integrate these into many areas across many different organisations.

Supporting Figures:

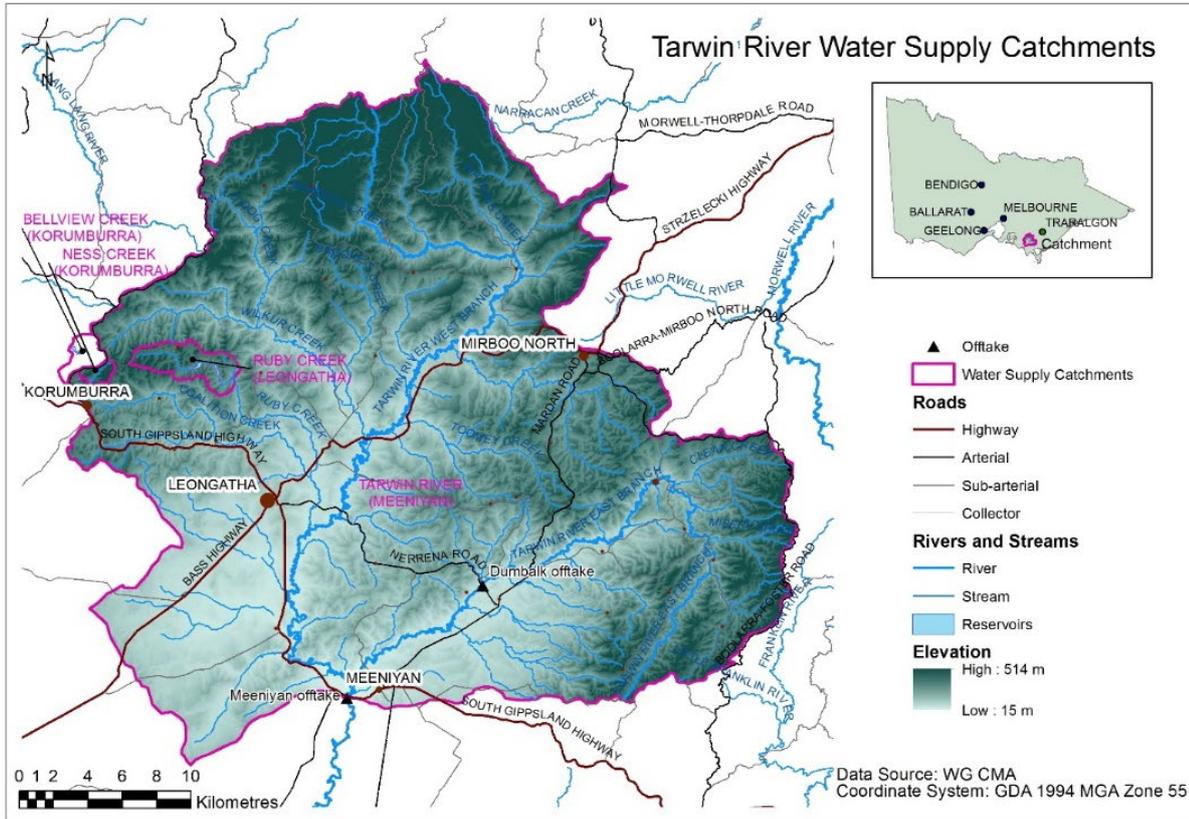


Figure 1. Location of Tarwin River Water Supply Catchment (South Gippsland, Victoria)

Flow chart for development of Tarwin Water Supply Catchment Water Quality Management Plan

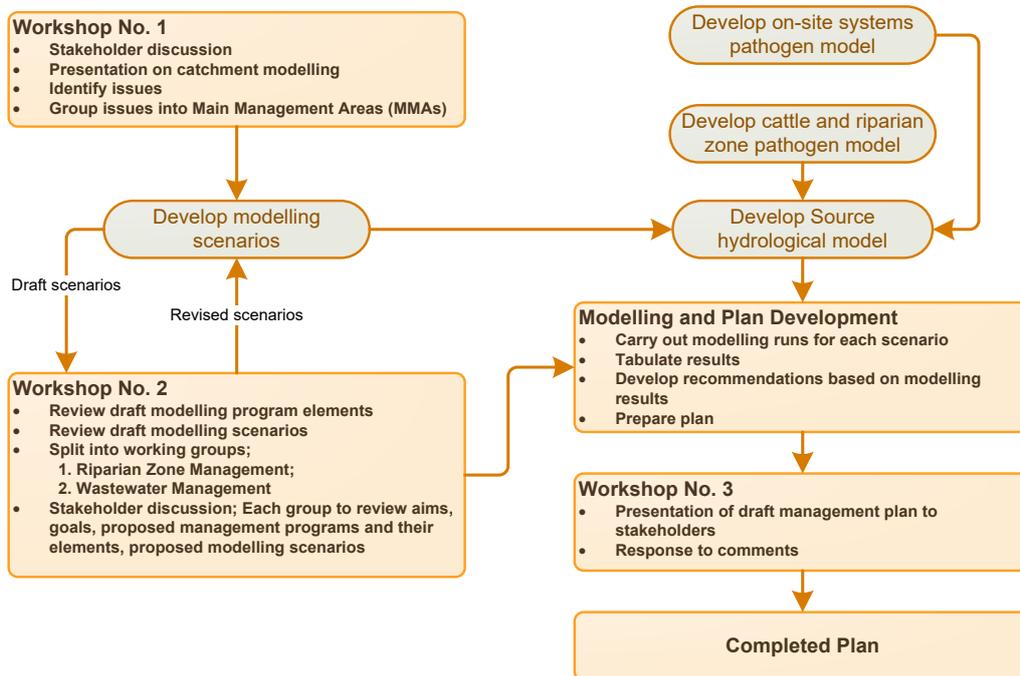


Figure 1. Flow chart for development of Tarwin Water Supply Catchment Water Quality Management Plan.

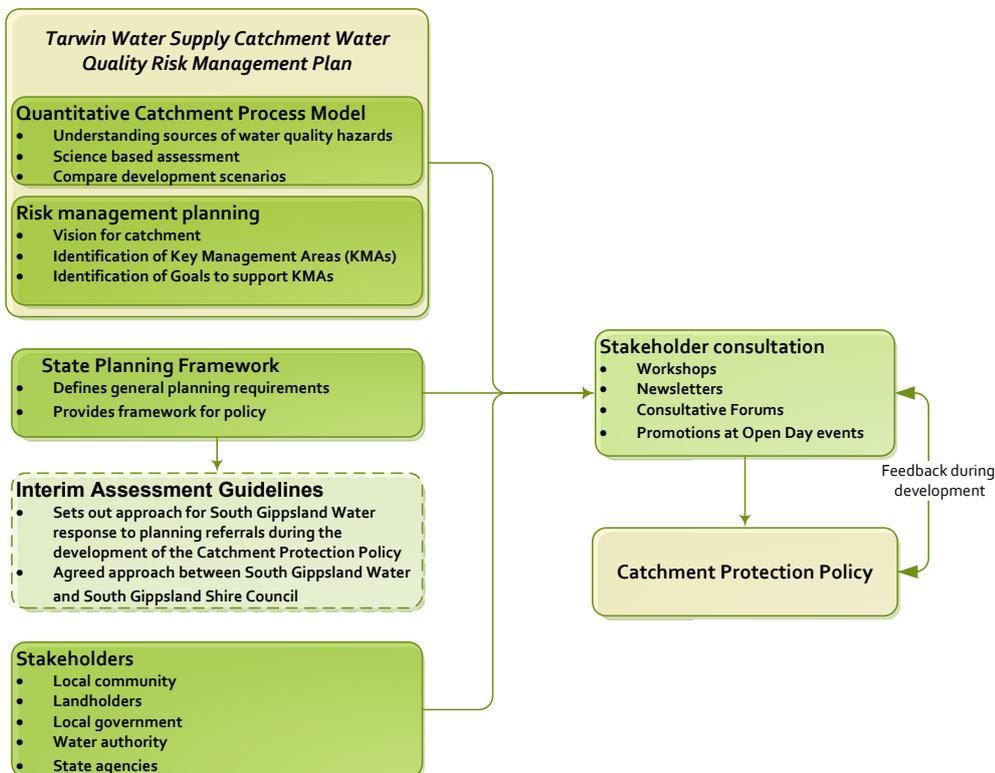


Figure 3. The development strategy for the Tarwin Water Catchment Policy

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South Gippsland Shire Council Domestic Wastewater Management Plan (2012)