# SUCCESSFULLY INVOLVING COMMUNITY AND INDIGENOUS GROUPS IN WATER AND WASTEWATER INFRASTRUCTURE - THE NEW ZEALAND WAY

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## CASE STUDY SUMMARY

In New Zealand, the growing recognition of stakeholder involvement, including our indigenous people Te Maori, in planning infrastructure has led to more collaborative and innovative approaches to water management regimes. Maori have a special cultural and spiritual relationship with water and regard it as a taonga or treasure to be guarded and protected for current and future generations. With a very holistic view of water, and the water cycle, Maori bring their unique views and traditional practices to influence management by local councils of the 3 Waters – drinking water supply, wastewater disposal and stormwater management.

The objectives of these case studies is to: describe how New Zealand uses effects-based national legislation to manage its resources and the environment; provide examples showing how communities, particularly Māori, are involved in planning infrastructure; and demonstrate how this can provide very positive outcomes for current and future generations.

Highlights in this paper are:

- NZ environmental laws require community consultation for 3 waters infrastructure
- This contrasts with numerical standards in other nations' environmental laws
- Water quality and discharge standards are agreed in a collaborative framework
- Stakeholder involvement improves ownership and provides positive outcomes
- Examples of how stakeholders, particularly Maori, are involved setting standards

## YEAR CASE STUDY WAS IMPLEMENTED

2009 to 2014

## TAURANGA COMPREHENSIVE STORMWATER CONSENT

Tauranga is a medium sized coastal city located in the fast growing Bay of Plenty region of New Zealand. It is well known for its white sand beaches, safe harbour and outdoor lifestyle. Tauranga is also home to New Zealand's busiest port and is the centre of New Zealand's kiwifruit and avocado industries. Approximately 128,000 people live in Tauranga and this is expected to increase to more than 200,000 in the next 50 years (SmartGrowth Regional Growth Strategy).

Tauranga faces many stormwater challenges from urban development, existing flooding issues and diverse and sensitive receiving environments. This case study will show how consideration of the effects on cultural significance and customary practices are incorporated into consent conditions and operational practice.

The English translation for the Maori place name, Tauranga, means 'safe anchorage' or 'resting place' and the area has been continuously occupied by humans for hundreds of years. Three iwi (tribes) Ngati Ranginui, Ngai Te Rangi and Ngati Pukenga and twenty-three hapu (subtribes) live in Tauranga and maintain an intimate connection with the land and sea. Traditionally the long coastline and lowland forests provided habitats for kai moana (sea food) and mahinga kai (food gathering) and waerenga (food gardens). Tauranga has twenty six marae (cultural centres) and many tangata whenua (people of the land) live on the remnants of their once extensive tribal estates. Maori also maintain spiritual connections with sites of regional and national significance, such as Mauao (Mount Maunganui), Te Awanui (Tauranga Harbour) and Te Rae o Papamoa (Papamoa Hills).

Colonisation and subsequent urban development have affected the relationship between Maori and the environment by affecting their connection to culturally significant sites or their ability carry out customary activities to varying degrees. The concept of kaitiakitanga (stewardship of natural and physical resources),

recognition of the effects on cultural values and customary practices and the principles of the Treaty of Waitangi are now protected under statutory law. These cultural effects are considered as part of the sustainable management of New Zealand's resources, including stormwater management practice.

In recent years, Tauranga City Council (TCC) has obtained comprehensive stormwater consents for all of Tauranga City. These consents were granted under the Resource Management Act 1991 (RMA 1991) and allow for the management and monitoring of the discharge of stormwater from the public network onto land and waterways. These consents require catchment management plans (CMPs) for specific areas based on known flooding issues, water quality and associated land based activities. CMPs describe the stormwater issues and methods to address these matters.

**Recognising Cultural Effects**

During the consent application process, the RMA 1991 requires the assessment of activities on the environment while considering the social, economic, and cultural well-being and health and safety of people and communities. Depending on the type of activity, public consultation may be required.

In the case of Tauranga's comprehensive stormwater consents (Bowles et al (2014)), consultation was carried out with representatives of iwi and hapu groups with regard to cultural effects. It was during this consultation that three groups, including Ngati Ranginui raised concerns about stormwater quality and its effects on the receiving environment. They also sought to be involved in stormwater quality monitoring and to be kept informed of changes in stormwater quality over a period of time.

As part of the CMP process, iwi provided cultural impact assessments (CIAs) with regard to the overall effects on Tauranga and hapu groups provided CIAs regarding localised area effects. CIAs are commonly utilised to inform resource consent processes in New Zealand. While the CIAs allowed TCC to identify both the overall and specific cultural effects of the stormwater activity the CIAs did not allow tangata whenua to participate further in monitoring or mitigating the effects of the activity.

To address this issue, TCC also engaged Cultural Effects Monitoring and Mitigation Plans (CEMMPs) for specific catchments of Tauranga City. These CEMMPs relate the stormwater activity to pre-agreed cultural indicators. The CEMMPs would then interpret the results of stormwater quality and receiving environment monitoring information carried out by TCC in its long-term monitoring programme in terms of the following cultural indicators:

- The presence and abundance of taonga (highly prized) fish and shellfish species
- The ability to eat kai moana (sea food) and kai awa (freshwater food)
- The visible presence of pollution, foams, oil, sediment and gross pollutants
- The ability to access the foreshore of traditional seafood gathering areas
- The abundance of taonga plant and bird species relevant to the CMP area

TCC elected to undertake further monitoring, over and above that specified in the consent conditions for plant and bird species.

It was also agreed that stormwater and receiving environment monitoring information would be reported to iwi and hapu groups annually and that the interpretation from the CEMMPs would be incorporated into CMPs every five years for the duration of the 35 year comprehensive consent.

**Lessons Learned and Critical Success Factors**

Involving iwi and hapu groups in the stormwater consent process has provided an increased awareness of the effects of the public stormwater activity on cultural values and customary practices in Tauranga. TCC now has measurable indicators of the cultural effects of stormwater discharges to the environment and Maori are regularly informed about stormwater quality and practices across the city.

For a growing city like Tauranga, stormwater management is one of several activities that require cultural input and to date there have been limited cultural resources available to implement the CEMMPs. However, the processes are in place and once fully implemented, the CEMMPs will influence future stormwater management practice leading to an overall improvement to the environment and consequently the health and wellbeing of the community, including Maori.

YEAR CASE STUDY WAS IMPLEMENTED

2010 to present

EAST COAST BIOLOGICAL TRICKLING FILTERS

Three cities - Gisborne, Napier and Hastings - on the east coast of the North Island have installed biological trickling filters (BTFs) to treat municipal wastewater in response to consultation with the community and Maori. Historically, disposal of all municipal and industrial wastewater has been to Hawkes and Poverty Bays through ocean outfalls, with minimal treatment. This case study will describe how community consultation influenced the selection of wastewater treatment technologies for the communities of Hastings, Gisborne and Napier and how this resulted in cost-effective treatment processes with the flexibility to upgrade to provide solids removal and disinfection in the future.

**Specific Issue**

The three cities share many issues in relation to their wastewater systems, and to a large extent these shared features have led to remarkably similar solutions to treating and discharging wastewater to the ocean. Historically, each of these coastal cities has hosted a number of large primary industries, such as freezing works, fellmongers, tanneries, wool scours, and food and beverage processing plants. Industrial and domestic wastes were traditionally discharged either to local rivers or through short sea outfalls, until in the late 1960s Gisborne installed the first long (2,000m) ocean outfall in New Zealand. Similar long outfalls followed at Napier and Hastings, which greatly improved the near shore coastal water quality, and significantly reduced public health risk through dilution and dispersion of the effluent fields. All such discharges were consented through then current legislation and were then reconsented under the Resource Management Act (RMA 1991) in compliance with regional coastal plan requirements.

The common form of treatment was basic milliscreening of the total wastewater flows – industrial and domestic/municipal – through 1.0 to 3.0mm aperture screens. However, local iwi in all three council areas held long-term grievances against the discharge of wastewater of human origin to receiving waters from which kai moana (shellfish – such as pipi, paua, kina and mussels) had traditionally been harvested. The three ocean outfall discharges in their current “untreated” state perpetuated this practice, even though conventional dilution/dispersion modelling and quantitative public health risk assessments at each site had concluded there to be a very low risk from pathogen and virus contamination of the coastal waters, either for recreational water contact or shellfish harvesting.

**Approach Developed to Address Issue**

Each council took a slightly different approach to resolving this conflict between western science and engineering of “mechanical treatment” processes and traditional Maori cultural practices of disposing of human waste remotely from food sources or by disposing of such waste to and through land.

Because of the large proportion of high-strength (as measured by BOD/COD) industrial wastes in each city’s waste stream, any secondary biological treatment system with UV disinfection to reduce public health risk would have very high capital and operating costs. Such “mechanical treatment” systems would be unaffordable for the ratepayers and for industrial users. Even with this high level of treatment, iwi still believed the treated water to be tainted from its human sewage origins and still considered the practice of ocean discharge to be abhorrent. Each council was faced with the need to find an affordable compromise – fair to all its citizens and commercial businesses and acceptable to iwi, and not adversely affecting either the ocean or terrestrial environment.

**Summary of Activities and their Implementation**

The consistent approach adopted by each council – somewhat independently – was to recognise the need to separate as far as practicable the industrial waste streams from the domestic/human sewage, Treatment of the separable high strength industrial wastes focussed on minimising the physical (colour, turbidity, temperature) and toxic (chemicals, pH, heavy metals) impacts in the outfall discharge – generally using the ANZECC (Australian and New Zealand Environment and Conservation Council) marine environmental guidelines to set up-the-pipe tradewaste limits. The challenge remained of how to “treat” the larger but lower strength predominately human sewage balance of the city’s wastewater.

Hastings District Council led the way to developing a solution to this challenge. They consulted at length with local iwi groups on what had been their traditional practices to safely manage human waste – mainly faecal solids and urine without large volumes of “flushing water”. Burial in the ground where natural soil bacteria and

degradation through aging over time was a very common practice and, in the eyes of many generations of Maori, 'transformed' the wastes into a useful and safe organic material through this contact with Papatuanuku (earth mother). Council and its consultants investigated a number of biological treatment processes and proposed to the local iwi that a lowly-loaded (< 0.5kg BOD/cu.m media/day) trickling filter using a high surface area/volume plastic media would emulate the traditional transformation processes that occurred in the soil. Human organic waste would be changed into living humus solids that when they sloughed off the media would be safely absorbed back into the environment.

The term 'biotransformation' was coined and was accepted by iwi as a suitable treatment process for the human waste stream. Furthermore, unlike traditional BTF plants, iwi believed that the living organisms/solids sloughed from the filters through regular flushing cycles did not need to be removed from the discharged effluent – therefore there would be no solids stream processes and no disposal costs for sludges. A full description of this consultation, the outcomes and the resultant Hastings BTF plant is given in McWilliams et al (2012).

Both Gisborne District and Napier City Councils were going through very similar community debates, with Napier City Council deciding to run a 2-year pilot trial of a BTF fed with only human sewage, using both random and structured media at three different loading rates (0.4, 0.6 and 0.8 kg BOD/cu.m/day). Not only did this pilot yield valuable design information for the full-scale plant, but it was a useful demonstration plant for Councillors, the public and industrial users to witness firsthand the "biotransformation" process Crosby et al (2009) and Macdonald et al (2012). It also served as a valuable source of – information – and confirmation of process reliability - for Gisborne District Council who proceeded to build its own BTF plant in 2009/10 even before Napier City Council finally constructed its plant in 2012/13.

**Summary of Outcome and Measurable Impacts of the Activities**

Napier City and Gisborne District Councils went through similar consultation processes ahead of gaining their own long-term consents and then constructing BTF treatment plants which discharge unsettled BTF treated human sewage – combined with separated industrial wastes treated onsite – through their respective ocean outfalls. Gisborne has subsequently undertaken extensive scientific testing of the "transformation" of human DNA as well as the reduction of solids and traditional measures of wastewater strength for its single structured media BTF (loaded at 0.8 kg BOD/cu.m/day). The results have been very good and have been well received by local iwi – and by all other ratepayers who have a much more affordable and sustainable treatment plant than secondary treatment schemes previously considered. Gisborne District Council is now considering whether to add a second BTF (hence halving the BOD loading), or to settle the humus solids to enable UV disinfection, or to remove the BTF effluent from the outfall completely and pass it through further "natural" treatment systems such as constructed or habitat wetlands.

**Lessons Learned and Critical Success Factors**

The lesson learned in all three situations is that through positive engagement and respectful listening to our indigenous peoples (in this instance Maori) and the adoption in some form of traditional waste management practices may lead to unexpected and non-conventional solutions which have very acceptable performance when seen through a combined environmental, social, economic and (most importantly) cultural lens.

YEAR CASE STUDY WAS IMPLEMENTED

2007 to present

AKAROA WASTEWATER SCHEME

Akaroa is a small coastal settlement set on an attractive harbour on the eastern coast of the south Island. Developing a new wastewater scheme for the town brought the contrasting values of different sections of the community into sharp focus. Cultural concerns won through when the council application for approval to discharge MBR-treated wastewater to the harbour was declined on cultural grounds and because the resource consent hearing commissioners found that land based alternatives to a harbour discharge had not been adequately investigated. The final option is yet to be decided. This case study will describe the significant risks for local authorities going through a consultation process, included extended timelines and increased costs.

**Background**

Akaroa Harbour has been occupied by a runanga, Onuku Runanga, which is a subtribe of local Maori tribe (iwi) Ngai Tahu since precolonial times. The runanga has a strong tradition of gathering kai moana from Akaroa Harbour which it describes as "the food basket". In 1960 the previous borough council built a wastewater treatment plant on the site of a historic 1832 massacre of the local runanga by another Maori tribe. The construction of a wastewater treatment plant on such a culturally sensitive site caused offence to the local runanga and has been one of the main concerns about wastewater management in Akaroa ever since. The discharge of wastewater from the treatment plant to Akaroa Harbour has also been of concern as it has impacted on traditional food gathering from the harbour.

Christchurch City Council plans to develop a new wastewater scheme for the town, at a new location, brought the contrasting values of different sections of the community into sharp focus. Shifting the plant from the original site to a new site would deal with the cultural offence relating to the land where the original plant was built, while at the same time introducing the possibility of community impacts at the new site.

The development also opened up conversations about wastewater disposal and reuse options. In developing the new scheme the Council, consulting with local runanga and other community stakeholders, looked closely at reuse on land, as well as disposal to the harbour. Reuse on land was considered to be fraught with difficulty as available and suitable land is extremely scarce, privately owned, and subject to competition for other uses including rural-residential development. While the Council does have powers under the Public Works Act to compulsorily acquire land for public utilities this was seen as heavy handed and to be avoided if at all possible.

In 2011 the Council decided that reuse on land was too risky and problematic and decided to pursue a new harbour outfall with MBR treatment plant. The MBR treatment proposal represented a major step up in treated wastewater quality from the existing trickling filter and UV disinfection process. A number of stakeholders opposed the plan for a harbour discharge, including Ngai Tahu, recreational fishers group and commercial seafood interests. It was the Ngai Tahu submission, based on cultural grounds that led to the consent being declined, along with the lack of sufficient investigation into land based alternatives to a harbour discharge.

**Specific Issues**

Ngai Tahu and the local hapu opposed the application for discharge of wastewater to the harbour on grounds that it is culturally offensive and degrades the mauri or "life force" of the harbour. Their submission at the consent hearing was focussed on the need to "ensure the cultural health of Akaroa Harbour". Their preferred approach was for wastewater to be cleansed by passing through land – known as Papatuanuku or "mother earth" before flowing into surface or coastal waters.

From a Maori cultural perspective the harbour is "the food basket". The kaimoana, or seafood of the harbour is the "mana kai", or spiritual power, that stems from the food resources controlled by the local runanga. In this sense the concerns of the runanga are two fold; the food resources themselves may be despoiled, as well as the spiritual power of the people.

Maori cultural concerns are given strength in law through Sections 6, 7 and 8 of the Resource Management Act 1991, the New Zealand Coastal Policy Statement, and a range of other planning provisions that address cultural aspects. In terms of the detail, the decision to decline the consent for the discharge via a harbour outfall revolved round two aspects. First of all the requirement to consider alternatives adequately in order to justify the approach taken. This was judged to be insufficient to justify the harbour outfall proposal. Secondly it was determined that outfall would have significant effects of a cultural nature.

**Approach Developed to Address the Issue**

Following decline of the consent to discharge to the harbour the Council re-engaged with Ngai Tahu and the runanga to share ideas, discuss alternatives and seek feedback. A range of different technologies and wastewater disposal routes were tested with Iwi to identify their cultural acceptability. This included various wetland treatment options, overland flow options and land infiltration options. Through this a number of options were rejected and performance requirements were identified as follows:

- Reuse on land is preferable to any scheme involving a point source discharge to water
- Wastewater should pass through land to receive spiritual as well as physical treatment and improvements in quality before it reaches water
- The time spent being treated in the land is important – a longer time signifies more effective cleansing by Papatuanuku (earth mother)

Based on this approach options such as engineered wetlands and infiltration basins were rejected and irrigation of 100% of the wastewater to land was identified as the preferred and perhaps the only culturally viable option.

The process for developing alternatives based on irrigation of wastewater to land is ongoing. After considerable further work a number of land areas have been identified that may be suitable for treated wastewater irrigation. Some of these are remote from the treatment plant site and will involve higher costs. There is also the ongoing issue of potential opposition from local residents that may be affected by a land-based scheme.

**Lessons Learned and Critical Success Factors**

Maori cultural concerns over natural resources have both spiritual and physical dimensions. Both of these are protected in law. Identifying and understanding a Maori cultural viewpoint is a critical requirement in wastewater planning in New Zealand, and requires consideration of factors that may appear intangible to a wastewater engineer. Nevertheless, through a process of engagement with stakeholders over time, engineering options can be developed that are aligned to a cultural viewpoint.

Such culturally aligned options may offer wider benefits in terms of environmental sustainability with a potential win-win for the whole community, providing a range of stakeholders can be brought along with, and buy into the scheme, as it develops.

## CONCLUSIONS

The Resource Management Act 1991 and other national legislation provides for balancing the social, cultural, economic and environmental effects of waters infrastructure. Across New Zealand, local authorities are working with their communities, including Maori to determine the best solutions to meet their present and future needs. By planning and operating schemes that consider cultural values and rights to customary practices, more innovative technologies and cleaner practices can be implemented leading to better outcomes for Maori and the community as a whole.

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