Four "Well-beings" – Social, Economic, Environmental & Cultural
A Sustainable Development Approach To Biosolids Management

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Abstract: In New Zealand, since 2002, it has been mandatory for local government decision-makers to consider the environmental, economic, social and cultural well-being of the community in every decision they make. This applies very much to sludge and biosolids management and is additional to strong resource management laws. This new legislative prescription (particularly the social and cultural imperatives) is creating significant new challenges for the management of sludge and biosolids and New Zealand's experience in this area is considered relevant to all countries and communities that have a strong social agenda and a commitment to the rights and obligations of indigenous people.
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INTRODUCTION FROM JIM BRADLEY – OUR CHANGING WORLD

As a young civil engineer in the South Island of New Zealand in the 1970's, I cut my teeth designing and implementing wastewater systems. Like the Nike brand today, the philosophy at that time was just 'Just Do It'! We'd never heard of words like 'consultation' or 'cultural values'. Looking back now, they were uncomplicated times – the technology was tried and tested, the clients were well-informed, the contractors knew what they were doing, and as professional engineers, we were just left alone to get on with the job. The world was more relaxed then, change was slow and people were more trusting. How things have changed! We now live in a world of instant communication, global knowledge and global market forces. It is a more educated, more questioning and more litigious society. To a 'senior' engineer like myself, it seems like the world has sped up - and become more complicated at the same time. The challenges that this rate of change brings to our profession need to be acknowledged – in particular, it requires a new way of thinking, it requires new skills and revised approaches. In the next sections of this paper, I would like to describe what is happening in my small corner of the world and how this might be relevant to you.

THE UNIQUE NEW ZEALAND EXPERIENCE

General. New Zealand is a social/liberal democracy of 4 million people at the bottom of the world. We have a modest rate of growth, beautiful scenery and a strong economy. New Zealand has lush pastoral landscapes, beautiful beaches, volcanic cones, huge mountains and spectacular lakes - we call it "Godzone". Our economy is largely based on agriculture (meat/dairy/wool) and tourism, but the large majority of the population live in the five or six major cities.

History. Our indigenous people (Maori) originally came here from Polynesia around the 13th century. Five hundred years later, the Englishman Captain James Cook "discovered" New Zealand and in 1840, Governor Hobson negotiated the 'Treaty of Waitangi' with Maori chiefs. The intent of the Treaty document has been the subject of much debate over the last 40 years but at its most generic level it was intended to:

a) grant the Queen of the United Kingdom 'sovereignty' over New Zealand and the sole right to purchase land;
b) guarantee Maori Chiefs 'chieftainship' over their lands and treasures;
c) guarantee Maori the same rights as all other British subjects.

However, it is an unfortunate truth that for the next 140 years the Crown behaved badly – warring with Maori, confiscating land and generally not providing the level of protection and partnership promised in the Treaty. Inevitably, Maori well-being quickly diminished and today Maori feature negatively in crime, education and health statistics. This potted history is relevant because here in New Zealand, we are currently in the process of resolving grievances going back 150 years and as part of the redress, Maori have been given a particular role in dealing with environmental issues.

Governance. Parliament is based in our capital city, Wellington, and Central Government has responsibility for core public functions – police, defence, welfare, education, health etc. But there is a high level of devolvement to 'local government'. Seventy-three territorial authorities look after local planning, development and infrastructure - including the ownership and operation of public wastewater systems.

Innovation. We referred above to New Zealand's geographic isolation. In some ways, this has handicapped New Zealand's growth and development – for example, it is a long way to our traditional food export markets in the Northern Hemisphere. But in other ways, New Zealand's isolation and its small size has been a distinct advantage. Because it is so far away from the rest of the world, and so small, for the last 100 years or so it has been an ideal petri-dish for new ideas. For example, New Zealand was the first country in the world to give women the vote in 1893, in the 1930s a comprehensive social welfare package was rolled out, in the 1980s New Zealand totally reformed its protectionist economy into a market-based economy and today, New Zealand, in a legislative sense at least, is at the leading edge of 'sustainable development'.

Sustainable Development Journey. New Zealand officially began the sustainable development journey some 20 years ago when Parliament established the Ministry for the Environment and a new office called the 'Parliamentary Commissioner for the Environment'. The latter is an independent environment watchdog reporting directly to the New Zealand Parliament (<u>not</u> the Government). Both agencies have made a huge contribution to protection of New Zealand's environmental well-being and they were effectively precursors to two significant pieces of legislation. The first is the Resource Management Act 1991 (RMA), an act that controls all development in New Zealand. The purpose of RMA *is "…to promote the sustainable management of natural and physical resources*" where 'sustainable development' means: *"…managing the use, development and protection of natural and physical resources in a way, or at a rate, which enables people and communities to provide for their social, cultural and economic wellbeing and for their health and safety…"* The second significant piece of legislation is the Local Government Act 2002 (LGA). LGA identifies that one of the main the purposes of local government in New Zealand is:*"… to promote the social, economic, environmental, and cultural well-being of*

communities, in the present and for the future." Whilst RMA is all about 'sustainable management of natural and physical resources' and LGA is about the 'sustainable development of communities' there is in fact a high degree of alignment between these two pieces of legislation and interestingly, the language of sustainability is appearing in a wide range of other legislation as well. In summary, the concept of 'sustainability' has been philosophically appealing to a country with a strong environmental ethic, it has been progressively embedded into key legislation over the last 20 years and now it affects everything we do as wastewater and environmental engineers at a practical level.

Sustainability & Biosolids Management. Whereas wastewater management in the past was driven by technical considerations, the sustainability provisions of RMA and LGA are now driving more holistic and more integrated approaches. However, despite the broad legislative framework and all the rhetoric about sustainability, the actual uptake of beneficial biosolids reuse has, to date, been limited. In fact, in recent times three beneficial reuse schemes on land have either been terminated or their biosolid products redirected to landfill, either for disposal or cover & restoration. There are three reasons for this failure: the market for biosolids is small; there are quality control issues with some plants; and there is resistance to the beneficial reuse of biosolids in agriculture because of New Zealand's "clean/green" image and the negative perception of biosolids in some of our offshore markets. Notwithstanding the current roadblocks, this technique is expected to increase significantly in the near future. One of the key objectives of the Government sponsored 'New Zealand Waste Strategy 2002' is: *"By December 2007, 95% of sewage sludge currently disposed of to landfill, will be composted, beneficially used or appropriately treated to minimise the production of methane and leachate."* The Government also issued guidelines in 2003 that set standards for the safe application of biosolids to land and there is consideration being given at the moment to a 'National Environment Standard' that would allow the application of high-quality biosolids to land 'as of right' – subject to certain procedures being complied with.

SOCIAL AND CULTURAL WELL-BEING

We probably need to explain the concept of social and cultural well-being a little more.

Social. A key part of the concept of sustainability is community engagement. Public agencies do not just make decisions based on the information before them, they engage with effected communities in a meaningful way and listen to what they have to say before making a decision. This does not mean decision-makers have to agree with what they are hearing – but the views of stakeholders have to he considered 'with an open mind'. The rules, protocols and principles around consultation in New Zealand are -prescriptive, demanding and time-consuming. I think the jury is still out on whether we might have gone overboard with the requirement to engage effectively on almost every decision. A new term in New Zealand is 'consultation fatigue'.

Cultural. From the 'cultural' perspective, some 15% of New Zealanders identify themselves as being Maori but the likelihood is that something like 25% of New Zealanders are actually of Maori descent. Many Maori live lives that are different from mainstream New Zealand in the sense that much value is placed on extended family ties and the maintenance of links to the rural homelands. Traditional customs surrounding birth and death are widely practised while cultural performance and the

execution of traditional art forms are as vibrant and lively as ever. These are indicators of a healthy and creative culture that has become a normal part of a tolerant and accepting New Zealand society and which underpins the Maori place within it. As a continuation of that societal development, under the RMA Maori have a role that makes consultation on resource consent (or licence) applications more or less mandatory. For example, any consenting decision needs to make provision for the traditional relationship that Maori have with their ancestral lands, waters, sacred places and other "taonga" or things important to them. The intent is to ensure cultural and heritage matters important to Maori are identified and considered as part of any development proposal.

Maori also retain a guardianship role over natural resources and the legislation requires that that role be provided for. This is very important in dealing with such matters as water quality and the treatment and disposal of wastewater – e.g. there is a cultural abhorrence to the discharge of effluent to natural water. In this respect, Maori have an environmental protection role that complements the statutory role of local authorities. This point is reinforced by a further requirement that in the administration of the RMA, all participants must have regard for the principles of the Treaty of Waitangi, the nation-founding document that was mentioned earlier. While the prime responsibility for the proper observation of Treaty principles rests with Government, in development terms project proponents need to consider such things as the principle of partnership, generally interpreted as being met through consultation with Maori; or the principle of mutual benefit where developers need to show what their projects can deliver in terms of beneficial environmental or cultural outcomes.

The "renaissance" of Maori culture mirrors what is perceived to be a global movement by indigenous people to have their cultural values and more importantly their unique identity and way of life recognised and respected in their home countries. As a matter of course, indigenous people everywhere have a traditional lifestyle that emphasises close spiritual ties to the land and its waters. Maori are no different and, like other native peoples, are at the forefront in wanting protection for that land and its geographical features, landscapes, flora and fauna, waters, native fish and similar because when these elements are in good health so too is the spiritual life of what Maori call the "tangata whenua", the people of the land. Over the last four decades, the enlightened New Zealand approach to the steady redress of Maori grievances arising from colonisation has been an inspiration and example to other indigenous people. Similarly, the expectation is that the Maori experience, with goodwill and understanding, will also provide meaningful examples of how those same peoples can engage in a pragmatic way in the resolution of environmental issues in their respective countries.

TOOLS AND TECHNIQUES TO ENCOMPASS THE FOUR WELL-BEINGS

As described earlier, one of the key features of RMA and LGA is the 'sustainability framework' and there are four dimensions to this. The first dimension is taking a 'wide view' and in the text above we have referred above to the four 'well-beings'. This makes for very broad decision-making criteria. The second dimension to sustainability is the 'long view'. The idea that we should think about issues and solutions in a long-term context and this is particularly relevant to biosolids management where we are dealing with significant investment decisions, fixed infrastructure, public money and the long-term growth of communities. The third

dimension is the concept of 'community engagement' which we described in the last section, and the fourth is what we call the 'whole of government' approach. In other words, public agencies making a conscious effort to work together to align policy frameworks, consenting requirements and so on. In addition to the sustainability framework, we have a range of specific tools that are commonly used in the development of sustainable biosolids solutions and we describe a few of them below.

Long-term Council Community Plan (LTCCP). One of the key process tools around the four well-beings is the statutory requirement an all 85 local authorities in New Zealand to produce an LTCCP every three years. The LTCCP is essentially a strategic plan identifying what the long-term vision of the community is, who the key stakeholders are and how they are contributing to the achievement of the community vision. The Plan has to forecast out at least 10 years and the local authority must identify the specific plans and programmes it proposes to advance social, economic, environmental and cultural well-being of its community, including how that programme of work will be funded. The Plan has to be consulted on, submissions heard and all strategic decisions taken in open forum. This statutory requirement effectively forces councils to practice the sustainability framework – think wide, think long, work collaboratively and engage with the community.

Education, Case History Plants and Site Visits. Before a wide range of stakeholders can meaningfully dialogue and become engaged in wastewater and biosolids management projects they need a good level of understanding of the background needs, issues and options that present themselves. Providing this basic education, tailored to and in tune with the range of stakeholders, is fundamental to the success of the project and the 'buy in' it may achieve. Part of this education can be most effectively undertaken by visiting existing facilities be they full scale working operations, or pilot plant and trials.

Working Parties and Liaison Groups. The formation of these groups comprising a wide range of stakeholder individuals and organisations, is commonplace in New Zealand. Such groups work closely with the local authority in the development of wastewater and biosolids projects and after the completion of the project, in the ongoing monitoring of outcomes and assessment of future options. In fact, the requirement for such groups, their structure and 'terms of reference' are nowadays often the subject of conditions in the project resource consent (licence) itself.

Multi-criteria Analysis and Decision-conferencing – Relative Sustainability. Multi-criteria analysis is used successfully as a decision making tool for wastewater/biosolids management projects. The decision-conferencing part of this tool provides the input into the multi-criteria analysis itself. Decision-conferencing is a method of collective decision-making using structured discussion of issues through multi-stakeholder group workshops. The objective is to arrive at a group consensus view on the issues to be agreed upon. The methods used rate options for the projects against a variety of social, Maori cultural and spiritual values, public health, environmental and economic factors. Different weightings can be given to these factors to test the sensitivity of the decision for the preferred option against changes in the importance of relative factors. A similar tool used to assess the "relative sustainability" of a range of project options is to rate and weight a wide range of sustainability factors based around the four well-beings, (social, economic, environmental and cultural). This technique gives a relative sustainability number

and like decision-conferencing, a sensitivity analysis can then be applied by changing the weight of the various factors.

Resource Consent Conditions and Reviews. All land use and contaminate discharges to the environment require specific approvals and/or resource consents. These approvals and consents are issued with a range of conditions including a requirement for ongoing monitoring and reporting. Also, it is becoming more common for consent conditions to include the establishment of multi-stakeholder groups and/or separate Maori/tangata whenua liaison groups along with the definition of tasks the group must perform. Another condition becoming commonplace is to require the owners or managers of wastewater plants/biosolid arrangements to periodically (often at a five yearly interval) undertake comprehensive reviews of advances in technology and environmental monitoring in order that they can be considered for the project in question.

SOME CASE HISTORIES

Tauranga. In the Tauranga case, the cultural issues associated with the disposal of wastewater were complicated by the existence of internal tribal politics and overlaid by land grievances that had their origins in the colonial land wars of the 1860s. The land on which the project was located had been confiscated as a result of those wars and over the next century other portions of land were compulsorily taken for public works such as schools, railways, roads, quarries to provide building materials for other infrastructure and similar. Under the RMA however, an opportunity presented itself for the Maori people involved to exercise a measure of power over the process whereas previously – particularly with the loss of their lands - this had not been an option. An extensive consultation process followed and in summary revealed that after a consideration of all available options in reality there was little alternative to the proposed upgrade. However, Maori concerns, including their cultural abhorrence to the discharge of effluent into the sea ensured that that discharge was of a particularly high standard. The motivation behind the Maori position was to ensure that fish and shellfish – traditional food resources – would be unaffected by the effluent discharge. Other Maori cultural considerations such as the belief that all discharges should be to land to enable the wastewater to be cleansed by its passage through earth – to Maori, Papatuanuku – the “earth mother” – were partly met by the use of some of the wastewater for spray irrigation on the local golf course, airport margins and local parks. There is also discharge into a constructed wetland (although the “polishing” ability of this process is questionable) prior to eventual discharge into the ocean but again this meets the cultural requirements.

Wellington. The treatment system for wastewater from New Zealand’s capital city involves production of significant quantities of biosolids. The biosolids are conveyed some distance from the treatment plant to the City’s landfill where it is dewatered and mixed with local green waste to form a compost or soil conditioner. This is used extensively to refurbish parks and reserves. Good quality topsoil is in short supply in our capital city and the biosolid product provided a ready alternative. Maori concerns revolved around the fact that the waste-stream contained blood products (from hospitals, dentist surgeries and similar) and possibly body parts (from morgues, funeral parlours and hospitals). Even though these “materials” might be present in minute, undetectable quantities, nevertheless it was a cultural concern taken very seriously. The matter was largely resolved when it was demonstrated that the

"materials" on entry into the waste stream were very quickly broken down so that they were unrecognisable. The compost itself was appropriately labelled warning users of its content. This latter action was to meet Maori concerns that the compost would be used for food production and in Maori traditional thought could mean that Maori, in consuming those food products, they might also be consuming "minute portions of family members." The solutions were the result of a major consultation effort and the pragmatic acceptance that the traditional Maori way of doing things – arising as they have from a small village hunter-gatherer society - was insufficient to deal with the volumes of waste produced by a modern urban society. Cultural evolution was the only sensible response.

Hastings. In the Hastings case, an "historic and probably unique accord" (the words of the Chair of the Hearings Panel) between the Council and local Maori has been achieved. This has resulted in local Maori and councillors working together through a statutorily established joint-committee to determine and have consented (licenced) a unique, biological, trickling filter wastewater plant. The incoming raw wastewater is finely screened before being fed to the trickling filter. The plant discharges the excess cell biomass from the trickling filter to the ocean through a long offshore outfall. No secondary clarification is required and accordingly no sludges are produced requiring further treatment and disposal. This paradigm shift in wastewater treatment has resulted, in effect, in a "no-sludge" plant.

Two key issues for Maori that have assisted this unique solution are: the traditional abhorrence of the discharge of human waste to natural water has been satisfactorily addressed on the basis that the trickling filter transforms human waste to non-human waste; secondly, because the no-sludge solution means that sludge is not being transported past Maori meeting houses, cemeteries and sacred Maori land.

The difficulty in dealing with sewage effluent and wastewater/biosolids from a Maori cultural perspective was illustrated the local Hastings newspaper in March 2005. The front page headline screamed: "Trucking of Human Waste Offends Maori". The problem arises from the use by Maori in traditional times of severe religious restrictions to safeguard people. The health dangers associated with human waste were emphasised by making any activity associated with such wastes deemed to be "tapu" or spiritually dangerous. The use of religious restriction in this manner was the highest form of social control available to traditional Maori society and worked effectively. However the volumes of human waste produced by contemporary New Zealand society have largely overwhelmed the circumstances that underpin the traditional approach. Nevertheless, modern Maori still possess a residual cultural concern for all matters involving human waste and the Hastings case is a good example of this.

Watercare. In New Zealand's largest city, Auckland, the growth of the city required the construction of a new main trunk sewer line to bring wastewater for treatment to a central treatment plant. The proposed route of the pipeline passed over the remnants of an extensive historic gardening village complex known as "the Stonefields", the name being derived from the use of local volcanic stone cleared from the gardens and used for building walls to protect crops. Local Maori objected to the desecration of the site because of construction activities and the fact that raw sewage would also be passing over the site. Some of the objectors felt so strongly about the issue that they occupied the area. Their objections were driven by what they perceived as a lack of respect for this ancestral site that through other developments in the area – including

quarrying – had already been severely diminished and in their view, damaged. Resolution came through extensive consultation, a sympathetic design that effectively disguised the above ground pipeline and the creation of a reserve that served to protect the remnant Stonefields. The fact that the pipeline contained raw sewage was dealt with by an appropriate traditional ceremony.

LESSONS LEARNED & FUTURE PREDICTIONS

Sustainability. We expect that the 'sustainability' drum will continue beating for some time to come before it becomes 'business as usual'. But in New Zealand, support for the concept of sustainability is strong. The sustainability approach adds time and cost to projects as well as a significant new layer of complexity. The belief and the hope though is that we achieve better long-term solutions.

Experience. We now have about 15 years experience in biosolids management with a social and cultural overlay and there is now a significant body of experience to draw from. Hopefully this means we will see faster progress and fewer 'issues' on projects in future.

Planning. The added complexity of projects arising from this wider sustainability perspective makes high-quality project planning even more critical.

Skills. The added dimensions of social and cultural wellbeing require the development of new skills and capacities.

Integrity. Integrity is everything, especially around consultation on cultural matters. Take the time to understand different perspectives and allocate time to work these through. Also, invest time in building community capacity to enable informed debate.

Evolution. Uncertainty is the only certainty. Nothing stays the same. Technology, environmental standards and social/cultural perspectives are evolving quickly. What was considered 'radical' ten years ago is now mainstream. Societal change is likely to drive technology - rather than the other way around.

Flexibility. The 'evolution' referred to above means that we need to be ready to learn and adapt. Design and consents (licences) need to reflect this need for flexibility.

Horses for Courses. There is no 'one solution'. There will always be a need for a suite of biosolids options to meet the needs of different communities and different cultures around the world.