

THE JOURNEY TO SUSTAINABLE INFRASTRUCTURE

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ABSTRACT

An organisation's ability to deliver sustainable infrastructure depends on a variety of different factors which extend far beyond traditional engineering approaches. In order to deliver sustainable outcomes, an organisation needs to have aligned capabilities across people and process; an informed view of its current position; clear vision and operating principles; as well as the flexibility to adapt as circumstances change. Dunedin City Water and Waste Services Business Unit has undergone a transformational change to enhance its capability and delivery in a number of these areas. This journey has involved a co-ordinated approach across both management and technical disciplines.

The change process has been a balance of both planned and organic change, as the organisation has continued to adjust in response to its developing knowledge and competence. This paper discusses the various aspects of the change process and the integrated approach that has been taken. It reflects on the challenges of translating technical information on infrastructure constraints into long term plans for action, whilst concurrently developing an organisational capability and team culture capable of delivering a new vision for the future.

KEYWORDS

Strategy; Sustainability; Change Management; Organisational Capability; Integrated Management

1 INTRODUCTION

Dunedin City covers a geographic area of 3,350 square kilometres, making it the largest city in New Zealand by land area. Much of the city's 124,000 population live in the metropolitan area, although the extensive rural hinterland is a critical part of the city's economy and culture. The city's population is growing relatively slowly, but is subject to seasonal variation due to the high population of students and the arrival of summertime cruise ships. Strategic issues such as climate change provide both challenges and opportunities for the city and its water infrastructure. In order to ensure that the city's infrastructure and service provision is sustainable, the Council needs to have capability, resources and flexibility to adapt to a changing and uncertain future.

The Water and Waste Services Business Unit is responsible for 21,000 hectares of water catchment and provides water and waste services to approximately 49,000 properties. It owns and operates 1,425km of water main, 1,232km of sewer, 12 operational water treatment plants, 7 wastewater treatment plants, 57 storage reservoirs and 124 pumping stations across the three waters.

Until the recent change process, the Water and Waste Services Business Unit had a tendency to be largely reactive, with a limited amount of short range planning and minimal long range strategic planning. The culture was technocratic, siloed and hierarchical, with limited balance between engineering skills and other disciplines. There was a heavy reliance on consultants for a range of professional services and, as a consequence, there was often limited buy in or follow through on consultant led initiatives.

In 2006, the Business Unit was approaching the end of the implementation of its previous strategies. These had been 'single issue' strategies relating to the requirements to upgrade both the water and wastewater treatment plants to meet new compliance standards. A change of senior management led to the recognition that the Business Unit was not well positioned to meet the challenges of the future. As a result, a major change process was started with the development of a comprehensive business improvement plan. This signalled two major initiatives; the formulation of a vision and strategy for 3 Waters; and a departmental restructure to align the

organisation with the new vision. Later, a third initiative – the Asset Management Improvement Programme – was added.

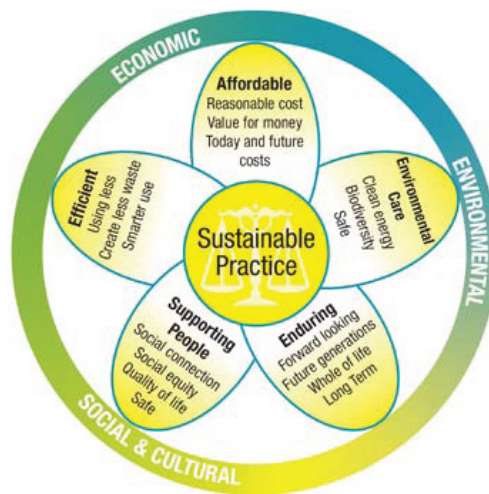
2 STRATEGY DEVELOPMENT

2.1 SUSTAINABLE INFRASTRUCTURE - WHAT IS IT?

Dunedin City Council’s vision for a more sustainable Dunedin is:

‘A City that makes the most of its natural and built environment and which meets the needs of today’s community, without jeopardising the ability of future generations to meet their needs’.

Figure 1: Dunedin City Council’s Elements of Sustainable Practice



The Council has also defined a number of elements of sustainable practice as shown in Figure 1. Much of the infrastructure used to deliver water, wastewater and stormwater services has a long life. Consequently, the decisions that are made now have a long term impact on affordability and service delivery. The Challenge for Water and Waste Services was to translate the broad statements and concepts of sustainable practice into meaningful and appropriate goals and actions.

2.2 THE 3 WATERS STRATEGY PROJECT.

A key initiative of the Business Improvement Plan was the development of a vision and strategy for the 3 Waters over a 50 year planning horizon. This initiative took the form of the Three Waters Strategy Project. The project was undertaken in conjunction with OPUS and URS and can be conceptualized in three distinct phases.

Phase 1 – Development of strategic level hydraulic models to allow the identification of capital and operational investment needs at a macro level.

Phase 2 - Further development of the hydraulic models to determine capital and operational needs at a catchment or zonal level.

Phase 3 - Implementation of capital and operational works programmes to realise the required level of service improvements.

The overall objectives of the study were to:

- Determine required levels of service for each of the three waters’ networks, having due regard to affordability, flexibility, legal obligations and population change in space and time.

- Determine capital and operational costs associated with improvements to the three waters' networks and priorities and phasing for investment.
- Develop a greater understanding of the network operations through targeted asset and flow data collection and the development of decision support tools including network models.
- Develop integrated Stormwater Catchment Management Plans in a format suitable for submission in resource consent applications.

Phase 1 of the project has been completed and work is well underway on Phase 2. Many of the quick wins that were identified during phase 1 have already been implemented or are programmed for the current financial year. Prior to this project, understanding of network operation and performance issues was largely based on local operator knowledge. It was not generally available for comprehensive analysis and planning decisions. This project has significantly enhanced the City's understanding of current and future technical constraints of the 3 waters network infrastructure, as well as providing tools for ongoing analysis of operational issues as well as both short and long range planning scenarios.

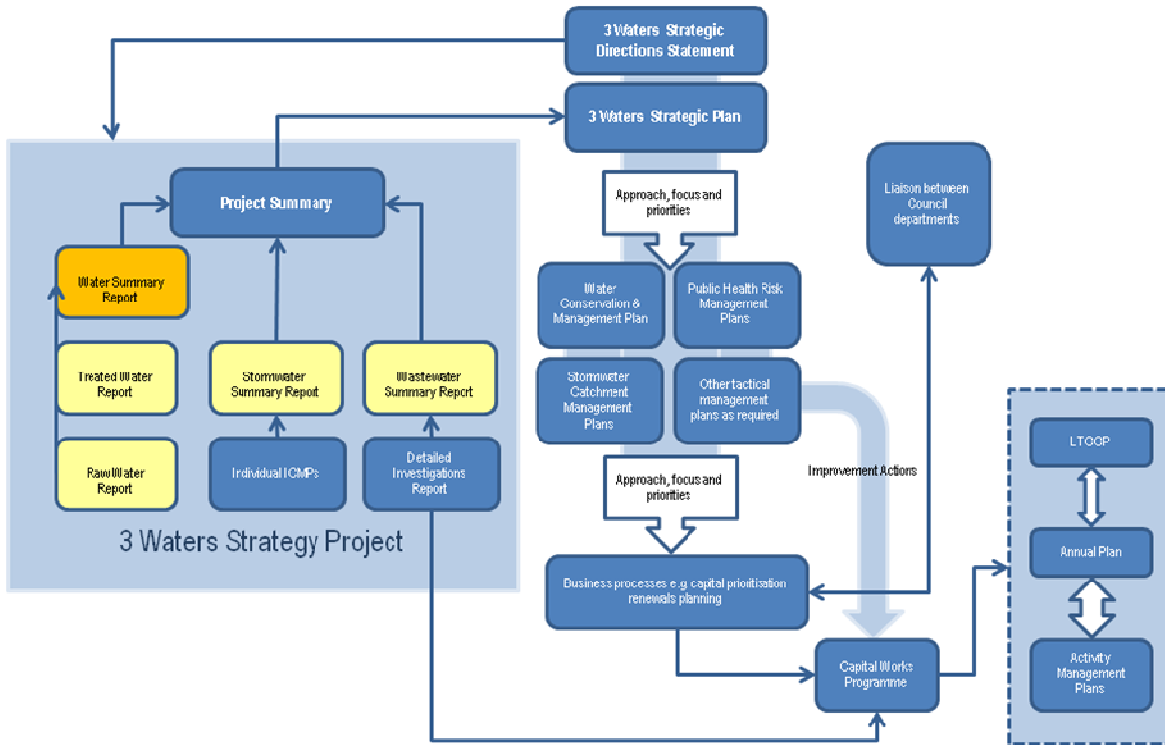
In undertaking this project, it became apparent that there needed to be some overarching principles to guide decision making and recommendations from the modelling work. Whilst the LTCCP provides performance targets up to a 10 year timeframe, these were generally extrapolated from short term targets. This was inadequate for providing direction to planning decisions over the 50 year horizon being used for the strategy project. As a result, the Council undertook to develop a '3 Waters Strategic Direction Statement 2010-2060'.

2.3 STRATEGIC DIRECTION STATEMENT

The 3 Waters Strategic Direction Statement 2010-2060 provides a generalised set of priorities and approaches for use in all areas of water, wastewater and stormwater management undertaken by the Dunedin City Council. It is intended to provide the basis for the approach, focus and development of tactical management planning documents, which include specific improvement targets and actions. Furthermore, the strategic direction is being integrated into business processes such as decision making frameworks, so that the day to day operations and decision making become aligned to the strategic direction. The Strategic Direction Statement was developed in parallel with the Strategy Project. It is both informed by, and informs, the project outputs as shown in Figure 2. The challenges and benefits of this integrated and iterative approach are discussed further in Section 4.

The Strategic Direction Statement was developed by council staff. In developing the statement, staff utilised a variety of strategic planning techniques, including environmental analysis and scenario planning. The team also engaged market research consultants to support a community consultation exercise on issues and priorities. Staff skills and experience in areas of environmental science were utilised to undertake technical reviews of literature in areas such as climate science, hydrology and oceanography. Asset management and financial planning disciplines were also brought to bear in areas such as renewals forecasting. This was in addition to the strong technical and engineering input from both in house staff and consultants involved in the 3 Waters Strategy Project. The Council has also engaged specialist consultants in the areas of climate change, and demographics to undertake cross council projects, the results of which were incorporated into the strategic direction. Consequently, the Strategic Direction Statement is built on a strong foundation of multi-disciplinary research.

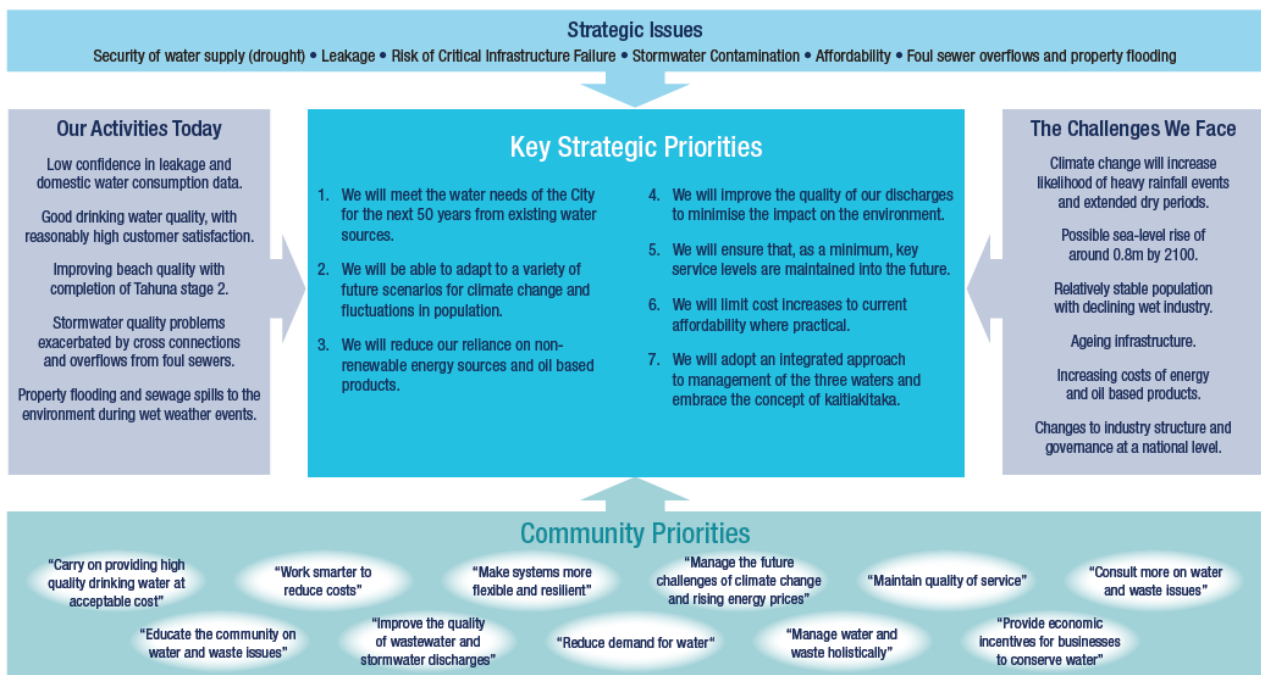
Figure 2: Relationship between Strategic Direction Statement and other planning documents.



Whereas the modelling and catchment planning work has a predominantly technical focus and deals primarily with network infrastructure, the Strategic Direction Statement provides a holistic picture of the issues relating to the provision of the water and waste services. The statement lays out the principles and priorities for sustainable management of the 3 Waters for the next 50 years. It recognises Dunedin’s unique situation and the challenges of meeting environmental aspirations with significant constraints around affordability in a City with slow growth and ageing infrastructure. The strategic direction is summarised in Figure 3.

Figure 3: Summary of Dunedin City Councils 3 Waters Strategic Direction 2010-2060

Key Strategic Priorities



3 ORGANISATIONAL CAPABILITY

3.1 OVERVIEW

In order to develop and implement the strategy, and ensure sustainable infrastructure management into the future, the Water and Waste Services Business Unit needed to address its shortcomings in organisational capability. Organisational capability refers to an organisation's ability to perform a coordinated task, utilizing organisational resources, for the purpose of achieving a particular end result (Helfat, 2003). It is made up from a variety of different elements including people skills and knowledge, relationships between people, organisational processes and technology. All of these elements need to be aligned to, and supportive of clear organisational vision and objectives.

3.2 STRUCTURE

The restructure of the business unit was designed to provide greater focus on long term strategic planning, and to reverse the previous 'reactive' nature of the organisation. This was achieved in a number of ways. Firstly, a dedicated network management function was created. This team has the responsibility for proactive management of the network infrastructure and customer related issues. It is separate from the reactive network maintenance function which provides first response to operational issues on the network. Secondly, a new asset strategy team was created. This provided a dedicated strategic planning function, as well separating the responsibility for developing forward works programmes from the responsibility for delivering capital projects. This has also allowed the capital delivery team to introduce a greater degree of rigour around overall programme management and project management, in addition to their traditional role as project engineer and client representative.

These clearer and more streamlined responsibilities have made it easier to identify the appropriate skill sets for roles, and target recruitment accordingly. Furthermore, it has supported the development of team and individual performance targets to meet business objectives.

3.3 PEOPLE

3.3.1 RECRUITMENT AND SELECTION

Prior to the change process, the Business Unit had a strong bias towards technical and engineering skills. However, as evidenced by the interdisciplinary approach to developing the 3 Waters Strategic Direction Statement, sustainable infrastructure management needs to draw on a much broader skill base, particularly in areas such as strategic planning.

The restructuring of the Business Unit created a significant number of vacancies in the asset planning area, with 14 out of 21 staff having either been newly recruited to the organisation, or making a significant change in role. This has provided an ideal opportunity to broaden the skills base of the team. Team members now have a diverse range of background, including engineering, environmental science, economics, finance, IT and business management. This diversity is added to by the fact that the team originate from 7 different countries across 5 continents. This diversity has not been without its challenges, arising from different cultural expectations, language barriers and perspectives based on academic background and working experience. However, it has also led to many positive outcomes as a result of staff having to consider alternative view points, and having the opportunity to draw on appropriate skills or experience as required.

Throughout much of the water industry, there are concerns about the challenges of an ageing workforce, and the limited availability of experienced staff. The recruitment strategy recognised these challenges by recruiting younger and less experienced staff into roles where there was potential to provide extensive development. Overseas recruitment, recruitment consultants and head hunting were used to fill roles that required specialist skills or extensive work experience. In all cases, careful consideration has been given to selecting individuals who will be able to deal with high degree of uncertainty and rapid pace of change that exists as the team develops. Selection methods such as role playing and team working exercises have been used for some roles, and tools such as Occupational Personality Questionnaires and capability tests (verbal and numerical reasoning) have been used extensively. For some roles it has been a major challenge to find people with the correct balance of capability, experience and fit with the team and in some cases there have been multiple rounds of recruitment.

The structure is now completed, but has taken almost 2 years. However, recruiting the correct individuals is seen as the foundation stone to delivering the long term objectives.

The large number of new recruits in a short period of time made it important to have a comprehensive and structured induction process. This was something that had not previously existed and has been continuously improved with feedback from each round of new recruits.

3.3.2 TRAINING AND DEVELOPMENT

As noted above, the recruitment strategy has included taking on staff with relatively limited work experience, in roles where there is potential to develop them. As in many organisational contexts, budget constraints can limit the amount of formal training that can be undertaken. Consequently spend on training courses and conferences has been prioritised based on organisational priorities. In order to supplement formal training arrangements, alternative development approaches have been used extensively. These include:

- Guided on the job experience and coaching
- Working alongside consultants (including a formal coaching relationship)
- ‘Seconding in’ consultants to support new teams whilst they find their feet
- In house knowledge sharing / informal training sessions – everything from excel skills to hydraulic modelling to performance management.
- Best practice visits / discussions with other water service providers.
- Team rotation and shadowing (for cadetship roles).

Organisational capability relies not only on the technical abilities of individuals in their specialist fields, but also on their ability to interact in a manner that supports organisational objectives. In order to support balanced development of individuals across both technical and ‘soft’ skills, a ‘Skills and Behaviours Framework’ has been introduced to the Asset Planning Team which details five different levels of proficiency across ten different skills and behaviours. These provide a consistent framework for defining the required proficiency for a particular role as well as communicating the current level of proficiency of a particular individual. The framework is useful in a range of different situations including performance management, development planning and succession planning.

Whilst consultancy services will always have their place in the organisation, the intention of the development programme is to ensure that in house staff have the capability to deliver all of the core asset management planning activities, to guide and generate continuous improvement and to ensure that the Council are able to set clear requirements and get good value when we are outsourcing work.

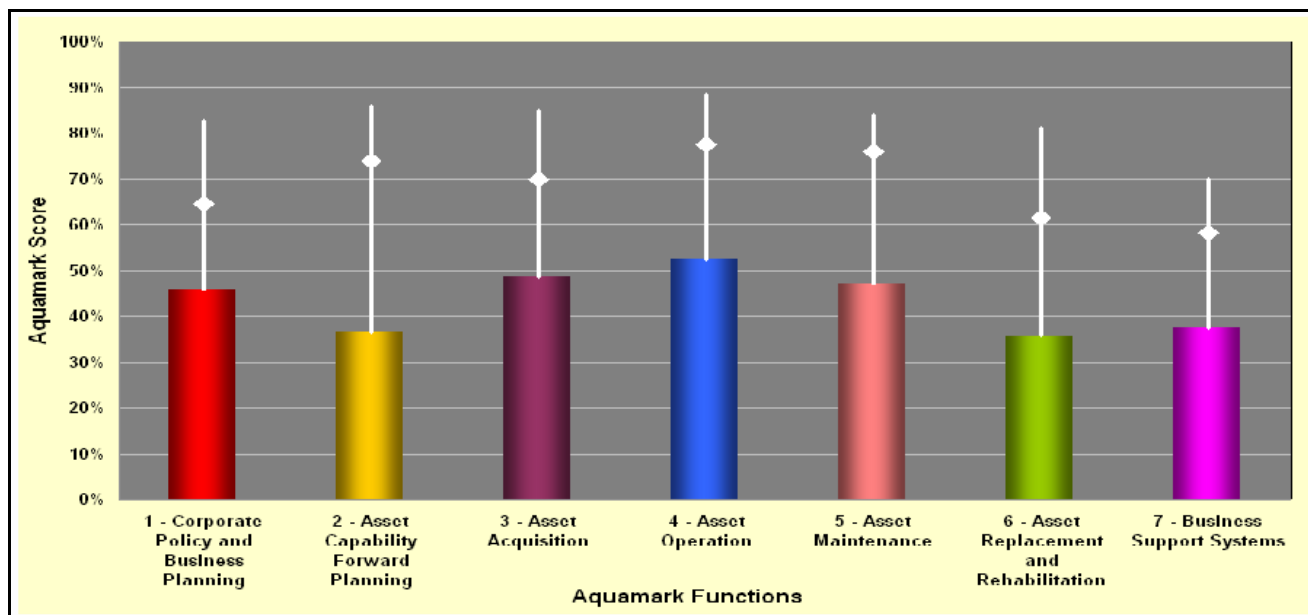
3.4 PROCESSES

Clear and consistent business processes are critical to ensuring that key work activities are aligned to the organisations vision and objective. In 2008, the Water and Waste Services Business Unit took part in the IWA-WSAA Water Industry process benchmarking exercise. This exercise compared the results of 42 water utilities, from 7 different countries looking at 67 individual process areas relating to asset operation, maintenance and management. As first time participants in the exercise, Dunedin City were at the lower end of performance relative to the New Zealand peer group (Figure 4). However, this group comprised only 6 Councils, and Dunedin was one of only two outside the Auckland Region. The exercise did however provide a stake in the ground and helped to identify some key priorities for improvement.

The priority areas for improvement were: quality management; data management and utilisation; maintenance strategy; asset risk assessment and management; and optimised decision making. Improvement initiatives in each of these areas were developed under the general heading of the ‘asset management improvement programme’. To date, these initiatives have resulted in the development of network criticality assessments, proactive condition assessment programmes, investment prioritisation frameworks and the preparation of risk based asset lifecycle strategies for key ‘lifelines’ assets. In most cases, the processes initially implemented will continue to evolve over multiple iterations, as staff skills, information and supporting technology become more advanced. The focus for the team in working through these new business processes is on continuous,

incremental improvement involving staff at all levels in the organisation to promote ownership and understanding.

Figure 4: Dunedin City Council process benchmarking results (relative to the New Zealand Peer Group).



Key:
 Highest Participant Score
 Your Utility Score
 Peer Group Median
 Lowest Participant Score



Prior to the change process, many of the business unit’s processes were informal and not documented. With the exception of the areas of water production and meter testing (both of which were ISO accredited), there was no formal quality management system. This presented a high risk both in terms of lost knowledge due to staff turnover and inconsistent service provision. In particular, the organisation operated on a great deal of ‘assumed knowledge’ which made it difficult to consistently induct and train new staff. The process benchmarking identified the need for a quality management system as the single most urgent area for development. Consequently, the business unit is in the process of developing a web hosted quality management framework and has made good progress on documenting all critical policies, procedures and business processes.

4 MANAGING THE CHANGE

4.1 APPROACH

The change process has been a balance of both planned and organic change, as the organisation has continued to adjust its implementation plans in recognition of its developing knowledge and competence. Whilst improvement plans were documented for each of the major initiatives, the specific actions have generally been managed by integration into individual job roles and performance objectives rather than being managed under any formal project or programme management process. The exception to this was the Three Waters Strategy Project, where formal project management processes are in place.

This ‘loose’ management approach provides a greater degree of flexibility and is considered likely to generate more buy in and ownership from a wider range of staff. It is likely that formalised project management would have been perceived as overly bureaucratic. The approach taken has had the benefit of being more organic and adaptable to change, and timeframes have been flexed to match the changing needs and capabilities of the organisation.

4.2 CHALLENGES AND LESSONS LEARNED

The change process has provided some significant challenges. In particular, the organic approach has sometimes made it difficult to maintain momentum and to ensure that all activities remain aligned. It has been essential to have periodic reviews of progress and refocus as necessary to ensure that the overall intentions of the change process are being achieved.

At times, it has been challenging to align timeframes on interdependent workstreams, where the outputs from one are required as the inputs to another. This has particularly been the case where outputs from e.g. the criticality assessments have been needed by the 3 Waters Strategy Project in order to meet specific project deadlines. There has been a great need for flexibility of staff and consultants involved in all aspects of the change process. Frequently, pragmatic decisions have needed to be made as to whether to continue to progress one workstream based on currently available information, or to hold off until another workstream has progressed further to provide better or more complete information. Communication has been key to ensuring that these decisions are made consciously and pragmatically, in order that staff understand that aspects of their work may need to be revisited at a later date once further information is available. Where these areas have involved consultants, there has needed to be a 'best for Dunedin' approach to the project, carefully balanced against commercial realities of consultancy contracts. This ability to balance these potentially conflicting areas has been significant in the council's selection of, and working relationships with, consultants and to date have been relatively successful.

The developing organisational capability has also meant that the relative roles of consultants and in house staff have changed as in house skills have developed. At the outset of the 3 Waters Strategy Project in particular, the majority of aspects of the work were heavily consultant led. However, as the council's skills have improved, council staff have taken a much more active role in directing the project, providing boundary conditions for the modelling work (e.g. growth and climate change scenarios) from workstreams undertaken in house in parallel to the main project, and more latterly in reviewing outputs from the consultants work. In this case, it was clearly identified to the consultants from the start that they would have a coaching role with regards to council staff. Therefore, this changing relationship was clear from the outset and has been extremely effective.

With so many different co-ordinated aspects all moving forward incrementally, it has sometimes been a challenge to ensure that teams are kept up to date with the changing roles and needs of others. Whilst there has been a great deal of emphasis on building a common understanding and sharing knowledge, this has been much easier with those who are office based, and / or who are close to the change process. There is still some way to go to build those strong and collaborative relationships right the way across the business unit to include field staff at all levels.

Throughout the change process, a variety of consultants have been used in differing roles and across differing workstreams. The 3 Waters Strategy Project has a high consultant involvement, and there have been several joint workshops with council and consultancy staff to ensure a shared understanding of the vision and direction. Other consultants have been brought in for specialist tasks, such as the community consultation exercise, or to cover resourcing gaps before the structure was fully recruited. The Council also makes use of consultants in its professional services arrangements for delivery of capital projects. It has therefore been essential to communicate the changing direction and priorities to these staff for integration into the day to day management of projects. This has been done both by direct communication to consultancy staff who have frequent involvement with council projects (presentations, newsletters etc.) and by ensuring that the appropriate messages are cascading to consultants from their council staff contacts, through business processes, contract documents and day to day discussions. Whilst this process is ongoing, it is generally working effectively to cascade the principles from the 3 Waters Strategic Direction Statement, and the new management priorities, into business as usual across both Council and consultancy staff.

The multi-disciplinary approach to developing sustainable infrastructure management capability has been beneficial to the overall quality of the output. However, it has sometimes been difficult to share technical information with audiences from different backgrounds. In particular, there have been frequent discussions about the relative importance of operational versus strategic priorities. As the change process has gone on, staff have become more skilled at conflict resolution and more adept at engaging freely in constructive debate. It has been challenging translate and summarise technical information into a meaningful and accessible 'strategy' suitable for community, political or executive audiences. The multi-skilled nature of the team has allowed

technical documents to be peer reviewed by both technical and non-technical reviewers to ensure the balance of accuracy with appropriateness for audience.

There has also been a challenge to co-ordinate the preparation of a 50 year strategic direction statement, with mandated Council processes such as the LTCCP and Annual Plan. Executive managers and politicians are understandably nervous of committing to a course of action without a clear understanding of its implications, particularly those of a financial nature. However, many of the issues addressed by the Strategic Direction Statement are necessarily long term, and uncertain in nature. Therefore, it is extremely difficult to prepare detailed action plans and financial impact statements. Consequently, in adopting the 3 Waters Strategic Direction Statement 2010-2060, a compromise was reached. The document was approved as '*a document to guide the future development of detailed work programmes and financial plans, which are subject to separate approval*'. A tactical implementation plan is therefore currently under development. This will cover a 10 year time period, to align with the LTCCP, and will deal with specific actions (both capital and operational) that need to be taken to move towards the long term desired position. It will also provide specific, costed and time bound performance targets against the priority areas identified in the Direction Statement.

5 CONCLUSIONS

The Water and Waste Services Business Unit has undergone a transformational change over the past three years. This change process has been focussed on providing overall strategic vision and direction, as well as building the organisational capability to deliver that vision. Considerable progress has been made since the change programme's inception, including restructuring of the business unit, developing in house staff capabilities, the development of 3 Waters Strategic Direction Statement and development of analytical capability such as hydraulic models. Although the impact of the change process has been transformational, the approach has been a balance of both planned and organic change, as the organisation has continued to adjust its implementation plans to match its growing organisational capability develops. The journey is by no means complete, however the foundations have been set for the sustainable management of the Dunedin's water infrastructure.

REFERENCES

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