



Parameters for Evaluating Aggregated Water Service Delivery Models

22 July 2020

Executive Summary

The New Zealand Government is proposing significant reform of water service delivery. Currently, water services are almost all provided by 78 local authorities directly. In 2017 operational failures in water abstraction and delivery in Havelock North caused up to four deaths and 5,000 cases of serious illness. An Inquiry identified systemic failure. Cabinet agreed to commence comprehensive reforms in 2018, prioritising regulatory reform (a new drinking water quality regulator) to be followed by changes to service delivery arrangements.

The Government has identified affordability of services and capability of service providers as key challenges for the sector. The Department of Internal Affairs (DIA), which is leading the policy reform process, has settled on amalgamation to achieve greater scale as the preferred reform model. Officials' advice and Cabinet discussions have focussed on the models adopted in Scotland and Tasmania. In each of those jurisdictions multiple water providers were successively amalgamated into a single provider. We understand that DIA officials and Ministers favour an amalgamated model of three to 12 water providers where the water assets and operations of local authorities are aggregated into regional water corporations.

The Government's policy process appears flawed and has settled on high-risk options that may not deliver benefits

The policy development process so far has not followed the standard process for reforms of this sort. A focus on only one among a range of important factors—economies of scale—has contributed to premature selection of a preferred model following a relatively cursory review of the international experience. Not following standard policy processes creates a risk that the model selected could fail, and lead to reforms that do not meet the agreed public policy objectives, or that produce unintended consequences. To avoid such outcomes, we recommend that Local Government New Zealand (LGNZ) and its members steer the debate in the direction of a standard policy process.

The standard policy process would identify the problem, state the objectives and then develop a theory of change around the outcomes sought. It would identify several options which could achieve the desired results, establish criteria by which to evaluate

the options, and involve stakeholders to develop a consensus on the option best suited to the country's needs.

We recommend the following six parameters to inform choices between institutional forms:

- Does the model achieve economies of scale and scope?
- Is the water delivery service accountable to customers?
- Does the model improve competence of management and operations?
- Are providers able to reliably raise the finance needed for investment?
- Are incentives aligned with objectives?
- Will the model be flexible and adapt to change and new information?

Economies of scale and scope

Economies of scale generally exist in natural monopolies because unit costs tend to fall as the firm's production increases. However, economies of scale in water services need to be carefully examined. Caution is especially warranted when examining evidence of economies of scale in water services to find cost savings as a reason for amalgamation.

Economies of scope are also less clear cut with water services. Economies can exist where water services are provided alongside other services (such as with many council water services currently).

Accountability of water delivery services to customers and communities

Accountability to customers and communities is important to ensure the water services are provided at the desired quality and cost level. Institutional structuring options provide varying degrees of accountability. These include municipal democratic control, regulation, corporatisation and direct ownership.

Improvements in competence of management and operations

Competent and sophisticated management and operations is essential to safe and efficient water services. There are various ways of achieving this including scale, competition, regulation, outsourcing and competition.

Reliable access to finance for investment

Water providers need access to adequate finance for investment needs. Various barriers currently exist preventing water services in New Zealand from efficiently financing investment. Overseas institutional models avoid these barriers through revenue financing, and stand-alone corporate structures.

Alignment of incentives with objectives

Incentive alignment is important for the short- and long-term. More care is required to align the incentives of management and those charged with governance with the public policy objectives over the long-term. Regulatory and institutional design support incentive alignment to varying degrees.

Flexibility and adaptability to change and new information

Water services involve expensive, long-lived assets that require long-term investment and stewardship. Nevertheless, water services need to be flexible and adapt to change and emerging new information, such as changes in customer preferences, society's expectations and growth. Institutional design can help preserve this flexibility.

Castalia team

You asked us to provide more information on our Castalia experts working on this assignment. David Ehrhardt is one of the world's leading experts on water utility structuring and regulation. He has advised clients over a 25 year career on significant regulatory and institutional reform projects in New Zealand (with Watercare), England, Australia (Melbourne and Tasmania), South Africa (Cape Town), Oman, and many other countries. David is Castalia's CEO and is based in Washington, DC. Dylan James has more than 20 years of experience as a regulatory, policy, and strategy specialist, and has advised on major institutional reform projects for water in New Zealand, the Pacific and Middle East. Andreas Heuser has over 15 years' experience as a legal, policy and economic advisor to governments and infrastructure investors, specialising in institutional economics. Erwin Ricketts has experience in economic, regulatory, and machinery of government issues. Biographies are in Appendix A.

1 Introduction

Cabinet has decided to develop options to reform New Zealand’s drinking, waste and stormwater (“three waters”) service delivery and funding system. Amalgamation along the lines of the experience in Scotland (Scottish Water) or Tasmania (TasWater) is Government officials’ preferred option.

LGNZ is engaged in discussions and policy development with its members and the central Government on these reforms. LGNZ expects to participate directly in the Government’s policy development steering group with the Department of Internal Affairs that will develop the reform options.

LGNZ engaged Castalia to assist it to better understand the key parameters for three waters reform, drawing on Castalia’s international experience.

This note presents key parameters that we recommend be used in evaluating amalgamation and other reform options. These parameters are based on analysis of the reform objectives (section 2), the Government’s preferred model and the policy process followed so far (section 3). The parameters themselves are presented in section 4. Appendix A presents biographical sketches of the Castalia experts responsible for this report.

2 Reform Objectives for Water Services

Stakeholders have set out various objectives for the reforms:

Cabinet’s objectives for water reform

Cabinet¹ identified seven objectives, namely:

- Improve safety and quality of water services and environmental performance of wastewater and stormwater systems
- Ensure New Zealanders have equitable access to affordable three waters services
- Improve coordination of resources and unlock strategic opportunities for larger scale infrastructure
- Increase resilience of three waters services to short- and long-term risks
- Improve financial sustainability of three waters services
- Address affordability and capability challenges faced by small suppliers and councils
- Improve transparency and accountability of costs and performance.

LGNZ has particular objectives for the reform process

LGNZ advised us that the local government’s objectives are fourfold:

- Aggregated water entities remain governed by community preferences, interests and needs, being the ultimate equity holders of the three waters assets
- Transition to a new regime is as smooth as possible
- Any new model improves the allocative efficiency in the overall system as well as responsiveness to change in the urban environment
- Impact on local government is considered and, where necessary, remedied.

Single overarching objective can improve clarity when assessing options

The Cabinet and LGNZ objectives are useful for setting out the specific things that have motivated the desire for reform (for example, drinking water safety and improving access to lowest-cost finance) or which must not be lost in the reform process (for example, community responsiveness, financial wellbeing of local authorities).

Numerous discrete objectives can lead to confusion. We therefore also suggest a single overarching objective that is consistent with and encompasses the numerous objectives of Cabinet and LGNZ. This is:

Provision of safe, resilient, reliable, and customer responsive water services, at least cost.

¹ Cabinet Paper, 28 January 2020, “Three waters service delivery and funding arrangements: approach to reform, Office of the Minister of Local Government”

3 Government's Preferred Model and Process Creates Risks

The Government appears to have settled on a preferred option of aggregating water operations of local authorities into new autonomous statutory corporations with responsibility for water services across a region. The new corporations would be owned by the local authorities that make up the region. Shareholding would probably be based on assets currently owned by the constituent local authorities, adjusted for factors such as population. Each corporation would have a board, members of which would be selected for relevant professional competence. The reforms also envisage creation of a national drinking water safety regulator (Taumata Arowai) to enforce standards. Regulatory arrangements for pricing and other aspects of quality regulation have not yet been decided.

Government appears already settled on amalgamation and potential benefits of scale

DIA, which is leading the policy process, has identified greater scale and amalgamation as a preferred delivery model. Officials' advice, research and analysis, and Minister's attention, has centred on the Scottish Water model and TasWater reforms. In Scotland all water services have been amalgamated under a single utility, following successive amalgamation processes from the 1940s when up to 210 drinking water organisations were rationalised to the relevant local authorities to provide water. In the 1990s water services were merged into three regional public service providers. In 2002, the three providers were merged into one corporation: Scottish Water. Tasmania has also undergone considerable consolidation. Prior to 2009, 29 councils provided water services. Reforms led to three regional water corporations from 2009 to 2013 and a shared services provider. These were merged into a single state-wide entity (TasWater) in 2013.

Government risks carrying out poor policy process

By focussing on a particular criterion (scale via amalgamation), and focussing on only a limited set of international examples, the Government risks poor outcomes for the water sector. A better policy process would follow this model:

- State the case for change: What problems are we trying to fix?
- State the reform objectives: What outcomes do we want to achieve?
- Develop a theory of change: How will the proposed interventions cause the desired outcomes?

DIA's theory of change in water service delivery needs to be fully tested

DIA's theory of change is that improving institutions or the sector operating model will improve outcomes. However, a challenge to a rational policy process is that it is often not obvious which institutions will produce which outcomes, creating risk of faulty reasoning such as:

- Water sector institutions need to be reformed to achieve better outcomes (agreed premise)

- Therefore, DIA's proposed institutional reform should be implemented (false conclusion).

LGNZ should insist that reform options are evaluated against agreed criteria or parameters

Typically, in arguments like this, the person questioning aspects of the proposed reform is characterized as a defender of the status quo. Since it is agreed that the status quo is unsatisfactory, this discredits that person's arguments. To avoid this losing situation, we recommend that LGNZ insist that a range of options be developed, and evaluated against agreed criteria. These criteria cannot simply be the *objectives* of the reform. Various institutional options could be put forward by proponents who *claim* that their preferred model will achieve the objectives. The real requirement is for criteria to judge which institutional forms are most likely to achieve the agreed objectives.

4 Key Parameters to Assess Best Practice Water Services

We have identified six key parameters that LGNZ could use to evaluate policy proposals for reforming the water sector. These parameters reflect how global best practice achieves the objective identified above.

4.1 Does Proposed Model Achieve Economies of Scale and Scope?

Economies of scale and scope can provide benefits in the delivery of water services. However, it is important to assess the specific facts of the case, and in the case of reform, judge the actual economies being generated (if any) from the reform interventions.

Economies of scale in water services can reduce costs per customer but the evidence needs to be fully explored

When a firm's scale of production leads to lower average costs, there are economies of scale. Economies of scale are often assumed to exist because water services are generally monopolies with high fixed costs, and additional transmission of water (production) is thought to not add significantly to costs.

However, there are two key questions to ask when evaluating economies of scale in water utilities for structural reforms and amalgamations:

- What is the relevant output to measure to assess existence of economies?
- Are the physical water networks being assessed contiguous or separate?

The relevant output for assessing the existence of economies of scale in a structural reform is the number of connections: Does an increase in number of connections lower the average cost of provision? Here, the evidence needs to be carefully examined. It is not immediately obvious that increasing the number of connections (which have associated capital costs) drives increasing returns to scale. There may be savings in operating costs (for example corporate head office services) on a per customer basis as the number of connections increases. However, this is likely to be a small proportion of the total cost per customer.

It is important to know whether the physical water networks are contiguous or separate because amalgamating networks in a single urban area has different costs to networks separated by long distances. It is not clear that aggregating water services of several discontinuous urban areas (for example, towns in the lower South Island) with vast distances between water networks would deliver economies of scale benefits. Figure 3.1 illustrates two models.

Figure 4.1: Two Types of Economies of Scale from Aggregation in Water Services

Simple model: Aggregation of contiguous urban area

Supply is lower cost if one network and one provider serves entire area



Total population: 1 million

More complex model: Aggregation of separate urban areas

Supply may not be lower cost if one provider services entire area. Separate networks remain



Total population: 1 million

The relevant literature for the amalgamation proposal in New Zealand would be on amalgamations of networks that remain discrete (no one is proposing to physically join the water networks of New Zealand’s small towns that are not already physically connected). The relevant literature for New Zealand would exclude literature that just shows that serving a larger densely populated area has lower average costs than serving a smaller one. From our review of DIA’s evidence base, it seems that this distinction has not been made.

The evidence base ought to include empirical assessment of whether increasing numbers of connections under one water service provider lowers average costs. Data Envelopment Analysis (DEA) one such empirical technique. DEA involves plotting a series of efficiency measures to define an efficiency frontier. For a given case, this frontier can be used to judge if water services become more or less efficient after reforms. DEA could be carried out across countries as well. While there would be a considerable amount of data collection, a lot of this has already been done (for example, OFWAT has data for England and Scotland going back to privatisation). Robust cross-country DEA would be expected to reveal the extent of efficiency benefits over time from actual amalgamations. For example, we would expect such DEA to reveal if Tasmania’s amalgamations delivered efficiency benefits over time. DEA analysis could show if the course of reforms from 29 to three to one utility over the 11- year period improved efficiency or not.

In conclusion, economies of scale are important because they can drive down costs where they can be achieved. The focus in the New Zealand policy debate will need to be empirical. There has to be evidence that amalgamation will achieve average cost

reductions (accounting for improvements in quality due to other factors such as additional investment).

Economies of scope can exist at both small and large scales

Economies of scope are a proportionate saving in cost from producing two or more distinct goods. In water services this could be a cost saving from one service provider delivering both the clean drinking water and wastewater services. Economies of scope in water services are more often assumed than empirically verified. For example, it is assumed that coordinating network expansion of both drinking and waste water services would deliver economies of scope.

Economies of scope also exist between water services and other municipal services. This can be true at both small and large entities. Some small councils in New Zealand have one person responsible for “infrastructure” that typically covers water and roads (for example, Buller, Carterton, and South Wairarapa District Councils). Furthermore, New Zealand stormwater networks are closely linked to road engineering and building functions. Removing water services from local authorities could reduce economies of scope.

In conclusion, economies of scope can reduce the average cost of water services. Therefore, close attention will need to be paid to the risk that separating water services from local authorities could increase costs as scope economies are reduced.

4.2 Do Water Services Provide Accountability to their Customers and Communities?

There is a cost and quality trade-off in the provision of water services. It is important that service providers remain accountable to customers for where the service sits on the cost and quality continuum. Customer accountability gives customers the ability to act on concerns and receive the level of service they want for a given price.

Despite common perceptions, water services can be provided over a range of different quality levels. These include:

- Drinking water standards (from minimum health standards to mineral content and taste)
- Wastewater contaminant standards
- Water availability (quantity and seasonal availability)
- Customer service quality.

Water service quality can be highly variable, even above safe minima. Water service can even take on luxury good characteristics. Customers in high-income areas may wish to use more water for gardens (and be willing to pay to avoid sprinkler bans). In contrast, customers in low-income areas may be happy with simply safe, available drinking water. Some consumers may value friendly customer service and prompt attention to faults. In New Zealand, there are differences in how some Iwi wish to have their cultural values in water and waterways reflected. For example, many find discharge of treated wastewater into waterways abhorrent.

Consumers also want to ensure that water services are provided at a fair price. It is therefore important that the cost/quality trade-off is made by an entity, or in a way,

that provides accountability to customers. There are several high-level ways to achieve this:

- Local government (current model)
- Independent regulator
- Regional/council-owned entity
- Direct ownership by consumers.

Provision by local authorities (similar to current model) has democratic accountability

Direct ownership and operation of water services by councils/municipalities provides strong customer and community accountability. The customers in the community can have a more direct link to the provider, and can vote for local government representatives that will ensure price and service levels are met. This ensures those charged with governance of the service are incentivised to ensure the water utility serves the community well, and those that fail to do this may be voted out. However, there is some risk that accountability for water services is subservient to political pressures related to other municipal services.

Independent regulation of water service providers has some commercial and indirect democratic accountability—only if the regulator performs well

Regulation is a way of providing public accountability by (natural) monopoly service providers. Regulation can set prices and quality levels. One of the best-known water regulators is OFWAT in the United Kingdom which regulates over 20 public, semi-public and privately-owned utilities. It can enforce regulatory action amounting to many hundreds of millions of pounds in fines.² However, when regulators perform poorly, for example by failing to take into account regional preferences, the only recourse available to customers is usually indirect or costly. Customers can vote or complain via democratic representatives in national elections. It is difficult to make water service and price issues stand out alongside the many other national level political issues. Finally, regulators were originally created to modify the behaviours of for-profit companies where the profit incentive provides a driver for efficiency. In the absence of profits (like the proposed New Zealand model), the regulator model may not work as well.

Regional or state-owned entities can have commercial accountability to shareholders, but only limited democratic accountability

Water services can be owned at a regional level and operated under commercial mandates as statutory entities (like SOEs). This model can provide commercial accountability to shareholders (which might represent the interests of the community) and via statutory obligations through public financial reporting and Board accountability to the public-sector shareholders.

Regional or state-owned entities have been tried in the past under the Water Board model in England and Wales. This reflected a general trend in developing countries

² For example, Thames Water was ordered to pay penalties and payments to customers amounting to GBP 120 million in 2018, about 6 percent of its annual revenues

from the 1950s to 1980s to integrate water utilities under regional corporations. The model was followed in the developing world in the 1970s.

One notable example of centralisation into regional entities but with a time limit is from the developing world. Brazil undertook centralisation of water utilities with World Bank support in the 1970s. The government encouraged municipal governments to delegate control of their water and sanitation services to newly created state utilities (CESB in Portuguese).³ Municipal governments did this by issuing concession contracts with fixed terms (usually 15-30 years). Concessions are agreements which delegate the provision of public services from government. The private party assumes operational and maintenance obligations and receives fees or tariffs. These are common in many civil law countries (France and Portugal for example). Despite some successes, by the mid-1990s, many CESBs were unprofitable and inefficient due to a wide range of political and economic factors. Some municipalities chose not to renew the concession contracts with the CESB when they expired, and instead appointed private concessionaires to operate the water services.⁴

Direct ownership by consumers can provide more direct accountability

Cooperative ownership models where consumers own the utility (like many small private water schemes) provide more direct accountability. Corporate governance structures (constitution, Board oversight, shareholder meetings) provides a mechanism for this accountability. Around 20 of the local electricity distribution monopolies in New Zealand are owned by trusts that represent the ownership interest of consumers. The trusts hold elections in the community for trustees. The trustees represent the community's interest in governing the utility.

Conclusion on customer and community accountability

In conclusion, there are various institutional options to give customers and communities accountability for price and quality preferences in water services. The institutional design options need to be evaluated for the extent to which they are likely to be effective in the New Zealand environment.

4.3 Does Model Improve Competence of Management and Operations?

Competent and sophisticated management and operations occur when management meets organisational objectives, uses available resources efficiently, maintains high levels of employee performance and professionalism, and provides excellent service to customers. This is essential to safe, resilient, reliable water services at least cost. Management and operational competence involve basic safety matters, such as ensuring filters are changed or chlorine drips discharge at the correct rate.

Competence can be improved via the following ways:

³ *Public-Private Partnerships (PPPs) and Concessions of Public Services in Brazil*, Cesar A Guimaraes Pereira (2014); *Building Regulatory Bodies in the Brazilian States*, Adam Joseph Cohon (2013), at page 26.

⁴ For example, Sao Paulo's SABESB which otherwise relatively successful even had some municipalities elect not to renew the concession contract. SABESB is listed on NYSE, although the majority of shares are still held by the government.

- Scale: Castalia's analysis⁵ identified that water asset management competence among New Zealand local authorities and providers is correlated with size and scale
- Competition between water services: Whereas a single water service can tend toward a bureaucratic culture, multiple providers that compete to attract skilled staff can result in improved competence.
- Outsourcing: Utilities can hire skilled managers and operations specialists to carry out particular functions, for example where network size does not justify a full-time position
- Regulatory enforcement: Well-designed regulation can enhance competence if fines or public reprimand incentivise behavioural change
- Profit incentives: Where profits can be generated from improving services, this incentivises managerial and operational competence.

In conclusion, institutional options should be evaluated according to the likelihood and extent that competence of management and operations is improved. There are several ways to achieve this, not all of which necessarily follow from increased size.

4.4 Are Providers Reliably Able to Raise Finance Needed for Investment?

Water providers require access to the lowest, risk-adjusted cost finance available on terms that align with their capital and operating cost needs. The cost of finance is set by the market, and reflects the market's assessment of the provider's ability to earn revenues to repay its lenders. Water services involve high cost assets with long lives and lumpy investment. Financing instruments like bonds need to reflect a long-term investment horizon.

Financing barriers can prevent efficient investment, including investment for future growth. For example, the water services of many councils in New Zealand are constrained in accessing finance due to overall indebtedness levels of the council's consolidated balance sheet, and caps imposed by credit rating agencies that, if breached, would increase the cost of debt.

Financing models exist that overcome these barriers. Revenue bonds are one example because these link interest payments directly to the revenues of the project being financed. Creditors hold security over the pledged revenues. These bonds are uniquely rated by credit ratings agencies and other creditors. Stand-alone, non-consolidated water utilities are common overseas. These can access debt under general obligations bonds at higher levels than New Zealand water services. This is because creditors and the wider market believe that municipal or state governments will not bail out the utility.

In conclusion, access to adequate finance is essential to meeting investment needs. Various barriers can artificially constrain water services' borrowing. Reform options

⁵ Castalia. (2017). Three waters asset management maturity in New Zealand. Available at: [www.dia.govt.nz/diawebsite.nsf/Files/Three-watersdocuments/\\$file/Castalia-ThreeWaters-Asset-Management-Maturity-in-NZ-\(final-report\)-Oct-2017.pdf](http://www.dia.govt.nz/diawebsite.nsf/Files/Three-watersdocuments/$file/Castalia-ThreeWaters-Asset-Management-Maturity-in-NZ-(final-report)-Oct-2017.pdf)

should be assessed for the extent to which water service providers can access finance that reflects the riskiness and revenues of the water business and its projects alone.

4.5 Are Incentives Aligned with Objectives?

This criterion refers to the institutional settings that incentivise those charged with governance and management of the water service to make decisions that achieve the overarching objective. The incentives can be short- or long-term. Ideally, both short- and long-term incentives are aligned with the objectives.

Short-term incentives of governance and management can be aligned via performance contracts and financial targets. Institutional incentives generally arise from accountability to shareholders. A profit motive generally ensures short-term incentives are aligned.

Long-term incentives can also be aligned, with more care. Long-term incentives are a challenge in any institution, especially where assets have long-lives and investment needs are over decades. One key issue is ensuring long-term capital investment is sufficient. The benefits of capital investment in water services can emerge over long periods of time, well after management personnel have moved on. Therefore, institutional settings, such as ownership interests or regulation, need to ensure that management are incentivised to make costly capital expenditure even where the benefits will not produce immediate returns. Regulation can ensure long-term incentive alignment via statute. For example, the Commerce Commission must “promote the long-term benefit of consumers”⁶ when regulating electricity lines, gas pipelines and telecommunications businesses, and other monopolies with long-term asset lives.

In conclusion, incentive alignment can follow from financial or contractual incentives in the short-term, and require more care in the long term through institutional design.

4.6 Will Model be Flexible and Adapt to Change and New Information?

Flexibility and adaptability to change and new information is desirable in water service providers. While water services are generally long-lived and high capital cost businesses, technology, customer preferences, and society’s expectations can change. For example, growth or decline can change investment needs. Society’s environmental expectations can change, for example the change from historical attitudes to discharge of waste into the environment. These changes or new information require water services to adapt in response.

Providers that are closer to customers can generally adapt more easily due to better local knowledge and understanding. Institutional settings can also ensure dynamism and responsiveness to customer demands over time. The example of Brazilian municipalities in section 4.2 above shows how time limitations on institutional arrangements can be valuable.

It may also be desirable for changes over time in the boundaries between service providers, or their respective size and scale. Rather than locking in geographical

⁶ Part 4, section 52A (Purpose of the Part), Commerce Act 1986.

boundaries as permanent features, it can be desirable to preserve the option for water services to change size and form over time. For example, as Auckland grows beyond the geographical boundaries of the historical Auckland region, it might make sense for parts of the water systems in Waikato or Northland to join the Auckland system.

In conclusion, institutional settings should be assessed on the extent that these are responsive to change and new information.

Appendix A—Castalia Water Sector Experts

Our team includes David Ehrhardt, Dylan James, Andreas Heuser and Erwin Ricketts. Short biographies are set out below:

David Ehrhardt, Chief Executive

Mr. David Ehrhardt is Castalia’s Chief Executive and a recognized expert in developing innovative thinking on sector reforms and private sector participation.

David is among the world’s leading authorities on water sector restructuring. Qualified in both law and economics, he wrote the World Bank’s Sourcebook on Urban Water Governance, authored the Explanatory Notes on Water Regulation, and played a major role in drafting the Water PPP Toolkit. In his 25 years of advising on institutional and regulator reform in the water sector, he has worked for leading utilities, regulators, governments, and private investors.

He has designed capital expenditure plans, and advised on financing and deliver those plans, so as to meet service coverage and security goals at least cost. He has assisted Essex Water and Severn Trent in the United Kingdom, Melbourne Water and the Hobart Water Board in Australia, and Watercare in New Zealand in these matters.

As an institutional and organizational specialist, David has developed management turn-around plans, business plans, and institutional reforms for more than 30 water utilities. Mr Ehrhardt is also highly experienced in evaluating water investments from an economic and financial perspective, and is recognized as a world leader in design of PPP contracts, particularly in the water sector.

David began his career at the New Zealand Treasury working on the privatization of the electricity sector and design of energy markets.

Dylan James, Director

Mr. Dylan James has more than 20 years of experience as a regulatory, policy, and strategy specialist, particularly in regulatory design and evaluation, environmental regulation and cost benefit analysis. Qualified in economics and business strategy, Dylan also advises companies and Governments on the economic and financial viability of infrastructure investments by assisting with demand assessments, financial analysis, and asset valuations. His work has included a range of commercial strategy, regulatory, and investment advice.

Dylan has recently delivered economic evaluation projects on water quality regulation for the Ministry for the Environment, economic evaluations of options in the wholesale reform of the Sultanate of Oman’s water sector, analysis of asset management sophistication in the water sector for Department of Internal Affairs, evaluation of wastewater treatment options in Cook Islands as well as a range of projects for World Bank, Asian Development Bank, Otago Regional Council, New Zealand Treasury, and the Ministry of Business, Innovation and Employment. Dylan applies his well-developed understanding of microeconomics to the problems faced in environmental regulation, infrastructure and government sectors to help clients make good strategic, policy, and investment decisions.

Andreas Heuser, Manager

Mr. Andreas Heuser, is an institutional economics, policy and legal specialist, with a focus on utilities, urban infrastructure and natural resource economics.

Andreas has deep experience in institutional design and regulatory policy. He has managed a range of infrastructure advisory projects in New Zealand, the Pacific and South East Asia since joining Castalia. In the water sector he has managed high-profile projects assessing economic impact of proposed freshwater regulation reforms in New Zealand for Local Government New Zealand and the Ministry for the Environment. He managed a project to evaluate wastewater treatment options in Cook Islands. Andreas has wide infrastructure economics experience in leading design of a social infrastructure PPPs in the Pacific, managing the preparation of a renewable energy strategy for the Government of Laos, and a Pacific-wide exercise identifying infrastructure investment opportunities for a global investor.

Andreas was previously with New Zealand Treasury where he guided contentious policy reforms in urban planning and in funding and financing of water and roading infrastructure. He is a qualified lawyer and has advised infrastructure investors on international arbitration disputes in the oil and gas and transport sectors in Europe.

Erwin Ricketts, Senior Analyst

Mr Erwin Ricketts brings four years of experience advising on economic, regulatory, and machinery of government issues. His experience spans New Zealand's primary sector and natural resource sectors having worked in both the New Zealand Treasury and the Ministry of Business, Innovation, and Employment.

Recently, he has advised on the review of Crown Minerals regime and the development of New Zealand's minerals and petroleum resource strategy. Through this work he has advised on long-term risk and resource allocation issues intersecting Government and non-Government interests. This has included leading a review to diagnose issues and improve the way that petroleum infrastructure decommissioning liabilities are shared between Government and private actors.

Erwin has provided value for money and strategic alignment analysis of proposals in support of formulating several New Zealand Government Budgets, and in the allocation of the \$3 billion Provincial Growth Fund. These proposals have spanned the agricultural, fisheries, forestry, biosecurity, energy, and regional economic development sectors.