



**Three Waters Asset  
Management Maturity in  
New Zealand**

**Report to Department of Internal  
Affairs**

**October  
2017**

## Acronyms and Abbreviations

AM	Asset Management
AMP	Asset Management Plan
CBA	Cost Benefit Analysis
DC	District Council
DIA	Department of Internal Affairs
ICR	Investor Confidence Rating
IIMM	International Infrastructure Management Manual
IPWEA	Institute of Public Works Engineering Australasia
LG	Local Government
LGA	Local Government Authority
LoS	Level of Service
NAMS	New Zealand Asset Management Support
NPS	National Policy Statement
NZTA	New Zealand Transport Agency
OAG	Office of the Auditor General

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## Executive Summary

The three waters services are made up of potable water, wastewater and stormwater. Although local government manages and owns three waters infrastructure, central government holds an interest in its effective functioning because of its importance to the economy and human health.

Recent reports and events have suggested there are management challenges, such as the Havelock North contamination case, and reports from the Auditor-General and the Productivity Commission which have raised concerns about investment and regulation of three waters infrastructure.

The Department of Internal Affairs (DIA) is reviewing whether current practices are fit-for-purpose and able to deal with challenges facing the sector. DIA have engaged Castalia to interview asset managers from local councils and other water service providers (collectively 'service providers') and conduct desk-based research to answer two key questions:

- How well is asset management (AM) of three waters services performed in New Zealand, and what is the variation across the country?
- How does this compare with the quality of AM in other infrastructure fields?

### **Service provider size correlates with asset management maturity**

Service provider scale correlates with asset management maturity. We found that the population size of a service provider correlates with the AM maturity of the service provider: the greater the population level, the higher the level of asset management maturity. There was one major outlier from a medium-sized service provider, that has an upper 'intermediate' AM maturity score (all other medium service providers we reviewed we less mature).

For this report, we refer to 'small', 'medium' and 'large' scale service providers. There are many aspects to service provider 'scale', including population size, service provider growth rate, service provider balance sheet, value of assets, and the geographic size of the service provider itself. For this report, we measure service provider scale by reference to service provider population size. Population size provides a consistent, easy to measure indicator, and is a good proxy for the other aspects of 'scale'.<sup>1</sup>

Service providers with more advanced AM practices ('advanced' and 'intermediate') are large and urban. They have big specialist teams made up of formally qualified individuals.

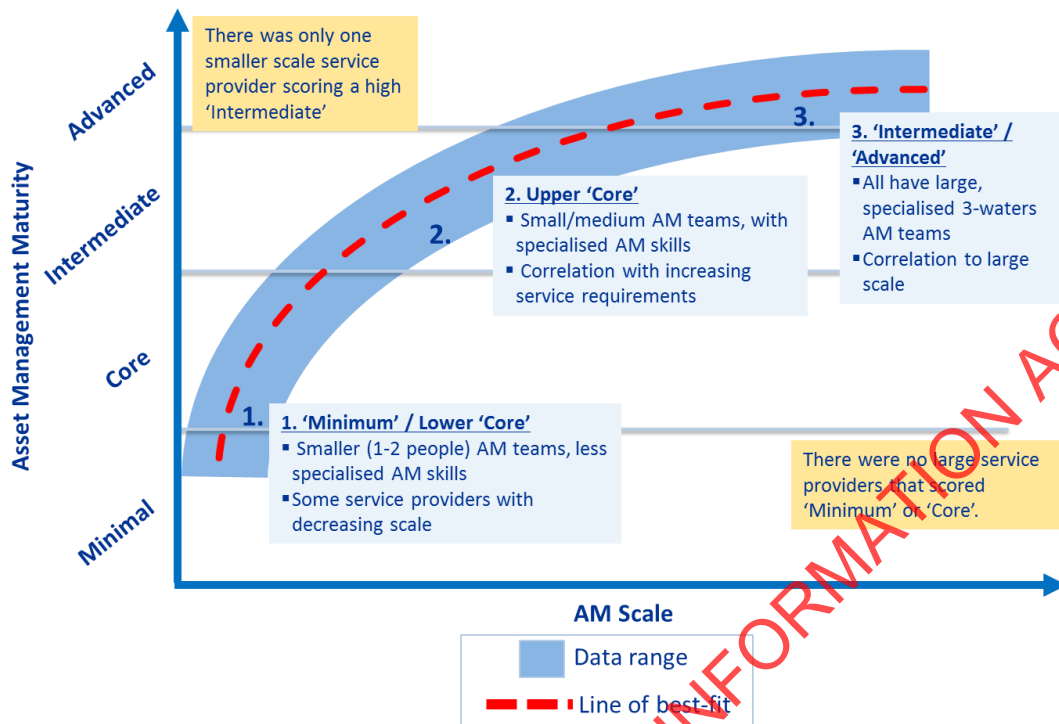
The least advanced service providers (those scoring 'minimum' or lower 'core') are small service providers, with smaller AM teams (typically 1 or 2 individuals).

Most of our sample were 'mid-pack' service providers, which scored 'core' in their AM maturity. They were predominantly medium sized service providers, with small to medium AM teams (30 to 40 individuals) with specialised AM or engineering skills.

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<sup>1</sup> Small service providers are service providers with populations below 20,000, medium service providers are service providers with populations of between 20,000 and 90,000, and large service providers are service providers with populations exceeding 90,000.

Figure E.1: Asset Management Maturity Correlates with Service Provider Size



**Larger, more mature service providers are more mature across all measures**

Most service providers have the basic, underpinning ‘architecture’ of sensible AM, but above this, maturity is commensurate with scale. All service providers we interviewed had an AM framework, policy, AM plan, and AM information systems. All the AM plans we reviewed adhere to the International Infrastructure Management Manual (IIMM) best-practice template and terminology. However, the quality of plans and policies, and the full utilisation of AM information systems varies between service providers (correlated to scale).

Service providers have low confidence in their understanding of the condition of their assets, but this is less severe in larger service providers, who are also developing short-term plans to improve condition data. Service providers have attempted to understand asset criticality, but maturity of understanding varies by scale. Most service providers do not have mature quality management systems and processes: in smaller service providers, there is a particularly strong reliance on the knowledge of a few individuals and little succession planning. For small and medium service providers, understanding community levels of service (LoS), and asset performance reporting, rarely goes beyond what is required by regulation. The use of more advanced analytical tools increases with service provider scale.

**At the ‘strategic’ level all service providers perform similarly**

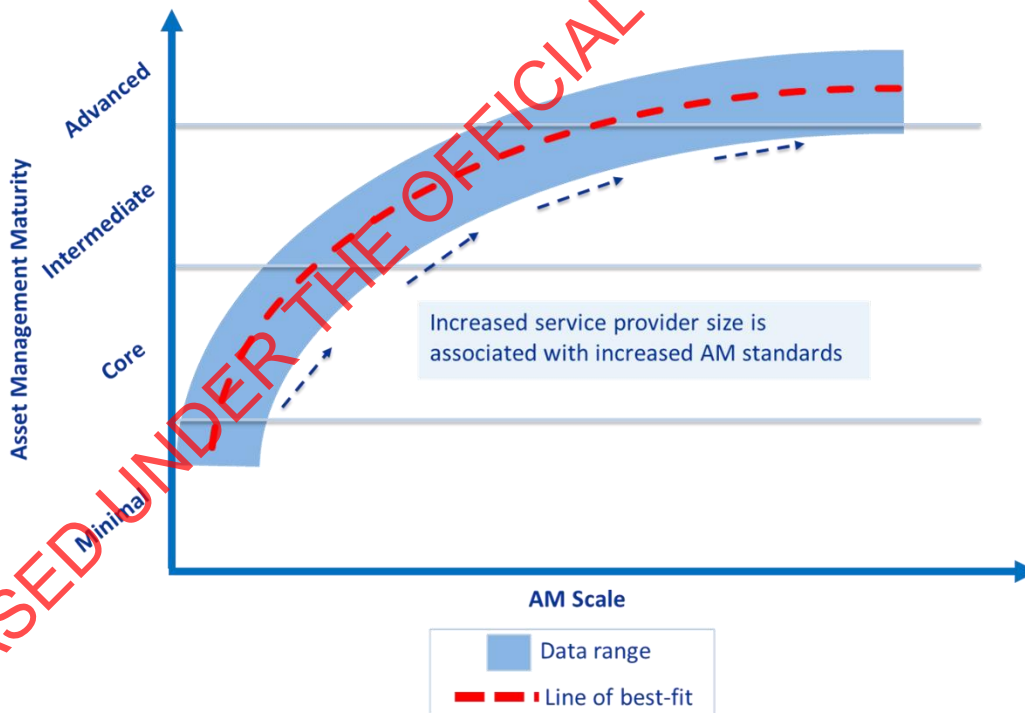
Maturity at the ‘strategic’ level – which includes how well AM teams engage with other council functions (e.g. finance teams), executive team members, and elected members – is similar across service provider types, but methods of engagement differs significantly. In small service providers, engagement with elected members, executive team members, and across teams is more informal. Larger service providers have more formalised and systematised arrangements, and there is greater evidence of integration across day-to-day decision-making processes.

### An increase in scale is a way to increase AM maturity

We identified a set of common themes which were shared by all large, urban water providers and contributed to their more advanced AM practices:

- **Scale provides improvements in analysis and data collection.** We found two examples of large, urban service providers where disparate AM systems, practices and processes have been brought together and standardised. This has created economies of scale and improvements in analysis, data collection, and procurement.
- **Larger organisations allow for increased specialisation.** Small service providers typically have one or two individuals responsible for multiple asset classes, whereas larger organisations have teams of up to 400 individuals. This allows people to focus on niche areas and tasks, allowing for deeper analysis and a more thorough understanding of the asset base. It also allows larger service providers to ‘look above the day-to-day firefighting’ by hiring individuals to consider long-term strategy, the potential roles of new technologies, and advancing innovative practices.
- **Large service providers can attract and retain talent.** This is a challenge for some regions, particularly small service providers, and is very likely to continue as populations increasingly move towards metropolitan centres.

Figure E.2: The Impact of Scale on Asset Management Maturity



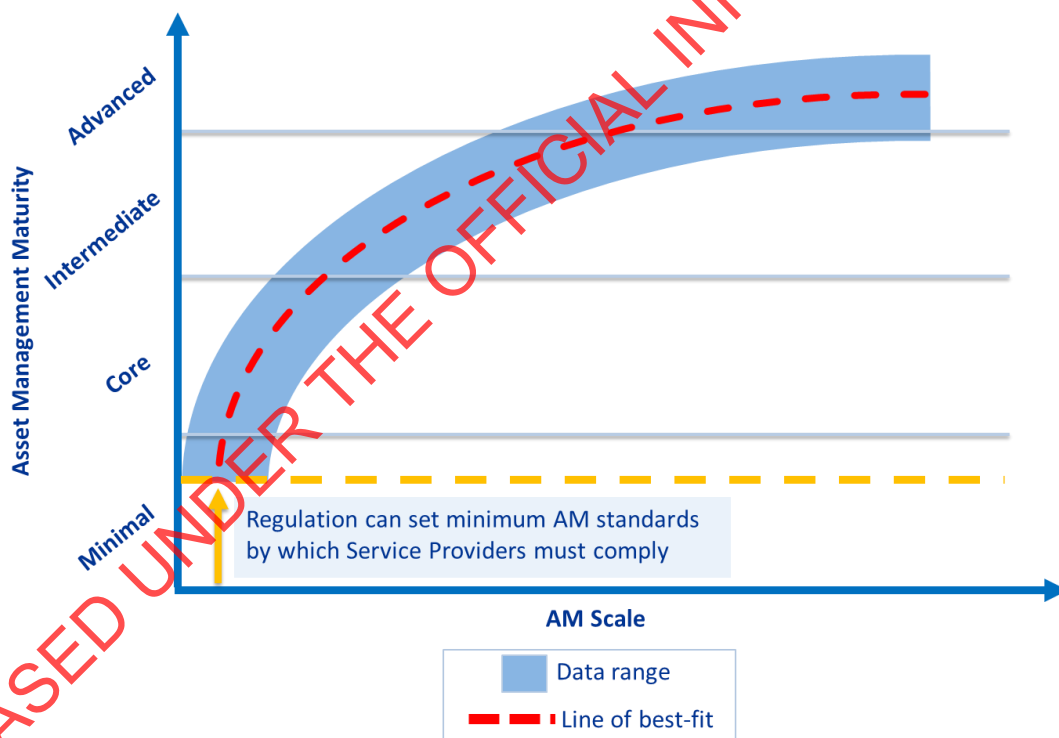
However, the institutional arrangements of larger organisations can create opportunities and challenges. For example, non-asset owning council-controlled organisations (CCOs) must position themselves as a ‘trusted advisor’ to their council shareholders, to be able to perform their role effectively. Asset-owning CCOs can raise rates to pay for required works, can better bridge the gap between tactical and strategic decisions.

Equally, our sample included a council that splits its service delivery model between a CCO for potable and waste waters, and in-house management of stormwater. This has resulted in the stormwater team making innovative collaboration arrangements. In addition to collaborating with the CCO (e.g. a pipelining panel, pipe checking, and collaboration on operations and maintenance contracts), the team also collaborates extensively with other council bodies including the transport function (e.g. catchpit maintenance and cleaning) and resource consenting teams on land use planning. The scope of this study has not allowed us to explore the advantages and disadvantages of this arrangement.

**Regulation improves standards for service providers that are not already at a minimum level of AM maturity**

Interviewees from smaller service providers reported improvements to their AM practices in response to regulatory requirements, but argued they were not always fit-for-purpose and imposed resultant inefficient costs. Conversely, interviewees from medium and larger providers reported no further improvements to their AM practices in response to regulation, but approved of the use of non-financial performance indicators (albeit with reform to the required indicators – discussed below) that allowed them to benchmark their performance against other service providers and encourage movement towards best-practice.

**Figure E.3: The Impact of Regulation on Asset Management Maturity**



It is hard to create one-size-fits-all standards suitable to the wide range of service provider sizes and locations. This creates trade-offs: regulation can improve asset management maturity at greater cost. Several service providers stated centrally-set regulations can undermine community-set levels of service, which creates tension when regulation demands service levels that are not affordable to the local community.

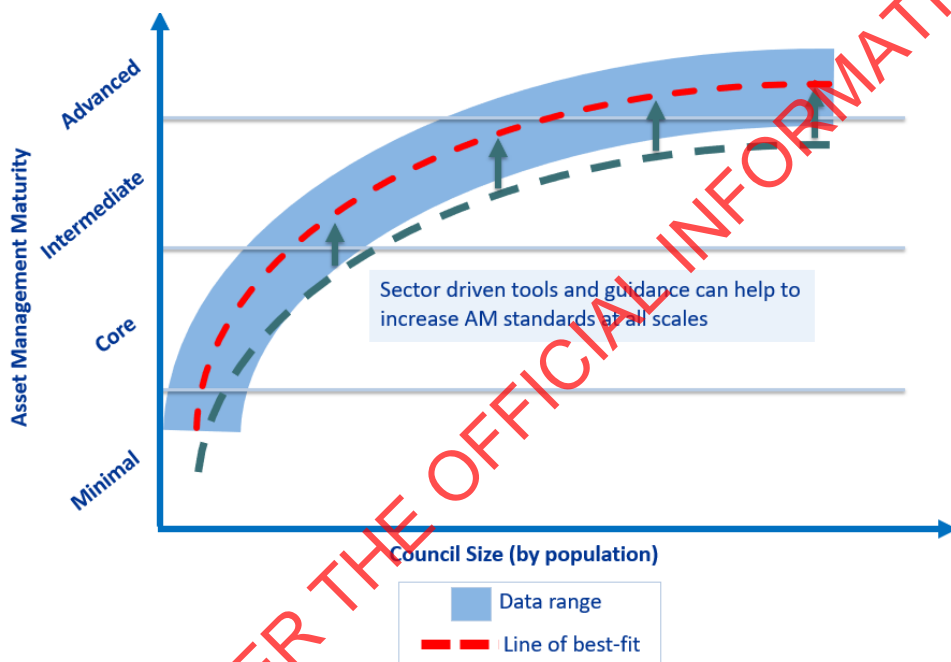


Having to adhere to multiple government department regulations could be one of the factors adding to the complexity of meeting regulatory requirements. Asset managers from all service provider sizes suggested that a unified regulatory body could make it simpler.

**Asset management maturity increases for all service provider types as sector-driven initiatives such as guidance, tools and collaboration are taken up**

Interviewees across all service provider types reported turning to sector guidance and collaboration to drive better AM, including uptake of the IIMM, ISO55000, and benchmarking against central government investor confidence ratings (ICRs). It is our observation that this has been a relatively recent occurrence: for instance, there has been wide uptake of the IIMM guidelines across service providers, with all AM plans reviewed using it as a base for their plan structures. Service providers gave two broad reasons for this recent uptake: the growing need for AM capabilities that can meet growth or other affordability challenges, and the growing need to meet new regulatory requirements.

**Figure E.4: The Impact of Sector Initiatives on Asset Management Maturity**



**Advanced AM is unlikely to be fit-for-purpose at a small scale with the resources available**

Although regulation and sector-driven initiatives both advance AM maturity in service providers, interviewees from smaller service providers reported resource constraints as barriers to more advanced AM practices. Conversely, large urban water providers all reported an ability to advance their AM maturity because they had large teams and the ability to attract talent.

**Three waters AM is less mature than other sectors**

We compared the AM maturity of other infrastructure sectors in New Zealand, and of the three waters sector of other countries. While recognising that the three waters sector in New Zealand is unique with its own specific features and challenges, we found that:

- The **energy sector** has more mature AM practices, as well as greater scale and higher levels of regulation.

- The **local roads sector** has more mature AM practices, as well as additional funding incentives and greater visibility of the asset to the public.
- The **Scottish and Australian water sectors** have more mature AM practices, and greater scale.

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# 1 The Purpose of DIA's Review

The three waters services are made up of potable water, wastewater and stormwater. Three waters infrastructure is vital to economic security, health, safety, and environmental protection. Clean, potable water, and functioning wastewater systems, are highly important for human health. Efficient wastewater treatment is crucial to the protection of the freshwater and marine environment. Stormwater infrastructure plays a key role in mitigating flood events, and avoiding associated loss of life and economic damage.

## **Central government has a strong interest in a well-functioning three-waters sector**

The Local Government Act grants local government general competence over three waters infrastructure ownership and management. Local councils and other service providers (collectively 'service providers') have an asset stewardship role to ensure the local community's current and future service needs are met, in a way that is most cost-effective to households and businesses.

Several central government ministries also play a role in the management of the sector, including in evaluation and regulation. This is because, although three waters infrastructure is owned and managed by local government, central government has a significant interest in ensuring that the sector functions effectively to allow it to fulfil its own responsibilities, including preserving human health and managing a well-functioning economy.

The sector also represents a potential liability to central government: if a service provider is unable to meet the financial obligations of a large-scale failure to mitigate a risk to human health or the economy, central government intervention or financial assistance is very likely.

Central government's interest and potential liabilities mean it has a strong interest in how the sector is managed. However, recent reports and events have suggested there are management challenges:

- The Auditor-General and the Productivity Commission have raised concerns about investment and regulation of three waters infrastructure.
- There was widespread outbreak of gastroenteritis in Havelock North in August 2016, with more than 5,000 people falling ill from contamination of the drinking water supply.
- A wastewater scheme in Kaipara District Council was intended to cost the community \$18.5 million, but actually cost \$63.3 million, and required the Crown to appoint Commissioners to replace the elected council.
- A wastewater scheme in Whanganui District Council, costing \$27 million, failed to meet intended performance levels and a new scheme costing approximately \$41.2 million is now proposed.

## **DIA is reviewing the sector**

In June 2017 the Government announced a review of the three waters sector, to be led by the Department of Internal Affairs (DIA). The purpose of the review is to assess whether current practices are fit-for-purpose and able to deal with the growing challenges facing the sector, such as the public's increasing expectations, growth, demographic shifts, and affordability.

The review will be based around three key workstreams: financial incentives, compliance and monitoring, and the focus of this report: Asset Management (AM). The first stage of the review is discovery and analysis. This report is centred around two key questions:

- How well is AM of three waters services performed in New Zealand, and what is the variation across the country?
- How does this compare with the quality of AM in other infrastructure fields?

This report sets about answering these questions through four steps:

- **We establish a framework describing how we assess AM maturity (Section 2).** Our framework draws from our extensive experience and sector best-practice described by the International Infrastructure Management Manual (IIMM). We focus on three key levels of AM practice: strategic, tactical, and operational. We develop criteria and examples on which to assess service providers based on the IIMM asset management maturity scale, which ranges from ‘minimum’ to ‘advanced’ AM maturity.
- **We evaluate service providers’ AM practices against this framework (Section 3).** We assessed a mixture of service providers from the North and South Islands by interviewing asset managers and conducting desk-based analysis of service provider Asset Management Plans (AMPs). We supplemented our research with interviews with representatives from peak bodies and analysis of peak body reports. We describe our key findings and discuss the trends that we observed.
- **We discuss the general direction that AM maturity is heading, and present three main drivers for this (Section 4).** An important factor in assessing the maturity of AM in New Zealand is to identify the direction that it is moving. We present the factors that we see as the most important drivers behind this, and discuss how they have affected different types of service providers.
- **We compare three waters AM maturity with the energy and local roads sectors and two international examples (Section 5).** Energy provides a useful comparison because it provides insight into the implications of heavier regulation and larger organisations. Roading is useful because it provides direct comparison with a sector of similar scale (because local councils are responsible for local roads like three waters). We also compare how the NZ three waters sector compares to the Scottish and Australian water sectors.

## 2 How We Identify Good AM Practice

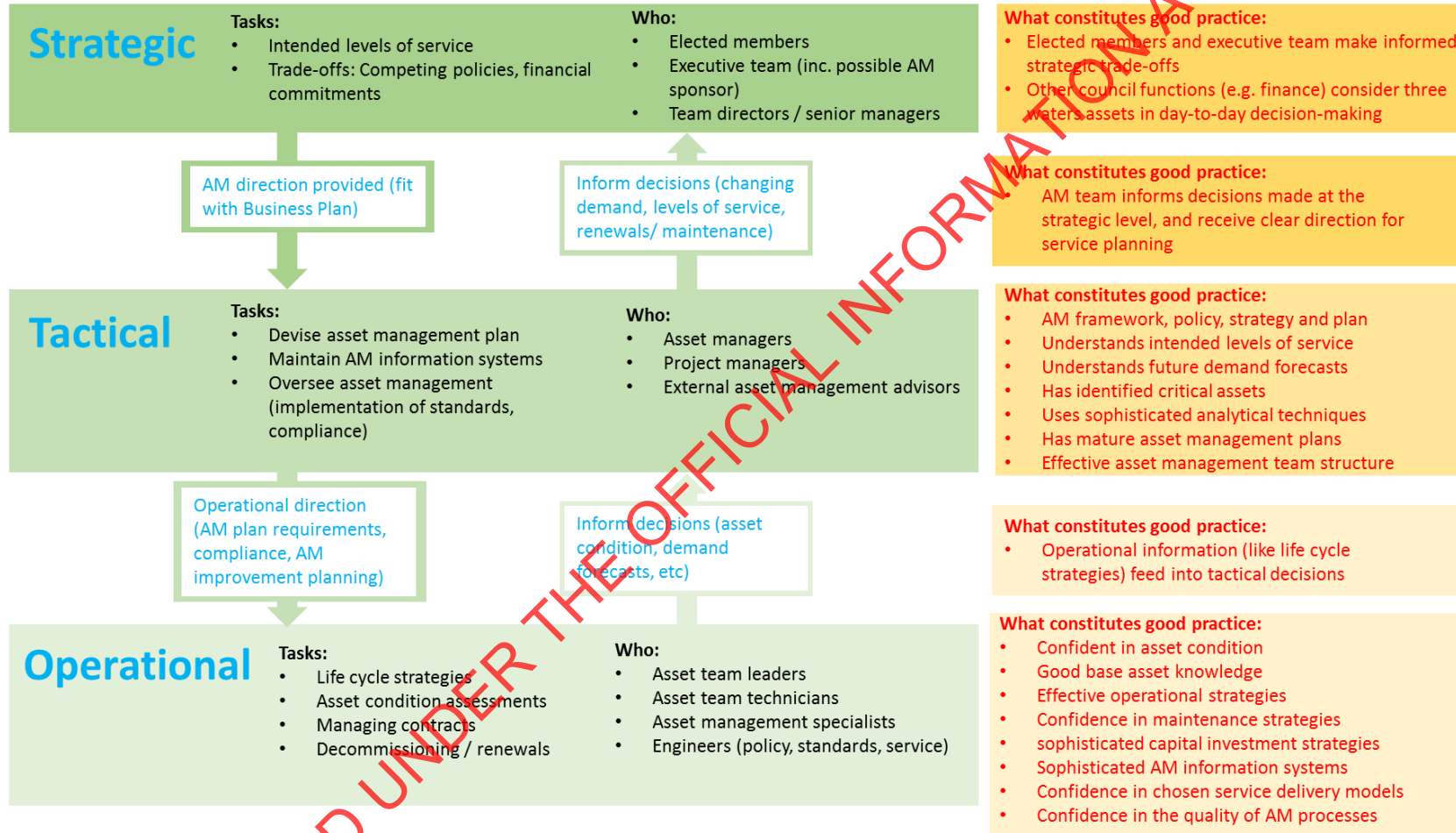
We adopted a framework to review the primary factors that contribute to three waters AM maturity. The framework assesses service providers across three functional levels relevant to mature AM: the *strategic*, *tactical*, and *operational* levels.

We assessed service providers at each level using criteria derived from extensive experience and AM best practice. For the *strategic* level, we derived criteria using Castalia’s experience across infrastructure sectors. For the *tactical* and *operational* levels, we have drawn from the International Infrastructure Management Manual (IIMM) – which is supported by peak bodies and used throughout the sector.

We assessed service providers by attributing a score to each criterion. The scores are based on the AM maturity continuum developed in the IIMM, ascribing a service provider’s AM practices as either ‘minimal’, ‘core’, ‘intermediate’, or ‘advanced’.

Figure 2.1 illustrates our framework. We describe each of the AM functional levels, and our assessment criteria, in the subsequent sections.

Figure 2.1: Castalia Framework to Assess Service Provider AM Maturity



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## **2.1 Criteria for Assessing AM at the Strategic Level**

At the strategic level, elected members and council executives make strategic trade-offs to prioritise competing council interests: for example, whether to use resources to build a new library or replace water pipes. In more mature service providers, we would expect these decisions to be informed by AM teams in a language that elected members and council executives can understand.

The strategic level is also where AM interacts with the council's broader business planning functions, including the council's policy, finance, and other functions. This is important to the functioning of the council, and achieving council strategic goals. For example, AM teams and finance teams can face different incentives when forecasting growth. Finance teams can be more cautious because growth forecasts feed into council income (rates) projections, and overestimating growth leads to overestimating future income. AM teams, on the other hand, are typically more optimistic to ensure future infrastructure can accommodate future growth.

In more mature councils/service providers, we would expect to see join-up across functions. For example, a shared approach to valuing assets or forecasting demand across AM and finance teams.

Table 2.1 describes our assessment criteria in detail.

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Table 2.1: Assessment Criteria at the Strategic Level

What we would expect to see when this is performing well	Minimal	Core	Intermediate	Advanced
Other council/service provider teams (e.g. council finance functions) consider three waters assets in their day-to-day decision-making	No regular interaction; AM is done in isolation to other service provider functions	Some interaction, particularly with finance functions: AM teams report on financial performance of assets, prepare long-term financial forecasts and send these on to finance teams.  Finance teams do not share the same practices to key areas like growth forecasting and asset valuation.	Some interaction, particularly with finance functions: AM teams report on financial performance of assets, prepare long-term financial forecasts and send these on to financial teams.  Join-up between AM and finance teams across key areas like growth forecasting and asset valuation.	Very regular interaction: finance, strategic policy, audit, legal, compliance and other teams interact with AM, including discussing strategic funding trade-offs. Finance teams use the AM plan as reference material in their day-to-day operations.
AM teams inform decisions made at the strategic level. Elected members and executive team members make informed strategic trade-offs.	No regular interactions between AM team and service provider decision-makers	Some interaction, service provider decision-makers receive advice on three waters for bigger or more topical decisions. Advice might be quite technical and impenetrable.	Fair levels of interaction; service provider decision-makers receive regular advice on three-waters. Committees or working groups established to facilitate engagement. Advice might be quite technical and impenetrable.	Very regular interaction; AM champion sits at the service provider executive level, and three waters advice marries up AM functions with financial functions. Advice is tailored to audience.

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## **2.2 Criteria for Assessing AM at the Tactical level**

At the tactical level, AM teams inform decisions made at the strategic level, and translate council corporate objectives into more detailed AM policies, strategies, and plans. It involves determining service delivery options to meet intended service levels, implementing AM standards and legal requirements, and maintaining knowledge management and information systems.

We would expect more mature service providers to:

- Have an integrated AM framework, policy, and strategy
- Understand intended levels of service (LoS)
- Understand future demand forecasts
- Identify and prioritise critical assets
- Use sophisticated analytical techniques
- Have mature AMPs
- Have an effective AM team structure.

Table 2.2 describes our assessment criteria in detail.

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Table 2.2: Assessment Criteria at the Tactical Level (drawn from the IIMM)

What we would expect to see when this is performing well	Minimal	Core	Intermediate	Advanced
Service provider has an AM framework, which includes an AM policy, strategy and plan	Corporate expectations expressed informally and simply E.g. "All departments must update AM plans every three years"	Defined policy statements for all significant activities. Clear linkage to corporate goals. Policy supported by action plans with defined responsibilities for delivery.	AM Policy and Strategy possibly reviewed and adopted by the Executive Team each year. Expectations of each activity area defined with detailed action plans, resources, responsibilities and timeframes.	AM Policy and Strategy fully integrated into the organisation's business processes and subject to defined audit, review and updating procedures.
Service provider understands intended LoS	Asset contribution to organisation's objectives and some basic LoS have been defined.	Customer Group needs defined, and requirements informally understood. LoS and performance measures covering multiple service attributes. Annual reporting against performance targets.	Customer Group needs analysed. Costs to deliver alternate key LoS are assessed. Customers are consulted on significant service levels and options.	LoS consultation strategy developed and implemented. Technical and customer LoS are integral to decision making and business planning.
Service provider understands future demand forecasts	Demand forecasts based on experienced staff predictions, with consideration of known past demand trends and likely future growth patterns	Demand projections based on robust projection of a primary demand factor (e.g. population growth) and extrapolation of historic trends. Risk associated with demand change broadly understood and documented.	Demand forecast based on mathematical analysis of past trends and primary demand factors. A range of demand scenarios are developed (e.g. high/medium/low).	As 'intermediate', plus risk assessment of different demand scenarios with mitigation actions identified.

What we would expect to see when this is performing well	Minimal	Core	Intermediate	Advanced
Service provider has identified critical assets	Critical assets understood by staff involved in maintenance/renewal decisions.	Risk framework developed. Critical assets and high risks identified. Documented risk management strategies for critical assets and high risks.	Systematic risk analysis to assist key decision-making. Risk register regularly monitored and reported. Risk managed consistently across organisation.	Formal risk management policy in place. Risk is quantified, and risk mitigation options evaluated. Risk is integrated into all aspects of decision making.
Service provider uses sophisticated analytical decision-making techniques to inform investments	AM decisions based largely on staff judgement and agreed corporate priorities.	Formal decision-making techniques (MCA/BCA) are applied to major projects and programmes.	Formal decision-making prioritisation techniques are applied to all operational and capital asset programmes within each main budget category. Critical assumptions and estimates are tested for sensitivity to results.	As 'intermediate', plus the framework enables projects and programmes to be optimised across all activity areas. Formal risk-based sensitivity analysis is carried out.
Service providers have mature AMPs	AMP contains basic information on assets, service levels, planned works and financial forecasts (5-10 years) and future improvements.	Same as 'minimum', but with executive summary, description of services and key/critical assets, top-down condition and performance description, future demand forecasts, description of supporting AM processes, 10 year financial forecasts, 3 year AM improvement plan.	As 'core', with analysis of condition and performance trends (past/future), customer engagement in setting LoS, ODM/risk techniques applied to major programmes.	As 'intermediate', but with comprehensive Optimised Decision-Making (ODM) techniques, risk management programmes and LoS/cost trade-off analysis. Improvement programmes largely complete with focus on ongoing maintenance of current practice.
Operational-level information (like life cycle strategies) feed into tactical-	Teams might not all be on-site, but regularly interact. Key	Teams are all in the same location. Full integration of AM information systems and AM planning / decisions.	As 'core', but feedback loop also exists: asset managers at tactical level seek new ways to improve operations, and implement this.	As 'intermediate', plus team has members whose role is to draw in other service provider functions (e.g. financial).

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What we would expect to see when this is performing well	Minimal	Core	Intermediate	Advanced
level decisions (such as the AMP)	information is pulled for the AMP			

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### **2.3 Criteria for Assessing AM at the Operational Level**

Information gathered at the operational level feeds into decisions made at the tactical level. This means that the quality of information collected at this level is very important to the ultimate quality of the service provider's tactical and strategic decisions: for example, poor understanding of asset condition means a service provider cannot confidently establish a work programme to renew critical assets, or speak to their elected members about how much this will cost and when. We would expect more mature service providers to have:

- Confidence in their understanding of asset condition
- A good base asset knowledge
- Effective operational strategies
- Confidence in their maintenance strategies
- Sophisticated capital investment strategies
- Sophisticated AM information systems
- Confidence in their chosen service delivery models
- Confidence in the quality of their AM processes

Table 2.3 describes our assessment criteria in detail.

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Table 2.3: Assessment Criteria at the Operational Level

What we would expect to see when this is performing well	Minimal	Core	Intermediate	Advanced
Service provider is confident in asset condition	Condition assessment at asset group level ('top-down'). Supports minimum requirements for managing critical assets and statutory requirements (e.g. safety).	Condition assessment programme in place for major asset types, prioritised based on asset risk. Data supports asset life assessment. Data management standards and processes documented. Programme for data improvement developed.	Condition assessment programme derived from benefit-cost analysis of options. A good range of condition data for all asset types (may be sampling-based). Data management processes fully integrated into business processes. Data validation process in place.	The quality and completeness of condition information supports risk management, lifecycle decision-making and financial / performance reporting. Periodic reviews of programme suitability carried out.
Service provider has good base asset knowledge (i.e. an asset register)	Basic physical information recorded in a spreadsheet or similar, but may be based on broad assumptions or not complete.	Sufficient information to complete asset valuation - replacement cost, asset age and life, asset hierarchy, asset identification and asset attribute systems.	A reliable register of physical and financial attributes recorded in an information system with data analysis and reporting functionality. Systematic and documented data collection process in place. High level of confidence in critical asset data.	Information on work history type and cost, condition, performance, etc. recorded at asset component level. Systematic and fully optimised data collection programme. Complete database for critical assets; minimal assumptions for non-critical assets.
Service provider deploys effective operational strategies and plans	Operational responses are understood by key staff, but plans may not be well-documented, mainly reactive in nature. Asset	Emergency response plan developed. Demand management is considered in major asset planning. Asset utilisation is measures for	Emergency response plans and business continuity plans are routinely developed and tested. Demand management is a component of all operational	Operational plans routinely analysed, tested and improved. Formal debriefs occur after incidents. Asset utilisation measured real-time and

What we would expect to see when this is performing well	Minimal	Core	Intermediate	Advanced
	utilisation is measures for some key assets but is not routinely analysed.	critical asset groups and is routinely analysed.	decision making. Asset utilisation is measured and analysed for most asset groups.	effectiveness analysed across all asset groups. Operational programmes are optimised using cost-benefit and risk analysis.
Service provider is confident in maintenance strategies	Organisational objectives and how asset functions support these are understood. Compliant with legislation and regulations. Maintenance records maintained.	Asset criticality considered in response processes. Fault tracking and closure process. Strategy for prescriptive versus performance-based maintenance developed. Key maintenance objectives established and measured.	Contingency plans for all maintenance activities. Asset failure modes understood. Frequency of major preventative maintenance optimised using benefit-cost analysis. Maintenance management software implemented.	Forensic root cause analysis for major faults. Optimisation of all reactive and planned programmes alongside renewal planning. Procurement models fully explored.
Service provider uses sophisticated capital investment strategies and plans	There is a schedule of proposed capital projects and associated costs, based on staff judgement of future requirements.	Projects have been collated from a wide range of sources such as hydraulic models, operational staff and risk processes. Capital projects for the next three years have been fully scoped and estimated.	As 'core', plus formal options analysis and business case development for major projects in the 3-5 yr period. Major capital projects for the next 10-20 years are conceptually identified and broad cost estimates completed.	Long-term capital investment programmes are developed using advanced decision techniques such as predictive renewal modelling.
Service provider has an effective AM team structure	AM allocated primarily to one or two people who have AM experience.	Cross-Service provider coordination occurs through a steering group or committee. AM training occurs for primary staff. The executive	All staff understand their roles in AM, it is defined in their job descriptions, and they receive supporting training aligned to that role. A person on the	A formal AM capability building programme is in place and routinely monitored. The AM structure has been formally

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What we would expect to see when this is performing well	Minimal	Core	Intermediate	Advanced
		team have considered options for AM functions and structures.	Executive Team responsible for delivering AM policy.	reviewed with consideration of the benefits and costs of options.
Service providers have sophisticated AM information systems	Asset register can record core asset attributes - size, material, etc. Asset information reports can be manually generated for AM Plan input.	Asset register enables hierarchical reporting (at component to facility level). Customer request tracking and planned maintenance functionality enabled. System enables manual reports to be generated for valuation, renewal forecasting.	More automated reporting, and data on unplanned maintenance, condition, performance is held.	Financial, asset and customer service systems are integrated and all advanced AM functions are enabled.
Service provider has full confidence in chosen service delivery models (for maintenance, construction, operations, etc).	Service delivery roles clearly allocated (internal and external), generally following historic approaches.	Contracts in place for external service provision. Core functions defined.	Internal service level agreements in place with internal service providers. Contracting approaches reviewed to identify best delivery mechanism. Tendering/contracting policy in place. Competitive tendering practices applied.	All potential service delivery mechanisms reviewed and formal analysis carried out. Risks, benefits, and costs of different options considered.

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What we would expect to see when this is performing well	Minimal	Core	Intermediate	Advanced
Service providers are confident in the quality of their AM processes	Simple AM Quality Management documentation in place for service-critical activities.	Defined quality policy and basic Quality Management System. All critical activity processes documented.	Process documentation implemented in accordance with the Quality Management System (QMS) plan. All processes documented to appropriate level of detail.	ISO9001 certification achieved and audits demonstrate satisfaction with the QMS.

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## 2.4 The Service Providers We Assessed

We interviewed asset managers, engineers, and environmental managers from 13 water service providers, and supplemented our findings with an assessment of nine publicly available AMPs for separate service providers. The service providers in our sample included a range of population-served and geographical location, made up of 13 North Island and 9 South Island service providers. Table 2.4 shows the breakdown of these by type and population.

Our observations in this report only relate to the sample of service providers we interviewed and assessed, although we believe this is a representative picture of what is going on in the New Zealand three waters sector in general.

For this report, we refer to ‘small’, ‘medium’ and ‘large’ size service providers. This relates to the scale of the service provider. There are multiple ways that service provider ‘scale’ can be measured, including size of population served, local council growth rate, council balance sheet, value of assets, and the geographical authority of the provider. For this report, we measure service provider scale by reference to service provider population served. Population served provides the best correlative fit, is easy to measure, and is a good proxy for the other aspects of ‘scale’. Small service providers are service providers with populations below 20,000, medium service providers are service providers with populations of between 20,000 and 90,000, and large service providers are service providers with populations exceeding 90,000.<sup>2</sup>

We supplemented our service provider interviews with further interviews with representatives from the following peak bodies:

- Engineering New Zealand (previously IPENZ)
- The Institute of Public Works Engineering Australasia (IPWEA)
- New Zealand Asset Management Support (NAMS)
- Water New Zealand
- Local Government New Zealand (LGNZ)
- The Office of the Auditor General (OAG)

**Table 2.4: Profile of Assessed Service Providers**

Type of Service Provider	Sample	Total Population Served
Small service providers	5 (4 interviews)	52,518
Medium service providers	11 (4 interviews)	486,870
Large service providers	6 (5 interviews)	2,399,973
<b>Total</b>	<b>22</b>	<b>2,939,361</b>

<sup>2</sup> This mirrors the split of council type used by the sector into rural (populations below 20,000), provincial (populations between 20,000 and 90,000), and metropolitan (populations exceeding 90,000) -sized councils.

### 3 Three Waters AM Maturity Correlates with Service Provider Scale

Service provider scale correlates with their asset management maturity: the greater the population level, the higher the level of AM maturity. The only major outlier to this trend was Queenstown Lakes District Council; a medium sized service provider with an upper 'intermediate' asset maturity level (all other medium level service providers we reviewed had a 'core' AM maturity score).

Table 3.1 shows the positive correlation between the average populations of the service providers that received advanced, intermediate, core, and minimum AM maturity scores.

**Table 3.1: Population Profile of 22 Service Providers Assessed, By AM Maturity Score**

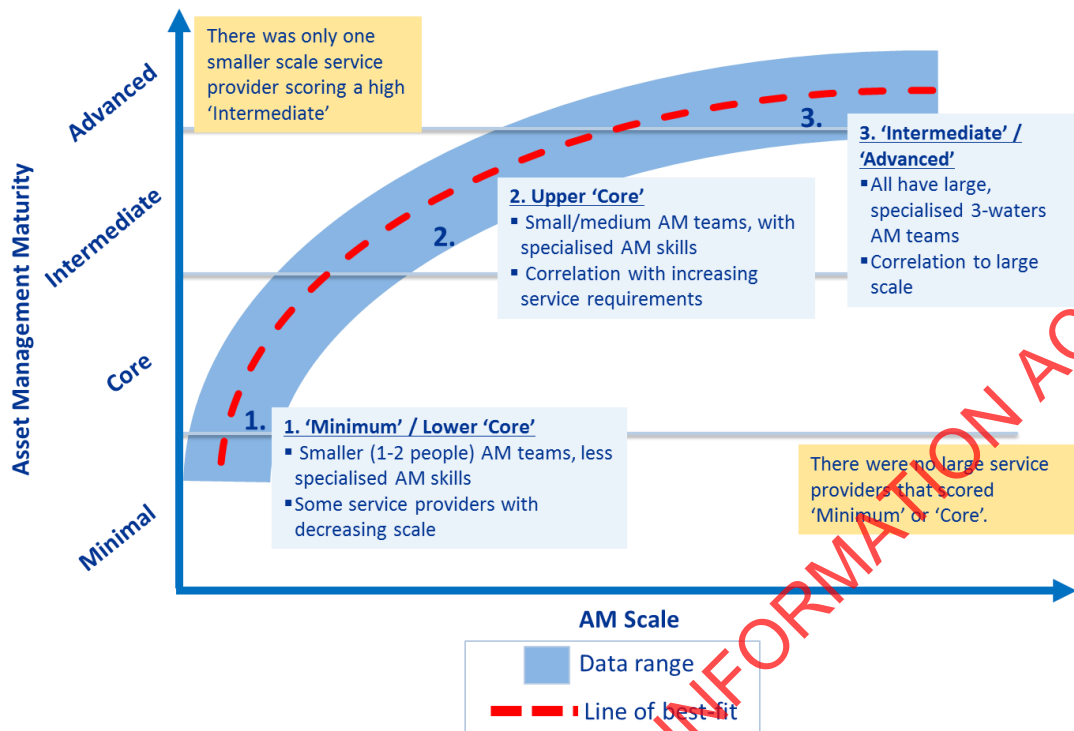
AM Maturity Ratings	Sample	Average Population
Advanced	1	1,415,550
Intermediate	5	178,480
Core	13	46,533
Minimal	3	8,825

Service providers with more advanced AM practices ('advanced' and 'intermediate') are large and urban: the one exception to this observation is Queenstown Lakes District Council, which is a provincial service provider that is not heavily urbanised. They have big specialist teams made up of formally qualified individuals.

The least advanced service providers (those scoring 'minimum' or lower 'core') are small service providers, with smaller AM teams (typically 1 or 2 individuals) without formal AM qualifications (for example, in one small service provider, the individual managing across multiple asset classes is an environmental manager). All these service providers have largely static or decreasing populations.

Most of our sample were 'mid-pack' service providers, which scored 'core' in their AM maturity. They are predominantly medium-sized service providers, with small to medium AM teams (30 to 40 individuals) with specialised AM or engineering skills.

Figure 3.1: AM Maturity Correlates with Service Provider Size



**'Tactical' and 'Operational' maturity is driving the difference**

When we break down the factors driving the scores, we find that differences at the 'tactical' and 'operational' levels were more influential in driving the differences in AM maturity across service providers. AM maturity at these levels increased as scale increased. This was for all the criteria we assessed at the 'tactical' and 'operational' levels.

At the 'strategic' level, which assessed service provider engagement with elected members and across service provider teams (finance, audit, etc), effectiveness was similar across service provider types but methods differed significantly – this is discussed below in Section 3.1.

**Stormwater is less mature than potable and waste water AM**

Stormwater was consistently reported as the least developed of the three waters across all service providers we assessed, except in Auckland. Asset managers gave the same reasoning in all cases: they felt less confidence is required in the state of the assets because stormwater is viewed as less critical to human health than potable and waste water.

In Auckland, stormwater AM is more mature ('advanced') than potable and waste water (upper 'intermediate') because of institutional arrangements, specifically that stormwater is separately managed from the potable and waste waters. This has created two reasons for advanced stormwater AM:

- The stormwater team is not 'competing' with the other two waters for prioritisation of resources, because they are funded and resourced through separate arrangements. Because substantial resource is dedicated to stormwater, Auckland Council's stormwater AM team is big, specialised, and able to attract talent;

- Auckland Council is an amalgamation of eight previous Auckland authorities, including its regional council, which was responsible for flood management. This led to the stormwater team developing a focus on meeting flood-related levels of service, because stormwater management is integral to flood management, which necessitated more advanced analytical capabilities (e.g. rapid-flood analysis to define critical assets).

Our observation on Auckland is not a normative statement about whether it is better to split the management of the three waters, because there may be unintended consequences outside of the scope of this study. For example, although combining three waters management into one entity can lead to less advanced stormwater management because it is viewed as less important to human health, this may reflect more efficient resource prioritisation. Lower levels of stormwater service quality may correspond to proportionally higher levels of service in potable and waste water, as resources are transferred to the management of those assets deemed more critical to human health.

The difference between prioritisation of potable and waste water across service providers is less clear. Some service providers reported having higher confidence in their waste water assets, and others in their potable water assets. We found no clear reasons for these differences.

### **3.1 Performance at the Strategic Level**

At the 'strategic' level, our criteria assessed service provider AM teams' ability to inform elected members' decision-making, and ability to influence and inform other relevant service provider teams (like the finance team). In recognition of a parallel study commissioned by the DIA exploring three-waters AM governance, we have not focussed as heavily on this aspect of our framework, but have concentrated our role in reporting the views of asset managers themselves.

All AM teams we assessed, across all service provider types, reported feeling comfortable with their ability to communicate with elected members, senior service provider officials, and other teams. However, formality and systematisation of methods varies. Anecdotally, most asset managers across all service provider types reported difficulties persuading elected members to prioritise three waters AM, although we were unable to verify this.

#### **Larger service providers have more systematic ways of undertaking the strategic engagements between functions**

In small service providers, engagement with council elected members, executive team members, and across teams is more informal: smaller team sizes mean interaction occurs frequently and informally in an 'at-the-water-cooler' manner. In one small service provider example, the asset manager sits on the council executive team. In another small service provider, the asset manager we interviewed reports directly to the council chief executive and her relationship with elected members was close enough that she directly invited the Mayor to attend our meeting. Small service providers report proximity to other teams leading to shared ideas and shared awareness of problems or initiatives. Asset managers report being able to hold free and frank conversations as a result.

However, we did not find evidence that proximity leads to more systematic ways of engaging (such as initiatives to develop formal shared approaches to financial reporting, or shared information systems), which creates risk because of reliance on interpersonal relationships and individuals' knowledge. This chimes with OAG's previous findings that financial and funding strategies are not always joined up in AM and finance teams: in 2014 they reported that the ratio of forecast renewals expenditure was consistently lower than rates of depreciation.<sup>3</sup>

Medium service providers have more formalised approaches to engaging. The Director of Public Works of one medium service provider saw 'approximately 30 percent' of his role in translating technical information into useful advice to senior executives and elected members. Medium service providers also have more systematised ways of engaging at the strategic level including working groups and committees. Hastings District Council, for example, has a Works and Services Committee where elected members and asset managers meet to discuss AM issues.

Larger service providers also have formal engagement processes, but there was greater evidence of integration across the organisation's day-to-day decision-making processes. Hamilton City Council, for example, have an AM sponsor at the executive team level and established an Asset Management Centre of Excellence in 2015 responsible for embedding AM thinking across the organisation and improving AM considerations at the corporate level.

### **'Strategic' level engagement methods vary between shared service arrangements and CCOs**

The asset-owning council-controlled organisation (CCO) in our sample reported greater efficiency in linking their tactical-level and strategic-level decision-making than local council AM teams, because they are more independent with the ability to collect their own rates independently to fund their activities.

The non-asset owning CCO in our sample reported having to spend more time nurturing their relationship with each of their council shareholders to bridge the tactical decisions they take with the strategic decisions their council shareholders take. They reported spending considerable resource placing themselves as "trusted advisor" to their council shareholders. This has been effective: the CCO is able to progress their work programme, with the support of their council shareholders. This work programme includes strategic alignment across councils regarding the biggest challenges, and agreement to move to a standardised approach to quality of levels of service. The chief executive received credit from individuals within the organisation, and representatives from the peak bodies, as being instrumental in this success, which strongly suggests the importance of the CCO leadership team. However, the CCO is about to embark on reforms to their 'tactical' AM practices, which may create new challenges in getting agreement across councils; we cannot comment on this process because it has not yet started.

## **3.2 Performance at the Tactical Level**

All service providers we interviewed have the underlying architecture of tactical-level AM practices, including an AM framework, policy, asset management plan, and AM information systems. All the asset management plans we reviewed adhere to the International Infrastructure Management Manual (IIMM) best-practice template and

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<sup>3</sup> OAG Water and Roads: Funding and Management Challenges, 2014

terminology. However, the quality of plans and policies, and the full utilisation of AM information systems, varies between service providers, correlated to scale.<sup>4</sup>

Most small service providers we interviewed stated they established the ‘underlying architecture’ after turning to best-practice guidance (such as the IIMM) relatively recently. There are several reasons for this, discussed in Section 4.

Above establishing the underlying architecture (to differing levels of quality), all tactical level assessment criteria correlated to scale, except for Queenstown Lakes District Council (a medium service provider, with upper ‘intermediate’ AM).

**Service providers’ understanding of asset criticality is generally low, though still correlated to scale**

For all service providers, understanding of asset criticality, including understanding of risks, resilience, and vulnerability, is generally lower than all other tactical-level criteria we assessed. Even the most mature service providers within our sample are still developing their understanding of asset criticality to a level they feel confident in.

However, although lower across the board, understanding of asset criticality still correlated strongly to scale. The small service providers have a strong reliance on the knowledge and personal judgements of a few individuals. There was little evidence of succession planning, suggesting a serious risk of lost knowledge on asset criticality when key individuals move on.

The medium service providers we interviewed are at the start of the process of formalising their understanding of asset criticality. Hastings District Council cited an improving understanding of asset criticality: historically, they used asset size as a proxy for asset criticality to prioritise site visits, but now they are using more analytical models including resiliency scenario running and assessing the network-level impacts of individual-project level deferrals. One medium service provider Works and Services Director stated he decided to upgrade to a more advanced AM information system as a deliberate strategy against lost knowledge when individuals move on, using the opportunity for data clean-up and systematisation to drive institutional resilience.

Large service providers are more advanced: Auckland Council uses sophisticated techniques such as rapid-flood analysis to identify critical assets, for example. However, all larger service providers we interviewed felt their asset criticality understanding could be better, and were actively pursuing improvements. For example, Wellington Water are moving towards a phase of “tactical prioritisation”, as they move towards finishing the “strategic prioritisation” phase of their Smart Investment Plan, while Christchurch City Council are prioritising understanding of asset criticality and vulnerability following modelling of failure risk.

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<sup>4</sup> Our observations are:

- AM information systems: The use of sophisticated information systems is widespread – although the information stored varies in line with council scale;
- AM policies: The complexity of policies varies significantly, in conjunction with the size of AM teams;
- AM plans: The structure of AM plans is similar across councils (adhering to the IIMM template), however the quality of content (understanding of levels of service, demand, asset criticality, investment analysis, etc) varies in line with council scale.

### **For small and medium service providers, level-of-service understanding and asset performance reporting rarely goes beyond what is required by regulation**

Small and medium service providers often saw little value in engaging directly with local communities to determine levels of service because they felt that regulatory requirements were good proxies for local requirements and, unlike other asset types like roads, community expectations were clear and unchanging ('clean tap water, working toilets'). Asset managers did not see value in dedicating resources to refining levels of service. Equally, asset managers did not see value in performance metrics beyond the non-financial performance measures.

Larger service providers were more likely to refine their understanding of community levels of service requirements. Auckland Council, for example, recently commissioned an economic study of the willingness to pay for stormwater services.

### **The use of more advanced analytical tools increases with service provider scale**

Larger service providers have more analytical rigour in their tactical decision-making. For example, we found little use of a range of demand scenarios outside of large and medium service providers, and small service providers do not consistently use advanced analytical decision-making techniques (e.g. cost-benefit analysis) for new capital expenditure. Where they do, external consultants are used.

## **3.3 Performance at the Operational Level**

Operational level advancement correlates to scale, except for Queenstown Lakes District Council, who perform higher than the average medium service provider.

### **Understanding of asset condition is one of the lowest-performing criterion across service providers, but correlates to scale**

There were examples of all sized service providers that do not conduct formal, regular asset condition assessments. However, service provider frequency and quality of assessments largely correlates with scale.

However, across large service providers, there are plans in place to improve asset condition assessments, but this is likely to take several years because of the sheer volume of assets, many of which are underground. In several small service providers, which lack the resources for regular asset condition assessments, we found evidence they are addressing asset condition by requesting external service providers to collect data as they perform maintenance tasks.

Maturity of maintenance strategies follow the same pattern, largely because they rely on asset condition data (and an understanding of asset criticality, which is also less mature, as discussed in Section 3.2). For small service providers, proactive maintenance of critical assets usually comes from knowledge of age and criticality from a few individuals, but is not systematised. Reactive maintenance on non-critical assets is triggered by performance or condition deficiency.

### **Understanding of asset utilisation correlates to scale and service provider growth**

Small and most medium service providers have limited understanding of asset utilisation, but with limited growth in almost all of these regions, asset managers we interviewed stated that understanding this was less of a priority. Conversely, asset utilisation was better understood in larger service providers, or service providers experiencing growth. For example, Queenstown Lakes District Council are responding to a 2015 audit report highlighting deficiencies in asset utilisation by developing their modelling capabilities, including using cell phone metadata to understand fluctuations in tourism numbers,

mandating water meters to understand per capita water use, moving to more advanced hydraulic modelling, and conducting economic network planning to understand the relationship between asset utilisation and the economic value of assets to tourism.

**Box 3.1: The uptake of shared metadata standards is mixed**

Shared 'metadata standards' are a shared approach to collecting data on assets, at the component level. For example, a shared metadata standard for collecting data on the diameter of a water pipe might mean agreeing that the diameter is measured from the interior wall of the pipe, rather than the exterior.

The New Zealand metadata standards were developed by the roading, three-waters, and light commercial/residential building sectors in New Zealand to drive a shared approach to collecting detailed data on assets at the component level. By collecting data on assets in the same way, proponents argue that it becomes easier to share best-practice approaches to analysing the data and making good AM decisions, such as when to renew or replace an aging asset. They also state that performance benchmarking between service providers becomes easier, which can drive improvements.

Within our sample of service providers, we found a mixed view of shared metadata standards. Within those service providers that do see value in them, there is still disagreement about the value of the specific *New Zealand* metadata standards.

**Larger service providers see value in shared metadata standards...**

We found that larger, more mature service providers see value in shared metadata standards because these service providers have:

- advanced analytics that they overlay their data with, which run complex algorithms to provide insight into AM decisions (like asset renewal investments). They state that a shared approach to data standards will allow them to share best-practice analytics, and improve their decision-making capabilities.
- larger AM teams, which provides them with the human resources to regularly discuss best-practice, and seek benchmarking opportunities, with the wider sector. Shared metadata standards would assist this.

Smaller, less mature service providers do not see value in shared metadata standards. This is because they do not have the analytics or additional human resources of larger service providers to derive the full value from them.

**... However, some larger service providers query the usefulness of the specific, *New Zealand* metadata standards**

Where larger service providers are taking up the New Zealand metadata standards, several are adding to them to meet local needs (while trying not to undermine the shared nature of them). One large, more advanced service provider argued that although a shared approach to analytics was highly useful, the advancement of New Zealand metadata standards was outmoded because, in their view, it was more effective to use a geotechnical database that pulls data from different platforms.

**AM team structures are fit-for-purpose**

Small service providers typically have one or two individuals managing multiple asset classes. The AM teams regularly engage with other service provider teams, their executive teams, and often have relatively close relationships with elected members. The team structures are not elaborate, but are fit-for-purpose within resource envelopes.



Medium service providers typically have bigger AM teams of 30 to 40 people, organised into operational and tactical teams. They also have cross-service provider coordination committees and working groups. Queenstown Lakes District Council have an innovative team structure, consisting of a project team made up of policy, AM, and engineering expertise designed 'look above the day-to-day firefighting' and progress advanced AM across the organisation. The council's chief executive established the team to drive better AM, which has resulted in notable improvements culminating in Queenstown Lakes' maturity score of upper 'intermediate.'

Large service providers also have more advanced AM teams, with Hamilton City Council providing a good example of innovative team structuring. Hamilton City Council established a Centre of Excellence in 2015 to drive AM maturity across the organisation. They developed an organisational improvement programme which led to a leadership team driving AM maturity across the organisation, a working team to drive knowledge-sharing across AM teams, and a sponsor at the executive team level.

Watercare and Wellington Water have advanced AM team structures, resulting from the evident importance of three-waters AM to their corporate objectives. They have organisational structures that fully integrate AM decision-making from operational level to executive team level, with specialist individuals with defined AM roles specified in their job descriptions, and regular training.

**Quality management is generally low, but bigger service providers are seeking to align with best-practice**

Quality management relates to how much confidence a service provider has in the quality of their asset management processes, including documenting service-critical activities and establishing processes and systems for knowledge retention and dealing with staff churn. In the most advanced scenario, a service provider can seek formal ISO9001 certification for the quality of their Quality Management Systems. We did not find any examples of advanced quality management systems across all service providers, although variation correlates to scale. Small service providers lack adequate documentation processes, creating significant risk of knowledge loss with staff movements, which is exacerbated by the small size of their AM teams (often one or two individuals). Larger service providers are aware of this deficiency and are seeking to address it: one large service provider is actively seeking to develop its quality management processes after it was highlighted in an external review, and another large organisation is seeking to align with ISO55000 (although is not seeking formal accreditation, and did not explicitly cite alignment with ISO9001).

## **4 AM Maturity Across the Sector is Improving**

Despite the variability in AM maturity seen across service providers, there is a common trend that the quality of AM practices is increasing across the board. We have identified three key drivers for this:

1. An increase in scale is a way to increase AM maturity, which was observed in all three examples where this was observable.
2. Regulation improves standards for service providers that are not already at a minimum level of AM maturity.
3. AM maturity increases across service provider types as sector-driven initiatives such as guidance, tools and collaboration are taken up.

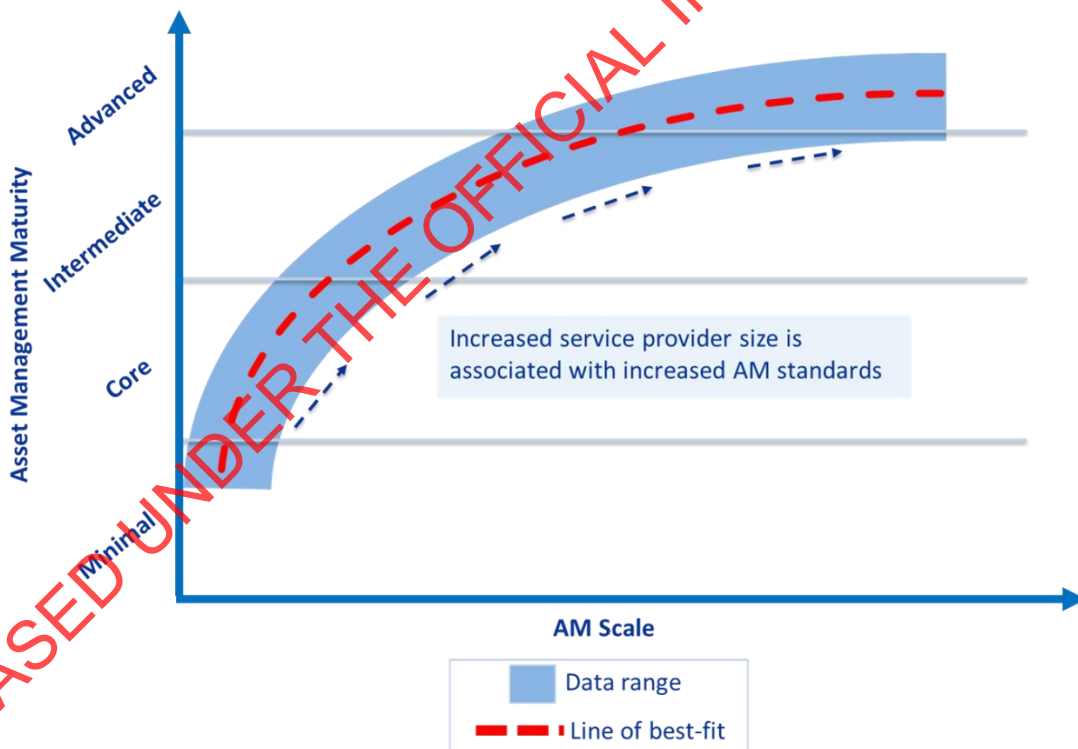
#### 4.1 Scale Can Drive More Advanced AM

All large service providers scored upper ‘intermediate’ or ‘advanced’ in our assessment.

Conversely, no small or medium service provider scored within these categories, except for Queenstown Lakes District Council (QLDC). It is unclear what has driven QLDC’s high score compared to other service providers of similar size, but likely reasons include:

- **The ability and skills of individuals.** The current chief executive is credited with wanting to focus on AM maturity and on setting up the current project team progressing mature AM practices. Within the project team, there are highly qualified individuals including an asset planning manager who is also the vice president of IPWEA, a very influential AM peak body. It is unclear why QLDC is more capable of attracting talented individuals than other smaller regions, but one possibility is the beneficial lifestyle offered by the region.
- **Growth.** Although QLDC has a moderate population of approximately 30,000, it is experiencing high growth rates. High growth rates create a political focus on infrastructure because of its vital role in servicing growth, which in turn creates a service provider institutional focus on higher-quality infrastructure AM. Other high-growth service providers within our study also scored high in AM maturity (however these were also large service providers).

Figure 4.1: The impact of Scale on AM Maturity



#### Auckland Council scored ‘advanced’, with evidence that amalgamation led to their AM maturity score

Stormwater management in Auckland falls under Auckland Council authority. It has assets valuing approximately \$5 billion and, like Watercare, serves a population of approximately 1.5 million people. We scored AM as ‘advanced’. According to the Water Services Association Australia’s (WSAA) four-yearly international AM benchmarking process (the

Asset Management Customer Value (AMCV) project), Auckland Council's stormwater team received outstanding scores across the AMCV assessment with the strongest performing function being Asset Renewal. The lowest scoring function was 'asset capability forward planning', however, this still scored close to the 90th percentile across all peer groups. The review concluded "the independent verifiers identified practices that could be considered novel, that generally aligned with areas of relative AM strength in the organisation, and on which it was considered the broader industry would be interested to learn from."

The development of advanced practices can be directly linked to when eight Auckland authorities amalgamated in 2010. Prior to this, there were variable decision-making processes and methodologies and different data sets on the stormwater asset base of varying quality, which required significant focus and resources to combine.

**Watercare and Wellington Water have seen advancements in AM maturity**

Watercare is responsible for water and wastewater in the Auckland region, providing services to 1.5 million people, with significant population growth predicted. It was formed in 1992 and is now responsible for \$8.4 billion of infrastructure assets. It was originally set-up as a shared service arrangement across Auckland's district authorities, but since the formation of Auckland Unitary Council in 2010, it operates as an independent Council Controlled Organisation.

Wellington Water was formed in 2014 and is now responsible for the management of three waters for the Hutt, Porirua, Upper Hutt and Wellington City Councils, and Greater Wellington Regional Council. Combined they have a population of approximately 380,000. All councils are equal shareholders. Unlike Auckland, Wellington Water does not own the three waters assets.

Watercare and Wellington Water have both had to contend with significant legacy issues. For Watercare, there were significant asset criticality and risk management issues prior to amalgamation, with most water assets being ungraded. Since becoming a CCO, they have focused substantially on standardization and are currently upgrading their AM information systems to a single system. The focus on bringing all previous council areas up to the same, common-standard service offering has led them to spend \$326 million in Pukekohe alone, which had more complaints than any other region in Auckland.

For Wellington Water, there has been a substantial focus on getting the 'strategic' level decision-making processes right, before moving into the 'tactical' and 'operating' processes. This has been a particularly relevant focus for Wellington Water because they do not own the water assets – the council shareholders do – therefore prioritising their relationships with each of the councils and creating a common approach to service delivery is very relevant to achieving their corporate objectives. It has progressed strategic alignment across its five councils, including developing 12 outcome-related goals, a smart investment framework based on performance against the goals, and developing performance measures to assess progress against the goals. Its focus is shifting towards developing maturity at the tactical and operational levels over the next three to five years: for instance, they are about to start an AM maturity assessment, and adopt the New Zealand shared metadata standards when collecting information at component level.

**Evidence suggested Watercare and Wellington Water will continue to advance**

Both Watercare and Wellington Water explained that resolving legacy issues has been an explicit focus in recent years, but now that progress is being made, they are looking to progress their AM maturity in the short-term. Wellington Water have an explicit "tactical prioritization" phase within their Smart Investment framework, which they will be

advancing. Watercare are continuing to grade previously ungraded assets, align with ISO55000 (although they will not be seeking formal accreditation), and advance their asset critically modelling (including deploying a single geotechnical database capable of pulling data from different platforms from within the organization).

### **Large service providers also demonstrate the benefits of scale through their level of AM maturity**

All the large service providers we assessed scored at least 'upper intermediate', and are characterised with size and significant resources. For example, Christchurch City Council is responsible for delivering three waters services to 367,800 citizens, with three-waters assets worth \$7 billion. The Three Waters and Waste team is large, at 140 people. A new Hybrid Delivery Model (HDM) has been established to undertake three waters capital works after the wind up of the Stronger Christchurch Infrastructure Rebuild (SCIRT) programme, and have the capacity to deliver an average of \$150m of renewals, replacements and new works over the next 5 years.

### **There are multiple reasons why scale can lead to more mature AM**

We identified a set of common themes which were shared by large service providers and contributed to their more advanced AM practices:

- **Scale provides improvements in analysis and data collection.** Auckland and Wellington are examples of where disparate AM systems, practices and processes have been brought together and standardised. This has created economies of scale and improvements in analysis, data collection, and procurement.
- **Larger organisations allow for increased specialisation.** Small service providers typically have one or two individuals responsible for multiple asset classes, whereas larger organisations have teams of up to 400 individuals. This allows people to focus on niche areas and tasks, allowing for deeper analysis and a more thorough understanding of the asset base. It also allows larger service providers to 'look above the day-to-day firefighting' by hiring individuals to consider long-term strategy, the potential roles of new technologies, and advancing innovative practices.
- **Large service providers can attract and retain talent.** This is a challenge for service providers in some parts of New Zealand, particularly more rural areas, and is very likely to continue as populations increasingly move towards metropolitan centres.

### **The institutional arrangements of larger organisations can create opportunities and challenges**

The precise nature of any shared service model can create opportunities and challenges. For example, CCOs that do not own the water assets must position themselves as a 'trusted advisor' to shareholder councils to be able to perform effectively. This is different to asset-owning CCOs, who can raise rates to pay for required works, thereby better bridging the gap between tactical and strategic decisions.

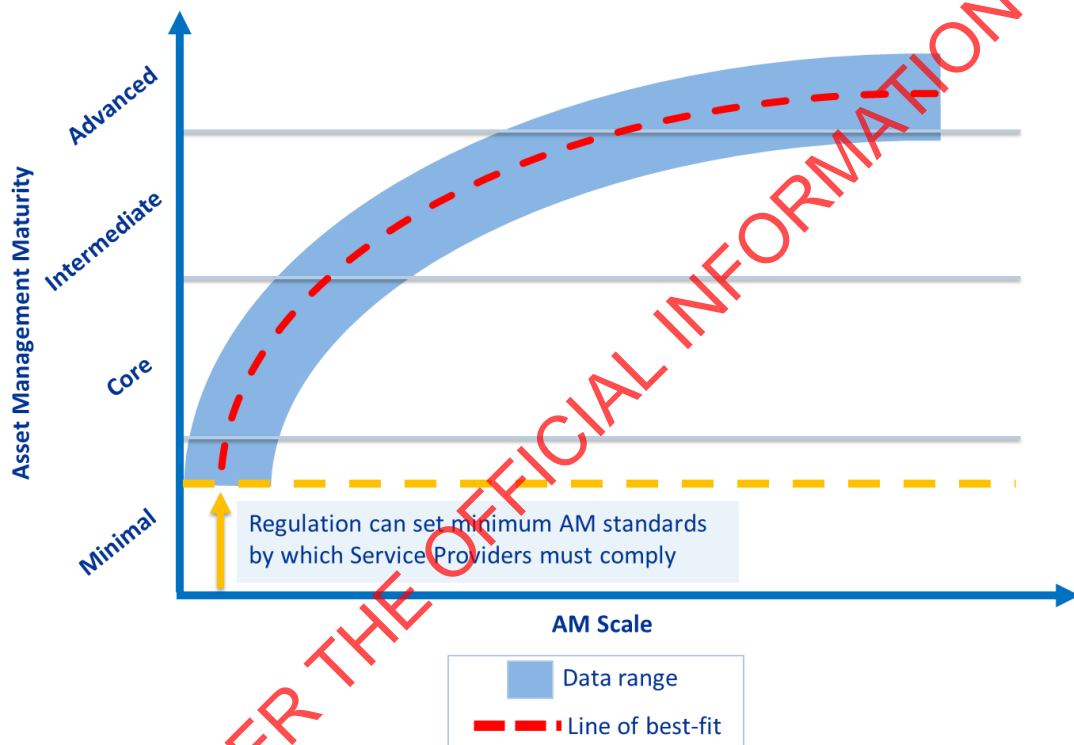
Auckland Council's stormwater team is separate to Watercare, which has resulted in different collaboration arrangements. In addition to collaborating with Watercare (e.g. a pipelining panel, pipe checking, and collaboration on operations and maintenance contracts), Auckland Council also collaborates equally with other council bodies including Auckland Transport (e.g. catchpit maintenance and cleaning) and Auckland's resource

consenting teams on land use planning. The scope of this study has not allowed us to explore the advantages and disadvantages of this arrangement.

## 4.2 Regulation Can Advance AM Practices

Interviewees from small and medium service providers reported improvements to their AM practices in response to regulatory requirements, but argued they were not always fit-for-purpose and imposed resultant inefficient costs. Conversely, interviewees from larger service providers reported no further improvements to their AM practices in response to regulation, but approved of those regulations that allowed them to benchmark their performance against other service providers and encourage movement towards best-practice.

Figure 4.2: The impact of Regulation on AM Maturity



The impacts of key regulations are discussed below.

### The Local Government Long Term Plans and 30-year Infrastructure Strategy Requirements have enhanced important future planning

There was a consensus across all service providers that the Long Term Plans helped asset managers to hold conversations with elected members that looked beyond local election timeframes. There was also consensus that the 30-year infrastructure strategies have been beneficial by requiring service providers to publish plans beyond a 10-year horizon, allowing asset managers to hold 'the difficult' conversations with elected members about longer-term AM and renewals expenditure.

Several asset managers also reported that the OAG's role as auditor of service provider strategies created strong incentives to publish meaningful and useful products – one asset manager commented that "auditors can be friends" and provided useful guidance to service providers.

### **The 2013 Non-Financial Performance Measures received a mixed response**

The Non-Financial Performance Measures require local service providers to provide performance metrics on the safety of drinking water, maintenance of reticulation network, fault response times, customer satisfaction and demand management.

Service providers were mixed in their views. Smaller service providers felt they created reporting requirements that did not add value for them because they did not use the measures for benchmarking against other service providers or improving service delivery. The reason cited was the additional time required to engage meaningfully in benchmarking – often a significant chunk for small AM teams of one or two individuals – and a perceived lack of benefits (asset managers cited lack of time to implement any AM improvements that might result).

Large service providers agreed with the purpose of the non-financial performance measures as an important tool for benchmarking, sector improvement, and best-practice sharing, but argued that the policy details and implementation were flawed. This included that:

- There are significant variations in data collection methodologies being used across the country, which means they cannot be effectively used to benchmark.
- Some measures focus on response rather than LoS. An example from one small service provider related to the Fault Response Times Measure: the service provider reported instances in the past when they have had someone out on site when a fault is noticed who is able to attend to it immediately – resulting in very short response times – however because response times are measured from the time of notification and it was not officially notified to service provider, the service provider was not allowed to report it.
- The demand management average consumption per resident per day measure was a challenge for some service providers with significant tourism, as their figures were greatly skewed.

### **Drinking Water Standards and The National Policy Statement for Freshwater Management (NPS FM) are important measures but create significant challenges for smaller service providers**

It was unanimously agreed that having safe drinking water and minimising pollution to freshwater environments was highly important to New Zealand. However, smaller service provider interviewees felt that they were being subject to ever-increasing standards without extra funding or resourcing to support them.

All service providers agreed that the drinking water standards and the NPS FM were too prescriptive, and that service providers needed greater flexibility in how they achieve safe drinking water and freshwater management. One small service provider asset manager suggested it would be cheaper and more impactful on water quality standards for the local service provider to buy local dairy farms around local rivers and mitigate dairy run-off, than to upgrade expensive water treatment plants. A large service provider stated that consultation with their community showed the quality of the marine environment was most important to them, but the NPS FM was pushing them to focus on its rural waterways instead. This resulted in the service provider spending time and resource to lobby for change, and ‘framing’ their work programme to fit regulatory requirements.

### **One-size-fits-all regulations can increase AM maturity for smaller, less mature service providers, but this comes at a cost**

It is hard to create one-size-fits-all standards suitable to the wide range of service provider sizes and locations. Several service providers stated centrally-set regulations can undermine community-set LoS, which creates tension when regulation demands service levels that are not affordable to the local community.

Having to adhere to multiple government departments regulations could be one of the factors adding to the complexity of meeting regulatory requirements. Several asset managers, predominantly from large service providers, suggested that a unified regulatory body could make it simpler.

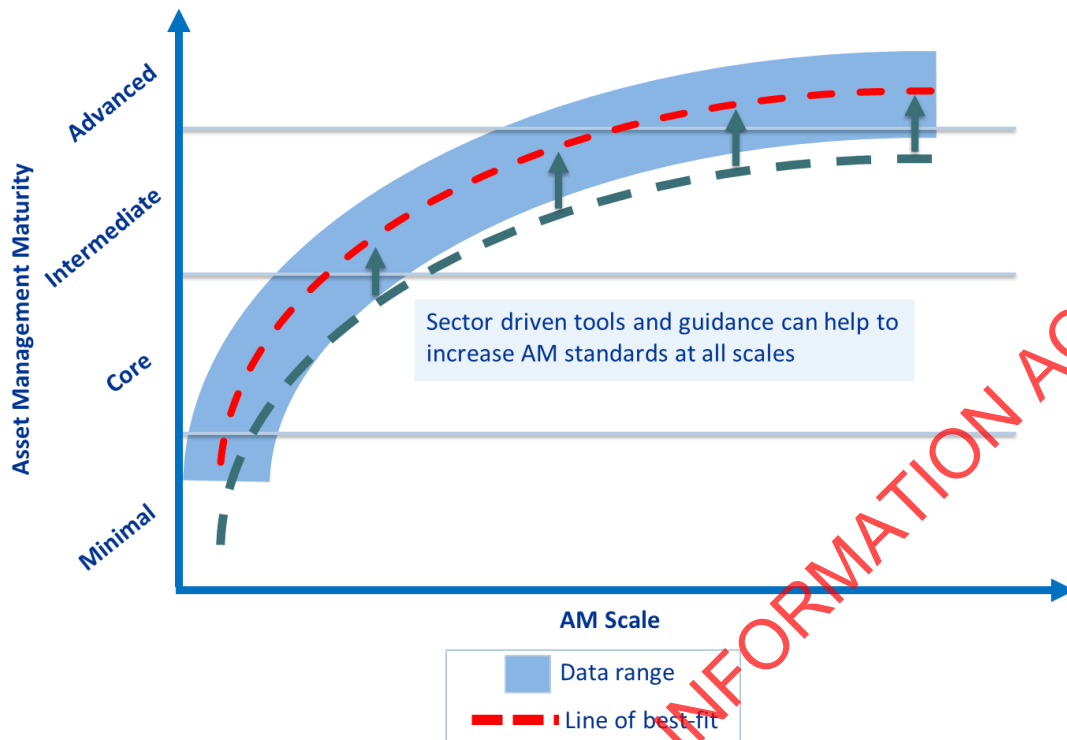
### **4.3 Sector Guidance, Tools and Collaboration are Advancing AM Practices**

Interviewees across all service provider types reported turning to sector guidance and collaboration to drive better AM. It is our observation that this has been a relatively recent occurrence: for instance, there has been a wide uptake of the International Infrastructure Management Manual (IIMM) guidelines across service providers, with all AMPs reviewed using it as a base for their plan structures. Service providers gave two broad reasons for this recent uptake: the growing need for AM capabilities that can meet growth or other affordability challenges, and the growing need to meet new regulatory requirements.

Interviewees often cited the role of peak bodies in accelerating their take-up through recommendations at conferences and other sector events. Several large service providers are also using ISO55000 as a guide to better AM, though few are seeking formal certification. Several larger service providers reported looking to apply and use the Treasury's investor-confidence rating (ICR) to benchmark against central government to drive better practice.

Water New Zealand produces annual reports which provide benchmarking service across the industry. Participation and sharing of data is voluntary, but 50 service providers out of 67 contributed to the 2015/16 report, showing a big increase on previous years.

Figure 4.3: The impact of Sector Initiatives on AM Maturity



### Service provider collaboration and sharing of best-practice is an important tool

All service provider types reported the benefits of voluntarily working and sharing practices with other service providers. Collaborative initiatives related to sharing best practice, or shared procurement. We found no examples of more extensive collaboration. Examples included:

- Rangatikei District Council and Manuatū District Council share an asset manager
- Ruapehu District Council reported a ‘friendly and helpful’ collaboration with Watercare
- Wellington Water have provided technical assistance to Hastings District Council
- Hastings District Council are establishing a regional water committee (akin to the regional land transport committees) made up of key stakeholders including the regional council and local District Health Boards
- Christchurch City Council are part of an Engineering Managers Committee between councils
- A voluntary group have been established to discuss management of the Whanganui river catchment area.

### Due to their voluntary nature, sector-driven initiatives have limitations

Interviewees reported three important limitations to sector-driven initiatives:

- **They rely on individual motivation.** Staff that have been in the industry for a long time may want to stick with a ‘the way it’s always been done’ approach.



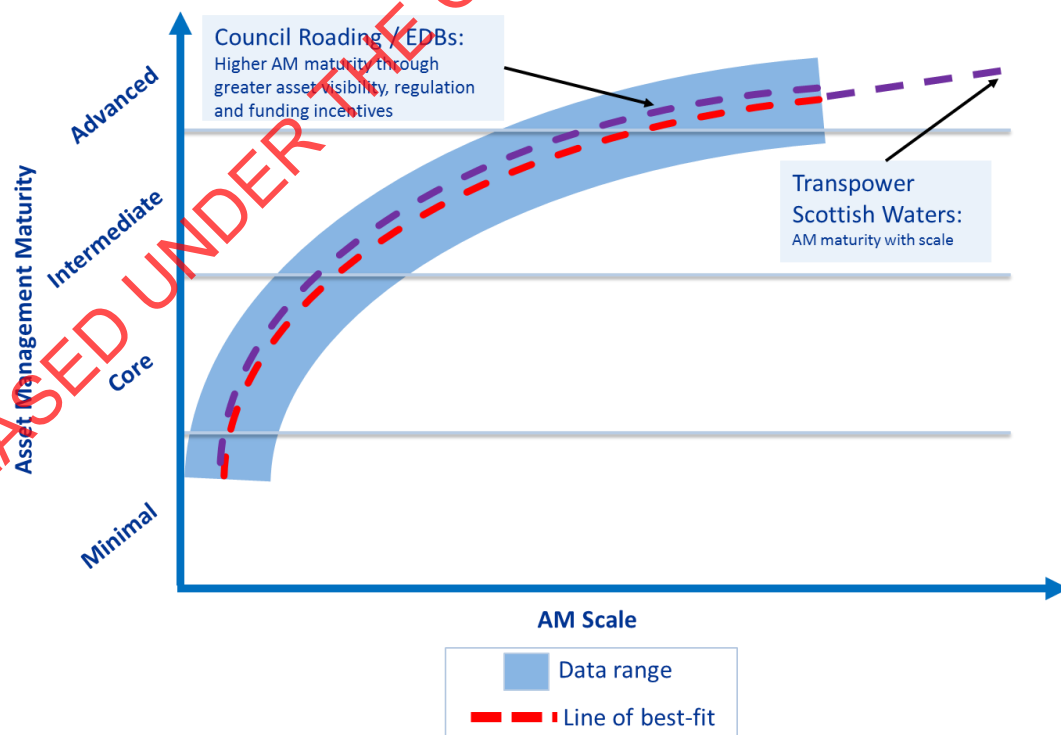
- **They can take up time and money that smaller service providers do not have.** Examples include going to national forums and conferences, membership fees, and costs of accreditation.
- **They can only take service providers so far.** Several interviewees from small service providers stated that constraints of time and resources fundamentally limited adoption of best-practice. The uptake of the IIMM standards in AMPs is a good example: though all service providers are following the IIMM best-practice template, the quality of analysis within AMPs varies considerably.

## 5 Three Waters AM is Less Mature than Other Sectors

We studied the AM maturity of other infrastructure sectors in New Zealand, and of the three waters sector of other countries, to explore possible drivers. While recognising that the three waters sector in New Zealand is unique with its own specific features and challenges, we found that:

- The **energy sector** has more mature AM practices, as well as greater scale and higher levels of regulation.
- The **local roads sector** has more mature AM practices, as well as additional funding incentives and greater visibility of the asset to the public.
- The **Scottish and Australian water sectors** have more mature AM practices, and greater scale.

Figure 5.1: Sector Comparisons: Energy, Local Roads, and International Best-Practice



## 5.1 Energy Sector AM is of a Larger Scale with Greater Regulation

The energy sector in New Zealand has a very different structure than that of the three waters. Transpower owns and operates the National Grid, whilst Electricity Distribution Businesses (EDBs) own the local distribution networks.

### Transpower has a relatively advanced level of AM

Transpower use the Maximo Asset Management system which is directly linked with the finance system, risk management and health and safety. They are also Certified ISO55000 and PAS55. Transpower use an advanced risk management framework involving six key stages consistent with NZA ISO31000, such as the use of bowtie analysis, asset criticality frameworks, and Asset Health Index.

The Commerce Commission must approve all Transpower's major capex, subjecting them to the regulator's scrutiny. They have AM plans for each type of asset class, and all assets are classified as low, medium, or high criticality.

*Transmission Tomorrow* sets out Transpower's vision for the energy sector over the next 40 years, and is designed to consider the electricity sectors changing needs and new technologies. It provides important sectoral direction at a strategic level, which is lacking in the three-waters sector (although we note that LGNZ have recently launched their Water 2050 project, designed to develop cohesive water policy).

### Electricity Distribution Businesses are more mixed in their AM maturity levels

There are 29 EDBs in New Zealand that must disclose an AMP every year, which is reviewed by the Commerce Commission. The Commerce Commission reviews the AMPs to assess the extent that the EDB has complied with disclosure provisions of the Electricity Distribution Determination 2012, and the Electricity Information Disclosure Handbook 2004. The feedback that the EDBs receive from the Commerce Commission helps them to continuously improve their plans, and their AM processes. The size of EDBs ranges from Vector, serving a population of approximately 1.5 million, to OtagoNet, serving approximately 21,000 people.

Earlier this year, the OAG conducted a review of three EDBs; Unison (serving 232,229), Alpine (serving 57,090), and Waipa (serving approximately 46,000).<sup>5</sup> The OAG noted that the three companies have adequate base asset knowledge, and appropriate initiatives to improve network resilience and ensure continuity of supply. However, they also noted that the EDBs lacked sufficient understanding of the financial effects of maintaining and replacing assets for a substantial portion of the assets' life, and more could be done to improve knowledge of asset condition, performance of critical assets, and risk management strategies.

The review was consistent with our observation that scale correlates to more advanced AM maturity, as the OAG concluded that Unison (serving the largest population of the three EDBs) was the most advanced.

## 5.2 Local Road AM is More Mature

The local roads sector is a useful comparator because, like the three-waters, local councils manage local roads.

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<sup>5</sup> OAG: Managing the Assets that Distribute Electricity, June 2017

### **Local roads AM is more mature with more visible assets and different funding arrangements**

The OAG completed a report in 2014<sup>6</sup> concluding that service providers have better and more reliable information about their above-ground assets than their below-ground assets, and are more likely to invest more in their road assets than in their three-waters assets. The main areas of AM difference were knowledge of the asset base, and confidence in asset condition.

Despite generally higher levels of AM maturity in local roads, variation across service providers is generally consistent with our findings across the three waters.

Interviewees in our study, from across all service provider types, consistently agreed with the OAG's findings that the two most likely reasons for higher AM maturity in local council roads are:

- Council roading is partially subsidised by the NZTA, and funding is subject to councils meeting NZTA requirements, standards, and procedural and technical audits;
- Roads are more visible, leading to greater public scrutiny and pressure on elected members to fix problems.

### **5.3 There are International Examples of More Advanced AM Practices in the Three Waters Sector**

We explored the AM maturity of Scottish Waters (Scotland) and the Australian water sector to understand if scale and AM maturity correlated in other jurisdictions.

#### **Scottish Waters is a useful comparator because of its mixed population density and its world-leading level of AM maturity**

Scotland Waters is a publicly owned company, responsible for drinking and waste water for all of Scotland, a population of approximately 5.4 million people (by comparison, New Zealand's population is 4.7 million). It was founded in 2002 after the merger of East, West and North Scotland Water Authorities. Since then, Scotland Waters have made significant advances and are now recognised internationally for their advanced AM approach, even offering advice and guidance to utilities worldwide.

They are PAS 55 certified and were the first organisation to receive certification in new ISO 55001. Their practices included advanced asset models, and asset type specific master plans with an optimised approach to whole lifecycle AM. AM is highly integrated into thinking at all levels of the organisation, with customer needs at the core. They are a good example of how scale correlates with AM maturity.

#### **Australia also has a large-scale approach to water management**

Australia has state-level regulation of the water sector, administered by ministry/departments of water. The utilities are state-owned and provide guidance, monitoring, and enforcement of water standards. Potable and waste water are a separate sector from stormwater.

The experiences of some Australian utilities demonstrate the importance of bridging siloed working structures to get the most value from scale. Challenges faced by some utilities in the Australian sector include a traditional AM siloed structure, with independently

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<sup>6</sup> OAG: Water and Roads: Funding and Management Challenges, November 2014

managed teams responsible for important tasks such as repairs, maintenance, and planning. This can result in priorities being overlooked by separate departments, or lost in translation.<sup>7</sup>

However, awareness of this is growing, and integrated asset lifecycle management is becoming increasingly popular. An example of this is the Victorian water utility, GWM Water, responsible for over AUS\$2 billion worth of assets. They have significantly advanced their AM maturity by adopting a centralised and integrated AM technology system that allows them to gather data from across the entire organisation and view it on a single easy-to-use platform. This has greatly increased their ability to understand how their assets are performing and track where they are spending money.

Queensland Urban Utilities, responsible for delivering drinking water and sewerage services to more than 1.4 million people, have also recently adopted a new technological approach to their AM. A new AM system allows them to conduct more advanced asset assessment analytics, which can extend the remaining life of certain assets, allowing them to optimise their budgets, and more sustainably plan for the future.<sup>8</sup>

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<sup>7</sup> Australian Water Association – 46 Million Reasons to Think About Asset Management, June 2017

<sup>8</sup> Queensland Water Award Finalist pushes for innovation in critical asset management, August 2017



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