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Far North
District Council

Review of WICS data

Far North District Council

July 2021

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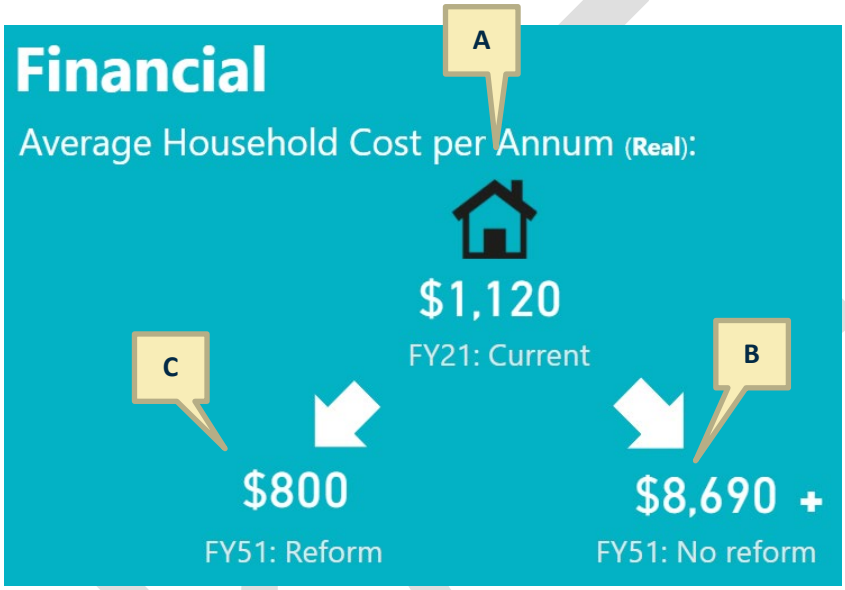
Executive Summary

This report provides commentary to provide councils support to interpret WICS calculations and how those relate to your existing council information. The key analysis of your council dashboard is of items A, B and C.

- **A** – represents the estimated average household cost using WICS modelling approach, this is not representative of actual charges.
- **B** – represents the projected future household charge in 2051 without reform.
- **C** – represents the projected future household charge in 2051 for **Entity A,** with water reform.



The most frequent questions typically raised by councils are:

- Why are the WICS numbers so different from our RFI?
- Can we rely on the WICS numbers?
- Is reform likely to be good for our council?

The WICS investment numbers are based on Scottish Waters' experience and applied to a NZ context using high level statistics and allocated using a formula to estimate investment costs. The way the model works is to maintain a three water debt to revenue ration of less than 250%. Even without this limit sensitivity testing still show a positive justification for the Entity.

In section 1.5, we modelled some sensitivity testing of the WICS model and noted even if Far North's total investment requirement is half the amount that WICS projected, household charges in Far North could be up to 5 times higher than the most pessimistic scenario for Entity A.

While WICS investment numbers may not be accurate for Far North District Council there is still a high level of confidence in the direction the WICS model is predicting. In our view:

- The WICS analysis may overstate investment needs for Far North, particularly for the ten year period to 2031.

- Notwithstanding the above, the analysis is directionally consistent with trends that we have observed in our detailed three waters work elsewhere in the country.
- Based on the WICS modelling, there are likely to be financial[1] benefits for ratepayers in the Far North District if water reform proceeds and Far North District council joins Entity A.

1 Introduction

The Department of Internal Affairs (DIA) has commissioned specialist economic, financial, regulatory and technical expertise to support the Three Waters Reform Programme and inform policy advice to ministers.

In mid-2020, a first stage of evidence was commissioned on the potential economic benefits of aggregating water service delivery entities in New Zealand. This was produced for DIA by the Water Industry Commission for Scotland (WICS) using publicly accessible council information and was released in December 2020. Between October 2020 and February 2021 a nationwide Request for Information (RFI) took place across all 67 councils.

This data has been used to inform several workstreams including the second stage of economic analysis found in the WICS Phase 2 report. This latest information has now been released to councils through the 'Council dashboard' and supporting reports.

This report is based upon our review of public WICS reports and individual council models provided by WICS. In some cases, the approach or assumptions used by WICS are unclear; this report focuses solely on the information we were able to access and interpret.

It is also important to highlight that there is no connection between the WICS analysis and the government's wider support package including calculation or allocation of the 'no-worse off' and 'better off' parts of the package.

The data in the dashboard is a combination of calculated information (household charges) and data straight from the RFI e.g. FTE data in Operation all the information within "Services".

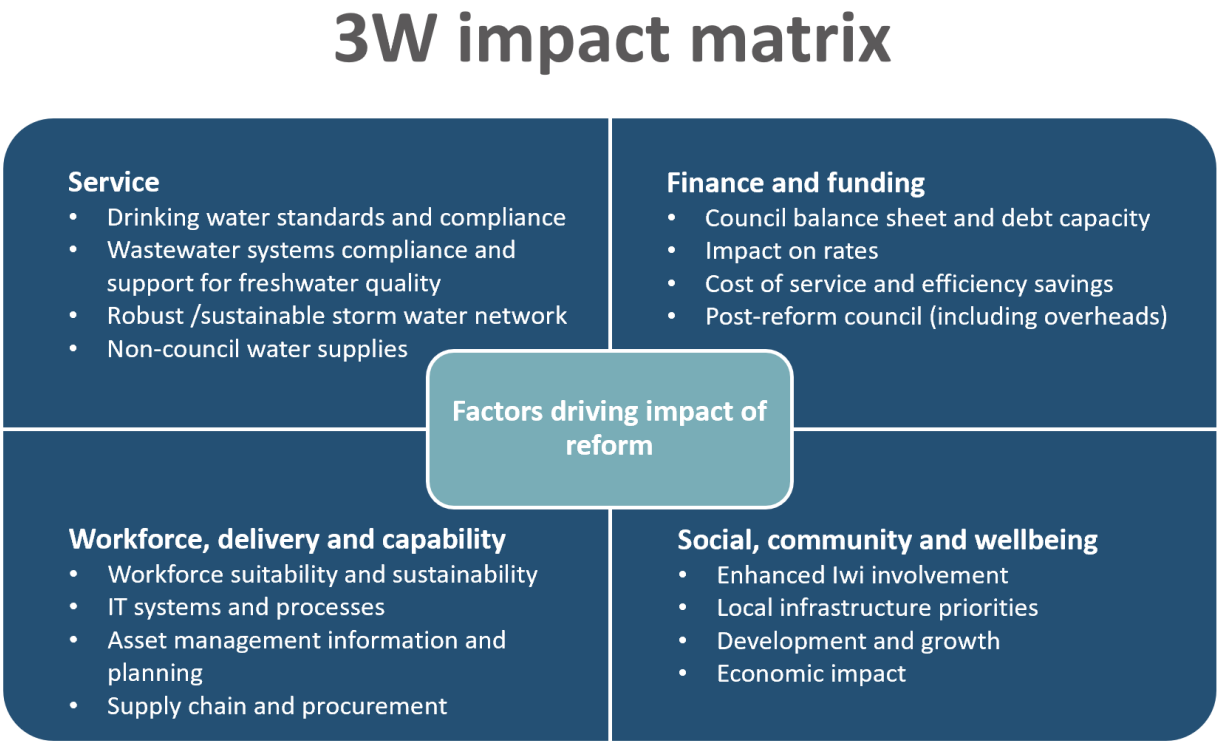
1.1 Three waters reform

While this report concentrates on the financial analysis recently provided in the Council dashboards, it is important to highlight that this is only one part of the wider suite of information that councils need to consider when looking at the proposed reforms. The impacts, benefits, issues and risks of reform are far more wide-ranging than just the financial impacts.

LGNZ has developed a matrix shown in Figure 1 below which highlights the broad considerations each Council should be considering and in our view this represents a good starting point. This helps ensure that benefits, issues and risks around levels of service, capability & capacity, prioritisation of investment and impacts in communities and councils are also considered alongside the financial.

[1] note this is purely from a financial aspect and has not included other considerations, such as those illustrated in Figure 1.

Figure 1 Understanding the impacts (LGNZ)



We also note that as a result of the three waters work we have undertaken across New Zealand over the last 18 months, our view is that the likely future household costs for three waters will increase significantly for all councils as a result of meeting increased standards, regulations and satisfying a more rigorous compliance regime. Our view of future costs may not be as high as modelled by WICS, but the direction is the same.

1.2 WICS Analysis

Scenarios

Broadly, WICS compares two scenarios:

- Aggregation of three waters services into four water services entities and the associated reforms to the regulatory, governance, management, resourcing, and policy direction that support improvements ('the whole reform package')
- No aggregation of three waters services and although in this scenario some reform takes place, for example, decisions already made to introduce a drinking water regulatory system and environmental standards, the wider reforms are not as extensive as in the former scenario.

Assumptions

The assumptions WICS have used to quantify the inputs are determined through benchmarking against the UK experience. Whilst there has been some adjustment based on council feedback the potential investment requirements and ability to deliver the same efficiency gains, both key drivers of the analysis, may not be comparable in the New Zealand context.

The key assumptions that drive household costs are:

- Investment – this is the single biggest driver of household cost in the WICS model. Due to the ways its calculated at a national level and allocated at entity level and council level it is difficult to understand the impacts it makes on the difference on the household charges under the two scenarios. Any change at the national investment figure will have a material impact on household charges in both scenarios.
- Debt/Revenue – the difference between the treatment of debt in the councils and the entities means that it is likely to overstate the size of the difference in charges between council and the water service entity.

The impact of these are so significant that all other assumptions have minimal impact on household costs.

The WICS analysis has been completed using a different approach, and different assumptions to the those in we used in an earlier business case we undertook for the three waters reform in NZ. We note that despite the differences in our analysis and the WICS analysis they are directionally consistent. That is, in both cases, it is anticipated that there are significant three water investment requirements to meet the new standards and this will lead to substantial increases in the cost of services.

A key risk is that the investment level in three waters could be greater than forecast. The WICS forecast investment articulates this risk. Our earlier business case also identified that an aggregated three waters entity was the option that best protected all ratepayers from the costs of meeting that risk.

Timeframes

WICS have undertaken the analysis over the 30 year time horizon. Responses to the RFI across the country were not consistent, where councils did not provide 30 year information, ongoing investment in growth infrastructure is assumed at the level of the final year in the data set. Undertaking future economic analysis based on a 30 year forecast is notoriously difficult especially in the context of the quality of the existing asset data. Additionally, this assumes capital expenditure follows a linear trend however we know that investment in three waters infrastructure tends to be lumpy.

More detail of the WICS analysis including methodology, impacts and assumptions is provided in Section 2 of this report along with a comparison to the relevant council based information or data.

1.3 Impact on Household Bills

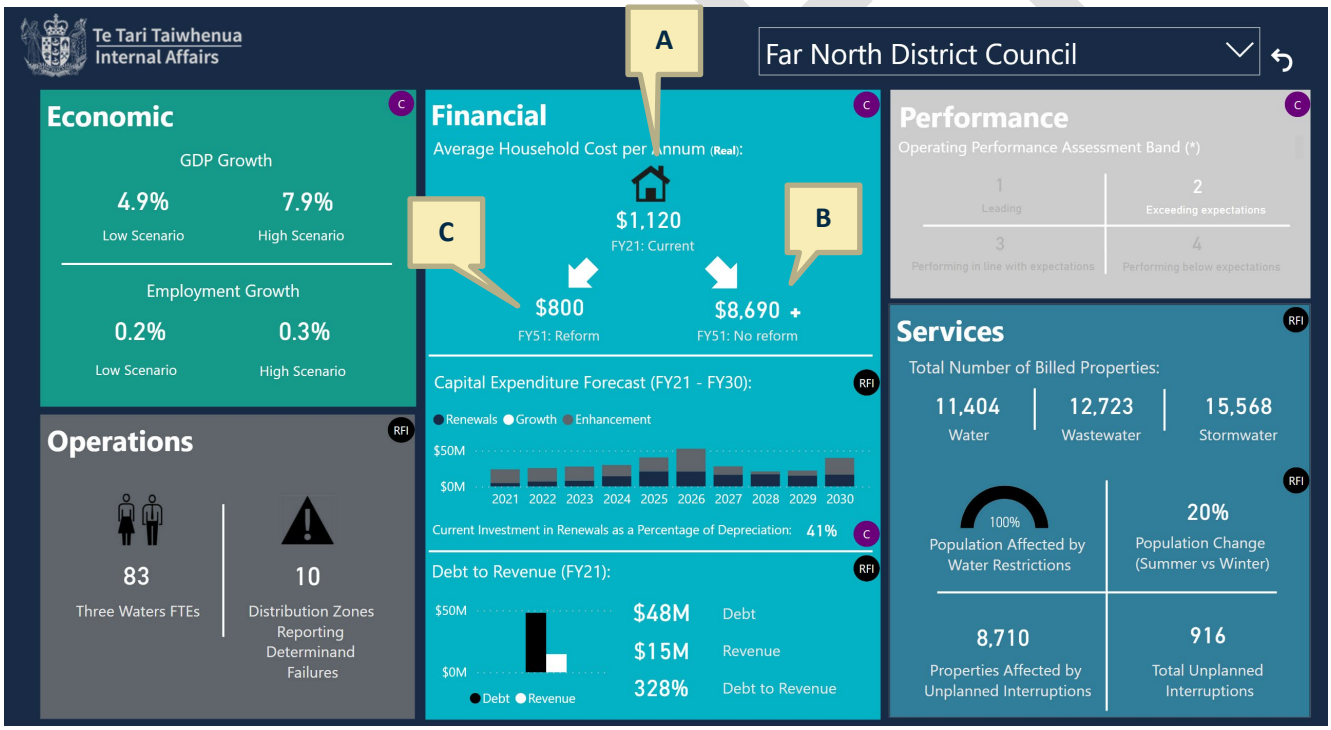
WICS have used an average household charge as the key piece of information for councils and communities.

The dashboards provided by DIA present three different average household costs, represented as A, B and C in Figure 2 below:

- **A** – represents the estimated average household cost using WICS modelling approach, this is not representative of actual charges.
- **B** – represents the projected future household charge in 2051 without reform.
- **C** – represents the projected future household charge in 2051 under the proposed Entity for your council, **Entity A,** with water reform.

These numbers are expressed in real terms, they are uninflated and expressed in today's dollars. The approach used by WICS to determine these values is outlined below.

Figure 2 DIA Dashboard



A

To estimate current household charges for each council, WICS have (**A**):

- Taken the starting total three waters revenue collected by the council (including development contributions but excluding grants and subsidies)
- Multiplied that figure by 70% - which is their assumed percentage of revenue derived from households. We have noted that the 70% does generally align with majority of councils, however some councils' revenue from households is higher and some lower

- Divided that figure by the estimated number of household connections, which in turn is derived from:
  - The average of the connected drinking water and wastewater populations. The model does not use actual household connection as identified in the RFI or use stormwater connections.
  - Divided by a standard "household density" multiplier of 2.7.

B

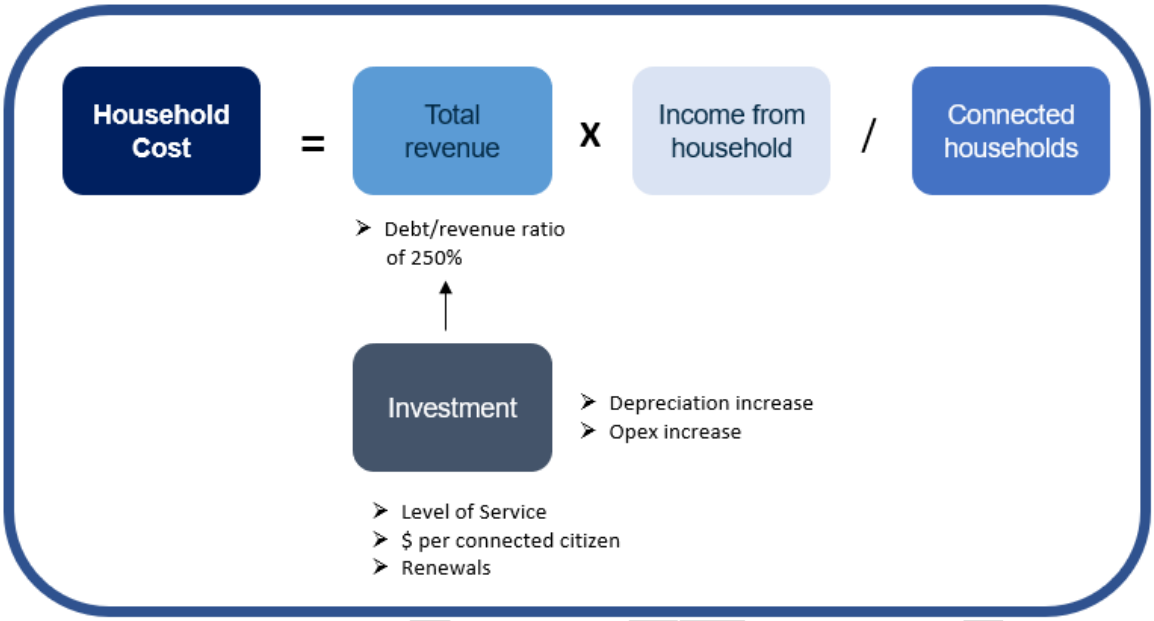
The process used by WICS to estimate future household charges (**B**) is the same as outlined above, using estimated future revenue requirements and estimated future household connections (which allows for growth in connections).

In order to determine the future household charge WICS have:

- Calculated the future required investment in growth, level of service enhancement, and renewal of assets:
  - Growth investment is assumed to be the same as disclosed in each council's RFI, with the same annual average expenditure applied across the full 30 year period if a council only disclosed 10 years of projected investment.
  - Renewal investment is assumed to be 100% of the economic depreciation of assets. WICS have undertaken their own calculation of economic depreciation based on assumed asset values and lives.
  - Level of service enhancement investment has been calculated using a standard approach across the country that has regard to population, land area and density. It does not reflect each council's actual investment set out in the RFIs.
- WICS have recalculated depreciation, this has increased council figures.
- Determined the impact of new investment on operating expenditure. WICS has assumed that for every $100 of capital investment there is $3 of additional operating costs. WICS have also included additional depreciation and financing costs for new assets.
- Determined the amount of new borrowings required to finance their modelled investment profile.
- Determined the amount of revenue that needs to be collected to ensure that councils are able to maintain a three waters debt to three waters revenue ratio of less than 250% over the modelling period. **This is the revenue number that is divided by WICS' estimated future household connections to reach the household charges at B above**.
- This revenue number typically results in operating surpluses being generated which are applied toward debt reduction.

This process is explained in Figure 3 below.

Figure 3 Household cost calculation



C

WICS have undertaken the same modelling to estimate the future household charges for rate payers of a council area if water reform entities were formed. The result reported in each council's dashboard (**C**) matches the projected future household charges for all councils in **Entity A** (of which the Far North District Council is a part) in 2051.

We have not reviewed (and have not been provided with) financial or economic models for any of the proposed water services entities, however we anticipate that the approach used to project future household charges for water services entities is closely aligned to that used to project future household charges for individual councils. The differences are likely to be in the assumptions applied, in particular:

- Entities have been modelled with no limit on the debt to revenue ratios (or no discernible limit). This means that WICS reports show the projected debt level for **Entity A** is allowed to nearly reach 800% of revenue by 2051. This accounts for a substantial part of the difference between the projected three waters rate for each council and **Entity A** in 2051.
- Entities have been assumed to be able to generate efficiencies amounting to 45% by 2051. By way of contrast, Far North District Council has not been allocated any allowance for potential operating or capital efficiencies. This accounts for most of the remaining difference between the projected three waters rates.
- Finally, the entity will benefit from the scale of aggregation. That is, the total revenue needs will be spread over a larger population base. The extent to which this scale benefit applies to a particular council will vary depending on population and land area.
- It is unclear whether the total investment requirements for **Entity A**, including depreciation and renewals investment, have been derived by adding the constituent parts of each council, or by undertaking new calculations using the population, land area and density of the new water services entity. Each approach is likely to have different results.

The various elements of the above approach are outlined in more detail in Section 2.

1.4 Comparison of key data from WICS

The following section compares data from the WICS model to that within councils RFI.

Far North District Council

The comparison highlights that WICS has modelled level of service and growth investment that is over three times larger than the investment requirements identified by Far North in its completed RFI. For Far North District Council, this is the most significant driver of the household charge calculations produced by WICS. The assumption of staying below a three waters debt/revenue ratio of 250% also drives a significantly higher three waters household charge than if debt/revenue was viewed at the total Council level.

Household Cost per Annum

Item	WICS - Council		WICS - Entity		Comments on assumptions
	2031	2051	2031	2051	
Household Charge (uninflated)	$8,118	$11,012	$1,018	$803	• Water Services Entity option shows a significantly lower charge per household.

Investment

Item	WICS - Council		RFI (2031)	Comments on assumptions
	2031	2051		
Total investment requirement	$777,950,540	$2,745,668,477	$316,544,837 (G1.3+G1.6+G1.9)[2]	• WICS model projects a significantly higher investment need.
Levels of Service Enhancement & Growth	$571,967,857	$1,715,903,572	$172,400,599 (G1.3+G1.6)	• WICS model projects a significantly higher LoS Enhancements and Growth needs.
Total Renewals/Capital	$205,982,683	$1,029,764,905	$144,144,238 (G1.9)	• WICS show slightly lower Renewals requirements.

Item	WICS - Council	RFI	Comments on assumptions
Asset Value	$919,793,243	$499,640,000 (Low) $1,157,760,000(High) (J1)	• Higher asset values become more relevant over time.
Depreciation	**$13,048,293** (Assumption C75)	**$4.373,000** (E1.25+E2.24+E2b.24)	• Depreciation 3 time higher than RFI. Depreciation becomes more material as investment in assets increase. • Implied depreciation rate WICS = **1.35% increasing to 1.75% over time. RFI = 0.87%.**

[2] Reference to data in Council RFI spreadsheet

Revenue

Item	WICS - Council			RFI	Comments on assumptions
	2021[3]	2031	2051	2031	
Total debt	$48,000,000	$380,058,968	$1,015,251,226	$153,118,000 (F3.14)	• WICS project debt to be significantly higher than in the RFI.
Total Revenue	$15,000,000	$157,300,184	$405,366,009	$15,382,983 (F10.62)	• WICS projects revenue to be significantly higher than in the RFI.
Debt to Revenue	328%	242%	250%	995%	• Charges increase to bring ratio back within 250% under the WICS model so comparison not relevant.
Operating Surplus	N/A	$56,433,624	$74,207,102	N/A	• Only exists under WICS model.

Item	WICS - Council	RFI	Comments on assumptions
Revenue from household	**70%**	**83%** (F10.4+F10.19+F10.54) / (F10.62-F10.61+F10.70)	• Far North collects a higher percentage from household charges compared to the WICS model assumption, this could mean Far North's future charges are higher than projected in the WICS model.
Connected household properties	**9,630**	Water = **9,512** (A1.1+A1.4) Wastewater = **10,843** (A3.1) Stormwater = **114,020** (A3b.1)	• Number of connected properties is lower in the WICS model, the charges are likely to be slightly lower than reported by WICS. • Not as material as other assumptions.
Development Contribution	**WICS assumes that development contributions, when combined with revenue from commercial and industrial users account for less than 30% of total three waters revenue**	**FNDC does not receive three waters specific development contributions**	• **Not material.**

[3] From DIA dashboard

1.5 Sensitivity testing key WICS assumptions

The impact of the key assumptions used by WICS outlined in section 1.4 has been outlined in the tables below:

- Table 1 shows the impacts on projected household charges in 2051 once the following adjustments have been applied:
  - Correction to the number of household connections to adopt the average of water and wastewater billed properties from Council's completed RFI
  - Correction to the percentage of revenue from households to match the percentage disclosed in Council's RFI
  - Sensitivity testing around the debt to revenue ratio assumption, to show the impact of applying a 500% ratio instead
  - Sensitivity testing around the projected investment requirement, showing the impact of halving the amount of investment projected by WICS.
- Table 2 shows the impacts of adjusting the level of required investment and assumed efficiencies for Entity A in 2051.

Table 1 Sensitivity testing of projected household charges in 2051 for Council

Investment	Three waters debt to revenue	
	250%	500%
100%	$12,354	$10,276
50%	$5,994	$5,483

Table 2 Sensitivity testing of projected household charges in 2051 for Entity A

Investment	Efficiencies	
	100%	50%
100%	$803	$1,075
50%[4]	$376	$516

The sensitivity shows that:

- When the underlying assumptions regarding percentage of revenue from households and number of connected properties are corrected, the forecast charges for Far North are likely to be approximately 12% higher than included in the WICS reports for Council.

[4] Entity A households costs under the 50% investment scenario include negative annual price movements which may be unrealistic. If a 0% price increase was used instead the household charges under both 50% investment scenarios would be $559.

- Even if Far North's total investment requirement is half the amount that WICS projected, household charges in Far North will likely be five and half higher than the most pessimistic scenario for Entity A.
- The scale of the difference between the entity and council scenarios is likely slightly less than WICS analysis indicates.
- At the extremes, council charges could be over thirty times higher than under an entity model, or as low as five higher than an entity in 2051.

2 Water Industry Commission for Scotland Commentary

2.1 Investment Projections

Investment is the single biggest driver of cost in the WICS model. WICS estimates potential investment requirement over 30 years for each council. This is considered for:

(a) Renewals (Replacement and Refurbishment).

(b) Levels of Service (Enhancement).

(c) Growth investment.

These three values are combined to determine a total investment programme for each council.

2.1.1 Renewals

In their various reports, WICS noted that based on a review of completed RFI's and comparison to their international benchmarks:

- Asset values reported by New Zealand Councils were typically low.
- Useful lives appeared to be optimistic.
- The split of asset value between short lived (less than 30 years) and long lived (estimated lives of around 100 years) was more heavily weighted toward long lived assets.
- Using the low range for asset values and the high range for asset lives (i.e. the two extremes) disclosed in RFI would increase the risk that there is insufficient resources available for asset replacement.

Based on their observations WICS therefore recalculated the depreciation for each council's asset base, assuming:

- 90% of existing assets are long life assets with an estimated life of 100 years.
- 10% of existing assets are short life assets with an estimated useful life of 30 years.
- Long life assets were assumed to have a valuation at the mid-point of the low and high end valuations disclosed in RFIs.
- Short life assets were assumed to have a valuation at the upper range of the valuations disclosed in RFIs.
- New investment is assumed to comprise 60% short life assets and 40% long life assets to enable the long/short life split of assets to eventually reach the international benchmark of 30% short life and 70% long life assets.

WICS has then modelled investment in renewals at 100% of depreciation throughout the modelling period. There has been no adjustment to planned renewals investment to reflect that some investment in level of service enhancement or growth is likely to also have a renewals component.

The modelled renewals investment is likely to differ substantially to renewals programmes that have been calculated by each council.

WICS have modelled an effective starting average depreciation rate of 1.35% of the revised asset value. This depreciation rate increases over the modelling period to eventually reaching 1.75%. These depreciation rates translate to an average useful life for three waters assets of 81 and 59 years, respectively.

Comments on the underlying assumptions

We note that WICS calculation of renewals expenditure and depreciation does not consider:

- The relative age profile of each councils network, and each councils stage in the asset lifecycle.
- The amount of investment in level of service enhancing infrastructure or growth infrastructure which may also have a renewals component.
- The actual split of long life and short life assets within each council, and the specific circumstances that give rise to that split (e.g. water networks with large distribution zones and therefore a higher proportion of reticulation assets which are typically long life, or the inclusion of stormwater assets which typically have longer lives and do not form part of the Scottish water asset base).

We note that the depreciation rate of 1.35% is broadly within the high end of the range observed in New Zealand already. However, the longer term depreciation rate of 1.75% is much higher than most councils in New Zealand (although this is intended by WICS).

While the rate of depreciation may be consistent with the New Zealand average, the valuation of assets is not. In our experience, councils typically value their assets at the low end of the valuation range provided in their completed RFIs. This means WICS has typically increased the total depreciation charge above those that are likely to be included in long term plans.

We are aware of a number of recent examples where councils that have had recent asset valuations have experienced substantial uplifts in assets value. This may support WICS assumptions around asset valuations.

Potential impact of assumption

Overstatement of the renewals requirement will result in an overstatement of debt and revenue projections for the entity.

This assumption is likely to affect the entity and council projections equally, so will likely have limited bearing on the comparative outcomes of household charges. However, it will have a significant impact on the projected household charges for councils in 2051 if reform does not occur.

2.1.2 Levels of Service and Growth Investment

The various reports produced by WICS outline three different approaches used to determine the future required investment in level of service enhancement (and in some cases growth expenditure):

- based on relationships between historical enhancement and growth investment in the UK (same approach as Phase 1 but updated using council RFI information).
- based on relationships between historical enhancement and growth in Scotland only (i.e. using the same approach as in Phase 1 but with Scottish data only); and
- based on the observed gap in asset values per connected system between New Zealand and the UK – this approach does not take into account growth.

While the approaches differ in how they arrive at their estimates they deliver broadly consistent results in terms of the magnitude of investment that is likely to be required over the next 30+ years. It indicates that in order to meet quality and growth outcomes, **spending will need to more than double from current levels over the next 30 years.**

WICS note these figures could ultimately be even higher, as they do not take account of investment uncertainty associated with the need to provide for seismic resilience, climate change, or responding to changing societal standards around environmental impacts (including iwi/Māori expectations).

It is unclear which of these approaches was used to identify the potential amount of level of service enhancement investment needed. However, we understand that the outcome under all three approaches is broadly similar.

WICS also applied two further adjustments:

- it appears that planned investment in growth infrastructure was effectively removed from the results in favour of using council's own projections for investment in growth infrastructure. Where councils only reported forecast investment for a 10 year period this was assumed to be representative of the next 20 years as well.
- applied a cap of NZ$70,000 per head for combined investment in level of service enhancement and growth infrastructure across any council area, this limits the modelled potential exposure of most rural councils.

WICS does disclose some of the formulas that it has used to identify potential investment requirements, although without knowing the source of the variables used within the formulas, we have been unable to replicate the results. We note however that the formulas (at least at a national level) do include length of waterways and coastline, so may make some attempt at incorporating relevant environmental factors.

However, at an individual council level, the investment numbers produced by WICS are based on population, land area, and density alone and have no relationship to each council's:

- Type, quality, or number of water sources
- Receiving environment for wastewater discharges
- Current treatment approach
- Current levels of service
- Asset age
- Asset performance
- Asset condition

Comments on the underlying assumptions

Investment is the single biggest driver of cost in the WICS model. It is what drives the future borrowing requirement, which in turn determines the amount of revenue that needs to be collected. That means that if the future investment requirements in the WICS modelling are under or overstated the future household costs are likely to be similarly impacted.

Despite this it is worth recognizing that predicting future investment requirements is notoriously difficult.

This is particularly true over long time frames, such as the 30 year period that has been modelled by WICS.

While predicting investment over a 10 year period is more certain, even this is challenging, as demonstrated by the long term plans of almost every council in New Zealand. Long term plans often have significant uplifts in their ten year capital works programs despite being only 3-year cycles.

We have not attempted to make an alternative assessment of 30 year investment requirements, and therefore have no view on whether the projected investment by WICS is appropriate. However, as it appears that a different approach may have been used to determine investment at a national scale than that used at a council level, even if the national, or regional investment projections are correct, the distribution of where that investment falls in relation to each council may not be correct.

Potential impact of assumption

WICS have used the derived future investment numbers in the stand alone financial analysis provided to councils as well as in the analysis completed for each water services entity. The higher numbers have a flow on effect to a number of assumptions, most importantly, the future revenue required by councils. This is then reflected in the calculated household charge.

We also note that for the purposes of their modelling WICS have assumed that this investment is evenly spread across the modelling period, however it is likely that this will be weighted further toward future years in practice. This results in a sharp increase in projected future household charges.

In the event that the future investment requirements are understated or overstated, there is likely to be a consistent impact on both the council and entity household charge projections. While this assumption may change the scale of the difference in projections it is unlikely to change the overall outcome of their analysis.

2.2 Revenue

Projected revenue is ultimately the main input into the WICS model that is used to determine household charges. The way in which future revenue is projected is therefore critical.

2.2.1 Three water debt to revenue ratio

The total three waters revenue that is needed to be collected by councils in the WICS model has been determined by reference to each council's total borrowing.

Revenue projections have been calculated by identifying the amount of revenue needed to ensure that each council maintains a three waters debt to revenue ratio below 250% over the entire modelling period. Revenue increases are front-loaded in the WICS model, with revenue increases typically stabilizing to match inflation over time (or at least reducing).

The WICS modelling results in forecast future revenue requirements which typically result in the council generating a significant operating surplus for its three waters activity. This surplus is applied toward debt management/repayment.

Water services entities appear to not have been subject to this restriction with Entity A's debt to revenue ratio exceeding 700% by 2051. We understand that the Government has received advice to suggest that a debt to revenue ratio of this magnitude would not adversely impact on water services entities' credit ratings.

Comments on the underlying assumptions

We note that councils are not typically financed on an activity basis. That is, councils are not required to maintain a three waters debt to three waters revenue ratio of 250%, and in fact a number of councils already exceed this ratio when looking only at three waters debt to revenue.

Three waters typically makes up between 20 – 30% of a council's total revenue, with most other activities typically requiring only low levels of debt. While three waters charges may increase at a much higher rate than other areas of council's business, we would still anticipate that a three waters debt to revenue ratio of around 500% would be within most council's future borrowing capability.

Potential impact of assumption

The revenue numbers directly translate into household charges for councils and the water services entities.

As councils are likely to be able to borrow more than 250% of their three waters revenue, the projected household charges are likely overstated.

Because no such cap has been applied to the water services entities, and we understand that there is official advice to support water services entities maintaining large debt to revenue ratios, this assumption has limited bearing on the projected household charges for the water services entity itself.

When viewed together, the application of this assumption by WICS is likely to overstate the size of the difference in charges between council and the water services entity.

2.2.2 Revenue from Households

WICS has used the split of revenue between households and non-households of 70% as observed in the UK. This has been applied to the total revenue figure above.

The 70% figure represents the total amount of three waters revenue derived from household water charges, and effectively does not include any revenue from development contributions, grants and subsidies, or commercial and industrial water use (or indeed irrigation/stock water schemes).

Comments on the underlying assumptions

In our view the assumption that 70% of revenue comes from household water charges appears to be fair at a national or water services entity level. However, this assumption is less likely to be applicable at an individual council level, noting that:

- Councils that have high levels of urban growth may receive a substantial portion of water revenue from development contributions, and in some cases this may account for the entire remaining 30% (or more) on its own.
- Highly rural councils may receive a large proportion of their three waters revenue from irrigation or stock water schemes, meaning much less than 70% of total three waters revenue is derived from households.
- Some territorial authorities receive large amounts of three waters revenue from large water users. This is particularly true in rural and provincial councils, which often have high water users in the agricultural and horticultural industries.

Potential impact of assumption

This assumption may impact on the size of the difference between the projected household charges under the council and entity scenarios because it is likely to be more accurate at an entity level than it may be for individual councils.

Councils which receive a lower proportion of their three waters revenue from households than is assumed in the WICS analysis will have higher projected household charges under the WICS analysis than they may otherwise have.

WICS analysis is also presented at a three waters level, which means it is difficult to see the impact for customers which may only receive one or two of the services provided. This is likely to be particularly relevant for councils with large rural areas.

2.2.3 Household connections

WICS have determined the number of household connections in their modelling by:

- Averaging the connected water and wastewater populations from each council's RFI
- Dividing the number by 2.7 (which is the average household density in New Zealand).

This value is used as the denominator in WICS' projections of average household charges. The higher this number is, the lower the projected household charge is.

WICS does not appear to have used any data regarding stormwater connections/charges within its analysis.

Comments on the underlying assumptions

Household density varies significantly between territorial authorities within New Zealand. This is particularly prevalent in the comparison of rural and urban councils. According to Statistics New Zealand, in 2018 the council with the highest occupancy rate has an average of 3.0 residents per household, compared to the least dense council having an occupancy rate of 2.1.

We understand that there are now councils that have significantly lower occupancy rates than that (with some reporting occupancy rates of less than 2 residents per household).

Potential impact of assumption

This assumption may result in a difference between the projected council and entity values (i.e. it will affect the entity and council differently) because the household density number varies significantly between council areas but is likely to be more accurate at an entity level.

For councils with low household density, it is likely that the application of this assumption will have resulted in the WICS analysis overstating the potential household charges in 2051 for individual councils. The projected household charges for the water services entity are less likely to be affected by the application of this assumption.

2.3 Capital and Operating Efficiencies

WICS looks separately at capital and operating efficiency expenditure. In both cases, WICS undertook econometric modelling (using the reworked Ofwat 2004 and 2009 models) of the potential for operating efficiency from each council using tools and techniques applied and fitted to UK water entities and tested this against New Zealand.

2.3.1 Efficiencies

WICS have applied efficiencies adjustments in some cases for individual councils. These efficiencies have been based on council size. The observed experience from United Kingdom demonstrates that only entities of a scale of more than 60,000 connected citizens could be expected to achieve any reductions in operating costs, even if they were subjected to robust governance and regulatory frameworks.

In the models provided, the scale efficiencies increase on a diminishing (logarithmic) basis above the minimum size threshold. This means there is no inclusion for efficiency improvement for councils with less than 60,000 population served. For councils above this threshold, efficiency gains are realisable (albeit at a diminishing rate) up to a maximum of 800,000 population served, after which no further returns to scale have been included in WICS modelling.

In determining the scale of efficiencies modelled for the Water Services Entities, WICS assesses the New Zealand Three Waters sector to be in a broadly similar position as Scotland in 2002, in terms of relative operating efficiency and levels of service. In just under two decades, Scottish Water has lowered its unit costs by 45% and closed the levels of service gap on the best-performing water companies in the United Kingdom.

WICS considers that New Zealand can achieve similar outcomes to Scottish Water i.e. a reduction of up to 45% over a longer period (30 years).

Comments on the underlying assumptions

We note that Entity A is projected to have around 1,700,000 customers on formation. This is comparable in size (but much less densely populated) to Bristol Water and South Staffordshire Water, who were cited as achieving efficiencies of 25% and 20% respectively in the WICS reports.

Potential impact of assumption

If modelled efficiencies from service delivery reform are overestimated, or underestimated, then this will have a direct impact on the projected household charges for the water services entities. That is, overestimation of the potential operating efficiencies will result in WICS' projections of household charges for water services entities being lower than they may otherwise be if those efficiency targets are unable to be met.

2.4 Sensitivity

WICS undertook detailed sensitivity analysis (Monte Carlo analysis) of their projected household charges to demonstrate whether there are any instances where household charges would be lower under continued council led service delivery versus the reform, scenario. Across the country, this analysis shows only a very limited number of cases where household charges have any potential to be lower without reform than with it. In these cases, WICS typically notes that the levels of service received by customers without reform would be significantly lower than they would be under the reform scenario.

Importantly, while this sensitivity analysis does consider different levels of investment requirements, it does not consider the impact of the debt to revenue assumption, or assumptions regarding the percentage of revenue from households, or the number of connections. We have not attempted to recreate the sensitivity analysis completed by WICS but would anticipate that correction of these assumptions prior to undertaking the sensitivity analysis would result in more instances where future household charges crossover under the reform and no reform scenarios.