IN THE MATTER of the Resource Management Act 1991

AND

IN THE MATTER of Resource Consents and Notices of Requirement for the Central Interceptor main project works under the Auckland Council District Plan (Auckland City Isthmus and Manukau Sections), the Auckland Council Regional Plans: Air, Land and Water; Sediment Control; and Coastal, and the National Environmental Standard for Assessing and Managing Contaminants in Soil to Protect Human Health

STATEMENT OF EVIDENCE OF TIMOTHY GERALD MUNRO ON BEHALF OF WATERCARE SERVICES LIMITED

PROJECT OVERVIEW

1. INTRODUCTION

1.1 My full name is Timothy Gerald Munro. I am the Manager of the Watercare Services Limited ("**Watercare**") Major Projects Group.

1.2 I have a Bachelor of Engineering (Honours) from the University of Canterbury and a New Zealand Certificate in Engineering from Auckland University of Technology. I am a member of the Institution of Professional Engineers, a Chartered Professional Engineer and an International Professional Engineer.

1.3 I have 30 years of engineering experience, 21 of which have been in designing and managing infrastructure projects and portfolios in the water and wastewater industry. I have worked for Watercare in a range of roles for over 18 years and I have extensive knowledge of Watercare's wastewater network and treatment facilities. I am currently managing a portfolio of infrastructure projects with a total value of over $2 billion.

1.4 Of particular relevance to the Central Interceptor Main Project Works ("**Project**"), I was the "Employer's Representative" (ie Watercare's Representative) for the Hobson Bay tunnel construction contract ("**Project Hobson**"). Project Hobson involved most of the same key aspects as the Project including link sewers, drop shafts, an odour treatment facility, a conveyance and storage tunnel that traverses under private property and the Waitemata Harbour, and a terminal pump station which is similar in depth to that proposed for the Project.

1.5 I also had an overview role in the development of the Three Waters Final 2008 Strategic Plan ("**Three Waters Plan**"), which identified the need for the Project as a key requirement of Auckland's future wastewater management strategy. I will discuss the development and outcomes of the Three Waters Plan later in my evidence.

Involvement in the Central Interceptor Project

1.6 As Manager of Watercare's Projects Group I first became involved in the Project in 2009 during the preparation of the consultant tender documents for the concept design and consenting phase. During that phase I provided guidance to the then Project Manager regarding the scope of the preliminary design and consenting works required to be undertaken by the consultants and the conditions of contract for the consultant engagements. I was part of the team that evaluated the consultant offers and selected the team to support Watercare through the preliminary design and consenting stages of the Project.

1.7 Since that time I have been involved with the Project to varying degrees. When the former Project Manager left in September 2012 I took over as the Acting Project Manager until the new Project Manager was appointed in April 2013.

1.8 I have therefore been very much involved in the development of the Project for over four years and have an extensive knowledge of the Project.

Executive summary

1.9 Watercare's vision is to provide "outstanding and affordable water services for all the people of Auckland". Water services include both water supply and the treatment and disposal of wastewater. Watercare's responsibilities for the supply of drinking water and treatment and disposal of wastewater mean the company is a major contributor to the health, prosperity, and well-being of the Auckland community. Of particular relevance, in order to fulfil its responsibilities and meet its statutory obligations, it must:

(a) maximise the use, and maintain the long-term integrity, of its existing assets; and

(b) continue to develop infrastructure to provide for growth and increased levels of service, while optimising the scope, timing and costs of any new investments.

1.10 As Mr Ford mentioned, Watercare must manage its operations efficiently with a view to keeping the overall costs of water supply and wastewater services to its customers (collectively) at the minimum levels consistent with the effective conduct of its undertakings[1] and ensuring it manages the effects of its activities on the environment.[2] The Central Interceptor Scheme is consistent with both these obligations.

1.11 The Central Interceptor Scheme is identified in the Auckland Council Auckland Plan 2012 ("**Auckland Plan**") as future critical infrastructure, and, as such, is said to be "fundamental to enabling development".[3] Prior to its inclusion in the Auckland Plan and following four years of investigations and consideration of alternative options, the Central Interceptor Scheme was also shown to be part of a "best practicable option" wastewater strategy for the Auckland region and the best practicable option to meet the trunk wastewater needs for central Auckland through the Three Waters Plan process. This has been further confirmed through the recent completion of the preliminary concept design which underpins the lodgement of the Notices of Requirement and consent applications with the Council in August 2012.

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1 In accordance with section 57(1)(a) of the Local Government (Auckland Council) Act 2009.

2 Under the Resource Management Act 1991.

3 Auckland Council Auckland Plan 2012, Chapter 12 at 679(i).

1.12 The Central Interceptor Scheme will address three critical needs (as identified in the Three Waters Plan). These were mentioned briefly by Mr Ford and are:

(a) To provide an alternative to the ageing 7 km section of the existing Western Interceptor nearest to the Mangere Wastewater Treatment Plant ("**Mangere WWTP**"), which includes the existing Hillsborough Tunnel and Manukau Siphon. This section has an estimated remaining life of between 15 and 25 years. Ensuring an alternative interceptor is available within this timeframe is essential to provide asset security and avoid the risk of major adverse effects on the Manukau Harbour in the event of a failure of the existing asset.

(b) To provide wastewater infrastructure capacity to service population growth anticipated in the Auckland Plan. The existing Orakei Interceptor serves more than 25% of the population serviced by the Mangere WWTP (including the CBD and the majority of areas which have combined sewers). It will reach its capacity within the next 10 to 15 years. Ensuring additional capacity is available within this timeframe is essential to avoid the risk of dry weather overflows throughout the area served by the Orakei Interceptor.

(c) To significantly reduce the major wet weather overflows in areas of central Auckland. Overflows currently occur at 122 locations within the Central Interceptor catchment area, in some cases on more than 100 occasions a year, with a combined annual modelled volume of discharge of 2,200,000 m^3 of diluted wastewater to local streams, and then out to the Waitemata Harbour. If no improvements are made, this volume will further increase as growth and development continues, and the risk of overflows occurring at these locations during dry weather will also increase.

1.13 The Central Interceptor Scheme involves two packages of works:

(a) This Project, which comprises a 13 km gravity tunnel from Western Springs to the Mangere WWTP, four link sewers extending from the main tunnel, a series of connections to the existing Watercare wastewater network, and a new pump station at the Mangere WWTP to pump wastewater to the treatment plant.

(b) The CSO Collector Sewers, a series of smaller sewers that extend out from the Project into the local catchments to provide overflow mitigation at numerous network overflow locations. A separate designation and consent package has been lodged for these works. These works do not form part of the applications being heard at this time, and so will not be discussed further in this evidence.

1.14 The Central Interceptor Main Project Works Assessment of Effects on the Environment, August 2012 ("**AEE**") concluded that the actual or potential adverse effects arising from construction of the Project are of an acceptable level, particularly in light of the significant improvement to the existing situation that will result from construction of the Project. Further, the Project will have no adverse effects on the operation of the associated infrastructure at Mangere WWTP. With the exception of the emergency pressure relief ("**EPR**") structure at Mangere, Watercare does not require, nor is it seeking, any new discharge consents or variations to existing conditions or consents for the Mangere WWTP in order to progress the Project. The proposed Mangere Pump Station is within the scope of the existing designation for the Mangere WWTP.

1.15 The Project will result in substantial benefits which span across a large geographic area including:

(a) Protecting the Manukau Harbour by providing an alternative to the existing Western Interceptor, which is at risk of failing if not addressed in an appropriate amount of time.

(b) Installing a key wastewater asset which future proofs capacity for growth across the Auckland Isthmus.

(c) Enhancing local streams and the Waitemata Harbour by reducing frequent discharges from 18 wastewater overflow locations (including the two largest across the entire wastewater network) achieving a targeted level of service consistent with international best practice. In particular, there will be significant reductions of the major wastewater overflows in the Meola Creek catchment as well as other overflows which discharge into the Motions and Whau catchments.

1.16 As Mr Ford has noted in his evidence, it is important to recognise that the Project is one part of Watercare's wider planning and infrastructure delivery strategy for the region. A number of other major components of the overall wastewater strategy will be delivered before or generally within the same broad timeframe as the Project. While these are all independent of the Project, they will provide additional public health and environmental benefits, and will further enhance the provision of essential wastewater services in Auckland.

Scope and structure of evidence

1.17 The purpose of my evidence is to introduce the Project, to explain why it is necessary, and to emphasise both the risks of not acting and the benefits of acting as proposed. I will provide the context in which the Project is being undertaken, and the scale of construction effects compared to the scale of the overall Project and its benefits. I will also directly address some of the matters raised by submitters.

1.18 My evidence is structured as follows:

(a) overview of the Central Interceptor Scheme;

(b) overview of the existing wastewater network;

(c) issues with the existing wastewater network;

(d) consequences of not addressing these issues;

(e) benefits of the Project;

(f) the Project is the preferred solution;

(g) consideration of alternatives;

(h) delivery of the Project;

(i) response to submissions;

(j) response to Council Pre-hearing Report; and

(k) conclusions.

2. OVERVIEW OF THE CENTRAL INTERCEPTOR SCHEME

2.1 I will start by explaining what the Project encompasses, and how it will be constructed.

Project description

2.2 The Central Interceptor Scheme has two elements - the main project works and the CSO Collector Sewers:

(a) The Project is described in greater detail below. In summary, it comprises a 13 km gravity tunnel from Western Springs to the Mangere WWTP, four link sewers extending from the main tunnel, a series of connections to the existing Watercare wastewater network, and a new pumping station at the Mangere WWTP to pump wastewater from the tunnel to the plant.

(b) Other associated works are required in the vicinity of the Mangere WWTP, including an air treatment facility, a rising main to connect to the plant, and an emergency pressure relief ("**EPR**") structure to provide for emergency situations. These works will duplicate the lower part of the Western Interceptor (thereby reducing the risk of, and reliance on, this asset), create additional network capacity and reduce overflows at some of the largest wastewater overflow locations.

(c) The CSO Collector Sewers comprise a series of smaller sewers that extend out from the main project works into the local catchments to provide overflow mitigation at numerous network overflow locations. A separate designation and consent package has been lodged for these works. These works do not form part of the applications being heard at this time, and so will not be discussed further in this evidence.

2.3 The main elements of the Central Interceptor Scheme are shown on **Figure 1.1** on page 4 of the Hearing Drawing Set, with the main tunnel shown in purple, the link sewers in black, and the CSO Collector Sewers in blue.

Overview of the Project

2.4 The Project involves the construction, commissioning, operation and maintenance of a trunk wastewater interceptor and associated activities. The Project comprises the following (as shown on **Figure 1.1** on page 4 of the Hearing Drawing Set):

(a) A new sewer tunnel between Western Springs and the Mangere WWTP, approximately 13 km in length and between 22 and 110 m in depth below the ground surface ("**main tunnel**"). Three link sewer tunnels and a smaller piped link sewer connecting to the main tunnel. In total, the link sewer tunnels will be about 5 km in length.

(b) Connections between the existing Watercare transmission sewer network (the transmission network comprises the large sewers which provide bulk wastewater conveyance) and the main tunnel and link sewer tunnels to divert flow from the existing network to the Central Interceptor.

(c) Associated structures at the connection points, including access shafts, drop shafts, flow control structures, overflow structures, grit traps, air vents and air treatment facilities ("**ATF**s").

(d) A new pump station at the Mangere WWTP to pump wastewater from the Central Interceptor tunnel to the plant.

2.5 The Project comprises a substantial physical works project. The current cost estimate for the Project works is $620 million, and for the CSO Collector Sewers is $180 million (a total of $800 million).

2.6 Watercare has demonstrated a successful track record of delivering other large physical works projects including Project Manukau (the $500 million upgrade of Mangere WWTP) and the $110 million Waikato River water supply project. In addition, Watercare has recent experience successfully delivering and operating the $136 million Project Hobson (a

significant wastewater conveyance and storage tunnel), which provides very relevant experience for implementation and operation of the Central Interceptor tunnel. It is also currently constructing the $400 million Hunua 4 water main (32 km in length and up to 2 m in diameter), which involves major works in Auckland's built up urban environment.

2.7 Because of their significant difference in scale and a difference in timing, the two components of the Central Interceptor Scheme are being managed as separate projects and will be implemented as separate construction packages. Further information and operation of the Project will be provided in the evidence of Mr Cantrell, while Mr Cooper will explain the proposed construction methodology.

2.8 Until the detailed design has been completed, the final alignment for the main tunnel and link sewer tunnels will not be confirmed. Accordingly, resource consents are being sought for a corridor within which the tunnels will be finally located. This was also the approach taken for the new wastewater tunnel delivered as part of Project Hobson. Mr Cantrell will present further details of this in his evidence.

Construction sites

2.9 Mr Cantrell and Mr Cooper will provide detailed explanations of the surface construction sites, the proposed construction methodologies and intended system functionality in their evidence. I will therefore only provide a brief summary of these matters by way of general overview.

2.10 The Project will be constructed by tunnelling methods with construction largely occurring underground, but facilitated by construction sites where activities will also occur at the surface. The construction sites are at 19 locations along the main tunnel and link sewer routes, as indicated on Figure 1.1 on page 4 of the Hearing Drawing Set.

2.11 The three primary construction sites will be located at:

(a) Western Springs;

(b) May Road (Mount Roskill); and

(c) the Mangere WWTP.

2.12 These sites are shown on **Figure 1.1** on page 4 of the Hearing Drawing Set. These primary sites will be the construction bases for the tunnelling of the main tunnel. The primary sites could operate for around five to six years, depending on the construction methods employed.

2.13 Permanent connections to the main tunnel and to the link sewer tunnels will be constructed at 16 secondary construction sites.

2.14 Seven of these sites are on the route of the main tunnel and would likely operate for around 12 to 18 months. The locations of the sites directly on the main tunnel route are shown on **Figure 1.1** on page 4 of the Hearing Drawing Set.

2.15 Ten of the secondary construction sites will provide connections to the link sewer tunnels, rather than to the main tunnel (although the Mount Albert War Memorial Reserve site provides access to both the main tunnel and the link sewer). These sites would likely operate for around 6 to 18 months each.

2.16 As stated above, further information on the proposed works and construction methodology at each of the construction sites is discussed in detail in the evidence of Mr Cantrell and Mr Cooper.

3. OVERVIEW OF THE WASTEWATER NETWORK

3.1 I set out below a brief description of Auckland's wastewater network and its history, as well as each of the relevant components of the existing network. This will assist in understanding the context in which the Project is considered necessary and the key drivers for its design.

Overview of Auckland's network

3.2 The general purpose and operation of an urban wastewater network is outlined in Section 3.3 of Part A of the AEE.

3.3 Watercare's current wastewater network comprises approximately 7,700 km of wastewater pipes and over 500 pump stations. The main wastewater treatment plants servicing metropolitan Auckland are the Mangere WWTP, which services the metropolitan area within the former Waitakere, Auckland, Manukau and Papakura District boundaries, and

the Rosedale WWTP on the North Shore. The Auckland Isthmus and Central Interceptor catchment area are serviced by the Mangere WWTP.

Mangere WWTP

3.4 The Mangere WWTP has been significantly upgraded since it was first commissioned in 1960, most recently during the early 2000s as part of Project Manukau. Project Manukau established a land based treatment process involving activated sludge reactor-clarifiers, final effluent filters and UV disinfection. The Mangere WWTP now produces a high quality treated wastewater which is discharged via a shoreline discharge to the Manukau Harbour.

3.5 At the time of installation, the UV disinfection system was the largest of its kind in the world. The technology implemented at the Mangere WWTP is state of the art in terms of international best practice which ensures a high level of protection of public health. Project Manukau has received a number of prestigious awards in the years following its completion. The highest accolade was the 2004 IPENZ Environmental Award, which recognised in particular the huge improvement in the water quality of the Manukau Harbour, the restoration of the foreshore and the return to a natural harbour environment of 550 hectares of the seabed, the site of the former oxidation ponds.

3.6 The Mangere WWTP was also designed to be increased in capacity and upgraded as wastewater flows and loads increased in the future, without any need to increase contaminant loads discharged to the Manukau Harbour. The significance of this is that the $500 million+ Watercare has invested in upgrading the plant since 2000 has provided a very solid foundation for meeting a significant part of the region's wastewater treatment needs through to the end of our current 50-year planning period in 2062, with appropriate further capacity upgrades as planned.

Wastewater network delivering flows to Mangere WWTP

3.7 The wastewater network delivering flows to Mangere WWTP consists of a system of branch sewers, pumped rising mains and large transmission interceptors. A map illustrating the current extent of the wastewater network delivering flows to Mangere WWTP is attached as **Appendix A**.[4]

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[4] Note this map also illustrates the location of the proposed Central Interceptor as well as the proposed Northern Interceptor.

3.8 The network consists of five key interceptor sewers:

(a) Orakei Main Sewer;

(b) Eastern Interceptor;

(c) Western Interceptor;

(d) Southern Interceptor; and

(e) South Western Interceptors.

3.9 Details of the network are included in the AEE and I have not addressed them in detail in my evidence, except in relation to the Western Interceptor below, part of which will be duplicated by the Project.

3.10 The Western Interceptor was constructed in conjunction with the construction of the Mangere WWTP. Wastewater from Auckland's western catchments, including those in West Auckland, flows through the Western Interceptor via the Hillsborough Tunnel and Manukau Siphon to the Mangere WWTP as shown in **Figure 1** below.

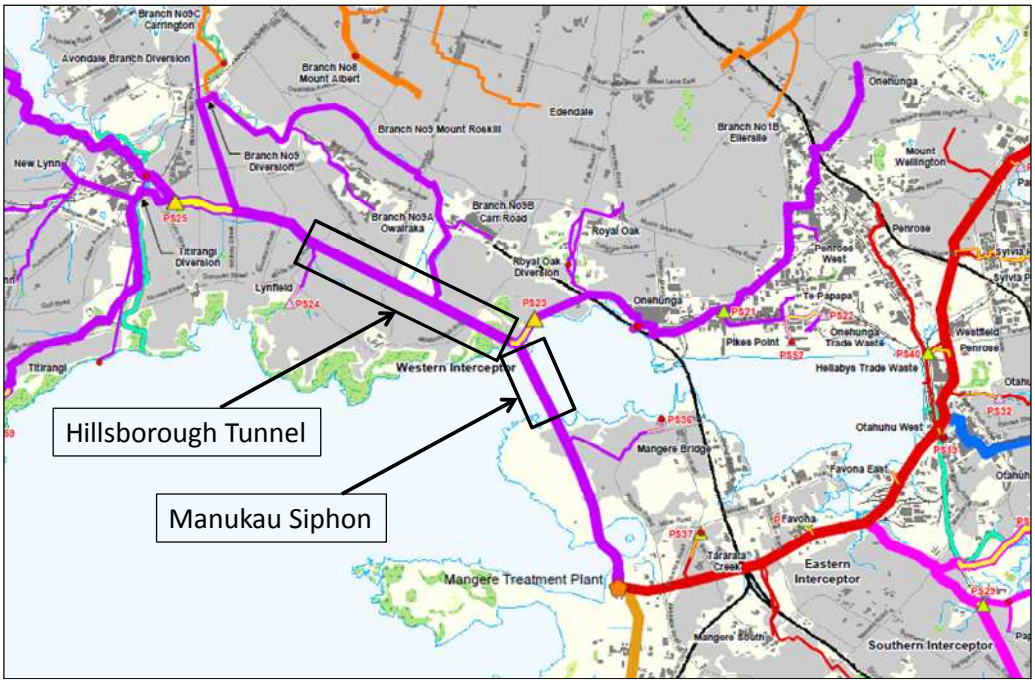


Figure 1: Location of the Hillsborough Tunnel and Manukau Siphon along the Western Interceptor

3.11 The Onehunga Branch sewer, servicing a largely industrial catchment to the west of Mount Wellington, enters the Western Interceptor immediately upstream of the Manukau Siphon. The Manukau Siphon,

itself an important part of the Western Interceptor, comprises a single 1550 mm diameter pipe that crosses under the Manukau Harbour between Onehunga and Mangere Bridge and then connects to the Mangere WWTP.

4. ISSUES WITH THE CURRENT WASTEWATER NETWORK

4.1 There are three significant issues with the current wastewater network:

(a) ageing assets;

(b) capacity for growth; and

(c) numerous existing wastewater overflows.

4.2 I discuss each of these below.

Ageing assets

4.3 The Western Interceptor currently serves over 200,000 people, and also conveys the majority of the industrial flow to the Mangere WWTP. Since its construction, it has been subject to deterioration due to sulphide attack on the concrete. In particular, the lower section of the interceptor through the Hillsborough Tunnel and the Manukau Siphon is showing signs of deterioration and is estimated to only have approximately 15 to 25 years of life left before it needs to be replaced. Portions of this infrastructure are in need of inspection, maintenance and upgrade and at present there is no ability to divert flows around these elements to allow for maintenance and risk management. It is important that such risk is addressed so that these potential risks of discharges to the Manukau Harbour in the event of failure are avoided.

Capacity

4.4 The Orakei Interceptor collects wastewater from over 25% of the population serviced by the Mangere WWTP, including areas spanning across Mount Roskill, Avondale, Mount Albert, Point Chevalier, Grey Lynn, Freemans Bay and the CBD. It is one of Auckland's oldest sewers and was commissioned in 1914. A 3 km section of this interceptor across Hobson Bay was replaced in 2010 as part of Project Hobson (discussed earlier). Continued growth and development has increased

the amounts of wastewater conveyed by the Orakei Interceptor for almost 100 years. Projections indicate that the capacity of the Orakei Interceptor will be fully utilised in approximately 10 to 15 years. Additional key branch sewers connected to the Orakei Interceptor are also approaching capacity limits in a similar timeframe, including Branches 9A, 9, 8, 7 and the Edendale Branch. Watercare's wastewater models also predict that local sewers feeding into these key branch sewers and the Orakei Interceptor are also at risk of approaching capacity limits, which will result in increased wet weather overflows and the risk of overflows also occurring in dry weather periods if no action is taken.

Network Overflows

4.5 The Auckland Isthmus is serviced by the older components of Watercare's wastewater network. Much of the Auckland Isthmus is served by a combined sewer system, where both wastewater and stormwater discharges drain to the same pipe network which was originally constructed in the early 1900s. This had the advantage of requiring only one network of pipes. However, as the network has only a limited capacity to convey storm flows, it regularly overflows during rainfall events and results in discharges of diluted wastewater and stormwater. This is very typical of sewer systems in cities that are of a similar age or older than Auckland. An example of an overflow is shown in the following photos of the Lyon Avenue combined sewer overflow, the largest one in Auckland, which discharges into the Meola Creek adjacent to Mount Albert Grammar School playing fields and the St Lukes Gardens Apartments, and is in the Roy Clements Treeway area.

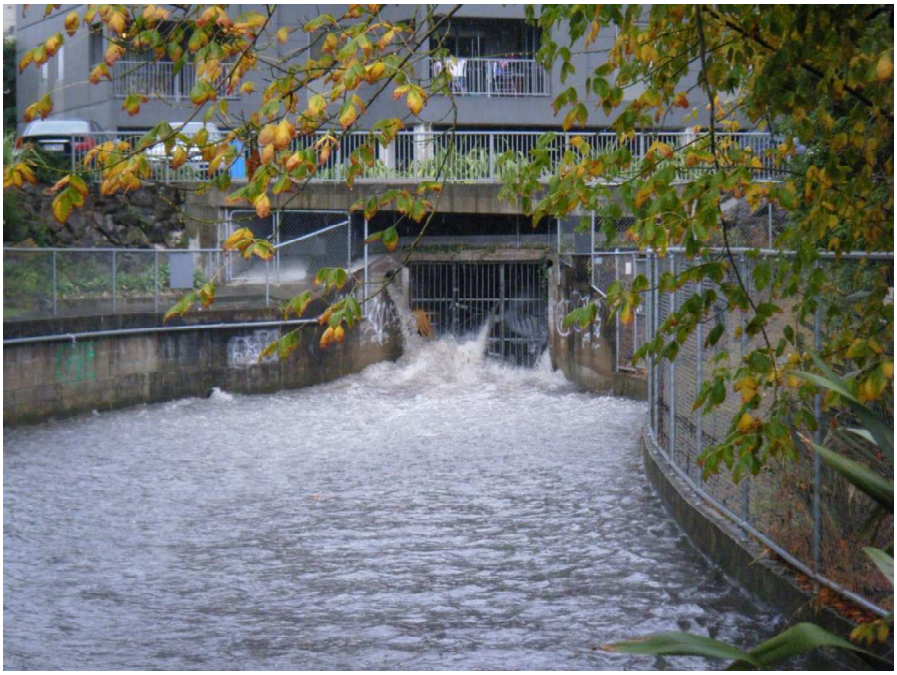
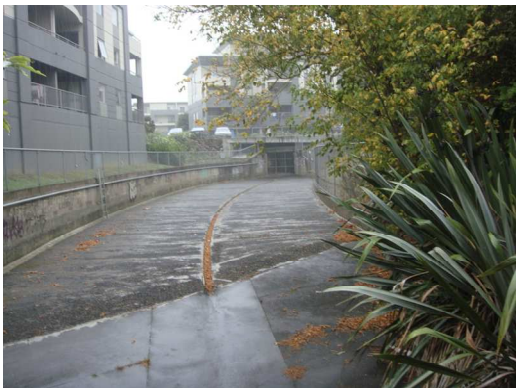
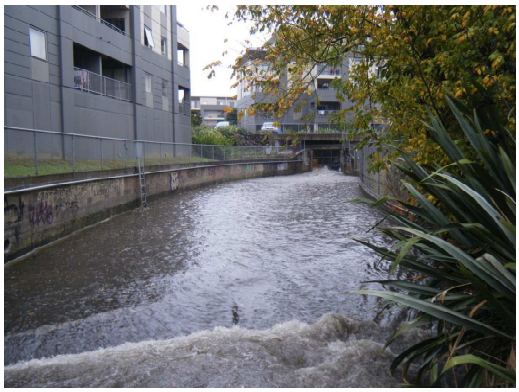


Photo of the Lyon Avenue CSO discharging a mixture of untreated diluted wastewater and stormwater (Note apartments directly above it)



Lyon Ave CSO during dry weather



Lyon Ave CSO during a small storm

The Lyon Avenue overflow during dry weather and a small storm.

Note the top photos were taken before the construction of the car park deck. The bottom photos are looking downstream. Note convergence with Meola Creek and the adjacent Mount Albert Grammar School playing fields.

4.6 Overflows from the wastewater network typically occur when the capacity of the conveyance system is exceeded in wet weather conditions, or (less frequently) as a consequence of blockages or power/mechanical failures at pump stations. To ensure that overflows occur in a controlled manner, dedicated engineered overflow structures are located at points along the network so that during rainfall events or blockages the excess flow can be more safely discharged to the local receiving environment. Without the controlled overflow structures, wastewater would "back-up" and uncontrolled overflows would occur in premises and private properties. The following figure (Figure 4-3 from the AEE) provides an illustration of how a typical combined sewer system works.

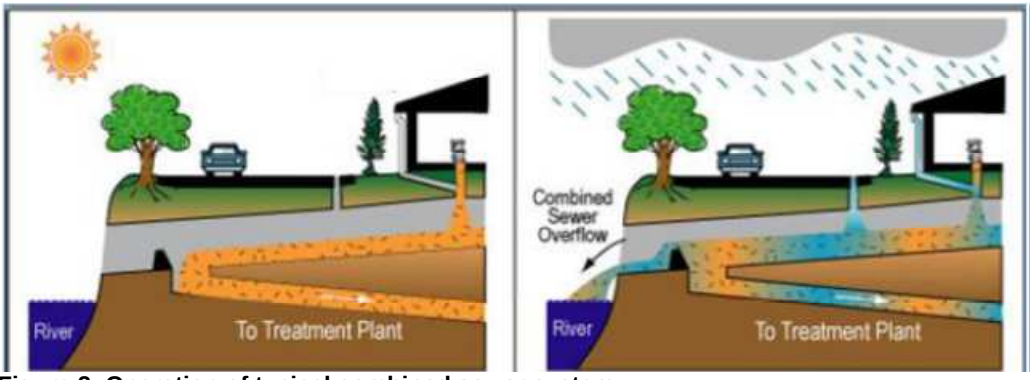


Figure 2: Operation of typical combined sewer system

4.7 While improvements have been made over the years to upgrade the combined sewer system, stormwater inflows remain significant and will continue to increase with the increasing growth and development anticipated for Auckland as more and more land is covered by impervious surfaces and storm flows are not able to be absorbed to the same degree.

4.8 Currently, there are some 122 active wastewater overflow points in the Central Interceptor catchment area which discharge a combination of diluted untreated wastewater and stormwater when it rains. Discharges occur directly via urban streams and to the Waitemata Harbour, and in many locations occur in residential areas, parks and adjacent to publicly accessible areas, including schools and parks. The streams which these overflows discharge into ultimately discharge into areas used for recreation such as the Point Chevalier Beach. These overflows discharge up to 100 times per year during wet weather, and presently discharge an approximate average volume of 2,200,000 m^3 of

wastewater and stormwater. This is equivalent to almost 1,000 Olympic swimming pools in present day terms, which would occupy an area of 125 hectares. These overflows will increase (both in volume and frequency) as growth continues.

4.9 Whau Creek, Oakley Creek, Meola Creek and Motions Creek, and the coastal waters around Point Chevalier and the Waterview Inlet are affected by these overflows, as shown in **Figure 3** below.

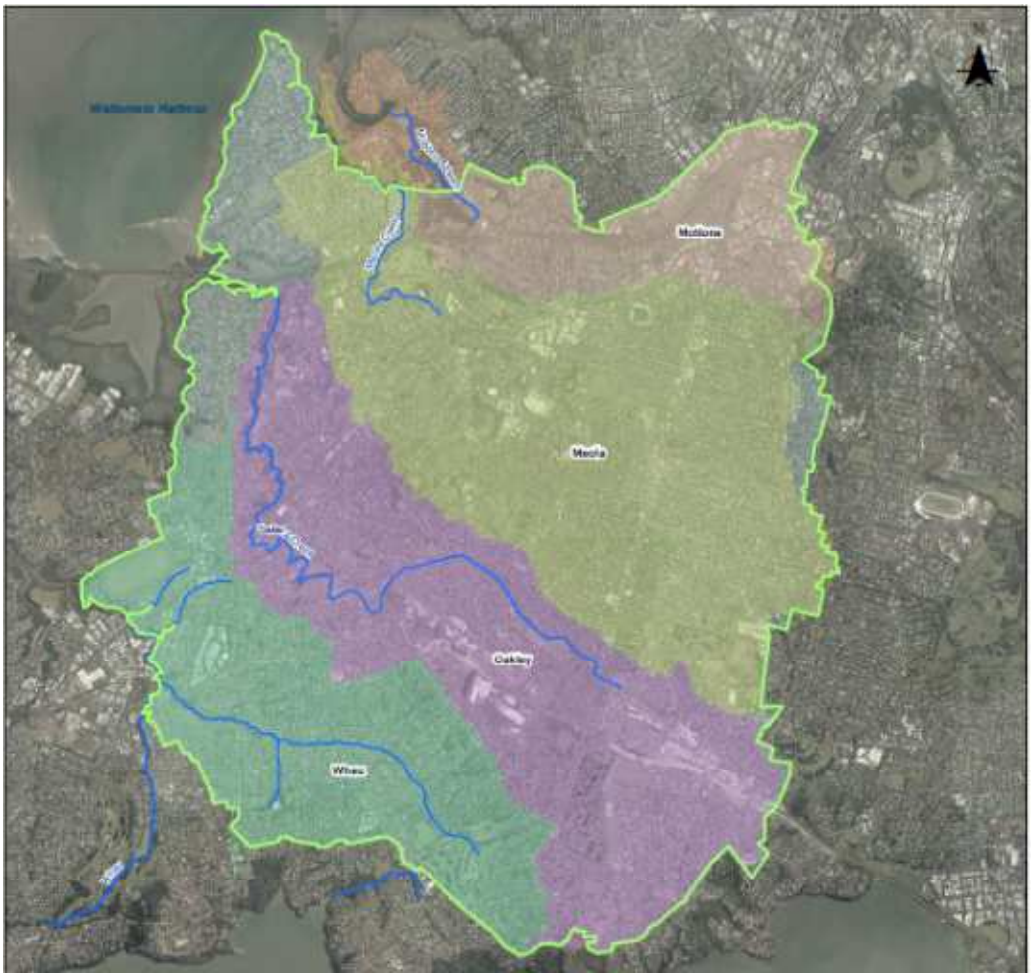


Figure 3: Catchments affected by 122 overflows targeted by Central Interceptor Scheme.

4.10 The existing overflows create potential public health risks for recreational users, and reduce the environmental, amenity and cultural values of the waterbodies. With on-going growth and development of the Auckland Isthmus this situation will continue to worsen if no improvements are made and the volume of untreated wastewater that is discharging to these areas will increase.

Conclusion

4.11 In summary, there are significant issues associated with ageing assets, Auckland's capacity for growth and the numerous existing wastewater overflows. I discuss the consequences of not addressing these issues below.

5. CONSEQUENCES OF NOT ADDRESSING THESE ISSUES

5.1 It is important to understand what could happen if these significant issues are not addressed. The main consequences of not addressing these issues are:

(a) An increased risk of failure of the Western Interceptor which would potentially result in significant adverse effects on the Manukau Harbour.

(b) The Orakei Interceptor and associated key branch sewers approaching available capacity in the next 10 to 15 years impacting on the future growth and development in the Auckland Isthmus and resulting in dry weather overflows of wastewater if no action is taken.

(c) Increases to already frequent wastewater overflow discharge events, volumes and effects in the areas of Whau, Oakley, Meola and Motions Creeks, and the coastal waters around Point Chevalier and the Waterview Inlet. This includes the risk of wastewater discharges in dry weather conditions, not just during wet weather events.

5.2 I briefly discuss each of these below.

Western Interceptor

5.3 The existing Western Interceptor will continue to deteriorate which presents an increasing risk of failure. If the Western Interceptor (in its current configuration) were to fail, it would be very difficult to repair in a short period of time. Failure could potentially result in continuous discharge of untreated wastewater into the Manukau Harbour from over 200,000 customers, including the majority of industrial flow treated at the Mangere WWTP.

Orakei Interceptor

5.4 Projected growth will result in the existing Orakei Interceptor, a primary trunk sewer servicing over 25% of Central Auckland's population (including the CBD), reaching its full capacity in the next 10 to 15 years. Beyond this point it will not be possible to provide sustainable wastewater service for the large areas of Auckland draining to this pipeline without frequent dry weather overflows.

Overflows

5.5 Existing wastewater overflows which discharge during wet weather at 122 locations throughout the western Isthmus of Auckland will continue to worsen in terms of frequency and volume. As growth continues, these overflows, which can currently discharge up to 100 times per year, will begin to also discharge during dry weather conditions. This will increase the potential public health risk and environmental and cultural effects. It is worth noting that these overflows discharge at multiple locations along key urban streams and the Waitemata Harbour, many of which are located in the vicinity of schools and parks. The significant benefits of the Project to public health have been acknowledged by the Auckland Regional Public Health Service ("**Public Health Service**"), which submitted strongly in support of the Project noting that there would be "clear public health benefits in this part of Auckland".

5.6 **Appendix B** provides a depiction of predicted future wastewater overflow activity both without and with the Central Interceptor Scheme in place during a 6-month storm event.

6. BENEFITS OF THE CENTRAL INTERCEPTOR SCHEME

6.1 The following provides a high level overview of benefits resulting from implementation of the Project as part of the Central Interceptor Scheme (which includes the CSO Collector Sewers package of works). To aid in understanding the benefits, the following overview provides some context of the benefits versus the adverse temporary construction effects. Mr Cantrell's evidence includes more details on the benefits provided by the Project.

6.2 The key drivers for implementation of the Central Interceptor Scheme are: mitigation of existing asset risks, providing capacity for growth (without dry weather wastewater overflows) and reducing existing wet weather wastewater overflows. Evidence presented by myself, Mr Cantrell and others will demonstrate why the Central Interceptor Scheme is the best practicable option to address these drivers. The key benefits are summarised below.

6.3 The Project presents an integrated and cost effective solution for the network that provides an alternative to ageing and deteriorating assets, addresses capacity issues, and significantly reduces overflows. It provides a key component for the on-going operation of the wastewater network for the next 50 years and beyond.

6.4 Once completed, the Project will provide the following key benefits:

(a) asset security through the duplication of the ageing Western Interceptor, which faces an increasing risk of failure if not addressed in an appropriate amount of time;

(b) the provision of capacity in the wastewater network for future growth and development on the Auckland Isthmus for the next 50 years and beyond;

(c) significant reduction of 18 major wastewater overflows (representing 50 to 60% of the total volume of overflows in the area targeted by the Central Interceptor) which impacts the Whau, Oakley, Meola, and Motions Creeks;

(d) enabling construction of the CSO Collector Sewers to further reduce the remaining 104 wastewater overflows from the combined sewer system into urban streams and the Waitemata Harbour;

(e) enabling the possible future extension of the Central Interceptor tunnel (the Waterfront Interceptor) to address up to 50 additional overflows in the Grey Lynn/Cox's Bay, Herne Bay, St Mary's Bay and Freeman's Bay areas; and

(f) as part of the wider wastewater network, significant positive effects on public health and the environment through the effective operation of the wastewater network generally.

6.5 It is acknowledged that, as with any project, there will be adverse effects during the construction period of the Project. These relatively short-term construction effects need to be considered in the context of the significant positive effects and wider regional benefits provided by the Project, and ultimately by the Central Interceptor Scheme as a whole. This context includes consideration of the geographic scale of the Project, the population served and affected and the timeframes involved. I briefly comment on each of these below.

Geographic scale

6.6 The Project will generate benefits across the Western Isthmus of Auckland including its watercourses.

6.7 Construction of the Project enables further works to be constructed, such as the CSO Collector Sewers (which are part of the Central Interceptor Scheme) and potentially the Waterfront Interceptor. Completion of the CSO Collector Sewers will increase this geographic area of benefits to include significant reduction in wastewater overflows from a further 104 existing overflow locations in the Central Interceptor catchment area (taking the total amount of overflow locations targeted by the Central Interceptor Scheme to 122). Additional overflows in the Cox's Bay, Herne Bay, St Mary's Bay, Freemans Bay and Grey Lynn areas could also be collected by the Waterfront Interceptor. Both projects depend on the construction of the Project.

6.8 The total geographic area potentially deriving direct and indirect benefits from the Central Interceptor Scheme is over 5,000 hectares in size, not including areas of the Manukau and Waitemata Harbours. Effects during construction of the Project are primarily limited to 19 surface sites along the 18.8 km alignment of the Project's main tunnel and link sewer tunnels.

Population scale

6.9 It is difficult to estimate the total population, both current and future, which will derive direct and indirect benefits from the Project and other associated works enabled by it. However, the population deriving benefits will be in the many hundreds of thousands.

6.10 Fortunately, due to the proposed method of below ground tunnelling to construct the Project, adverse effects associated with construction will either be contained within the tunnel or affecting only very limited local areas immediately adjacent to the relatively small 19 surface construction sites.

Timeframe

6.11 Benefits of the Central Interceptor Scheme will last for over 50 years in duration (likely greater than 100 years when considering the estimated life span of the main tunnel). Effects during the construction period are less than five to six years in duration (less than 5% of the anticipated life of the main tunnel), and the most disruptive effects which can almost all be mitigated to minor levels occur, in most cases, for 12 to 18 months or less. With optimisation during the detailed design process, we would expect that the effects of the works as assessed to date would, in reality, be to a lesser extent in many cases than described.

6.12 While the design life for the various mechanical and electrical components of the proposed Mangere Pump Station and other components range from 10 to 30 years, these items of equipment can typically be replaced or upgraded without impacting on the public or level of service. The design life for the Central Interceptor tunnel and the other main civil structures is however substantially longer, typically 100 years or more. These substantial design lives have proven to be possible as is demonstrated by the life of the old above ground Hobson Bay Sewer, which was just short of 100 years old before it was replaced by the Hobson Bay Tunnel. It is very important that these major assets are "future proofed" as far as possible as they will last for many generations. The effects of construction, which will occur for less than five to six years, is more than balanced with the very long life of the assets and the long-term public health and environmental benefits of the Project.

7. CENTRAL INTERCEPTOR IS THE PREFERRED SOLUTION TO ADDRESS ISSUES

7.1 The Project has been identified as a key part of a wider package of works to provide wastewater services in Auckland and to address the issues set out above. Planning has been underway for many years. I explain below how the Project fits within the regional framework,

expanding on some of the background already provided by Mr Ford in his evidence.

Regional approach

7.2 Watercare has contributed to an extensive history of planning for wastewater services on a regional basis. Fundamental to this process has been Watercare's involvement in assessing Auckland's future wastewater treatment plant and wider wastewater network (transmission and local) needs. This regional planning process, and the outputs from it, forms an important part of the context for the Project.

7.3 Importantly, it is necessary to recognise the financial challenge associated with upgrading the older parts of Auckland's wastewater network. Integrated solutions, addressing social, cultural, economic and environmental needs and limitations, are required to achieve the best outcomes.

7.4 Key elements of the regional framework, or regional approach, relevant to the development of the Project are summarised below.

Three Waters Plan

7.5 As outlined by Mr Ford, a regional wastewater strategy for Auckland was developed as part of the Three Waters Plan between 2004 and 2008. This process was undertaken to tackle the big issues underpinning a region-wide approach to assessing the future requirements of the Auckland region for the provision of water, stormwater and wastewater services.

7.6 The process, led by Watercare, took an integrated approach to planning water supply, wastewater and stormwater services over a 50 year period and beyond. The process was facilitated by Watercare working with the other Auckland water and wastewater service providers and the former Auckland territorial local authorities and Regional Council (as observers) along with government departments and community stakeholder groups.

7.7 The strategic planning process took more than four years to complete and incorporated input and feedback from engineers, environmental specialists, planners, national, regional and local body politicians, Maori, the Public Health Service and others. It culminated in the publication of the Three Waters Plan in December 2008.

7.8 The wastewater planning component of the Three Waters Plan included extensive consideration of options for addressing the region's trunk wastewater issues for the next 50 years including:

(a) approximately 30 options for discharge locations for treated wastewater discharges;

(b) more than 10 potential regional treatment plant locations and a range of treatment technologies;

(c) a wide range of wastewater collection, storage and transport options; and

(d) beneficial use opportunities for treated wastewater.

7.9 Twelve separate complete schemes were evaluated for areas of Auckland within the Metropolitan Urban Limits. Each scheme was evaluated by five separate expert groups with specialist experience in social, cultural, environmental, legal, technical and risk, and economic issues. Each group determined their own criteria to be used to evaluate the schemes.

7.10 Key conclusions from the strategic planning process were that:

(a) developing a new WWTP did not offer a cost effective or feasible solution to addressing the region's critical wastewater needs; and

(b) the ongoing wastewater treatment at the Mangere and Rosedale WWTPs represented the best medium to long-term option for servicing Auckland's future needs.

7.11 The continued use of the existing Mangere WWTP as the primary regional wastewater treatment facility was concluded to be the most practicable solution, with a future flow diversion from west / north west Auckland to Rosedale WWTP (instead of Mangere WWTP) and ongoing upgrading of both plants. This is the regional wastewater strategy that Watercare is now implementing.

7.12 Having confirmed the Mangere and Rosedale WWTPs as the future basis for wastewater treatment, the Three Waters Plan then identified that:

> Our most immediate wastewater need is to provide trunk sewer capacity to central Auckland. This is required urgently to significantly reduce wet weather wastewater overflows that already occur and to avoid the occurrence of almost daily dry weather wastewater overflows, even in times of no or minor rainfall, by possibly as early as 2035.[5] To meet this need, trunk sewer capacity to the Mangere Wastewater Treatment Plant will be augmented by way of a new Central Interceptor, with the final route and sizing optimised with the local network investment programmes to provide the least-cost regional solution.[6]

7.13 In summary, the Three Waters Plan confirmed the immediate need for the Auckland region was to:

(a) duplicate the critical section of the Western Interceptor and reduce the risk of trunk sewer failures due to ageing parts of the network;

(b) provide capacity for the future growth of the Auckland region; and

(c) mitigate combined sewer overflows and reduce untreated wastewater discharges from the wastewater network to the environment.

7.14 The Project was identified as the preferred solution to address all three of these needs, and as explained above these are the key drivers of the Project. Watercare has now lodged Notices of Requirement to designate land and is seeking the relevant Resource Management Act ("**RMA**") approvals to implement the Project.

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5 Watercare's most recent modelling assessments indicate that the capacity of the Orakei Interceptor will be insufficient to convey the normal daily dry weather wastewater flow within 10 to 15 years.

6 Three Waters Final Strategic Plan 2008, page 4.

Auckland Plan

7.15 The Auckland Plan reflects the outcome of the Three Waters Plan. It notes that Auckland faces significant wastewater management challenges, including capacity exceedance and wet weather overflows.

7.16 Watercare has adopted the Auckland Council's medium growth population scenario (issued May 2011) for its long-term strategic planning purposes. This scenario forecasts a population increase across Auckland from 1.48 million people to 1.75 million by 2022 and 1.95 million by 2031. There are currently around 1.26 million people served by connections to Watercare's metropolitan wastewater system. This is forecast to grow to 1.65 million people by 2031.

7.17 The Auckland Plan identifies existing and future locations for critical infrastructure to improve quality of life and help meet the vision of Auckland becoming the world's most liveable city. Strategic Direction 12 is to plan, deliver and maintain quality infrastructure to make Auckland liveable and resilient. The first of two priorities is to optimise, integrate and align network utility provision and planning.

7.18 Map 12.2 of the Auckland Plan (attached as **Appendix C**) identifies the "Central Interceptor (wastewater)" as a "Critical Infrastructure Network" in Auckland.

Watercare's regional wastewater strategy

7.19 Watercare's vision and key goals are set out in its Statement of Intent for the period 1 July 2012 to 30 June 2015. The vision is to provide "outstanding and affordable water services for all the people of Auckland". "Outstanding" means Watercare will provide safe drinking water, promote efficient water use, and enhance the environment including ecosystems and the health and wellbeing of people and communities, through the effective transport and treatment of wastewater. "Affordable" water services means that Watercare will run an efficient business and keep the overall costs of services to customers (collectively) at minimum levels. This is consistent with Watercare's statutory obligations.

7.20 The specific legal obligations placed on Watercare under the relevant statutory framework are to:

(a) maintain the long-term integrity of its assets; [7]

(b) manage its operations efficiently with a view to keeping the overall costs of water supply and wastewater services to its customers (collectively) at the minimum levels consistent with the effective conduct of its undertakings;[8]

(c) provide for growth in accordance with the Auckland Plan (and other relevant plans and strategies of the Auckland Council);[9] and

(d) manage the effects of its activities on the environment in accordance with the RMA.

7.21 In accordance with these obligations, the key components of Watercare's regional wastewater strategy over a period of ten years (except where noted in paragraph 7.25 below) are:

(a) The continued use of the Mangere and Rosedale WWTPs to service the metropolitan areas of Auckland in the future.

(b) Construction of the Central Interceptor Scheme to provide for growth, mitigate asset risk and reduce overflows in the Auckland Isthmus area.

(c) Construction of a Northern Interceptor to provide for growth and to divert flows from north western parts of Auckland, so rather than going to the Mangere WWTP, flows are diverted to the Rosedale WWTP.

(d) Implementation of planned upgrades at the Mangere WWTP (as outlined below).

(e) Implementation of planned upgrades at the Rosedale WWTP.

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7 Section 57 of the Local Government (Auckland Council) Act 2009.

8 As above.

9 Section 92 of the Local Government (Auckland Council) Act 2009.

(f) Potential future extension from the head of the Central Interceptor towards the Westhaven Marina area to address overflows in the Cox's Bay, Grey Lynn, Herne Bay, St. Mary's Bay and Freemans Bay areas (Waterfront Interceptor).

(g) The construction of local wastewater storage tanks where this is shown to be the best practicable option.

7.22 The Project is therefore a key component of Watercare's regional wastewater strategy and forms part of a wider programme of major wastewater network upgrades planned by Watercare.

7.23 While the Project is of a large scale, it is only one of a number of major improvements that Watercare has planned to address the wastewater issues in Auckland. A number of other projects will contribute to the delivery of the strategy and I briefly describe some of these below, to provide an overview of the comprehensive approach Watercare is taking. The Project itself could proceed without any of the other projects being in place but Watercare has planned the completion of the different projects in a logical, practical sequence that will provide optimum benefits to the region.

7.24 These include:

(a) The **biological treatment capacity of the Mangere WWTP** will be upgraded in general accordance with the Mangere WWTP Master Plan, which was completed in December 2011. The detailed design of the new biological nitrogen removal facility has commenced and Stage 1 will be completed by the end of 2017. This will increase biological treatment capacity by 2 m^3/s. Stage 2 involves modifications to the existing secondary treatment plant, which is programmed to occur between 2024 and 2030 and will improve the nitrogen removal and general efficiency of operation of the existing treatment units. In order to provide for growth and to ensure the conditions of the existing discharge permit will continue to be met, the upgrading is required whether or not the Project proceeds.

(b) The **Northern Interceptor** will transfer flows from West Auckland (currently collected by the Western Interceptor and treated at the Mangere WWTP) to the Rosedale WWTP. Stage

1 of this Northern Interceptor will be completed in 2020, and Stage 2 by 2032. The Northern Interceptor will result in a progressive transfer of flows, with flows from 75,000 existing residents being diverted and a projected total of 230,000 people being served by the Northern Interceptor by 2062.

(c) A **Wet Weather Treatment Facility at the Mangere WWTP** will be constructed to treat flows in excess of the biological treatment capacity of the existing plant and improve overall treated wastewater clarity and overall disinfection efficiency. The new facility will include its own new disinfection stage, which will result in an overall increase in disinfection capacity and allow the existing and new disinfection facilities to be optimised to treat normal flows and peak wet weather flows respectively. The wet weather treatment facility will be commissioned before the Project is commissioned and will more than adequately treat any additional wet weather flows collected in the Central Interceptor tunnel.

(d) The **Rosedale Wastewater Treatment Plant** has been progressively upgraded over a period of approximately 20 years. A recently completed process review has identified the remaining major upgrades required and planned to treat projected wastewater flows through to the end of the term of the existing discharge permit in 2030. These projects have been approved and a $45 million capital expenditure upgrade commenced in June 2012.

(e) Watercare is also investigating the feasibility of a future **Waterfront Interceptor** to connect into the Central Interceptor tunnel via Grey Lynn, Cox's Bay Herne Bay, St. Mary's Bay and Freemans Bay. This possible extension would provide additional capacity to these areas and address up to 50 additional overflows in other parts of the network. The Project has been designed to accommodate this extension. Areas targeted by the proposed Waterfront Interceptor already drain to the Mangere WWTP, so connection to the Central Interceptor tunnel simply reroutes this flow along a more direct path.

(f) Watercare also has, either in planning or under design and construction, a number of **local wastewater storage tanks** where these are the best practicable option to prevent wastewater overflows (including Barry's Point, Point England, and Howick).

(g) Lastly, **network upgrades** will continue to occur across Auckland as part of Watercare's normal management of the wastewater network. Other projects already identified in Watercare's Asset Management Plan are network upgrades in Newmarket, the North Shore, Otara and Pukekohe. The Project and the associated CSO Collector Sewers have been designed with sufficient capacity to enable future local network upgrades in the Central Interceptor catchment area.

7.25 The current programme for the implementation of the other planned major projects is summarised in the table below:

Project	**Timeframe**
New biological nitrogen removal facility at Mangere WWTP Stage 1	2017
Next upgrade of Rosedale WWTP	2019
Northern Interceptor Stage 1	2020
Wet weather treatment at Mangere WWTP	2022
Waterfront Interceptor	2024
Upgrades of existing biological treatment at Mangere WWTP	2024/2030
Northern Interceptor Stage 2 / further upgrading of Rosedale WWTP	2032*
New biological nitrogen removal plant at Mangere WWTP Stage 2	2032*

* **Actual timing will depend on population growth**

7.26 The construction for the Central Interceptor Scheme is expected to take place between 2017 and 2027. The Project will occur first, commencing in 2017 and is expected to be completed in 2023. The CSO Collector Sewers will be constructed from around 2023 to 2027.

8. CONSIDERATION OF ALTERNATIVES TO THE CENTRAL INTERCEPTOR SCHEME

Overview

8.1 Watercare has thoroughly considered a range of other possible alternatives to the Project as part of the concept design stage of the Project.

8.2 There are suggestions that options other than the Central Interceptor Scheme (eg combined sewer separation, storage tanks, reduction of stormwater infiltration) would be better for addressing wet weather overflows. While control of wet weather overflows is a key driver identified by Watercare, selection of the Central Interceptor Scheme as the best practicable option is based on three key drivers identified by Watercare:

(a) duplicating the existing Western Interceptor which is at risk of failure;

(b) providing capacity for future growth and development; and

(c) controlling wet weather overflows.

8.3 The first driver can only be feasibly addressed through the construction of a pipeline which extends from the Mangere WWTP past the Hillsborough ridgeline. The pipeline must be tunnelled due to the depth of the existing sewers (the Western Interceptor was tunnelled through the Hillsborough ridge in the 1950s) and the required hydraulics to receive flows at key connection points. This is the only practical means of providing duplication of the Western Interceptor.

8.4 The second driver can only feasibly be addressed by extending the new pipeline through to Western Springs. This is the only practical means of adding conveyance capacity which is vital for protection of public health and the environment. Furthermore, use of a tunnelling method minimises impacts to the environment during construction, and provides a long-term sustainable option by reducing the required power to transport flows to Mangere WWTP.

8.5 The only other alternative to providing additional capacity would be to duplicate, upgrade or replace the existing Orakei Main Sewer and Eastern Interceptor to provide sufficient capacity for future growth. However, this would require a much greater length of new sewer (more than 40 km), significant portions of which would be open cut rather than tunnelled and would cause significantly greater disruption to a far larger portion of the community. It would also come at a cost of at least $500 million more than the Project. It does not offer a viable alternative to the Project on the grounds of practicality, disruption to a larger portion of the community, timing and cost.

8.6 These two drivers alone can only be practically and cost effectively addressed by the Project. Given the Project is needed to achieve these two drivers, it provides a very cost effective opportunity to also reduce the targeted overflows. International best practice shows that in circumstances similar to the central Auckland area, use of a conveyance/storage tunnel is quite commonly determined to be the best practicable option. I understand from Mr Cantrell that there are numerous examples of cities with similar issues to central Auckland that have opted for a tunnel similar to the Central Interceptor.

8.7 In respect of the third driver, a number of options have been assessed for controlling wet weather wastewater overflows. These options included:

(a) local storage tanks;

(b) sewer separation;

(c) infiltration reduction;

(d) satellite treatment facilities;

(e) wastewater minimisation programmes;

(f) local treatment and disposal of combined sewer overflows; and

(g) use of the Central Interceptor tunnel (already required to address the first two drivers).

8.8 The other options, such as local storage tanks, sewer separation and infiltration reduction, do not provide duplication of the Western Interceptor or adequate capacity for growth (the existing trunk sewer system will be

at capacity on a dry weather flow basis within 10 to 15 years if additional capacity is not added). These options also result in far greater effects on the community due to larger surface space requirements, community disruption during construction, and/or much more frequent maintenance requirements after construction. For completeness, I have provided brief comment on each option that was assessed in **Appendix D**.

8.9 It is important to note that the only option which adequately addresses all three drivers is the Central Interceptor tunnel, as the tunnel can be used to provide both conveyance and storage capacity. Given that most of the tunnel infrastructure is built well below ground, with a relatively small scale of surface locations at 19 sites, it results in fewer impacts on the wider community than other options considered.

Summary of alternatives

8.10 Watercare and Auckland Council (and its predecessors) have spent many years considering network capacity, asset risk mitigation and overflow mitigation solutions that are environmentally acceptable and affordable to the community. These issues were studied carefully during the four year long process that culminated in the Three Waters Plan, which identified the Project as the best practicable option. Detailed assessment of other options which have occurred during the three year long concept design development, and as discussed above, have further confirmed that the Project is the best practicable option.

8.11 In summary, the Project is considered the best practicable option for the following key reasons:

(a) It is the only option which can adequately address all key regional issues, and does so for the lowest overall cost.

(b) In terms of the physical works required to address all project drivers, the Project achieves this with the least overall amount of adverse effects on the community and environment and the greatest certainty of outcome.

(c) In total, the benefits resulting from the Project are far greater than for other options considered.

8.12 Based on the evaluations completed in the Three Waters Plan, and the additional analysis completed by Watercare since that time, the Project represents the best practicable option for achieving an integrated solution that meets the future needs of the Auckland wastewater network.

9. RELEVANT EXPERIENCE

9.1 Watercare has developed comprehensive processes and procedures for all aspects of the planning and delivery of its major infrastructure projects:

(a) Long-term (strategic) planning of complete wastewater systems.

(b) The preparation of 50-year master plans or equivalent long-term plans for large facilities and networks, including the following of particular relevance to the Project:

(i) The Mangere WWTP Master Plan, which was completed in December 2011.

(ii) Trunk Master Plan for catchments served by the Mangere WWTP. This was developed initially as part of the Project's concept planning process and is being updated to reflect new information as it becomes available.

(c) Project-specific planning. Mr Cantrell provides more detail of this in his evidence.

(d) Project-delivery in accordance with Watercare's Project Delivery Manual, which was initially put in place around the year 2000 and has been progressively updated to reflect new information and processes over a period of more than 10 years of continuous improvement.

9.2 This overall approach to major infrastructure projects has resulted in the successful delivery of many large projects and the effective management of associated risks.

9.3 For example, in 2010 Watercare successfully completed Project Hobson. Project Hobson involved the replacement of an existing 100 year old above ground trunk sewer with the Hobson tunnel and pumping station. A key driver for Project Hobson was also to significantly reduce overflows existing at the time in the upstream network. Project Hobson consists of drop shafts, link sewers, a storage tunnel, pump station, an ATF and rising mains, much like the Project. The tunnelling conditions were also very similar to what will be faced for the Project, and the hydraulic control and air treatment systems are also very similar.

9.4 In the three years since the Project Hobson storage tunnel was completed overflows into Hobson Bay have been virtually eliminated and there have been no odour complaints.

9.5 The very successful implementation of Project Hobson clearly demonstrates that Watercare is well placed, and the Project is feasible, to construct and operate in local Auckland conditions. It also clearly demonstrated successful methods for mitigating the effects of construction on local communities and ensuring that the significant potential benefits (such as the ability to control wastewater overflows) that are able to be achieved. Project Hobson has also demonstrated the successful storage of storm flows during a storm event. The flows have been stored in the tunnel and then pumped forward after the storm has abated, with no adverse effects on the operation of the Mangere WWTP.

10. RESPONSE TO SUBMISSIONS

Support from Auckland Regional Public Health Service

10.1 As mentioned above, the Public Health Service has lodged a submission expressing strong support for the construction of the Project. The Public Health Service submission acknowledged the reduction in overflows enabled by the Project will provide direct benefits for local urban streams and the wider Waitemata Harbour, with clear public health benefits as a result.

10.2 As described throughout my evidence, the mitigation of overflows and untreated discharges is one of the three key drivers of the Project, and in turn results in significant positive benefits for public health. The support of the Public Health Service is therefore very much valued.

10.3 The Public Health Service also supports the requirement that any adverse health effects from construction activities be avoided, mitigated or remedied. Mr Cooper will explain the Construction Management Plans that can be used to ensure that any potential health effects arising during construction can be managed to an appropriate level.

Submissions on alternative options

10.4 The submissions of Dr Cayford, Friends of Oakley Creek and the Laingholm District Citizen's Association suggest that there are alternative options to the Central Interceptor that should be undertaken by Watercare. In particular, these submitters suggest that local storage tanks (as have been used in a number of locations on the North Shore) or sewer separation should be the preferred option. The submission of Mangere Bridge Residents and Ratepayers Association also states that the Project goes against best practice for the treatment of wastewater and stormwater.

10.5 I have addressed the issues raised in these submissions in section 8 above, and provide further detail in **Appendix D**. The evidence of Mr Mcilroy also addresses the issues raised in these submissions. In my opinion, Watercare has fully examined alternatives and the Central Interceptor is considered to be the most appropriate solution for all the reasons that I have explained.

Public health issues

10.6 The submission of Ngati Tamaoho Trust raises concerns about public health issues as a result of the Project. I discuss above the significant public health benefits that the Project can deliver through the significant reduction in wastewater overflows throughout the catchment. I have also noted the acknowledgement of the Public Health Service's support for the Project because of these public health benefits. I consider the Project will generate significant public health benefits.

Mangere Bridge Residents and Ratepayers Association and Manukau Harbour Restoration Society

10.7 The Mangere Bridge Residents and Ratepayers Association ("**MBRRA**") and Manukau Harbour Restoration Society ("**MHRS**") pro forma submissions both raise concerns with the current situation with overflows in the Manukau Harbour and whether the Central Interceptor is the appropriate response to Auckland's wastewater issues. The MBRRA's pro forma submission raises several specific "objections" to the proposed Project which also canvas a number of the issues raised by the MHRS. I deal with each of those issues that are relevant to my brief in turn below.

"The proposed CI goes against accepted best practice for the treatment of both wastewater and stormwater."

10.8 As discussed above, Watercare is addressing three key drivers with the Central Interceptor Scheme which include provision of an alternative to the ageing Western Interceptor, additional capacity to ensure the existing trunk sewer system is not overloaded as a result of growth, and reduction of 122 targeted overflow points which discharge a mixture of untreated wastewater and polluted urban stormwater just about every time it rains. Not only does the Central Interceptor Scheme address these key drivers, but it does so in a highly cost effective manner.

10.9 I understand from my own research, and from Mr Cantrell, that the concept of a tunnel/storage conveyance system has been determined to be the best practicable option in many cases around the world, solely on the basis of its ability to reduce overflows, and has been implemented in many cities around the world facing similar issues to Auckland.

"It is not good ecological practice to transfer large amounts of water from its natural catchments to a shallow enclosed harbour with finite capacity to receive it. It directly contravenes the conditions of existing resource consents designed to protect the Manukau Harbour's ecology."

10.10 Providing an alternative to the existing Western Interceptor, which is ageing and at risk of failure if not duplicated, also provides significant value to the continued protection of the Manukau Harbour. The Project ensures that Watercare can provide a robust and safe network to convey flows to the Mangere WWTP and avoid the significant consequences of the Western Interceptor failing. Failure of the Western Interceptor

(including the siphon section which is laid along the bottom of the Manukau Harbour) could result in uncontrolled discharge of all wastewater from over 200,000 people, plus associated commercial and industrial flows, discharging directly to the Manukau Harbour for several months before Watercare could implement a solution.

10.11 It is also worth noting that the 122 overflow points targeted by the Central Interceptor Scheme currently discharge untreated wastewater and polluted urban stormwater into four urban streams and the Waitemata Harbour. Because these overflows receive no treatment at all, the pollution associated with them exceeds the receiving water body's capacity to assimilate it. This situation will only get worse as the overflows increase in volume and frequency as growth continues if control measures are not put in place.

10.12 In addition to the 122 overflows which impact the Waitemata Harbour, the Project will also result in the removal of existing Pump Station 23, located on the Hillsborough side of the Manukau Harbour, and the existing pump station at Kiwi Esplanade. Both of these pump stations have the potential for discharge into the Manukau Harbour as a result of mechanical or power failure. The Project will minimise or "de-risk" the potential for discharges at these locations.

10.13 The Central Interceptor Scheme has been designed to allow a practical level of overflow volume and associated pollution reduction to be achieved that includes projected growth for the next 50 years. Because these flows will be conveyed to the Mangere WWTP, within the limits of the current consent conditions on allowable flows and volumes, they can receive an adequate level of treatment which ensures they can be safely discharged to the environment. The Mangere WWTP currently receives and treats approximately 130 million m^3 of wastewater and stormwater per year, and the results of the $500 million upgrade, completed as part of Project Manukau, include a significant improvement to the Manukau Harbour water quality. Ongoing harbour monitoring shows that the trend of improving water quality continues since the Mangere WWTP was last upgraded.

10.14 The additional volume which will be conveyed to the Mangere WWTP from overflows captured by the Central Interceptor is estimated to be less than 2% of the volume currently treated by the Mangere WWTP.

10.15 Furthermore, as explained above, Watercare is adding a state of the art wet weather treatment system at the Mangere WWTP. With these planned upgrades, the prediction is that net pollution loads discharged into the Manukau Harbour from the Mangere WWTP will not increase into the future despite any increases in volumes. For some pollution parameters, implementation of the Central Interceptor Scheme and associated wet weather treatment at the Mangere WWTP will actually reduce the current amount of pollution discharged into the Manukau Harbour.

10.16 Overall the ecological benefits of the Central Interceptor Scheme are positive for the urban streams, the Waitemata Harbour and the Manukau Harbour.

"The proposed CI is a huge holding tank (210,000 m^3). It represents a 'fix' for the overflows from Auckland's combined sewage system without addressing the fundamental problem. The proposed 'fix' is not quick, not economical and not ecologically sound."

10.17 Unfortunately, when it comes to addressing 122 overflows in a combined sewer system which has been in place for as long as 100 years, there is no such thing as a quick fix on a region-wide scale. As mentioned above, and also discussed in Mr Cantrell's evidence, many other cities around the world have come to a similar conclusion. A detailed analysis of the options to address overflows demonstrates that the Central Interceptor is by far the most economical solution. For example, a comparison of the cost for the Central Interceptor Scheme to address overflows to the cost of complete sewer separation shows significant net savings. Further detail on this comparison is provided in the evidence of Mr Mcilroy.

10.18 Where possible and practicable, Watercare is addressing overflows with near-term solutions, but this is not always possible due to site specific technical issues including the size and scale of the problem. For example, Watercare has recently been able to close off some small overflows in the Point Chevalier area which only required minor capital investment to address. Larger overflows targeted by the Central Interceptor Scheme cannot practically be addressed by small-scale solutions. The timeframe for implementing the Central Interceptor

Scheme is very similar to the timeframe for addressing similar-scale overflow problems in other cities.

"The proposed CI is a key part of a radical, new strategy for handling the future wastewater/stormwater requirements of Auckland. If constructed, the CI would likely commit the city to a very costly and very risky strategy, the costs and risks of which are not detailed in the application."

10.19 The Central Interceptor Scheme is not a radical or new strategy. In fact many cities around the world (as mentioned above) have implemented systems very similar to the Central Interceptor Scheme which have proven to achieve the targeted results within the defined cost budgets. Similar to many other conveyance/storage tunnel systems around the world (including the Project Hobson wastewater tunnel that was implemented by Watercare over three years ago), these schemes are robust and have a very low risk profile unlike other options such as complete sewer separation which are quite often found to cost much more than what is budgeted, and often do not achieve the targeted results.

"The proposed CI introduces very significant problems for residents at certain points along its route - especially for those living in Mangere Bridge. It also impacts on bird roosts and on recreational facilities. Further, it fails to provide satisfactory measures to deal with emergencies."

10.20 The Project will result in temporary adverse effects at the 19 proposed surface sites where shafts and structures are required for construction, connection of flows and long-term maintenance. However, compared to other options such as complete sewer separation or construction of multiple storage tanks, the impacts of constructing the Project are significantly less.

10.21 The concept design of the Project has included detailed assessments by multiple experts and specialists to ensure it can be implemented with minimal effects, which in almost every case have been assessed to be no more than minor with appropriate mitigation measures. The majority of the Project will be constructed deep underground using the same method of tunnelling which was proven to be very successful on Watercare's recent Project Hobson wastewater tunnel, and also for the

construction of the Rosedale outfall tunnel on the North Shore. Shaft site locations constructed on the Hobson and Rosedale tunnels were also very similar to ones proposed for the Project, including shafts in residential areas, community parks and coastal locations. The construction of the Hobson and Rosedale tunnel shafts was considered to be extremely successful in terms of managing local community and environmental issues, and reinstatement of sites after construction was completed.

Liability of Watercare and compensation

10.22 A number of the submissions raise issues in relation to the effects of shaft and tunnel construction on land and buildings and the need for Watercare or another party to be liable for any damage or adverse effect as a result of the Project. Some submitters, in particular the MBRRA, have asked whether Watercare will provide any compensation in respect of the construction activities or the tunnel alignment passing under private property or within the community areas.

10.23 In respect of construction activities, compensation is not necessary given the short duration of these works and the various mitigation measures that will be provided, where possible, to minimise construction effects at the surface construction sites on nearby residents. The evidence of Ms Petersen details some of the mitigation proposals that have been developed through consultation with particular landowners.

10.24 Watercare does not consider that compensation is appropriate for the Central Interceptor tunnel being located under a person's land. As the tunnelling works will be very deep underground, there is expected to be no effects on the land or buildings above the Central Interceptor tunnel alignment due to the construction methods that will be employed and the ground conditions of the alignment. Once construction is completed and the Central Interceptor tunnel is commissioned, there is not expected to be any effect on the ongoing residential or commercial use of the land, nor restrictions on development of the land. As Ms Petersen will detail, Watercare is committed to keeping landowners informed of the construction works so that if any issues arise, these can be promptly and appropriately addressed.

10.25 I note that in Project Hobson, which was very similar in nature to the Project, there were no effects on land or buildings above the tunnel alignment, either due to construction or following operation. There was no compensation paid to any of the residents.

10.26 Once Watercare has finalised the precise tunnel alignment, all affected landowners will be notified of the works in accordance with section 181 of the Local Government Act 2002 ("**LGA02**"). This section provides Watercare with the necessary property rights to undertake the works, rather than the environmental and resource management approvals sought under the RMA. The process under the LGA02 requires either the written approval of the landowners to the works or sets out a process by which the landowners can object to the works through a formal hearing process. Watercare will commence this process in due course.

10.27 The Central Interceptor Scheme is being undertaken for the benefit of the community. The Central Interceptor Scheme will:

(a) reduce the risk of uncontrolled discharges into the Manukau Harbour should the Western Interceptor fail, and in particular from the Manukau Harbour siphon;

(b) enable growth in the area serviced by the Central Interceptor Scheme to occur without the risk of dry weather overflows; and

(c) address overflows from 122 locations which currently impact on local streams and the Waitemata Harbour.

10.28 In effect, Watercare will be spending $800 million on the Central Interceptor Scheme for the benefit of the community. Watercare will be implementing appropriate mitigation measures at the 19 above ground construction sites where necessary. However, as an organisation with a statutory obligation to be a low cost provider of essential wastewater services for Auckland, it is not appropriate for Watercare to be offering any further compensation when there is no justification for doing so.

11. CONCLUSIONS

11.1 The Project is a key component of Watercare's regional wastewater strategy and forms part of a wider programme of major wastewater network upgrades planned by Watercare. Auckland faces significant wastewater management challenges, and the Project is the preferred solution to address all three of the immediate needs for the region identified in the Three Waters Plan. It will deliver significant benefits to the community of Auckland, and to the environment.

11.2 On behalf of Watercare, I request that the Committee recommends that the Notices of Requirement be confirmed and grants the consents sought for the Project on the conditions proposed by Watercare.

Tim Munro
12 July 2013