

**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 PETER ROAN ON BEHALF OF WATERCARE  
SERVICES LIMITED**

**MARINE ECOLOGY**

**1. INTRODUCTION**

1.1 My full name is Peter Anthony Roan. I am a Principal of the firm Tonkin & Taylor Ltd, Environmental & Engineering Consultants. I hold the qualifications of BSc and MSc (1st Class Honours) from the University of Auckland, with my specialist field of expertise being aquatic ecology.

1.2 I have been employed as an environmental specialist for the past 22 years and have worked on a wide range of resource management consenting projects. I lead Tonkin & Taylor's Resource Management team and much of my career has been spent managing the Assessment of Effects on the Environment ("AEE") process for development related projects and the associated resource consent process. A significant component of this work has focussed on water issues and on assessing the effects of activities on water resources and the associated ecosystems. In this field, I have been involved in projects ranging from water abstraction and impoundment, hydroelectricity generation, catchment management, and wastewater discharges, including numerous assessments of discharges to freshwater and marine systems. I have presented expert testimony on these issues at Council hearings and in the Environment Court.

- 1.3 Throughout my career I have worked on an extensive range of projects for Watercare, including both water supply and wastewater projects, and am very familiar with the infrastructure across their networks, and with their operations. I have been providing specialist resource management and water resource scientific advice to Watercare on these issues since 1994
- 1.4 Of particular relevance to the Central Interceptor Project ("**Project**"), I led the Tonkin & Taylor team that was responsible for gaining resource consents for Watercare's Project Hobson, a very similar project to the Central Interceptor. I was the principal author of the AEE which supported those applications and presented expert evidence at the joint Auckland City Council and Auckland Regional Council hearing for that project.
- 1.5 Of relevance to the evidence I am presenting today, I have previously completed work for Watercare assessing the environmental effects of the midge control agents that have historically been used in the tidal storage basin at the Mangere Wastewater Treatment Plant ("**Mangere WWTP**") and I am familiar with the wastewater discharge from the Mangere WWTP and with the various studies that Watercare has completed of discharge effects in the Manukau Harbour over the years.
- 1.6 Also of relevance, over the period 2005 and 2006, I led a working group on the development of wastewater overflow response procedures for the Auckland wastewater network. The working group involved representatives from Watercare and the seven territorial authority wastewater network operators, along with representatives from Auckland Regional Council's Pollution Response team and the Auckland Regional Public Health Service. The output from that process was a best management practice guideline document for wastewater overflow response that was adopted by those organisations for the Region. I was the principal author of the guideline document.<sup>1</sup>
- 1.7 In addition, I have recently led a process with Watercare and Auckland Council to update and revise those procedures, and they have recently been issued in a document titled: *Wastewater Overflow Regional Response Manual (Version 1.0 – May 2013)*. Part of that manual describes Watercare's wastewater overflow incident response procedures.

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<sup>1</sup> Dry weather sewer overflows Best Management Practice Guideline, June 2006.

### **Involvement in the Central Interceptor Project**

- 1.8 I have been part of Watercare's Principal Engineering Advisors working on the Central Interceptor Project since 2009. In this team my role has been to lead the AEE preparation process for the Project.<sup>2</sup> I have been involved in all phases of this work, including:
- (a) **the route options evaluation stage:** where I led the process of considering and evaluating the environmental issues associated with each of the route options and the associated construction sites;
  - (b) **the detailed specialist environmental investigations stage:** where myself and staff working under my direction have managed the team of specialists that have completed the various environmental studies supporting the AEE; and
  - (c) **the AEE preparation stage:** where myself and staff working under my direction prepared the AEE for the Project.
- 1.9 I have also assisted Watercare throughout the Notice of Requirement and resource consent process.

### **Code of Conduct**

- 1.10 I have been provided with a copy of the Code of Conduct for Expert Witnesses contained in the Environment Court's Updated Practice Note 2011 which took effect on 1 November 2011. I have read and agree to comply with that Code. This evidence is within my area of expertise, except where I state that I am relying upon the specified evidence of another person. I have not omitted to consider material facts known to me that might alter or detract from the opinions that I express.

### **Scope of evidence**

- 1.11 The purpose of my evidence is to outline the potential water quality and ecological effects of discharge from the Emergency Pressure Relief ("EPR") structure at the proposed Mangere Pump Station as part of the Project, should this ever occur.
- 1.12 My evidence is structured as follows:
- (a) Section 2 sets out an executive summary of my findings;

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<sup>2</sup> The Central Interceptor Main Project Works Assessment of Effects on the Environment was lodged with the Council in August 2012.

- (b) Section 3 describes the factors influencing the extent of any effects in the event of a discharge from the EPR structure;
- (c) Section 4 describes the potential water quality and ecological effects of discharge from the EPR structure;
- (d) Section 5 considers the alternative locations available for the EPR structure;
- (e) Section 6 describes the procedures Watercare has in place for managing the effects of discharge from the EPR structure;
- (f) Section 7 addresses concerns raised in submissions;
- (g) Section 8 addresses the Council Pre-hearing Report; and
- (h) Section 9 sets out my conclusions.

## **2. EXECUTIVE SUMMARY**

- 2.1 As a starting point, a discharge from the EPR structure is possible, but only under scenarios which are very unlikely to occur. Those scenarios are described in the evidence of Mr Cantrell. Should a discharge occur, any effects on water quality and ecology would be determined by a combination of factors, including: the quality of any discharge; the potential duration and rate of discharge; and the dilution and dispersion conditions in the tidal Manukau Harbour receiving environment at the time of any discharge.
- 2.2 In summary, the activation of the EPR requires a combination of events to occur. The key events include: a prolonged failure of the proposed Mangere Pump Station and associated backup generators, a significant storm event, and the failure of monitoring and diversion systems to adequately divert the overflows away from the Central Interceptor. The combination of these key events would result in an discharge from the EPR. Due to the multiple events that are required to occur, Watercare has assessed the probability of a discharge occurring as no more than once every 50 years. Mr Cantrell discusses the various measures that Watercare will have in place (such as backup generators and alarm systems) to avoid a discharge occurring in the first place.
- 2.3 If a discharge were to occur, such discharge would comprise of wastewater diluted by stormwater, with the duration and rate of discharge being determined by the time taken to repair and return the proposed Mangere Pump Station to service and by

the inflow conditions to the Central Interceptor tunnel at the time. If, under a worst case scenario, returning the proposed Mangere Pump Station to service took several hours, and the outage coincided with extreme storm conditions, then discharge could occur for several hours, potentially at a high rate. As noted, the likelihood of these scenarios occurring together is extremely low.

- 2.4 Dilution and dispersion of the discharge in the Manukau Harbour would be determined by tidal conditions at the time. On the outgoing tide, the foreshore discharge would disperse in a westerly direction past Puketutu Island and into the main Purakau Channel, from where it would be transported towards the south west. On the incoming tide dispersion would occur up the harbour in the Purakau Channel and the Wairopa Channel towards and onto the Hillsborough Coast, impinging on the shoreline from Cape Horn and the series of bays and beaches to Hillsborough Bay.
- 2.5 If a discharge were to occur it could result in public health and ecological effects. Generally, these effects would be resolved over a relatively short period of time by tidal processes.
- 2.6 The discharge would likely result in a public health risk to contact recreation along the Hillsborough shoreline. This would likely require beach closures, possibly for several days. Localised ecological effects on habitats in the zone from the point of discharge out into the Purakau Channel could also occur. These ecological effects would reduce relatively quickly (within hours) due to on-going tidal dilution and dispersion.
- 2.7 The main residual longer term effects would relate to the public health risk associated with shellfish gathering from waters affected by the discharge, in particular from the Nga Kuia e Toru Reef on the southern shoreline of Puketutu Island, and effects on ecological habitats in the area subject to the initial zone of reduced water quality. Recovery of shellfish quality and habitats would be expected over a series of weeks.
- 2.8 It is my opinion that there would be no permanent effects on the Manukau Harbour and its associated recreational or ecological values.
- 2.9 Alternative locations have been considered for the EPR structure, including at Pump Station 23 and at Kiwi Esplanade Reserve. The feasibility of these alternative locations are discussed in the evidence of Mr Cantrell. Based on Mr Cantrell's evidence and my own, it is my opinion that neither of these locations are preferable to the proposed location. Similarly, it is not feasible to extend the

location of the discharge point out into the harbour, nor to use the existing bypass channel, as Mr Cantrell explains.

- 2.10 Watercare will manage its response to a discharge from the EPR structure in accordance with procedures set out in the *Wastewater Overflow Regional Response Manual (Version 1.0 – May 2013)*, which has been developed jointly by Watercare and Auckland Council. The key purpose of these procedures is to reduce risk to people and the environment. The procedures represent best practice in New Zealand.

### 3. **FACTORS INFLUENCING THE POTENTIAL EFFECTS OF DISCHARGE FROM THE EPR STRUCTURE**

- 3.1 Mr Cantrell has outlined the various scenarios under which discharge from the EPR structure could occur. His evidence is that discharge from this structure is extremely unlikely, and would require an extended duration pump station failure to coincide with a significant storm event. My evidence addresses the potential water quality and ecological effects in the Manukau Harbour, should a discharge ever occur.
- 3.2 As Mr Cantrell has indicated, and as is shown in **Figure 1** below, the EPR structure is located on the foreshore of the Manukau Harbour, adjacent to the proposed Mangere Pump Station. The harbour environment at this location comprises intertidal mudflats.



**Figure 1: Manukau Harbour**

- 3.3 To establish what the potential effects of a discharge from this location would be it is first necessary to consider the following factors: the likely quality of any discharge; the potential duration and rate of discharge; and the likely dilution and dispersion conditions in the tidal Manukau Harbour receiving environment at the time of any discharge. I address these items in turn.

#### **Discharge Quality**

- 3.4 If a discharge from the EPR structure did occur it would, as described above, require an extended duration pump station failure to coincide with a significant storm event. In this regard, any discharge from the EPR structure would reflect the inflows to the tunnel at that time, and comprise a mixture of wastewater, diluted with stormwater. Organic matter, nutrient, heavy metal and microbiological pathogen and virus levels would all be similar to levels in the diluted wastewater overflows currently occurring at existing overflow locations that affect the urban streams and coastal receiving environments in the Central Interceptor catchment area.
- 3.5 Available monitoring data on overflow quality from the wastewater network indicates that quality can be variable, depending upon the nature of the upstream contributing wastewater and stormwater catchment, and the respective proportions of

stormwater and wastewater in the overflows. Wastewater overflow quality is also variable over the duration of any overflow discharge event, and generally reflects a strong first flush characteristic, where contaminant loads are higher at the start of a storm event but then reduce over time as the storm progresses. This concept has been explained in greater detail in the evidence of Mr Cantrell and Mr Mcilroy.

- 3.6 In the storm conditions where a discharge from the EPR structure could occur, flow in the tunnel will be dominated by inflows from the large combined sewer overflow ("CSO") connections. Mr Cantrell has identified that available monitoring data from the existing Lyon Avenue CSO is likely to be representative of the quality of a discharge from the EPR structure. The Lyon Avenue CSO is the largest in the Central Interceptor catchment area. Based on the available data it is reasonable to expect that any discharge from the EPR structure would have elevated levels of suspended solids, organic matter (Biochemical Oxygen Demand), nutrients (ammonia, Total Nitrogen and Total Phosphorus), metals and pathogenic indicators and viruses.
- 3.7 It is extremely unlikely that the discharge would comprise less dilute or raw wastewater as there are many hours of storage available in the Central Interceptor tunnel under dry weather flow conditions, as Mr Cantrell has described.

#### **Discharge Rate**

- 3.8 The rate of any discharge from the EPR structure would be determined by the rate of inflow to the Central Interceptor tunnel and the time taken to repair and return the proposed Mangere Pump Station to service. Any discharge occurring following the combination of an extreme storm event and Mangere Pump Station outage would be at a higher rate than discharge in a less extreme storm. Any discharge from the EPR structure would display an initial peak rate of discharge, which would then subside relatively quickly, reflecting the restriction of inflows to the Central Interceptor tunnel as Mr Cantrell has explained. Modelling undertaken of potential discharge flow rates indicates a peak rate of discharge of around 20 m<sup>3</sup>/s in an extreme 10 year storm. In smaller storms, the discharge rate would be lower, being around 2 m<sup>3</sup>/s for a 6 month storm.

#### **Discharge Duration**

- 3.9 The same range of factors affecting the rate of any potential discharge will also determine the duration of the discharge. As Mr Cantrell has outlined, a worst case discharge scenario would be a combination of an extreme storm event (eg a 10 year storm) coinciding with the Mangere Pump Station being out of service for



several hours and the tunnel being full. In this scenario, the discharge could occur for several hours. If these events coincided with a less intense storm event the duration of discharge would be shorter as the rate of inflows would be less. Ultimately, the duration of discharge would be determined by the rate of inflow to the Central Interceptor tunnel and the time taken to return the Mangere Pump Station to service.

### **Dilution and dispersion in the Manukau Harbour**

- 3.10 The key factor determining the potential for any EPR discharge effects on receiving environments will be the dilution and dispersion conditions in the Manukau Harbour. As I have noted above, discharge from the EPR structure would be at the coastal margin adjacent to the proposed Mangere Pump Station. Discharge would only occur in emergency conditions, and Watercare will have little or no ability to control the timing. As such, discharge could occur at any time over the tidal cycle. Accordingly, it is necessary to consider dilution and dispersion conditions over the range of possible tidal conditions, which I outline below.
- 3.11 The Manukau Harbour is a large, shallow, tidally dominated system. Watercare has previously completed studies of discharge dispersion in the Manukau Harbour for the discharge from its tidal storage basin near Puketutu Island under a range of tidal conditions. Based on those previous studies, discharge from the EPR structure occurring during outgoing tidal conditions would see the discharge disperse in a westerly direction past Puketutu Island and into the main Purakau Channel, from where it would be transported towards the south west. The next incoming tide would then disperse the diluted discharge back up the Harbour in the Purakau Channel and the Wairopa Channel towards and onto the Hillsborough coastline from Cape Horn east to about Hillsborough Bay. There are a number of small bays and beaches along this coastline (Waikowhai, Faulkner Bay, Granny's Bay, and Hillsborough Bay). These locations are shown on **Figure 1**.
- 3.12 A discharge occurring on the incoming tide would see dispersion restricted to the north of Puketutu Island, and the discharge water being dispersed towards the Hillsborough coast and Mangere inlet, and as the tide rises, against the Ambury shoreline also.
- 3.13 At low tide, and for a period either side of low tide, the discharge would drain across the intertidal flats until it reaches tidal waters, while under high tide conditions, and for a period either side of high tide, the discharge would be direct to tidal waters, but with limited additional mixing and dispersion.

- 3.14 Overall, until dispersed into the Purakau Channel and beyond, the discharge will see only limited dilution, but then tidal mixing will provide rapid dilution.
- 3.15 Receiving environment areas that could encounter the dispersing discharge will include the contact recreation areas and bathing beaches along the Hillsborough coast, along with the habitats on the northern shoreline of Puketutu Island and in the main Purakau and Wairopa Channels. The Nga Kuia e Toru Reef, which is located off the southern shoreline of Puketutu Island and is reported to be utilised for shellfish gathering, could encounter diluted dispersing EPR discharge if the discharge was to occur on the outgoing tide.
- 3.16 A number of Coastal Protection Areas ("**CPA**") identified in the Auckland Council Regional Plan: Coastal are located in the area where discharge dispersion may occur. These are CPAs: 25 (Puketutu Island); 24 (Te Tau Bank East); 26 (Ihumatao); 23c and 23 b (Ambury); 19 (Cape Horn); and 20 (White Bluff) (refer **Appendix A**). A number of these sites are identified to be of ecological significance as they support feeding or roosting habitat for wading birds (CPA 19, 23, 24, 25, 26) and intertidal sandbanks with biodiversity or shellfish values (CPA 19, 24, 26). In addition, the entire Manukau Harbour has been identified by the Department of Conservation as an Area of Special Conservation Value due to its importance for wading bird species.

#### **4. POTENTIAL EFFECTS OF DISCHARGE FROM THE EPR STRUCTURE**

- 4.1 Having addressed the factors that would influence the extent of any effects of an EPR discharge, I now turn to addressing the potential public health risks and ecological effects in the Manukau Harbour receiving environment. Given the broad range of possible scenarios around possible discharge duration and rate, and the tidal conditions that could be encountered at the time of discharge, I have taken a broadly based descriptive approach to this assessment. I consider potential effects in terms of:

- (a) short term effects (hours);
- (b) medium term effects (days); and
- (c) long term effects (weeks).

##### **Potential public health risks**

- 4.2 The potential public health risks associated with an EPR discharge relate principally to the contact recreation areas and bathing beaches along the Hillsborough coast,

from Cape Horn to Hillsborough Bay. As noted above, diluted discharge from the EPR structure would likely be dispersed along this shoreline, with the level of public health risk being determined by a combination of discharge duration and tidal conditions during the discharge. However, regardless of these conditions, the public health risk to contact recreational users along this shoreline would likely be unacceptable over the short to medium term, and would require beach closures and the posting of warning notices. This risk would likely exist for a number of days. I address the processes in place for managing the public health risks associated with wastewater overflow and discharge incidents to in Section 6 of my evidence.

- 4.3 I would note that if discharge from the EPR structure did occur, it would be during storm conditions. Under these conditions, stormwater inflow from the various catchments draining to the Hillsborough coastline will contain elevated levels of microbiological contaminants, which, regardless of any effect of the EPR discharge, will increase public health risks associated with contact recreation in the affected waters.
- 4.4 As I note above, if discharge from the EPR structure were to occur over an outgoing tide there is the potential for filter feeding shellfish (eg mussels) at the Nga Kuia e Toru Reef to be exposed to pathogens and viruses. This would require closure of this shellfish gathering area. While pathogens and viruses are naturally removed from shellfish over time, this public health risk could remain for several weeks.

#### **Potential ecological effects**

- 4.5 The potential ecological effects of an EPR discharge will be determined principally by the tidal conditions at the time of discharge. Immediately at the point of discharge and as the discharge disperses over the intertidal mudflats, it will form a scour channel out to the point where it mixes with tidal waters. Reduced water quality would occur in this zone and out into the Purakau Channel, where greater dilution and mixing is available. This zone of reduced water quality would persist until the discharge ceased and subsequently for a short period afterwards (ie hours) as further tidal dilution and dispersion occurs. Some localised ecological effects could be expected in this zone where limited dilution is available, due largely to low dissolved oxygen levels in the discharge. These effects might include some avoidance of the affected waters by mobile species such as fish and some possible reduction in the benthic (seabed) communities which are unable to avoid the discharge or which are affected by scour.

- 4.6 Watercare has completed previous studies of the benthic macroinvertebrate communities associated with the intertidal areas in this zone.<sup>3</sup> Much of this area was previously occupied by the oxidation ponds and has now been returned to intertidal habitat. Re-colonisation of this area by benthic marine species occurred rapidly after the oxidation ponds were removed, however, the diversity within this community is relatively low and is dominated by species that are more tolerant to environmental stress. In this regard, should a discharge from the EPR structure occur, any disturbance to the existing habitats is unlikely to result in any significant ecological change and recovery would be expected to occur rapidly.
- 4.7 Sediment quality information for this zone<sup>3</sup> indicates that most heavy metal concentrations in intertidal sediments are below sediment quality guideline values, with the exception being copper concentrations, which are above the Threshold Effects Level value. The load of heavy metal contaminants (or other sediment associated contaminants) that could be delivered to this area if discharge from the EPR structure was to occur is unlikely to result in any significant widespread change to existing sediment contaminant levels.
- 4.8 Over the medium term (days), tidal dispersion would result in the discharge being further diluted and dispersed in harbour waters. This dilution would likely limit any further ecological effects above those experienced over the short term.
- 4.9 Over the longer term (weeks), recovery of areas affected by the initial zone of reduced water quality would occur. This would include infilling of the scour channel by tidal and wave factors, and recovery of the benthic communities subject to any changes in composition.
- 4.10 While tidal dispersion of the discharge could possibly result in dispersion to some or all of the CPAs noted in paragraph 3.16 of my evidence, I would not expect the discharge to result in any long term alteration of the ecological values that these CPAs are noted for.

#### **Potential aesthetic water quality effects**

- 4.11 During a discharge from the EPR structure, some water discolouration could be expected in the zone from the point of discharge out to where mixing occurs in the Purakau Channel. The extent of this discolouration would be determined by tidal conditions and the rate of discharge, and would reflect a combination of suspended solids in the discharge and any material brought into suspension by scouring of the

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<sup>3</sup> Bioresearches (2008) Project Manukau: Harbour environment monitoring programme 2007-2008. (Client report for Watercare Services Ltd)

intertidal flats. This effect would be short term (for a period of hours) and temporary only and would be quickly remedied by tidal dispersion. I would note that should a discharge actually occur, it will likely coincide with a storm event and that in these conditions, tidal waters will naturally contain elevated levels of suspended sediment.

- 4.12 Mr Cantrell has indicated that the concept design of the EPR structure includes the ability to screen litter and floatable solids. In this regard, it is unlikely that discharge would result in adverse aesthetic effects due to the presence of wastewater associated solids or fouling of beaches or shorelines.

#### **Potential cumulative effects**

- 4.13 If a discharge were to occur from the EPR structure it would be to the same general receiving environment as the Mangere WWTP's daily discharge from the tidal storage basin near Puketutu Island. However, while a discharge from the EPR structure could result in some effects on water quality and on habitats, these effects would be temporary only. There would be no permanent cumulative effects on the Manukau Harbour resulting from a discharge from the EPR structure.

#### **Comparison to existing Mangere WWTP discharges**

- 4.14 Mr Cantrell has commented on the volumes and contamination loads of existing approved discharges from the Mangere WWTP in comparison to a potential discharge from the EPR structure. The approved discharges occur from the tidal storage basin and include the normal daily tidal discharge of treated effluent, along with bypass discharges, which occur when flow conditions at the head of the secondary treatment facilities at the Mangere WWTP exceed 9 m<sup>3</sup>/s. Bypass discharges occur as a consequence of high inflow to the plant during storm events, typically on several occasions each year. The discharge of treated effluent occurs at a rate of some 25 m<sup>3</sup>/s coinciding with specified tidal conditions to enhance dilution and dispersion. Bypass discharges occur at rates of up to about 14 m<sup>3</sup>/s and can last for several hours.
- 4.15 Mr Cantrell has compared the contaminant load contributed over the long term by these ongoing approved discharges. It is clear that the contaminant load discharged from the EPR structure will be significantly less.

#### **Positive ecological and public health effects of the Project**

- 4.16 Mr Munro and Mr Cantrell have both outlined the range of beneficial effects of the Project. In this regard, I note that the Project will provide significant ecological and

public health related benefits to Meola Creek, Motions Creek and Whau Creek and the associated coastal receiving environments through the significant reduction in wastewater overflows. These benefits will be immediate once the Project has been commissioned and will be ongoing over its operational life.

- 4.17 By comparison, a discharge from the EPR structure is an extremely unlikely event and, should it occur, any effects will be of a relatively short duration. Therefore, from an ecological and public health perspective, the beneficial effects of the Project over its lifetime, including its significant reduction in current wastewater flows year in, and year out, through the catchment, will far outweigh any relatively short term effects of a discharge from the EPR structure.

**Summary of potential public health, ecological and aesthetic effects**

- 4.18 Overall, my assessments indicate that in the extremely unlikely event of a discharge from the EPR structure, public health and ecological effects could occur. A discharge would result in a public health risk to contact recreation along the Hillsborough shoreline which would likely require beach closures, possibly for several days. Localised ecological effects on habitats in the zone from the point of discharge out into the Purakau Channel could also occur. In this area, some discolouration of water would also be expected.
- 4.19 If a discharge were to occur, it would most likely coincide with a significant storm event. In those conditions, tidal waters will naturally contain elevated levels of suspended sediment. Effects would reduce relatively quickly (within hours) due to ongoing tidal dilution and dispersion.
- 4.20 The main residual longer term effects of the discharge would be the public health risks associated with shellfish gathering from waters affected by the discharge, and in particular from the Nga Kuia e Toru Reef, and effects on the ecological habitats in the area subject to the initial zone of reduced water quality. Recovery of shellfish quality and habitats would be expected over several weeks.
- 4.21 No permanent effects on the Manukau Harbour and its associated recreational or ecological values would occur. Similarly, while the discharge might disperse to areas of identified ecological value, I would not expect the discharge to alter these values. The long term ecological and public health benefits of the Central Interceptor Scheme on the streams and coastal receiving environments associated with the Central Interceptor catchment area will outweigh any short term effects of a discharge from the EPR structure. As I and Mr Cantrell have highlighted, there is an extremely low risk of discharge from the EPR structure occurring.

## 5. CONSIDERATION OF ALTERNATIVE LOCATIONS FOR EPR STRUCTURE

- 5.1 As Mr Cantrell has described, consideration has been given to alternative locations for the EPR structure. The feasible locations include at: Pump Station 23, with discharge to the adjacent Manukau Harbour; and at Kiwi Esplanade Reserve, discharging also to the Manukau Harbour. Neither of these alternative locations were considered to be preferable to the proposed location. Mr Cantrell has also considered alternative options at the Mangere WWTP in his evidence.
- 5.2 A discharge at either Pump Station 23 or Kiwi Esplanade would be to an environment in close proximity to residential areas and areas of contact recreation. For these reasons, the proposed Mangere Pump Station location is preferred because of its remoteness from the public and because it is not an area with contact recreation values. Ecological values in this area are also lower than at the two other Manukau Harbour locations.
- 5.3 As has been described by Mr Cantrell, it is not feasible to convey an emergency discharge from the proposed Mangere Pump Station to the treated effluent discharge channel due to a lack of capacity in this channel. Similarly, constructing a pipeline to convey the flow further out across the intertidal mudflats would result in disturbance to habitats and could not guarantee additional benefit to the current shoreline discharge location unless it was sufficiently close to the Purakaa Channel that it ensured better initial dilution conditions. Mr Cantrell has concluded that such a pipeline is not technically feasible.
- 5.4 The proposed Mangere Pump Station site represents the most appropriate location for the EPR structure.

## 6. MANAGEMENT OF DISCHARGES FROM THE EPR STRUCTURE

- 6.1 Discharges from the EPR structure would occur only in the rare emergency scenarios described by Mr Cantrell. If discharge was to occur it would not be possible to avoid the effects I describe in Section 4 above.
- 6.2 In this regard, and reflecting the fact that overflows do occur from the wastewater network, Watercare operates its network in accordance with a set of procedures developed to minimise the effects of those wastewater overflows. The procedures set out how Watercare responds to overflow events from both the transmission network and the local network, including pump station overflow events. The procedures are documented in the manual titled: *Wastewater Overflow Regional Response Manual (Version 1.0 – May 2013)* ("**Overflow Response Manual**"), and

have been developed jointly by Watercare and Auckland Council. These procedures would govern the response to any discharge from the EPR structure.

6.3 The key purpose of the Overflow Response Manual is to reduce risk to people and the environment in the event of an overflow or discharge. The incident response process flow diagram is attached as **Appendix B** to my evidence. The procedures address a wide range of actions associated with coordinating the response to overflow events, including:

- (a) assessing the scale of incident and the response required;
- (b) ensuring public health and safety measures are in place;
- (c) notifying Auckland Council and the Auckland Regional Public Health Service;
- (d) managing the response, including the process of repair, overflow containment, if this is possible, and the process of clean up where this is feasible;
- (e) deploying appropriate warning signage at affected bathing beaches or contact recreation areas;
- (f) reviewing environmental monitoring data; and
- (g) incident closeout and follow-up reporting.

6.4 The procedures include a number of performance targets, including setting timeframes for implementing the response process.

6.5 Any discharge from the EPR structure would be managed under the procedures as a "Level 4 Incident" (Major Overflow). Incident levels range from Level 1 to Level 5, with Level 1 being for a routine type incident and Level 5 being a civil defence emergency. Level 4 incidents require escalation of management responsibilities to Watercare's Level 2 Management, with the Chief Operations Officer, or delegate, taking responsibility for incident response coordination and control.

6.6 In a scenario where discharge from the EPR structure was possible, Watercare would likely have several hours notice in advance of a discharge occurring (as it would be actively working to repair the Pump Station). The management response process for a discharge from the EPR structure would involve the following elements:



- (a) Appointing a Watercare Incident Controller, who would be responsible for overseeing the response process.
- (b) Notifying Auckland Council's pollution control hotline and the Auckland Regional Public Health Service of the discharge. The Overflow Response Manual requires the Auckland Council's Pollution Response Team to be notified within 15 minutes of a discharge being confirmed by the Watercare Incident Controller, and the Auckland Regional Public Health Service within 1 hour.
- (c) Working to repair the proposed Mangere Pump Station as quickly as possible. This action would have been underway for some time before any discharge occurred.
- (d) Deploying warning signage at locations where public health risks might exist. As I have described earlier in my evidence, a discharge from the EPR structure would present a contact recreation risk at beaches along the Hillsborough coast, and to shellfish gathering at Nga Kuia e Toru Reef. Deployment of warning signage at these areas, along with wider public communications, would be expected. Depending on the tidal conditions at the time and the duration of the discharge, warning signage may also be required along the Ambury foreshore. I would also expect that signage and warning tape would be erected on the foreshore around the EPR structure to restrict public access to the immediate area to address any health and safety risk.
- (e) Undertaking receiving environment monitoring to establish the level of public health risk.<sup>4</sup> Warning signage would remain in place until monitoring indicates water quality meets national contact recreation guidelines. Auckland Council's Safeswim website would be updated with relevant warnings if required. As I have indicated earlier in my evidence, it is likely that warnings for contact recreation would remain in place for some days following a discharge from the EPR structure, while restrictions on shellfish gathering would likely remain for several weeks. Additional receiving environment monitoring has also been proposed in the Pre-hearing Report, which I address at paragraph 9.5 of my evidence.

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<sup>4</sup>

This monitoring would be based on the sampling and analytical protocols set out in MfE's 2003 Microbiological Water Quality Guidelines for Marine and Freshwater Recreational Areas

- (f) Following closeout of the incident, undertaking reporting to document the reasons for the discharge, the repairs completed, the findings of any environmental monitoring and any particular recommendations that might be relevant to future response.

6.7 The procedures documented in the Overflow Response Manual represent best practice in New Zealand, and based on my review of international practice, are consistent with the procedures adopted by other large wastewater network operators internationally.

6.8 In addition, Watercare has proposed consent conditions which require it to:

- (a) operate the Central Interceptor tunnel to minimise the risk of discharge from the EPR structure;
- (b) manage the response to any discharge in accordance with the Overflow Response Manual; and
- (c) undertake additional formal notification and reporting within six hours of the discharge occurring, and would be over and beyond that required in the Overflow Response Manual. This additional reporting would enable more information on the discharge and the response to be conveyed to Council and the Auckland Regional Public Health Service.

6.9 Overall, it is my opinion that this approach is consistent with best practice and represents the best available method for managing any potential effects of a discharge from the EPR structure in the rare event that it needs to occur.

## **7. RESPONSE TO SUBMISSIONS**

7.1 Concerns relating to potential discharge from the EPR structure are raised in submissions from Te Akitai Waiohū Waka Taua Trust on behalf of Ngāti Pare Waiohū, Ngāti Pou Waiohū, Te Akitai Waiohū, the Onehunga Enhancement Society, Onehunga Business Association, and in the pro forma submissions lodged by Ngāi Tai Ki Tamaki Tribal Trust, Manukau Harbour Restoration Society and others. These submissions identify concerns relating to:

- (a) discharge volumes from the EPR structure;
- (b) mitigation of overflow discharge effects, and

(c) more general concerns regarding effects on public health, ecological values, and amenity values of the Manukau Harbour.

7.2 The submission from Ngati Tamaoho also raises general concerns regarding effects on the ecological values of the Manukau Harbour, while the submission from the Mangere Bridge Ratepayers and Residents Association raises concerns about impacts on recreation facilities and response to emergencies.

7.3 I address these matters insofar as they relate to a discharge from the EPR structure.

7.4 As Mr Cantrell has explained, the volume of any discharge from the EPR will ultimately be determined by the factors that would contribute to a discharge occurring and therefore it is not possible to be specific about discharge volumes. However, as I have indicated in paragraphs 3.8 and 3.9 of my evidence, if a discharge were to occur for several hours and coincided with a significant storm event, a large volume of diluted wastewater could be discharged. As Mr Cantrell has pointed out, the likelihood of a discharge occurring is extremely low.

7.5 In terms of mitigation of discharge effects, Watercare's overflow response procedures mitigate risks associated with any discharge, particularly with respect to public health risks. The procedures would place priority on repairing the proposed Mangere Pump Station, which will minimise the duration of discharge, and hence the extent of any effect on the receiving environment. The procedures deal specifically with response to emergency discharge scenarios and, as I have noted, represent best practice in New Zealand.

7.6 I have described the potential public health and ecological effects of a discharge from the EPR structure in Section 4 of my evidence. In summary, I conclude that public health and ecological effects could occur as a result of a discharge. Generally, effects would be resolved over a relatively short period of time by tidal processes. In the unlikely event that a discharge does occur, it will not be possible to avoid these effects. However, any effects of a discharge will be temporary and there will be no permanent effects on the Manukau Harbour, or on the intrinsic values of its ecosystems, or on its recreational or amenity values.

## **8. RESPONSE TO COUNCIL PRE-HEARING REPORT**

8.1 Section 9.2.13 (iii) of the Council's Pre-hearing Report addresses the effects of discharge from the EPR structure. Section 15.1 identifies additional matters on which further evidence is requested. I address these below.

## **Nature of the discharge**

### *Contaminant loads and storm scenarios*

- 8.2 Mr Cantrell has provided additional information in terms of the nature of the discharge and storm scenario used in the assessment of effects. In terms of the further evidence requested in Section 15.1(b), this has been addressed by Mr Cantrell. I agree with his analysis and have concluded in paragraph 4.15 above that the contaminant load contributed by a discharge from the EPR structure will be significantly less over the long term compared to the contaminant load contributed by the on-going permitted discharges from the Mangere WWTP.

### *Alternative locations*

- 8.3 Mr Cantrell has also provided further evidence on the feasibility of discharging from the EPR structure at alternative locations (Section 15.1, item (c)). I have provided additional comment on the ecological and water quality issues associated with particular alternative discharge locations in Section 5 of my evidence. While Mr Cantrell has noted that extending the discharge location further out across the intertidal mudflats would not be feasible, I have concluded that this would result in disturbance to habitats and could not guarantee additional benefit to the current shoreline discharge location unless it was sufficiently close to the Purakau Channel that it ensured better initial dilution conditions. I have concluded that the proposed location is the preferable location of the feasible options.

## **Potential effects on the environment**

- 8.4 The Pre-hearing Report seeks clarification on the potential adverse effects of discharge from the EPR structure. I have addressed these effects in Section 4 of my evidence. In terms of discharge dispersion, Watercare's previous studies of tidal dispersion indicate that if discharge coincided with an incoming tide, dispersion along the Ambury shoreline could occur. Some dispersion of the discharge is possible along the northern shoreline of Puketutu Island under most scenarios. Unlike the beaches along the Hillsborough coastline, these shoreline areas are not utilised extensively for contact recreation purposes. They are, however, utilised for passive recreation (eg walking) and provide good public access opportunities to the coastal environment.
- 8.5 As Mr Cantrell has noted, screening on the EPR structure to remove litter and floatable solids will be possible and has been included in the concept design of the EPR. In this regard, while discharge dispersion along the Ambury Park and Puketutu Island shorelines may occur, fouling of beaches or of the shoreline by

wastewater debris is unlikely. Consequently, and noting that the likelihood of discharge is extremely low, discharge from the EPR structure is unlikely to reduce the aesthetic values that these public open spaces and shorelines hold. I have noted in paragraph 6.6 that, should a discharge occur, deploying public health warning signage along these shorelines, as well as at beaches along the Hillsborough shoreline, could be necessary.

#### **Notification timeframes and responsibilities**

- 8.6 The Pre-hearing Report notes a difference between the notification timeframes set in the Overflow Response Manual and Watercare's proposed consent condition. The initial notification to Auckland Council's Pollution Hotline and to the Auckland Regional Public Health Service, which I describe in 6.6, is intended simply to advise these agencies of the discharge occurring and to provide brief details on the response. The purpose of the additional notice, within six hours of an event, is to enable more information on the discharge, and in particular Watercare's response, to be conveyed to Council and the Auckland Regional Public Health Service.
- 8.7 Mr Cantrell has addressed the ability of Watercare to predict the likelihood of discharge from the EPR structure in advance of it occurring. I have made the observation in paragraph 6.6 that Watercare would most likely have been working to repair the proposed Mangere Pump Station for some hours before any discharge would occur. In respect of who is responsible for the erection of warning signage, the Overflow Response Manual sets out that the Licensing and Compliance Team has responsibilities for ensuring public health warning signage is installed.
- 8.8 As a final point, I note that the Pre-hearing Report at Section 5.7.3 states that the "proposed EPR outfall structure is located in a CPA2 area". This is incorrect. The correct zoning is General Management Area, as shown on Auckland Regional Plan: Coastal Maps Map Series 1 – Sheet 12.

### **9. CONDITIONS**

- 9.1 A number of Consent Conditions have been proposed in the Pre-hearing Report relating to the EPR discharge. I make the following comments in relation to these.
- 9.2 The Council has proposed a new Consent Condition 10.4 to address the development of an EPR Discharge Management Plan ("**EPR Plan**"). I support this proposal but note that this Management Plan needs to reflect the provisions of the Overflow Response Manual. I also consider that the three month timeframe post granting of the consent for preparation of the Plan is not sensible. It will not be

possible to fully develop an EPR Plan until the detailed design for the Project has been completed. The EPR Plan will not be needed until the Project becomes operational. Accordingly, and so as to ensure that the EPR Plan appropriately reflects the actual design and construction of the proposed Mangere Pump Station, it is my opinion that the timeframe for development of the EPR Plan needs to be altered. Watercare has proposed an alternative wording to this condition which I support.

- 9.3 In relation to the Council's proposed new Consent Condition 10.7, I note that the proposal to make Watercare responsible for deployment of public health warning signage is inconsistent with the Overflow Response Manual. The Overflow Response Manual identifies that the Licencing and Compliance Team at Auckland Council holds this responsibility. It is my understanding that the approach set out in the Overflow Response Manual is consistent with the Council's wider responsibilities for public health risk management. I would note that Condition 10.4(c) requires the EPR Plan to address the procedures for deployment of signage. It is my opinion that responsibilities for signage deployment should be consistent with the Overflow Response Manual, unless say an alternative approach was agreed during development of the EPR Plan.
- 9.4 The Council has proposed a new Consent Condition 10.8 proposes reporting on the discharge within one month of a discharge occurring. This reporting is generally in accordance with the process set out in the Overflow Response Manual and I support this condition.
- 9.5 The Council's proposed new Consent Condition 10.9 sets out provisions for a receiving environment monitoring plan. The Overflow Response Manual provides only general guidance on receiving environment monitoring in relation to overflow incidents. In this regard, I support the provisions of Consent Condition 10.9. However, as per my comments regarding Consent Condition 10.4, sensible development of this plan can only occur once the design and construction of the proposed Mangere Pump Station has been completed. Watercare has proposed alternative wording to this condition to address this issue, which I support.
- 9.6 I note also that the Council's proposed new Consent Condition 10.10 addresses sediment quality monitoring, which more sensibly should be captured in the Monitoring Plan in Condition 10.9. I have proposed an amendment to Condition 10.9 (new 10.9(ja)), as part of the Monitoring Plan, which addresses sediment monitoring for those heavy metal parameters most typically associated with combined sewer overflow discharges.

9.7 Overall, it is my opinion that the proposed Consent Conditions put forward by Watercare appropriately mitigate the risks associated with discharge from the EPR structure.

## **10. CONCLUSIONS**

10.1 Overall, I note that a discharge from the EPR structure is possible, but only under scenarios which are very unlikely to occur.

10.2 Should a discharge occur, any effects on water quality and ecology would be determined by a combination of factors, including: the quality of any discharge; the potential duration and rate of discharge; and the dilution and dispersion conditions in the tidal Manukau Harbour receiving environment at the time of any discharge.

10.3 There is the potential for public health and ecological effects if a discharge occurred. Generally, these effects would be resolved over a relatively short period of time by natural tidal processes. It is my opinion that there would be no permanent effects on the Manukau Harbour and its associated recreational or ecological values. Nor would there be any permanent effects on public health.

10.4 Watercare has procedures in place that have been developed to address the response to wastewater and discharge overflow incidents to reduce risk to people and the environment. The procedures represent best practice in New Zealand.

10.5 Overall, it is my opinion that from an ecological and public health perspective, the beneficial effects of the Project over its lifetime will outweigh any relatively short term effects of a discharge from the EPR structure, in the unlikely event that it occurs. It is also my opinion that the proposed Consent Conditions, with the alterations I have outlined above, appropriately mitigate ecological and public health risks in the unlikely event that a discharge was to occur.

**Peter Roan**  
**12 July 2013**

