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ASSESSMENT OF WATERCARE WASTEWATER NETWORK STRATEGY TE WAI O PAREIRA/HENDERSON CREEK THE RIVER CARE GROUP JUNE 2022

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CONTENTS

Contents 2
Figures 3
Tables 3
Acronyms 4
Executive Summary 5
1. Introduction 7
2. Network Discharge consent 7
3. Wastewater Network Strategy 8
3.1. Network Performance and Prioritisation of Improvement 9
3.1.1. Performance 9
3.1.2. Prioritisation 10
4. Henderson Massey Local Board Catchment 10
4.1. Upper Harbour West catchment 13
4.2. Henderson Creek Catchment 14
4.3. Whau River Catchment 15
4.4. Wastewater Transmission Network 16
4.5. Northern Interceptor - Scope 17
5. Overflows from the network 20
6. Overflows to Te Wai o Pareira/Henderson Creek 21
6.1. Type 1 EOP Overflows 22
6.2. Type 2 EOP Overflows 23
6.3. Type 3 Uncontrolled Overflows 23
7. Improvement works 25
7.1. GLE PS 44 Western 26
7.2. The Whau River Catchment 27
7.2.1. WIN MH 75 27
7.2.2. The St George Pump station (PS 25) 27
7.3. WHE MH10, Taipari Strand 29
7.4. Siphons 31
7.5. Engineered Overflow Points 31
7.5.1. EOP 1604 10 Celsmere Lane 31
7.5.2. EOP 1583 Matipo Rd 33
7.5.3. EOPs 748 and 749 33
7.6. The Concourse Storage Tank 33
7.7. The Glen Eden Storage Tank 33
7.8. Northern Interceptor – Anticipated Outcomes 34
7.9. Inflow and Infiltration 34
7.10. Other works 35
7.10.1. Lawsons Creek 35

DocuSign Envelope ID: 315388FA-CC1A-4BAE-B9CD-49A9E999388B

7.10.2. Huruhuru Creek 35
8. Other Issues 35
8.1. Faults Reporting 35
8.2. GIS Omissions 35
8.3. Overflow Risk and Prioritisation of Improvement Works 36
8.3.1. Alternative Discharge Frequency 36
8.3.2. Overflow Risk Scores Henderson Creek and Whau River Catchments 37
8.4. Ammonia Monitoring 40
9. Monitoring and Safeswim 41
10. Recommendations for WWNS (2023) 43
References 48

FIGURES

Figure 1: WWNS update cycle 9
Figure 2: Henderson Massey Local Board Map overlaid with Wastewater catchment boundaries 12
Figure 3: Catchment 16 Upper Harbour West 13
Figure 4: Catchment 17 Henderson creek 14
Figure 5: Catchment 18 Whau River 15
Figure 6: Henderson Massey Local board area Wastewater Transmission network 16
Figure 7: Initial scope of the Northern Interceptor catchment 18
Figure 8: Effect of Northern Interceptor project 19
Figure 9: Potential Northern Interceptor catchment 20
Figure 10: Shoreline of Te Wai o Pareira/Henderson Creek 22
Figure 11: Locations of works affecting Type 3 Overflows 26
Figure 12: Connection of St George Pump station PS25 to the Central Interceptor 29
Figure 13: Overflow Events and Rainfall, Enterococci Levels Recorded at Taipari Strand 2021 - 2242

TABLES

Table 1: Catchment Details 11
Table 2: Type 1 Wet Weather overflows 2014 - 2021 23
Table 3: Type 3 Overflows From Transmission Lines In The Henderson Creek Catchment 2013 24
Table 4: Wastewater overflow frequencies at WHE MH10, 2014 - 2022 25
Table 5: Te Wai o Pareira/Henderson Creek siphons 31
Table 6: Alternative Discharge Frequencies for Henderson nCreek and Whau River EOPs 37
Table 7: Overflow frequencies > 2/year and Environmental Risk Scores 39
Table 8: Recommendations for input to the WWNS 2023 44

DocuSign Envelope ID: 315388FA-CC1A-4BAE-B9CD-49A9E999388B

ACRONYMS

ADF	Alternative Discharge Frequency
ADWF	Average dry weather flow
AEE	Assessment of Environmental Effects
AEP	Annual Exceedance Probability
ARI	Annual Recurrence Interval
ARPHS	Auckland Regional Public Health Service
BPO	Best Practicable Option
CCTV	Closed Circuit Television
CI	Central Interceptor
DWOs	Dry Weather Overflows
EOP	Engineered Overflow Point
GLE	Glen Eden Transmission Line
ha	hectare
HMLB	Henderson Massey Local Board
I&I	Inflow and Infiltration
km	kilometre
l/s	litres per second
m	metre
m/s	metres per second
MH	Manhole
mm	Millimetre
MOH	Ministry of Health
NORSGA	Northern Strategic Growth Area
NDC	Network Discharge Consent
NI	Northern Interceptor
NR	Not Recorded
PS	Pump station
RE	Receiving Environment
RMA	Resource Management Act
SH	State Highway
SMA 8	Strategic Management Area Rosedale
SMA 9	Strategic Management Area Mangere
TEN	The Atatū North Transmission Line
RCG	River care Group
SEA	Significant Ecological Area
SWN	Swanson Transmission Line
WHE	Whenuapai Transmission Line
WIN	Western Interceptor
WWNS	Wastewater Network Strategy
WWOs	Wet Weather Overflows
WWTP	Wastewater Treatment Plant

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EXECUTIVE SUMMARY

The freshwater catchment of Te Wai o Pareira/Henderson Creek is the largest watershed of the Waitemata Harbour. The wastewater catchment managed by Watercare is a gravity based system that primarily follows the landform of the freshwater catchment and impacts Te Wai o Pareira/Henderson Creek. It is the second largest wastewater catchment in Watercare's network. The Network Discharge Consent (NDC) was granted to Watercare in 2014. The Wastewater Network Strategy (the WWNS) is the key compliance mechanism of this consent. The WWNS describes:

- The existing performance of the wastewater network;
- The outcomes of completed improvement works;
- How the existing performance will be improved, and
- How urban development will be provided for, over the next six-year planning period and beyond.

The primary purpose of the WWNS is to demonstrate compliance with the requirements of the NDC by developing and implementing suitable processes, practices and improvement works to progress towards achieving compliance with the NDC target of two wet weather overflows per annum per Engineered Overflow Point (EOP) or an Alternative Discharge Frequency (ADF) justified by a Best Practicable Option assessment.

The WWNS is required to be updated and re-submitted every six years. The first iteration was implemented in 2017, with the next required by 30 June 2023. Data cut-off is 30 June 2022 to allow sufficient time for analysis, programme development and preparation documentation, and to consult and take account of stakeholder views[1].

The Rivercare Group Te Wai o Pareira (RCG) has reviewed Watercare documents supporting its consent application and WWNS 2017 development, the Annual Performance Reports required by the consent, operational guides, and many public information documents. These have been made available by Watercare on request or accessible from the internet.

The intent of this document is to;

- Summarise Watercare's obligations under the consent conditions for performance reporting and prioritisation of improvement works for existing and proposed infrastructure;
- Identify wastewater infrastructures that impact the Henderson-Massey Local Board area;
- Identify locations where completed, current and proposed improvement works may need updating for the WWNS 2023;
- Summarise the RCG monitoring and consultation activities;
- Assist the Henderson Massey Local Board for the consultation input to the WWNS 2023

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The central point of the RCG's concerns are the frequent high volume uncontrolled wastewater overflows directly to Te Wai o Pareira/Henderson Creek from the Whenuapai transmission line manhole WHE MH 10 located at Taipari Strand and controlled overflows from Engineered Overflow Points (EOPS). The manhole WHE MH10 is not an EOP but has a history of overflow frequencies predating the application for the NDC in 2014. The RCG's actions include:

- Observing and reporting wastewater overflows to Watercare and Auckland Council;
- The establishment of a programme for laboratory-based monitoring of the receiving environment;
- Quarterly workshop meetings with Watercare's operational team and specific meetings with Watercare's executive management group as required; and
- Advocacy to Auckland Council and the Auckland Medical Officer of Health to attain the inclusion of sites at Taipari Strand and the nearby Chapman Strand in the Safeswim Programme.

Completed works by Watercare and their outcomes are summarised. While measurable performance improvements are noted, none have resulted in any improvement on overflow frequencies to Te Wai o Pareira/Henderson Creek.

The RCG believes there are numerous contributing factors to these overflows that should be addressed in the WWNS 2023. For example:

- Protection of the Whau River Catchment has been achieved by restricting upstream flows resulting in poor performance in the Henderson Creek Catchment;
- Capacity and flow constraints upstream of the Concourse; and
- The major flow through Taipari Strand arises from upstream areas outside of the Henderson Creek catchment.

Attention to these factors could result in overflow frequency reduction over the next 2-3 years: These include:

- Prioritise improvement works in the Whau River and Henderson Creek catchments applying risk assessments based on Attachment 12 to the NDC;
- Reinstatement of the design flow at the Western Pumpstation PS 44 that connects the transmission network to the Western Interceptor;
- Investigation of the effects of the siphon crossing from the Te Atatū Peninsula to The Concourse;
- Expanding the Inflow and infiltration (I&I) investigation on The Atatū Peninsula to include the dominant flow from the Massey East/West Harbour sub-catchments that will remain subsequent to the implementation of the Northern interceptor Phase 1 diversion of wastewater to Rosedale Rd.

At a minimum, all of these factors should be addressed in the WWNS 2023 and an assessment made on the priority of subsequent improvement works.

Details of these factors are given in text boxes in report sections and compiled into Table 8.

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1. INTRODUCTION

The scope of this Background Information Document (BID) is to summarise the Rivercare Group's discovery of potential issues in Watercare's strategy for compliance with the NDC. This BID is intended to brief the Henderson Massey Local Board for their consultation on the review of Watercare's strategy relating to wastewater network performance, improvements and future growth as required by the conditions of the NDC.

Following the amalgamation of seven territorial local authorities in the Auckland region in 2010[2], Watercare became the largest wastewater infrastructure provider in New Zealand, and is currently responsible for a network of 18 wastewater treatment plants, over 7,700 km of public wastewater pipes and over 440,000 network connections[3]. Watercare obtained a network wide wastewater discharge consent in 2014.

The Rivercare Group (RCG) has been consulting closely with Watercare Services Limited on sewage overflows to Te Wai o Pareira/Henderson Creek since 2019. Over this period The RCG has reviewed over 10,000 pages of Watercare information and data collected to inform compliance with conditions set by the Network Discharge Consent (NDC) for discharges from the wastewater network in the Auckland region. This data was either freely available on the web or has been provided by Watercare on request.

2. NETWORK DISCHARGE CONSENT

The consent application covered discharges at 756 existing engineered overflow points (EOPs), as well as future discharges in known growth areas. Watercare's estimate was that approximately 15% the existing EOPs discharged more than twice per year. Two consents, for a period of 35 years, were granted by independent commissioners, on a non-notified basis, on 17 June 2014. These are:

- R/REG/2013/3743 (overflows to land and water)
- R/REG/2013/3755 (overflows to the coastal marine area)

During the preparation and review of the Wastewater Network Strategy (including the Wastewater Improvement Works Programme) that is prepared in accordance with condition 13, the Consent Holder shall consult with the parties listed below on the proposed Wastewater Network Improvement Works Programme, the effects of discharges on receiving environments, and how the proposed Wastewater Network Improvement Works are prioritised:

- Auckland Council;
- Local Boards;
- Auckland Regional Public Health Service;
- Other wastewater network utility operators within Auckland, where the networks of those operators are directly or indirectly affected, or affect the same receiving environment;

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- Stormwater network utility operators within Auckland.

The Consent Holder shall report back to those parties listed above who engaged in consultation on the outcomes and final form of the Wastewater Network Strategy.

In addition, Watercare is required to:

- Report annually to the regulator that it is operating the network responsibly;
- Ensure that on average no more than two wet weather overflow events per Engineered Overflow Point (EOP) occur per year (a 6 month Annual Recurrence Interval, 6mARI)
- If the 6mARI is not achieved for a particular EOP, an alternative discharge frequency (ADF) for that engineered overflow point shall be determined using the Best Practicable Option (BPO) methodology and applying the methodology for prioritising catchments and wastewater network improvement works;

The condition restricting overflows to two wet weather overflows per year (6mARI) applies to EOPs at pump stations (Type 1 overflows) and EOPs on the network (Type 2 overflows). Type 1 and 2 overflows are engineered to provide discharge control for faults and wet weather surcharging. Uncontrolled wet weather overflows generally discharge from network inspection manholes and are identified as Type 3 overflows. There are no specific conditions relating to Type 3 overflows in the NDC but improvement works are required under the attachments to the NDC.

The Annual Performance Reports contain a large amount of data collected on the network performance. This data has been used to review the network performance as it effects on the Henderson Wastewater catchment with emphasis on the Te Atatu Peninsula.

3. WASTEWATER NETWORK STRATEGY

The first WWNS was developed in 2017 (WWNS 2017). The feedback from the Local Boards after consultation on the strategy accepted that the information contained in it was comprehensive and helped to increase an understanding of how the network operates and how Watercare responds to overflows. The Henderson Massey Local Board requested ongoing liaison over the performance of the network and the incidence of Type 3 overflows within this catchment, with particular reference to the prioritisation of improvements.

An applicable update cycle, where BPO equates to WWNS, is illustrated in Figure 1[4]. The RCG has discussed elements of the WWNS 2017 that require amendment or updating with Watercare. Some elements have been resolved and others still under discussion. These are outlined in text boxes in the following sections and compiled in Table 8.

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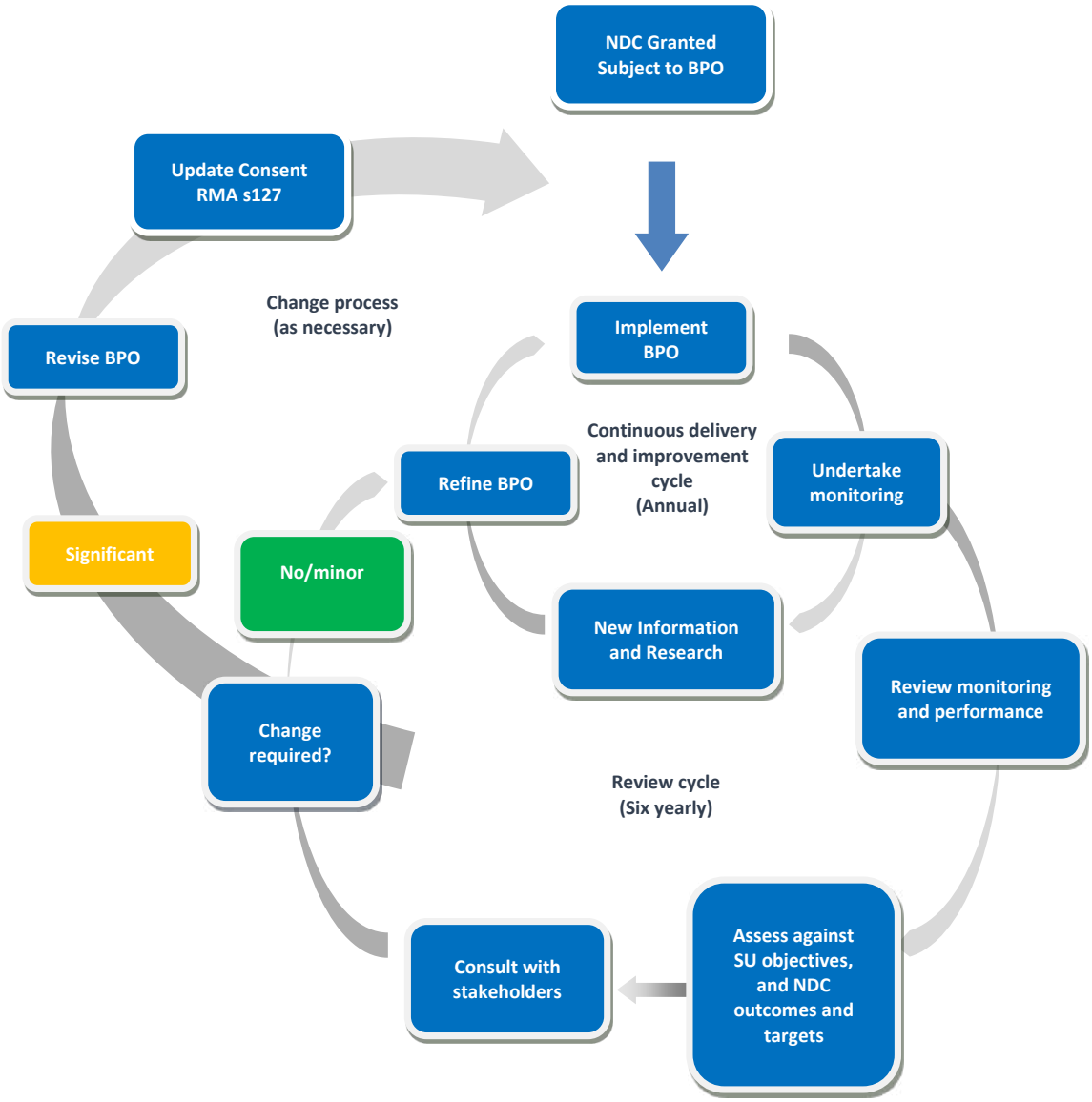

FIGURE 1: WWNS UPDATE CYCLE

3.1. NETWORK PERFORMANCE AND PRIORITISATION OF IMPROVEMENT

3.1.1. PERFORMANCE

Network performance reports required by the WWNS cover the following matters:

- identifying new overflow locations
- additions to the area of service

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- overflow frequencies and volumes
- improvement works completed
- Improvement works in progress
- Inflow and Infiltration (I&I) programmes
- Environmental monitoring information gathered by others (e.g. Safeswim) to demonstrate improvements in the performance of the wastewater network.

It is noted that no response is required if monitoring information gathered by others does not confirm improvements in performance.

3.1.2. PRIORITISATION

The methodology for prioritising catchments and wastewater network improvement works is set in Attachments 4 and 5 to the NDC. Watercare manages its assets on the basis of risk, including loss of service, public and environmental health, and financial risks. This includes assessing the discharge frequency and volume effects generated by wastewater overflows to specific receiving environments to develop a risk rating that provides the basis for prioritising wastewater network improvement works. The methodology provides for four Receiving Environment (RE) categories:

- Recreation (pathogen load)
- Ecology (contaminant load)
- Cultural (significance to iwi)
- Aesthetic values (significance to community).

For each of the four categories, an RE classification is assigned as Class 1 (high), Class 2 (medium) and Class 3 (low). Catchments with Class 1 risks are generally prioritised above other catchments.

4. HENDERSON MASSEY LOCAL BOARD CATCHMENT

The Henderson Massey Local Board area is shown in Figure 2[5] and the wastewater catchments of Upper Harbour West, Henderson Creek and the Whau River are shown in Figures 3 – 5[6]. The local board area includes parts of 3 wastewater catchments. These are:

1. The Henderson Creek catchment excluding the area south of Glendene
2. The western shore of the Whau River from Glendene to SH 16 (Whau River Catchment)
3. Ranui to Brigham Creek then to West Harbour (Upper Harbour West Catchment)

The Henderson Massey Local board area Wastewater Transmission Network is shown in Figure 6[7].

The wastewater network is shown as the red lines.

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The Henderson Creek wastewater catchment is ranked second largest in pipe lengths and third in connection numbers. in the Watercare network. Wastewater catchment details, including the first and third sized catchments (Upper Tamaki River and Western Isthmus) are summarised in Table 1.

TABLE 1: CATCHMENT DETAILS[8]

Catchment		Area (ha)	km pipes	Connections
16	Upper Harbour West	1199	156	7735
17	Henderson Creek	5300	746	41189
18	Whau River	2500	357	21460
35	Kumeu-Huapai-Riverhead	1270	73	2661
26	Upper Tamaki River		1093	59777
36	Western Isthmus	4300	620	44627

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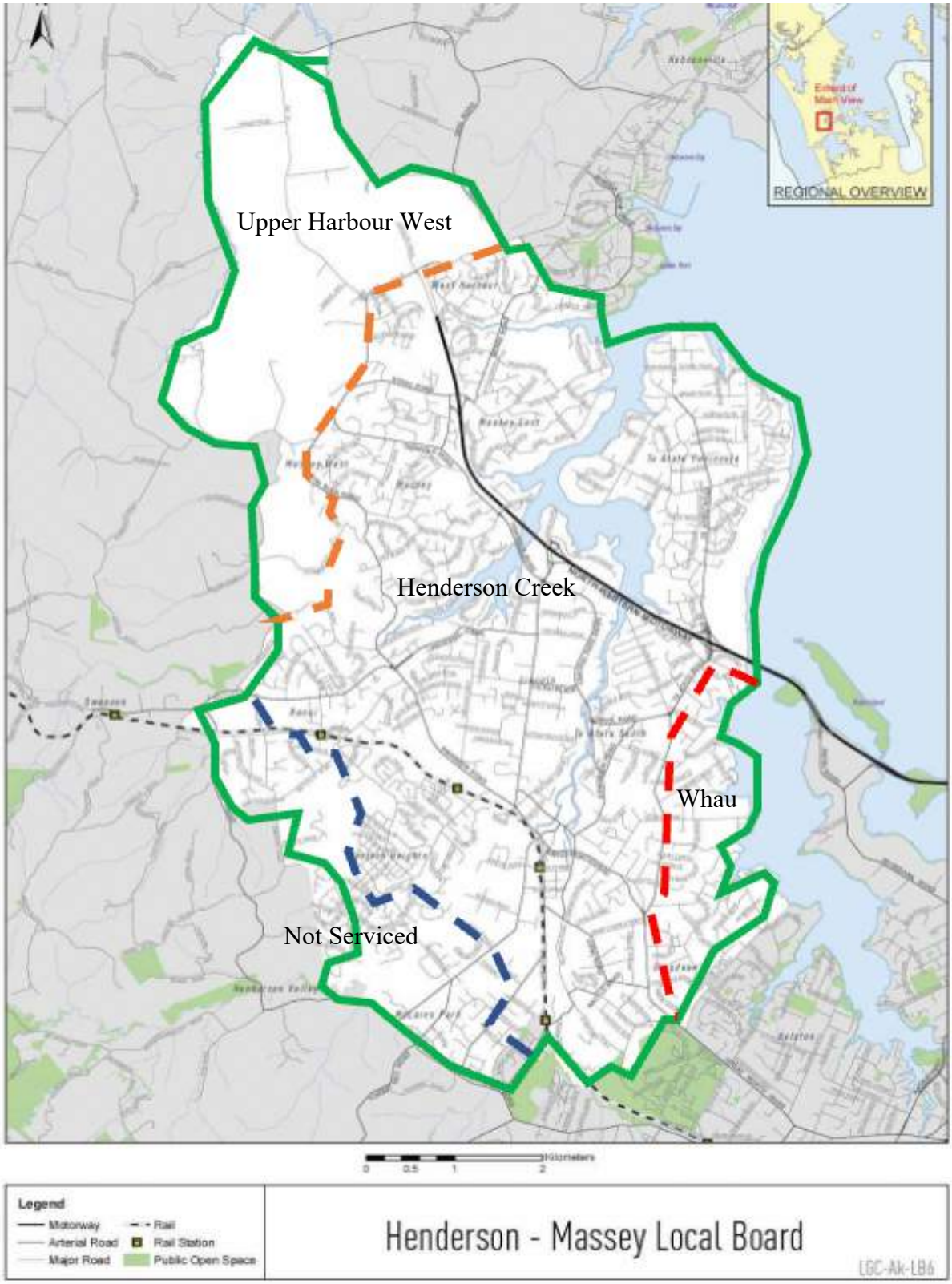

FIGURE 2: HENDERSON MASSEY LOCAL BOARD MAP OVERLAID WITH WASTEWATER CATCHMENT BOUNDARIES

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4.1. UPPER HARBOUR WEST CATCHMENT

The Upper Harbour West catchment is located on the western side of the Waitemata Harbour. The catchment contains the suburbs of Hobsonville, Whenuapai and Herald Island. The total land area within the catchment is approximately 1,100 ha.

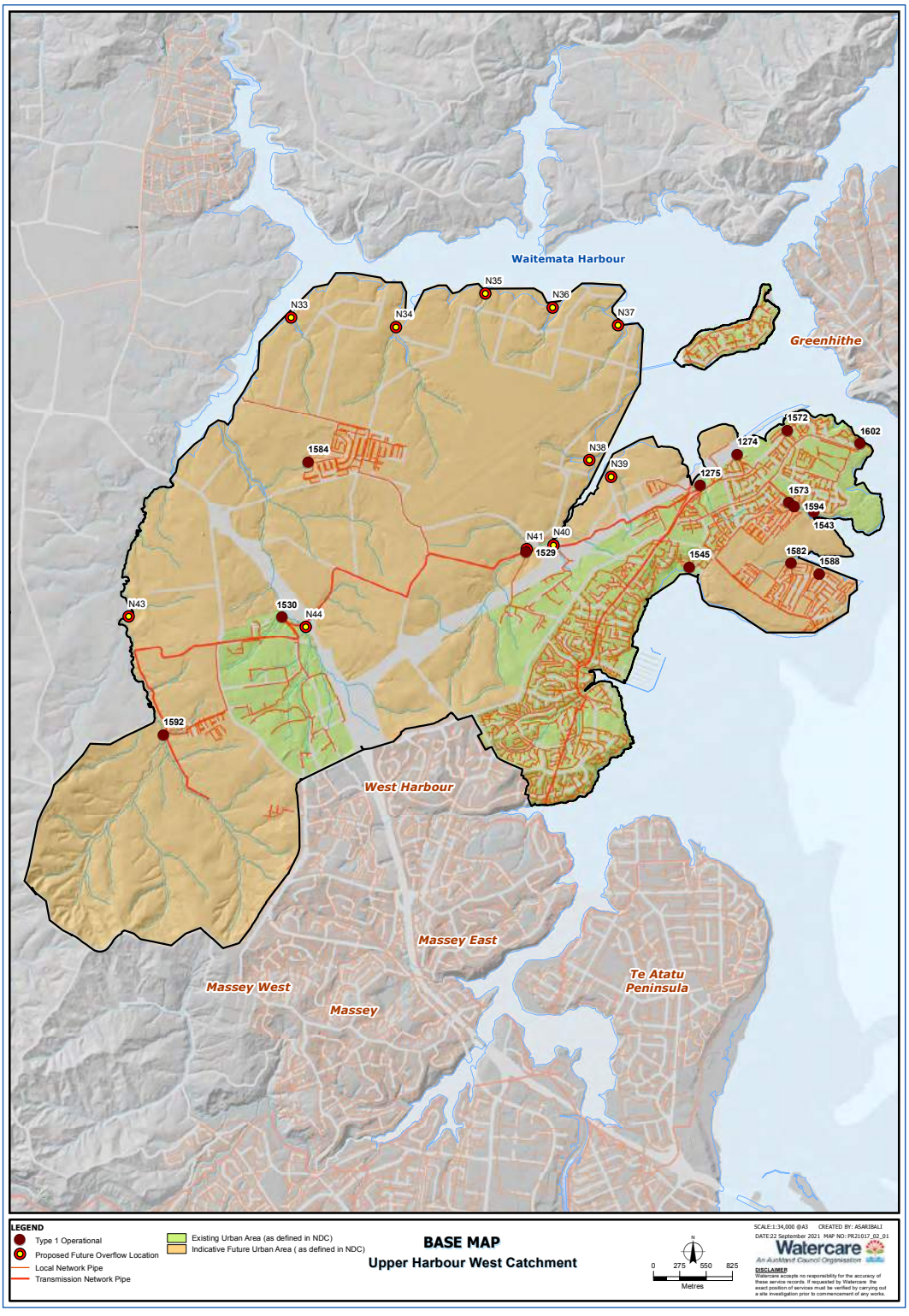

FIGURE 3: CATCHMENT 16 UPPER HARBOUR WEST

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4.2. HENDERSON CREEK CATCHMENT

The Henderson Creek catchment contains the suburbs of West Harbour, Massey, Ranui, Henderson, Te Atatū Peninsula, Te Atatū South, Glen Eden and North Titirangi. The total land area within the catchment is approximately 5,300 ha. The catchment does not service the area of the HMLB boundary to the west of Pine Avenue.

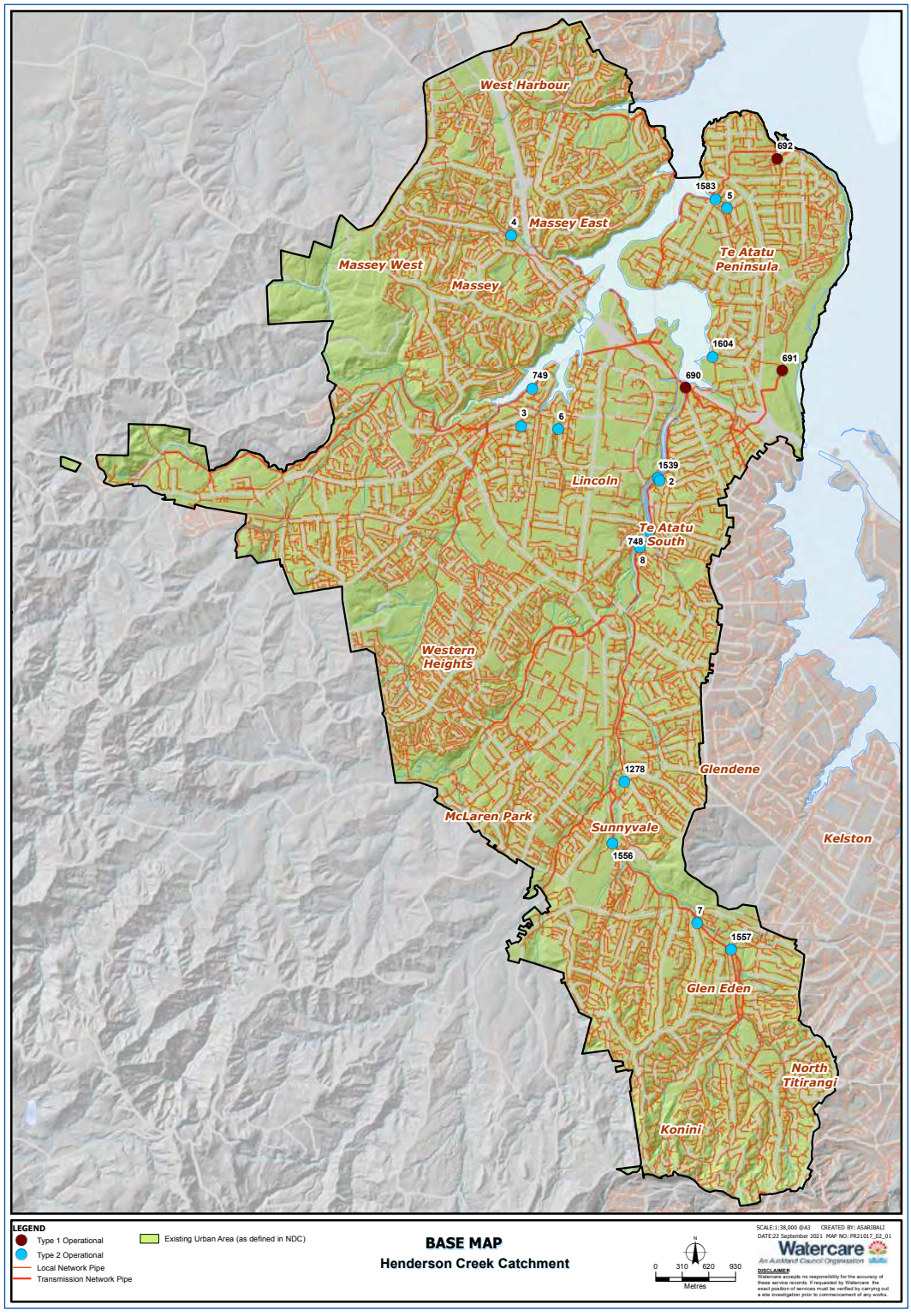

FIGURE 4: CATCHMENT 17 HENDERSON CREEK

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4.3. WHAU RIVER CATCHMENT

The Whau River catchment covers an area of approximately 2,500 ha in the western part of the Auckland Isthmus. The catchment includes all or part of the suburbs Te Atatū South, Glendene, Kelston, South Titirangi, Green Bay, Glen Eden, New Lynn, Blockhouse Bay and Avondale.

FIGURE 5: CATCHMENT 18 WHAU RIVER

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4.4. WASTEWATER TRANSMISSION NETWORK

The Wastewater Transmission Network flowing through the Henderson-Massey Local Board boundaries is shown in Figure 6.

FIGURE 6: HENDERSON MASSEY LOCAL BOARD AREA WASTEWATER TRANSMISSION NETWORK

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4.5. NORTHERN INTERCEPTOR - SCOPE

The first phase of the Northern Interceptor is expected take flows from the existing Hobsonville Pump Station to the Rosedale WWTP in 2022. The second phase, from Westgate to Hobsonville Pump Station, will enable growth in Whenuapai and Redhills areas by 2026. Further boost- pumping and extensions to the Northern Interceptor will be phased to accommodate growth, and The Concourse storage tank flow will be diverted from the Western Interceptor to the Northern Interceptor, currently programmed for 2036. Construction of a second Hobsonville Pump Station and duplication of the rising main from Hobsonville to Rosedale is timed to start in 2036.

- *Watercare to confirm completion date of NI Phase 1 and expected completion dates of proposed NI Phases.*

The area affected by the initial concept plans for the Northern Interceptor project is shown in Figure 7[9] and the resulting changes in the wastewater flow are shown in Figure 8. The transmission lines shown in Figure 8 are:

- The lines diverted to Rosedale WWTP in Phase 1 of the Northern Interceptor Project in 2022 (green);
- Lines in the final phase of the Northern Interceptor Project are shown in black.
- The legacy lines, Whenuapai, Swanson and Glen Eden, shown in red, were installed by local authorities in the 1960s to convey wastewater to the Mangere WWTP. Current scoping for the completion of the Northern Interceptor project has not identified significant modifications, apart from the diversion to the Rosedale WWTP, to flows in these lines;

- *Confirm that no significant changes are proposed for the Swanson and Glen Eden and the remaining Whenuapai transmission line after the NI Phase 1 completion.*

- The truncated Western Interceptor to Mangere is shown in brown.

The Glen Eden Branch Line and the Western Interceptor from the St George Pump station (located in the Miranda Reserve, Avondale) are currently being investigated by Watercare for inclusion in Phase 5 of the Northern Interceptor Project[10]. If included, the footprint of the Northern Interceptor (Figure 7) would be significantly increased (Figure 9).

- *Confirm the scoping of the inclusion of the Glen Eden transmission line and the Western Interceptor in the final phases of the NI project.*

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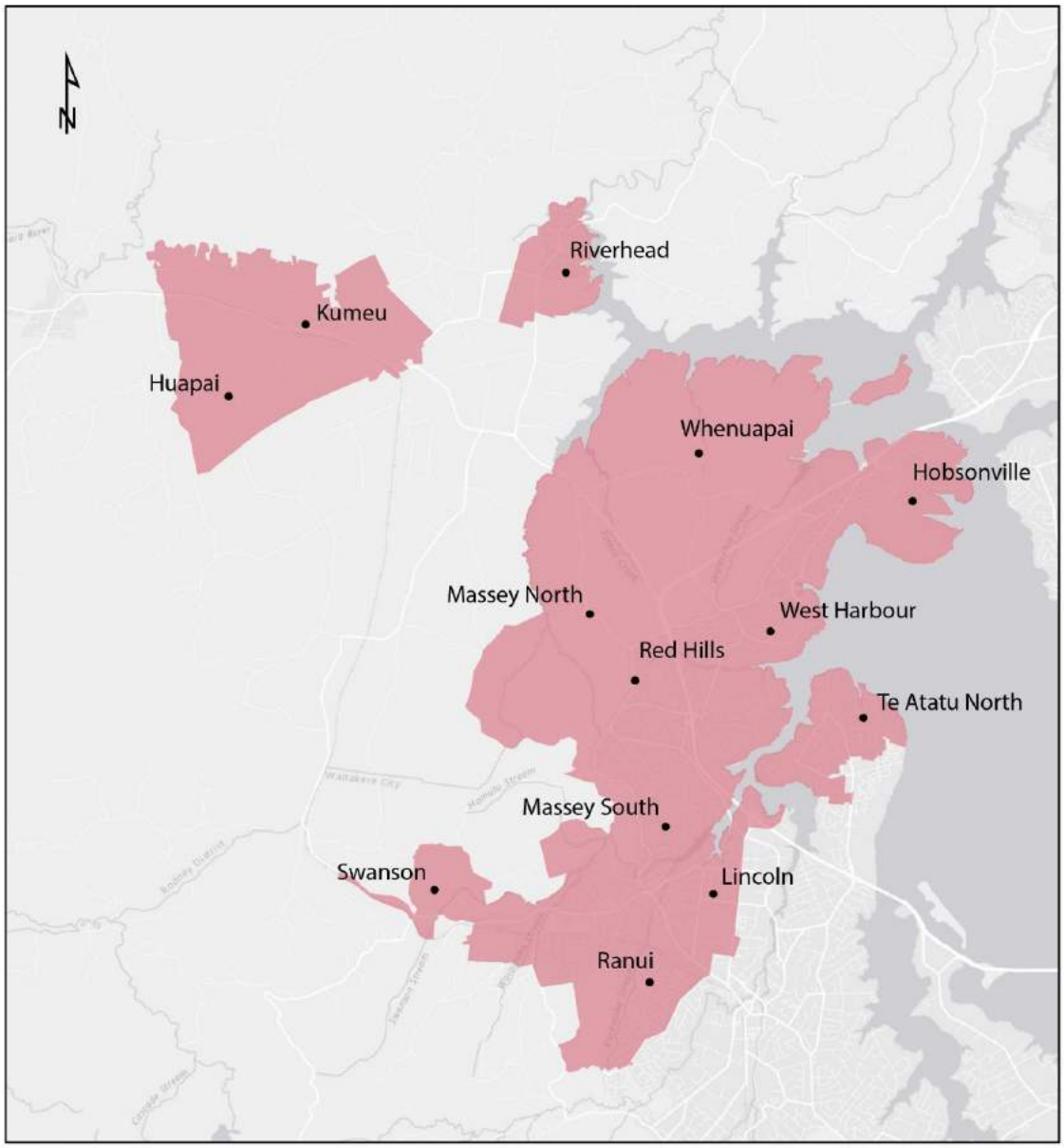

FIGURE 7: INITIAL SCOPE OF THE NORTHERN INTERCEPTOR CATCHMENT

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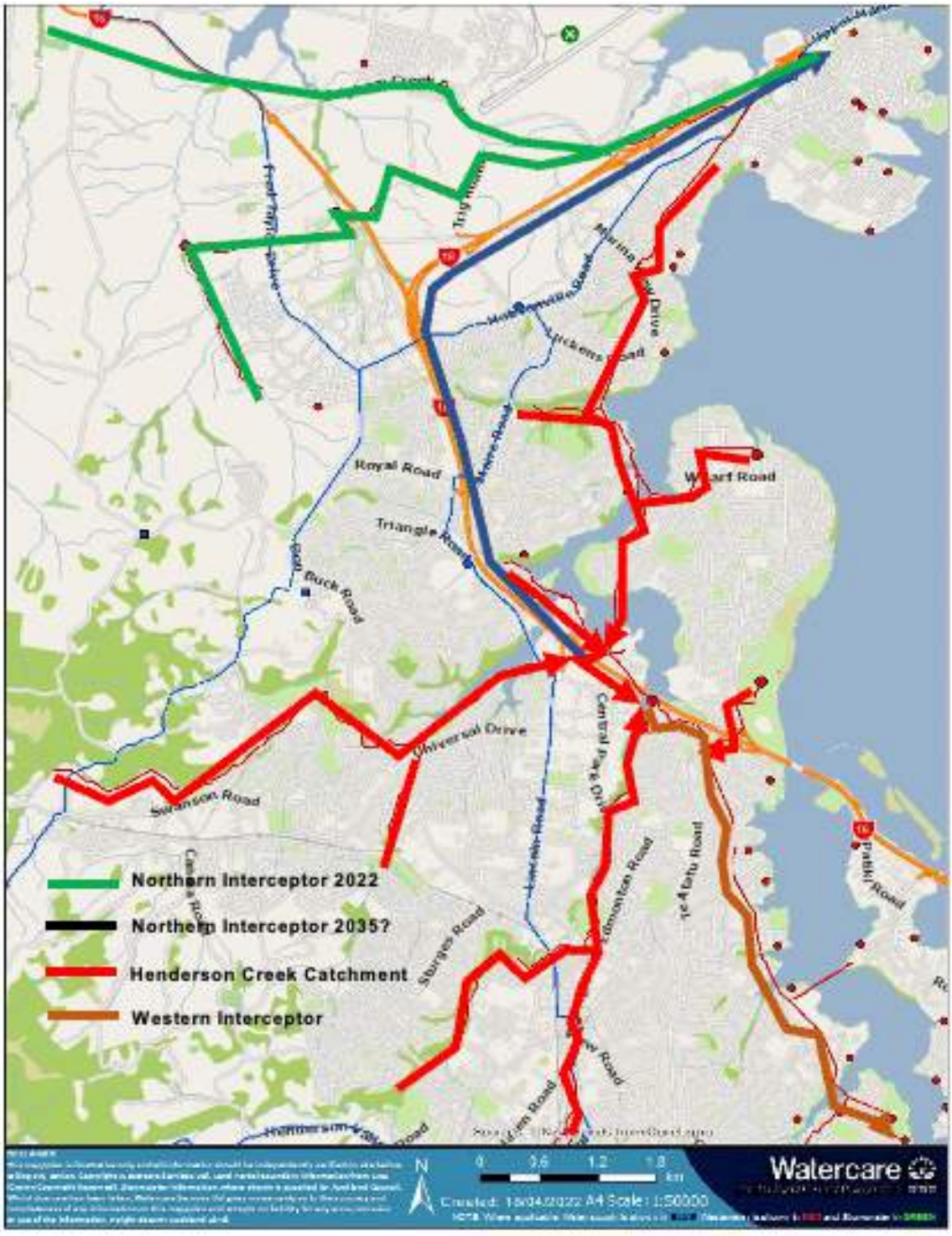

FIGURE 8: EFFECT OF NORTHERN INTERCEPTOR PROJECT

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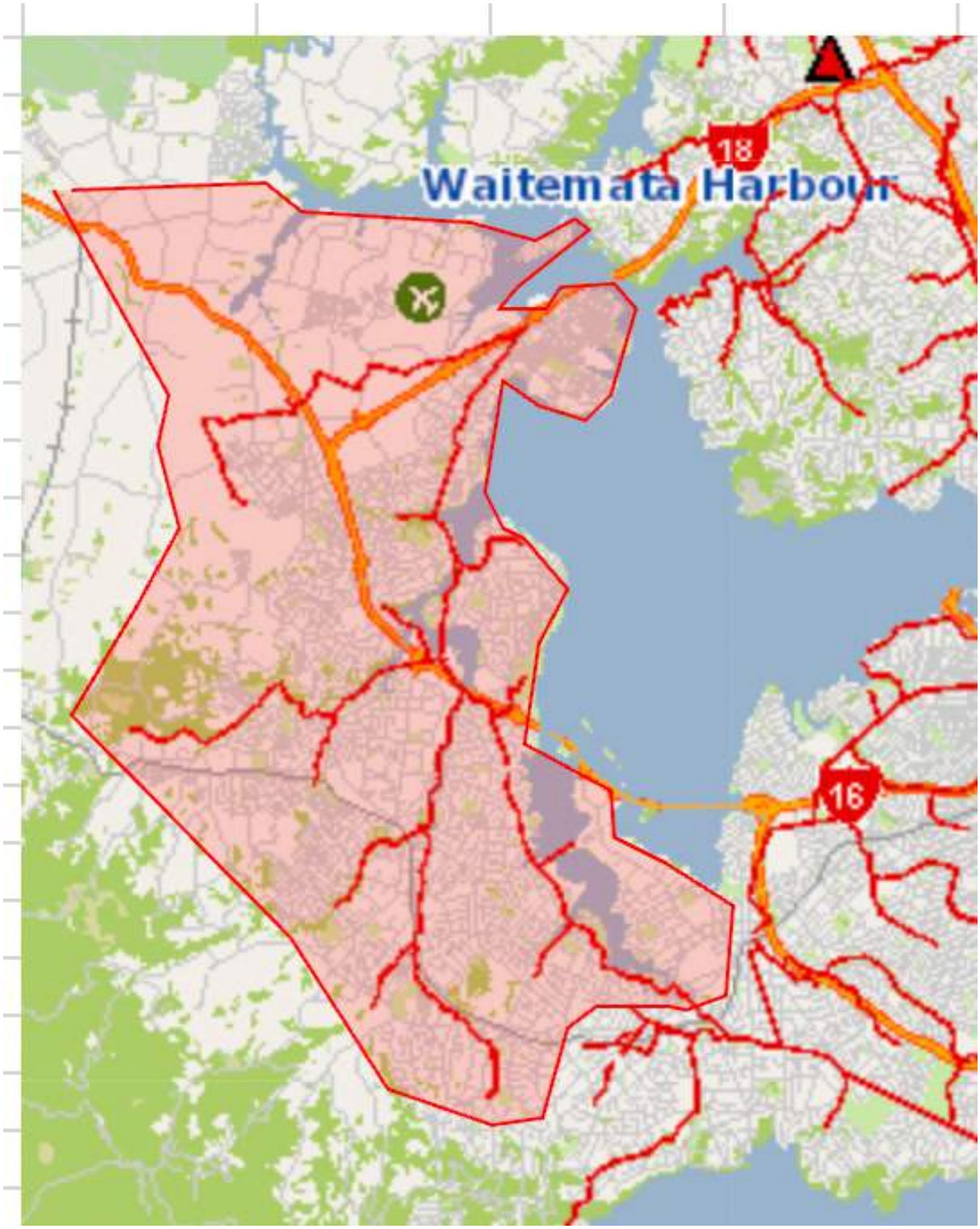

FIGURE 9: POTENTIAL NORTHERN INTERCEPTOR CATCHMENT

5. OVERFLOWS FROM THE NETWORK

There are three types of overflow points from the network:

- Type 1 Overflow Points– Engineered structures associated with a wastewater pumpstation.

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- Type 2 Overflow Points – Engineered structures that provide a relief point on the network; and
- Type 3 Overflow Points – Uncontrolled overflow points that usually discharge from a manhole as the result of surcharging during wet weather

EOPs are designed to control overflows and are generally at downstream locations on the wastewater network. They are constructed to provide limited storage and, when necessary, to discharge in a controlled manner to an acceptable receiving environment such as a stormwater course where dilution will reduce the impact on more sensitive waterways. Pipes at the top of the local network are sized to provide more capacity than is strictly needed to convey dry and wet weather flows to downstream EOPs. The aim is to convey wet weather flows to engineered overflow locations (Types 1 and 2) to eliminate Type 3 uncontrolled overflows.

Uncontrolled overflows can occur randomly and are generally identified through fault reporting by the public. Before being identified as a Type 3 location, the following must apply:

- Repeat overflow events have occurred at this location
- The cause of the repeat overflow is clearly attributable to lack of capacity in wet weather rather than asset failure (breakages, blockages, pump station failure or other causes)

Type 1 and 2 overflows are recorded by sensors or network modelling and reported in Annual Performance Reports, Type 3 overflows are random and unless reported by the community are often not reported as they are not captured by the network management processes (see section 8.1)

6. OVERFLOWS TO TE WAI O PAREIRA/HENDERSON CREEK

The estuarine shoreline of Te Wai o Pareira/Henderson Creek is shown in Figure 10. The area to the north of the Northwestern Motorway is a Class 1 Recreational Receiving Environment, the highest sensitivity level. The areas to the south of the motorway, Henderson Creek (Southern Arm) and the Huruhuru Creek are Class 2 Recreational Receiving Environments. Both sections are Class 1 Ecological, Aesthetic and Cultural Receiving Environments.

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FIGURE 10: SHORELINE OF TE WAI O PAREIRA/HENDERSON CREEK

6.1. TYPE 1 EOP OVERFLOWS

There are 3 operational pump stations, in the Henderson Creek transmission line Catchment that discharge to the Henderson Creek, PS 44 Western (EOP 690), PS 42 Te Atatū North (EOP 691) and PS 55 Te Atatū Central (EOP 692). The St George Pump station PS25 (EOP 695) discharges to the Whau Creek. The St George PS 25, although outside of the Henderson Creek Catchment is included as overflows from this location are managed in a manner that results in overflows in this catchment.

Their locations are shown in Figures 4 and 5. Discharges from PS 55 Te Atatū Central (EOP 692) and 9 pump stations to the Whau River all meet the target discharge frequency of less than 2 overflows per year. Table 2 summarises the wet weather overflow events and trends for those pump stations not meeting the target discharge frequency (from Table 4-4 of the Annual Performance Report 2021).

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TABLE 2: TYPE 1 WET WEATHER OVERFLOWS 2014 - 2021

EOP	PS	2015/16	2016/17	2017/18	2018/19	2019/20	2020/21	Trend
690	Western PS 44	2	5	7	2	12	4	increasing
692	Te Atatū North PS 42	2	12	8	3	6	3	decreasing
695	St George PS25	6	8	10	4	7	5	decreasing

6.2. TYPE 2 EOP OVERFLOWS

The 2020/21 Annual Performance Report lists 18 Type 2 EOPs in the Henderson Creek Catchment. Wet weather overflow exceeding 2 per year have been reported from 6 of these EOPs over the period 2014 – 2021. By comparison the Whau River catchment has 19 EOPs with all meeting the overflow frequency of < 2/year.

6.3. TYPE 3 UNCONTROLLED OVERFLOWS

The WWNS 2017 records 29 Type 3 network overflow points (identified as S1 – S29) for which improvement works that have been undertaken or planned. Of these 14 are in the Henderson Creek catchment (11 to public land and 3 to private property)[11]. S63 (WHE MH 9A) was added to the schedule of Type 3 overflow points in 2018/19 making the total 15[12]. Of these, 9 on the Glen Eden and Massey Branch transmission lines, have been remediated by improvement works undertaken since 2013. The remaining 6 are located on Te Atatū North and Whenupai Branch lines. 4 appear to have been remediated by the installation of an EOP at 16 Matipo Rd and flow monitoring at TEN MH 6 (see Section 7.3). S63 (WHE MH 9A) has been sealed, preventing overflows. However, this action has transferred continuing overflows to WHE MH 10.

- *Update the location of Type 3 overflows in the Annual Performance Reports.*
- *Update improvement works that have reduced the frequencies of identified Type 3 overflows.*
- *Record the frequency and ARIs of overflows at WHE MH 10 in future reporting years.*

The overflow points and improvement works are listed in Table 4.

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TABLE 3: TYPE 3 OVERFLOWS FROM TRANSMISSION LINES IN THE HENDERSON CREEK CATCHMENT 2013

OF ID	Transmission Line	MH No.	RE	Improvement works
S11	Glen Eden	MH 62	Public Land	Glen Eden Storage Tank and branch sewer upgrades 2017.
S12	Glen Eden	MH 63	Public Land	Glen Eden Storage Tank and branch sewer upgrades 2017.
S13	Glen Eden	MH 64	Public Land	Glen Eden Storage Tank and branch sewer upgrades 2017
S14	Glen Eden	MH 69A	Private property	Glen Eden Storage Tank and branch sewer upgrades 2017
S15	Glen Eden	MH 79	Private property	Glen Eden Storage Tank and branch sewer upgrades 2017
S16	Glen Eden	MH 88	Private property	Glen Eden Storage Tank and branch sewer upgrades 2017
S17	Glen Eden	MH 93A	Public Land	Glen Eden Storage Tank and branch sewer upgrades 2017
S18	Massey	MH 10	Public Land	Massey siphon upgrades 2018.
S19	Massey	MH 14	Public Land	Massey siphon upgrades 2018.
S20	Te Atatū North	MH 1	Public Land	EOP 1583 and Te Atatū North flow reduction 2018
S21	Te Atatū North	MH 2	Public Land	EOP 1583 and Te Atatū North flow reduction 2018
S22	Te Atatū North	MH 5	Public Land	EOP 1583 and Te Atatū North flow reduction 2018
S23	Te Atatū North	MH 6	Public Land	EOP 1583 and Te Atatū North flow reduction 2018
S24	Whenuapai	MH 10	Public Land	Remains under investigation for improvement options 2022
S63	Whenuapai	MH 9A	Public Land	Sealed 2015. No reported overflows since 2016/17

S24 (WHE MH10) on the Whenuapai Transmission Line has shown no improved performance and are increasing in frequency. The frequencies of overflows and annual recurrence interval (ARI) at S24 (WHE MH10) are summarised in Table 5.

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TABLE 4: WASTEWATER OVERFLOW FREQUENCIES AT WHE MH10, 2014 - 2022

year	2014/15	2015/16	2016/17	2017/18	2018/19	2019/20	2020/21	2021/22
No.	4	2	5	3	4	NR*	4	6
ARI	3m	6m	2.4m	4m	3m		3m	2m

*NR – not recorded

The 2014 – 2019 frequencies were recorded in the Annual Performance Report July 2018 to June 2019. Subsequent frequencies have not been recorded in the Annual Performance Reports. The 2020/21 and 2021/22 overflows were reported to Watercare by the RCG but not recorded in the annual reports.

7. IMPROVEMENT WORKS

Improvement works potentially affecting Type 3 overflows to Te Wai o Pareira/Henderson Creek have been discussed in Section 6.3. Locations of improvement works discussed in this section are shown in Figure 11.

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FIGURE 11: LOCATIONS OF WORKS AFFECTING TYPE 3 OVERFLOWS

7.1. GLE PS 44 WESTERN

The GLE PS 44 Western pump station is situated at the head of the Western Interceptor Sewer, and receives wastewater flows from the Glen Eden, Swanson and Whenuapai Transmission lines. Historically the Western pump station overflowed into Henderson Creek up to 7 times per year during wet weather events. The frequency and volume of overflow events was forecast to steadily increase as a result of the significant growth planned in the Northern Regional Strategic Growth Area (NORSGA) unless additional trunk sewer capacity or overflow mitigation was provided. To achieve this capacity, The Concourse Storage Tank was installed in 2012.

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In 2016 Watercare implemented network operational changes including restricting the outflows from Pump Stations GLE PS 44 Western and 42 Te Atatū North and lowering the weir into the Concourse Storage Tank to provide relief to the trunk sewer network[13]. This provides relief to the Western Interceptor but does not resolve upstream overflows[14].

- *It is recommended that the capacity of GLE PS 44 Western be reinstated to its design flow.*

The Taipari Strand Overflow Investigation report identified the flow restriction at GLE PS 44 Western resulted in The Concourse Storage Tank reaching capacity in wet weather events and the switching off inflow pumps. The buffering effect is lost and the PS 44 EOP overflows to Te Wai o Pareira/Henderson Creek. This loss of buffering effect also causes backflow upstream to WHE MH10, which, in conjunction with the incoming flows from the upstream catchment, results in overflows from WHE MH 10. Watercare has confirmed that the reduced flow at PS44 is the primary cause of upstream overflows[15].

7.2. THE WHAU RIVER CATCHMENT

7.2.1. WIN MH 75

Watercare have investigated the option of installing an EOP at WIN MH 75 to address overflows at this location. The site is located near a cliff top and there is a pipe bridge immediately downstream. They concluded that this option would cause issues further down downstream and was not technically feasible.

- *It is recommended that Type 3 overflows on the Western Interceptor (e.g. WIN MH 75) be recorded in the Annual Performance Reports*

The Annual Performance Reports 2017 – 2021 do not record overflows at WIN MH 75 and it is assumed overflow problems relate to those at the St George Pump station (See next section).

7.2.2. THE ST GEORGE PUMP STATION (PS 25)

Attachment 4 to the NDC assesses the priority of both the Whau River and Henderson Creek Catchments as medium for improvement works. Attachment 5 to the NDC assesses the potential environmental risks in the Whau River Catchment as at 2014[16]. It identifies 25 overflow points in Whau River Catchment 23 of which are low risk. Of the remaining 2, one (EOP 1279) was deleted from the schedule of EOPs in 2018. The remaining overflow point, EOP 695, is associated with the St George Pump station.

Attachment 5 to the NDC, the WWNS 2017 and the 2020 -21 Annual Performance report, all locate the St George Pump station EOP 695 at 25 Arran St, Avondale where the railway crosses the Whau Creek. This location is about 800 m north of the St George pump station. The Schedule of EOPs 2020-2021 identified the

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Recreation Receiving Environment of EOP 695 as Class 3. It has a record of high volume/medium frequency discharges. Documents supporting the NDC application, the WWNS (2017) and the annual performance reports do not identify any other overflows in the Whau River Catchment.

- *Explain the location of St George EOP 695*
- *Correct the location of the EOP given in Base Map for the Whau River Catchment.*
- *Confirm the redundancy of the St George PS 25 EOP 695 in 2023*

The St George WWPS 25 is currently being connected to the Central Interceptor enabling the wastewater to overflow into the Central Interceptor by 2023. This connection is designed to collect overflows at EOP 695 [17] [18] [19]. A diagram of these works is shown in Figure 12[20]. A presentation to the Wairau catchment working group meeting held on 25 June 2021 also shows these works and includes a diagram of predicted results that show the elimination of overflows associated with the St George WWPS 25[21]. These improvement works indicate that the St George PS 25 EOP 695 will become redundant in 2023.

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FIGURE 12: CONNECTION OF ST GEORGE PUMP STATION PS25 TO THE CENTRAL INTERCEPTOR

7.3. WHE MH10, TAIPARI STRAND

The Whenuapai Transmission line conveys wastewater from the Upper Harbour West Catchment and West Harbour and Massey East sub catchments to merge with

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wastewater from Te Atatū North at Taipari Strand. Currently the Whenuapai Transmission line is estimated to serve approximately 5000 connections from the Upper Harbour West Catchment, 6500 connections from the West Harbour and Massey East sub catchments and 3000 connections from the Te Atatū North sub catchment. The Upper Harbour West Catchment will be diverted to the Rosedale Rd WWTP in 2022, leaving the flows from West Harbour and Massy East to Taipari Strand. The remaining flow will make up over 2/3 of the flow at Taipari Strand. This flow will be similar to the flows through Taipari Strand before the the connections of Hobsonville Point, Redhills and Kumeu/Huapai to the Whenuapai Transmission Line over the last 5 years.

Frequent overflow events at WHE MH 10 were reported prior to the NDC application in 2014. The frequency of these events ceased to be reported in the Annual Performance Reports after 30 June 2019. This reporting should be reinstated in the Annual Performance Reports to allow the assessment of the effectiveness of the Northern Interceptor Project on controlling overflow frequencies.

- *Reinstate Annual Performance reporting of overflow frequencies at WHE MH 10*
- *Correct the improvements works at WHE MH 9 and 9A.*
- *Record that WHE MH 10 is an unsuitable location for an EOP and cannot comply with the discharge conditions of the NDC.*
- *Prioritise network improvement works to achieve compliance.*

In 2015, following significant uncontrolled overflows at Taipari Strand, Watercare reported that WHE MH 9 was sealed, transferring the overflow upstream to WHE MH10. WHE MH10 was fenced off and modified to discharge uncontrolled overflows directly to Henderson Creek[22]. There appears to be some uncertainty between WHE MH 9 and 9A as WHE MH 9A is sealed, not WHE MH9 and the annual performance reports record overflows at WHE MH 9A (S63) in 2015 and 2017, but not at WHE MH 9. No overflows have been recorded at either WHE MH 9 or WHE MH 9A since 2017. In addition, Watercare has advised the RCG that a level monitor will be installed at MH 9 to calculate level at MH 10[23].

The 2018 Watercare commissioned an overflow investigation to identify potential quick fix solutions to reduce or eliminate overflows at WHE MH10[13]. As a result, the flow at the Te Atatū North Pump station (EOP 692) was reduced and a new EOP 1583 installed at 16 Matipo Rd. These works appear to have reduced the frequencies uncontrolled overflows at TEN MH 1, 2, 5 and 6 but not at WHE MH10[24].

The upgrading of WHE MH 10 to an EOP by applying the BPO options of the NDC cannot be applied. Watercare has advised the River care Group that the invert level is unsuitable and the NDC does not permit new EOPS to discharge to a Class 1 Recreational Receiving Environment. The only option available to Watercare under the NDC is to prioritise network improvement works to eliminate wastewater discharges from WHE MH 10.

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7.4. SIPHONS

Details of the siphons are summarised in Table 6[25].

TABLE 5: TE WAI O PAREIRA/HENDERSON CREEK SIPHONS

Siphon	Installed	Barrels	Diameter (mm)	Length (m)
WHE MH 9A - 9B	2012	1	710	594
WHE MH 14 – 14A	1965	1	600	294
WHE MH 3 – 4	1965	3	390, 390 and 200	50
MAS MH 7B – 7C	2018	2	280 and 560	292
SWN MH 8B – 8C	2018	2	710 and 400	263

The WHE MH 9A - 9B (Royal Heights) siphon was installed in 2012[26]. The original siphon, connecting WHE MH 14 and WHE MH14A was closed in 2012 but remains operative as backup for the new siphon. No information has been given in the Annual Performance Reports to indicate any performance improvement effect of the 2012 siphon. This improvement work diverted the wastewater flow from WHE MH 11 – MH 14 and this section of the Whenuapai Transmission line now only carries wastewater from the Te Atatu North Transmission Line.

- *Discuss the effects of the WHE MH 9A-9B siphon on overflow frequencies at Taipari Strand..*

Watercare has recognised that wet weather surcharge at WHE MH 9A, installed in 2012, has resulted in uncontrolled overflows at WHE MH 10. It is, however, likely that the relocation of the Royal Heights Siphon will have reduced the risk of overflows at WHE MH 11 – 14 and TEN MH 1 – 6 on the Te Atatū North Transmission Line.

- *It is recommended that capacity constraints at the WHE MH3 – 4 siphons be investigated.*

In 2018 Watercare identified capacity constraints, resulting from pipe diameters at the WHE MH 3 – 4 siphons, as a potential cause of upstream surcharging[13]. Future investigations as part of longer term solutions for the catchment was advised.

The Massey and Swanson Branch siphon improvements have reduced the frequency of overflows to Te Wai o Pareira/Henderson Creek [27].

7.5. ENGINEERED OVERFLOW POINTS

7.5.1. EOP 1604 10 CELSMERE LANE

10 Celsmere Lane Te Atatū Peninsula is located on Henderson Creek, north of North Western Motorway (Figure 11). This part of the Henderson Creek has been identified as a Class 1 Recreational Receiving Environment in the NDC [36, 38]. The NDC consent conditions do not permit wastewater discharges to these environments.

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Uncontrolled wastewater overflows at this property were reported 2018. Initial response by Watercare was to plan an upgrade of the local network line to WIN PS 44. As a result, a temporary EOP was installed [28]. Subsequent investigations by Watercare concluded that the option to upgrade the local line through Rutherford College by increasing its diameter and remediating slumping would risk overloading the Western Interceptor down gradient of the Western PS 44 (see section 7.1). It was accepted that the EOP 1604 was to remain as a temporary measure while plans to improve the performance of the local network through Rutherford College were investigated.

The NDC consent conditions require the installation of new EOPs to be subject s to a BPO assessment and development of an ADF. The BPO for EOP 1604, was approved by the Auckland Council in 2019[29]. In 2022 this BPO was reviewed by the Rivercare Group who found that the BPO was incorrect in locating the discharge site in the Henderson Creek Southern Branch, a Class 2 Recreational Receiving Environment. The correct location is on the Henderson Creek, a Class 1 Recreational Receiving Environment. New EOPs are not permitted to discharge to this class of receiving environment.

In May 2022 Watercare engaged engineering consultants Tonkin & Taylor to review the BPO. Their report confirmed that the BPO assessment incorrectly identified the location of the EOP 1604 discharge[30]. This review also assessed the Recreational Classification of the receiving environment of this discharge. The Auckland Council Regional Plan: Coastal (2013) special activity area provision, S2.8 identified the Henderson Creek as an area allowing organised public events[31]. The Coastal plan was incorporated into the Auckland Unitary Plan (operative 2019)[32]. The provisions of S2.8 were not carried over to the Unitary Plan. We agree with the Tonkin and Taylor report that the special activity area provisions for Henderson Creek no longer apply under the AUP.

- *Acknowledge the errors in the Celsmere Lane EOP 1604 BPO assessment*
- *Reassess potential network improvements*
- *Review the Tonkin and Taylor conclusions on the Recreational Class of the receiving Environment.*

However we note that the Auckland Council Navigational Bylaw 2021[33] carried over the designation of the Henderson Creek area up to the high water mark adjacent to Cellsmere Lane for water skiing, wakeboarding and sea biscuiting activities i.e. the bylaw designates this area of Henderson Creek for recreational activities and supports the recreational classification as a Class 1 receiving environment.

The Tonkin and Taylor report also refers to the discharge from EOP 1604 is to mangroves and concludes that the recreational receiving environment classification is Class 2 and the discharges from EOP 1604 are compliant with the NDC. We question this conclusion as EOP discharges in mangrove areas have been classified as Class 1 recreational receiving environments e,g, EOP 700 at 76 Wainui Ave Pt Chevalier (EOP Schedule 2021-20 [8]).

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7.5.2. EOP 1583 MATIPO RD

EOP 1583 was installed at 16 Matipo Rd in 2018 as an interim measure to resolve uncontrolled overflows to private property and provide some relief to the Te Atatū North Transmission line. An ADF would have been derived for this EOP. A flow monitoring station was also installed at TEN MH 6. These improvements appear to have mitigated uncontrolled overflows at TEN MH 1 (S20), 2 (S21), 5 (S22) and 6 (S23), but not at WHE MH10 (S24).

- *Include an ADF and details of sensors at EOP 1583 and TEN MH 6*

7.5.3. EOPS 748 AND 749

The WWNS (2017) incorrectly located EOP 748 in the Western Isthmus Catchment. Watercare have acknowledged this error for correction in the WWNS (2023). It is recommended that the priority for improvement works at EOP 748 be reassessed in the Henderson Creek Catchment in the WWNS 2023.

Overflows at EOP 748 (GLE MH 16) and 749 (SWN MH 15) were reported to be of high volume and frequency in 2013. The Glen Eden Branch GLE 15D-15D pipe bridge and pipe connection to GLE MH 16 upgrade in 2012 reduced reported overflows at EOP 748 to medium frequency. The WWNS 2017 noted that further stages of improvement works were not planned until after 2022 and that upgrades to the Western Interceptor may impact performance at this location [34].

- *Correct location of EOP 748 in the WWNS (2017).*
- *Reprioritise improvement works at EOP 748.*

The Swanson Siphon upgrade 2018 was expected to achieve compliance[35] at EOP 749. The overflow volume and frequency were reported high and medium respectively at EOP GLE 748 and medium for both at EOP SWN 749 in the 2020/21 Annual Performance Report.

7.6. THE CONCOURSE STORAGE TANK

The $15 million Concourse Storage tank was installed in 2012. It provides 13,000m^3 of wastewater storage from the Swanson and Whenuapai Transmission lines. The purpose of this project includes the reduction of overflows from the Western PS 44 to the level permitted under the NDC and to address Type 3 overflows to private and public land [38]. The Annual Performance Reports 2019/20 and 2020/21 confirm that this objective has not been not achieved at Western PS 44 or WHE MH 10 (S24). Section 7.1 outlines possible causes for this failure.

7.7. THE GLEN EDEN STORAGE TANK

The Glen Eden storage tank and associated transmission line upgrade (Glen Eden Relief Sewer) was commissioned in 2017 to address uncontrolled overflows at 7

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locations in this area. These projects have been reported as successfully reducing the frequency of overflow events to <2/year on the Glen Eden Transmission line (Section 8.3).

7.8. NORTHERN INTERCEPTOR – ANTICIPATED OUTCOMES

Table 15 and Section 3.4.2.2 of Part 2.09a Mangere WWNS [19] state that the Northern Interceptor - Stage 1 will:

- Be completed by 2022;
- Allow wastewater flows to be diverted from the Northern Strategic Growth Area (NorSGA) and South Rodney (Kumeu / Huapai/Riverhead) to the Rosedale Wastewater Treatment Plant ; and
- Reduce Type 3 overflows S24 (WHE MH 10)

Section 5.2 of Part 3.01 WWNS states that the *Anticipated Outcome* of the Northern Interceptor Stage 2 will fully address overflows at these locations on completion in 2035[36].

- *Reconsider the WWNS (2017) statements on elimination of overflows at S25 (WHE MH10)*
- *Recognise the effects of the continuing flow of wastewater from West Harbour and Massey East through Te Atatū Peninsula.*

The completed Stage 1 of the Northern Interceptor only diverts wastewater flows from the NorSGA to the Rosedale WWTP. Wastewater flows from West Harbour and Massey East continue to flow to the Concourse Storage Tank via Te Atatū Peninsula. The WWNS 2017 does not identify any issues arising from these flows continuing to The Concourse. The anticipated results on Type 3 overflows at WHE MH 10 stated in the WWNS 2017 are highly unlikely unless improvement works also include improvement works to upgrade the wastewater flows from West Harbour and Massey East. These works could include I&I investigations in West Harbour /Massey East and eliminating flows through Taipari Strand.

7.9. INFLOW AND INFILTRATION

An I&I investigation on the Te Atatū Peninsula, but excluding Massey East and West Harbour, in 2017 was inconclusive. It is the Rivercare Group's view that the primary cause of I&I overflows is capacity at PS 44 (see Section 7.1).

Watercare has advised the RCG of an expanded investigation[37] including:

- *The I&I investigation be expanded to include Massey East and West harbour.*

- CCTV inspections and pipe cleaning, (from May 2022);
- A review of flow gauging data, telemetric data from pump stations and EOPs and modelling of Henderson Creek Catchment under the Mangere SMA model.
- A trunk stormwater network upgrade is being planned by Auckland Council.

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7.10. OTHER WORKS

7.10.1. LAWSONS CREEK

The Lawsons Creek Branch Sewer is located in the Mānutewhau Reserve, Massey East. Subsidence at this location in January 2019, resulted in pipe fracture and discharge of wastewater to the Mānutewhau Stream and subsequently to Te Wai o Pareira/Henderson Creek. The Lawson Creek Branch Sewer upgrade to cater for growth in West Harbour was completed in the 2020-21 period[38], resulting in the remediation of the pipe fracture.

7.10.2. HURUHURU CREEK

The RCG reported a broken sewage pipe discharging to the Huruhuru Creek in October 2018. Watercare completed a difficult repair under the creek bed. Overflows at this location have not been reported or observed since the repair.

8. OTHER ISSUES

8.1. FAULTS REPORTING

The internal reporting of overflow outcomes between transmission and local networks differ. Faults on local networks are identified by customer address and are reported in detail in the Annual Performance Reports. WHE MH 10 is on the transmission network and located on public land. It is attended by contractors after a severe weather event and is not reported as a fault as for the local network faults. Watercare does not report faults on public land in the NDC annual performance report[39].

The RCG's experience is that contractor response to faults on public land such as reserves can fail as the fault location reported may be a landmark as a street number is not available. An example is the reporting of an insecure manhole cover at the Trust Arena, Central Park Drive, Henderson resulting in the contractor going to the Spark Arena in Mahuhu Crescent, Parnell.

- *Upgrade their Reporting systems to record faults in network transmission lines on public land*

Watercare has responded to this issue and implemented changes to their fault reporting system that may give improvements.

8.2. GIS OMISSIONS

On investigating potential upstream sources overflow locations, the RCG discovered that the Watercare GIS did not show the junction of the Henderson

- *Explain the location of the St George PS 25 and its associated EROP 695.*

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Valley Transmission Line to the Glen Eden Transmission Line. This was notified to Watercare and corrections made immediately. Watercare has confirmed that the St George PS 25 EOP 695 is located some 700 m north of the pump station location in Miranda Reserve. Normally Type 1 EOPs are located on the pump station site.

8.3. OVERFLOW RISK AND PRIORITISATION OF IMPROVEMENT WORKS

8.3.1. ALTERNATIVE DISCHARGE FREQUENCY

Condition 9 of the NDC states that:

"The Consent Holder shall manage the Existing Network to achieve either:

*a. an average of no more than two Wet Weather Overflow Events per Engineered Overflow Point (as listed in **Attachment 2**) per year as assessed by computer modelling or actual recorded performance; or*

b. if (a) is not achieved for a particular Engineered Overflow Point, the Consent Holder shall determine an alternative discharge frequency (ADF) for that Engineered Overflow Point using the BPO methodology set out in Chapter 3 of Attachment 3 and the Methodology Prioritising Catchments and Wastewater Network Improvement Works set out in Attachment 4 (where condition 10b is used); and document this in the Wastewater Network Strategy that is prepared in accordance with condition13."

Condition 10 of the NDC states that:

" For the purpose of condition 9b, the Consent Holder may determine an ADF either:

a. for an individual Engineered Overflow Point; or

b. for more than one Engineered Overflow Point, and undertake the assessment for discharges that are rated high or very high on a catchment basis. Discharges and/or sub-catchments may be aggregated to allow for the integrated management of multiple sub-catchments and receiving environments."

Table 6 lists the EOPs in the Henderson Creek and Whau River catchments that have recorded ADFs[40].. Nine are in the Henderson Creek catchment and 1 in the Whau River catchment (see Figures 4 and 5). Apart from EOP 695 (St George PS 25), there are no other reported overflows exceeding 2/yr in the Whau River catchment. In the Henderson Creek Catchment, an additional 5 EOPS have been recorded as exceeding 2/yr. These are the Type 1 EOPS, 690 (Western PS) and 692 (Te Atatū North) the Type 2 EOPs, 2 and 1539 (Blethyn Place), and 1583 (16 Matipo Rd) (see Table 8). ADFs for these 5 EOPs have not been recorded.

- *Confirm ADFs for EOPS, 690 (Western PS), 692 (Te Atatū North) 2 and 1538 (Blethyn Place) and 1583 (16 Matipo Rd*

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Watercare has advised the Rivercare Group that the site of WHE MH 10 is unsuitable for upgrade to an EOP and thus the derivation of an ADF cannot be applied to this site.

Based on Conditions 9 and 10 of the NDC, the aggregated overflows in the Henderson Creek Catchment can be rated as higher risk to the receiving environments than the single overflow to the Whau Creek.

TABLE 6: ALTERNATIVE DISCHARGE FREQUENCIES FOR HENDERSON NCREEK AND WHAU RIVER EOPS

EOP	Catchment	Location	ADF
3	Henderson Creek	Ascot Ave, Henderson	3
4	Henderson Creek	Triangle Rd, Massey	6
5	Henderson Creek	Glenford lane, Te Atatū Peninsula	3
6	Henderson Creek	Kingdale Rd, Henderson	6
7	Henderson Creek	Woodglen Place, Henderson	11
8	Henderson Creek	Chilcot Rd, Te Atatū South	3
748	Henderson Creek	Coletta Lane, Te Wai O Pareira	9
749	Henderson Creek	Riverpark Crescent, Henderson	6
1604	Henderson Creek	Celsmere Lane, Te Atatū Peninsula	7
695	Whau River	St George PS25 Arran St Avondale	6

8.3.2. OVERFLOW RISK SCORES HENDERSON CREEK AND WHAU RIVER CATCHMENTS

Condition 16 (b) of the NDC states:

An assessment of the potential temporal and spatial cumulative public health and ecological effects of wastewater discharges, using the same principles and approach set out in the Auckland wide Wastewater Network Discharge Consent Application – Generic Assessment of Ecological and Recreational Effects (NIWA, April 2013) Attachment 12."

The principles and approach provided by NIWA[41] are based on the following location-specific characteristics:

- Receiving Environment Type: estuaries, harbours and rivers;
- Receiving Environment Class: ecological sensitivity and the potential for recreational activities; and
- Overflow Volume: (high, medium and low).

- *Reassess the comparative risk scores for the Whau River and Henderson Creek Catchment.*
- *Reconsider the priority of improvement works in the Henderson Creek Catchment*

Table 8 lists the overflow frequencies and their risk scores recorded in the Annual Performance Reports 2017-2021. The overflows in the Henderson Creek Catchment are more frequent than those to the Whau River catchment and discharge to

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a more sensitive recreational receiving environment. Applying the potential recreational/public health scores for wet weather overflows to estuaries given in Table 12 of NIWA's risk assessment to overflows from EOP 695 (St George Pump Station) to the Whau Creek gives a low score. High scores are returned for overflows to the Henderson Creek from WHE MH10 and EOP 748.

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TABLE 7: OVERFLOW FREQUENCIES > 2/YEAR AND ENVIRONMENTAL RISK SCORES

year		St George	Western	TEN North	Taipari Strand	Celsmere Lane	16 Matipo	Central Park Drive
		EOP 695	EOP 690	EOP 692	WHE MH10	EOP 1604	EOP 1583	EOP 748
		Whau River	Henderson Creek	Henderson Creek	Henderson Creek	Henderson Creek	Henderson Creek	Henderson Creek
2014-2015		3	2	2	4	NR	NR	NR
2015-2016		6	0	2	2	NR	NR	NR
2016-2017		8	5	12	5	NR	NR	NR
2017-2018		10	6	8	3	NR	NR	NR
2018-2019		4	2	3	4	6	NR	NR
2019-2020		7	12	6	NR	6	7	NR
2020-2021		5	4	3	4*	4*	2	NR
Current year 2021-2022		NR	NR	NR	6*	6*	6*	NR
Rolling Average		6	4	5	4	6	5	NR
2020-21 risk**	Volume	high	low	low	NR	NR	NR	high
	Frequency	medium	medium	medium	NR	NR	NR	medium
2021-22 risk*	Volume	NR	NR	NR	high	NR	NR	NR
	Frequency	NR	NR	NR	medium	medium	medium	NR
Recreational RE		3	2	1	1	1	2	2
Risk Score (NIWA Attachment 12)		low	low	low	high	low	low	high

NR: Not Recorded;

* reported by RCG and/or Watercare

** Table 4-2 of Annual Performance Report 2020-2021

Frequency Risk/year : low = ≤2, medium = >2 but <12, high = >12

Volume Risk/year: low = <1000, medium = 1000 – 10000, high = >10000

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8.4. AMMONIA MONITORING

Watercare identifies indicators of possible sewage contamination as:

Visual and odour clues:	• Presence of faecal solids, paper, sanitary products • Black / grey water • Sewage fungus growths • Sewage odour
Ammonia	• < 3 ppm: Low reading • > 3 ppm: Moderate • > 6 ppm: High reading

Of these, ammonia testing is identified as providing the strongest practical tool for assessing the likelihood of contamination[42].

Attachment 12 to the NDC gives the concentration of ammonia measured in wastewater inflow to Watercare's Mangere Wastewater Treatment Plant as 47 ppm and states that concentrations are likely to be lower when in-pipe dilution occurs in surcharge events. Watercare guidance documents generally consider that surcharging events increase network volumes by a factor of up to 7, thus the maximum ammonia concentration at the point of overflow may only be 7 ppm. Discharge to a water body will result in further dilution. The pollution response specified in Attachment 8 is not triggered by ammonia testing unless the concentration exceeds 6 ppm 100 m downstream of the overflow location.

Based on the discussion above, this concentration is highly unlikely to trigger a response to an overflow. Low or non-detectable concentrations are highly likely to be interpreted as the overflow being of low to very low risk. The reporting of non-detect ammonia levels risks false negative results.

A search of Table D-6 of the 2020-21 Annual Performance Report (Wet weather overflows associated with uncontrolled spills (type 3 overflows) within the public network, that have been reported and validated) shows ammonia levels were not reported at 506 of 519 uncontrolled spills. Three results were reported as 0 (non-detect), 3 ≤ 3 and 3 as 6. This level of reporting shows that ammonia monitoring is not an effective method for identifying contamination arising from overflows from the wastewater network and should not be relied upon to indicate the scale of pollution following overflows into water bodies.

- *Review the status of ammonia concentrations in determining risk rating and spill response.*

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9. MONITORING AND SAFESWIM

Te Wai o Pareira/Henderson Creek has a long history of sewage contamination dating back to Auckland water supply investigations at the end of the 19th Century[43, 44]. The Auckland Council Marine Water Quality Programme recorded enterococci levels in samples collected at a Henderson Creek site approximately 500 m north of Chapman Strand, Te Atatū Peninsula, from the 1990s up to 2013. Enterococci regularly failed to meet the MOH Guidelines for recreational contact.

This programme ceased in 2014 as it was unreliable for assessing health risks at bathing beaches. It has been superseded by the Safeswim programme, a joint initiative between Auckland Council, Watercare, Surf Lifesaving Northern Region and Auckland Regional Public Health Service. It informs the public about water quality and safety hazards that may occur at our beaches. Safeswim included the area of Te Wai o Pareira/Henderson Creek north of SH16/Northwestern Motorway in their reporting programme in December 2021.

The RCG has downloaded rainfall data from the Environment Auckland data set, observed and recorded overflow events at WHE MH 10 in Taipari Strand and undertaken targeted monitoring for pathogens at the overflow locations.

Peak monthly rainfall (mm/24hr) and enterococci (cfu x 10^3) over 2021 – 2022 are plotted in Figure 13. Five confirmed overflow events were recorded on 26/07/21, 31/08/21, 23/09/21, 18/10/21 and 21/03/22 with e events on 31/08/21, and 23/09/21 are combined as a single bar

There is an apparent correlation between overflow events and rainfall > 30 mm/24 hours. This correlation indicates two unconfirmed overflows. On 14 December 2021, rainfall was 37 mm with a further 50mm over the next 48 hours). The enterococci levels recorded on 14 and 15 December 2021 are high indicating an overflow. On 6-7 February 2022 61 mm rainfall fell over 10 hours. Watercare reported overflows at both the Cellsmere Lane and Matipo Rd (EOPs 1604 and 1508) at that time, also indicating an overflow at WHE MH10. Enterococci monitoring carried two days later showed low levels of 500 cfu.

Pathogen levels are generally low over dry periods, but some high levels have been observed indicating contamination from currently unknown sources. The RCG is expanding the range of monitoring sites to try to identify these sources.

Unlike ammonia monitoring (Section 8.4) these results reliably indicate contamination arising from uncontrolled wastewater overflows to waterbodies.

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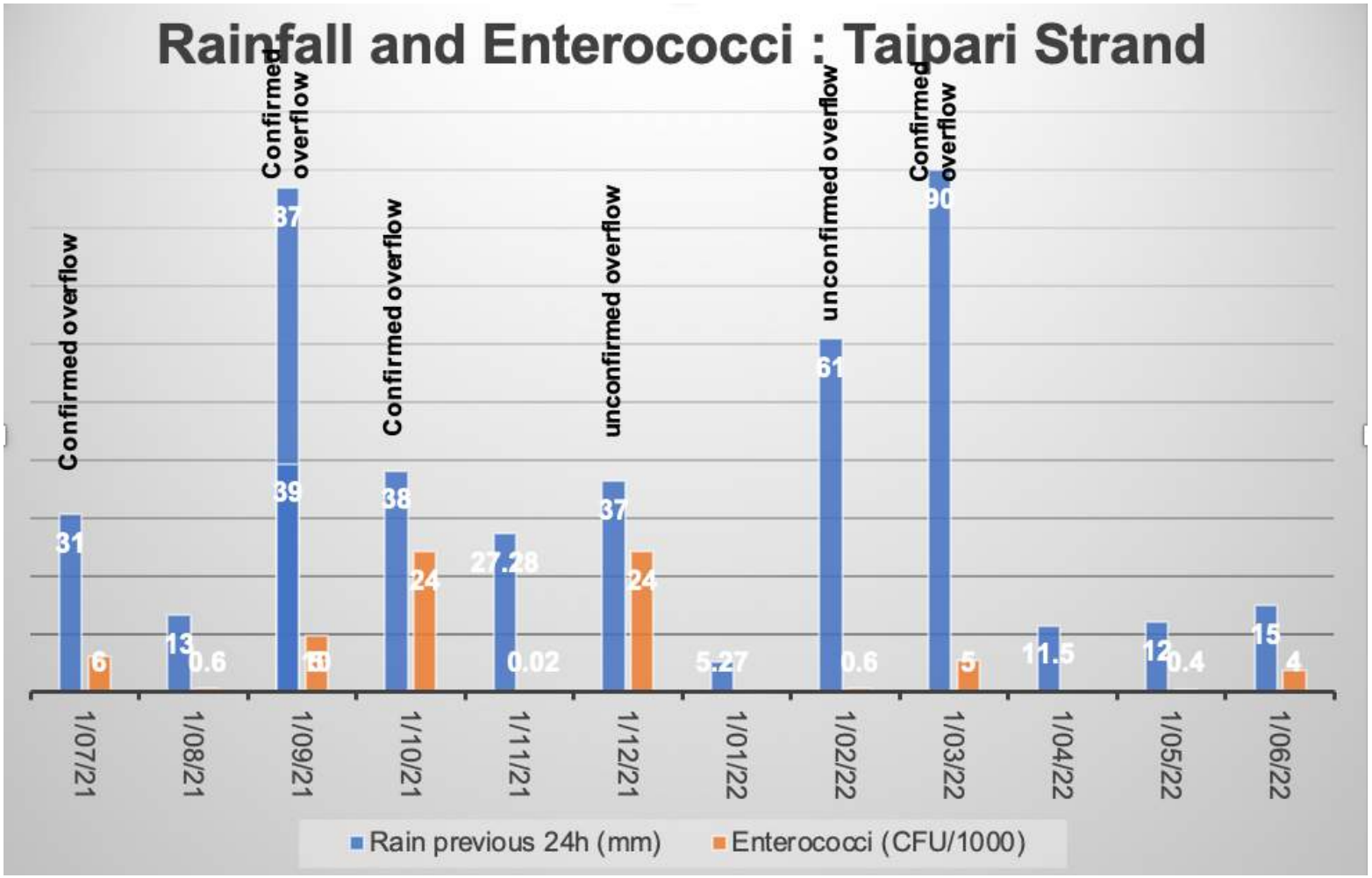

Figure 13: Overflow Events and Rainfall, Enterococci Levels Recorded at Taipari Strand 2021 - 22

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10. RECOMMENDATIONS FOR WWNS (2023)

Recommendations, with reference to the sections of this document, for inclusion in the WWNS 2023 are summarised in Table 8.

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TABLE 8: RECOMMENDATIONS FOR INPUT TO THE WWNS 2023

Section	Recommendations
2. Network Discharge Consent	• *Consultation on WWNS 2023*
4.5 Northern Interceptor - Scope	• *Confirm completion date of NI Phase 1 and expected completion dates of proposed NI Phases.* • *Confirm that, apart from redirection to the Rosedale Rd WWTP, no significant changes are proposed for the Swanson and Glen Eden transmission lines and for the remaining Whenuapai transmission line after the NI Phase 1 completion.* • *Confirm the scoping for the inclusion of the Glen Eden transmission line and the Western Interceptor in the final phases of the NI project.*
6.3 Type 3 Overflows	• *Update the location of Type 3 overflows in the Annual Performance Report.* • *Update improvement works that have reduced the frequencies of identified Type 3 overflows.* • *Record the frequency and ARIs of overflows at WHE MH 10 in future reporting years.*
7.1. GLE PS 44 Western	• *Increase the capacity of GLE PS 44 Western to its design flow following improvement works scheduled for 2023.* • *Record Type 3 overflows on the Western Interceptor.*

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Section	Recommendations
7.2.1 WIN MH 75	• *Record overflows at WIN MH 75.*
7.2.2 The St George PS 25	• *Explain the location of St George EOP 695* • *Correct the location of EOP 695 given in Base Map for the Whau River Catchment.* • *Confirm the redundancy of the St George PS 25 EOP 695 in 2023*
7.3 WHE MH 10	• *Reinstate Annual Performance reporting of overflow frequencies at WHE MH 10 and assess against historic frequencies and predicted future frequencies.* • *Correct the improvements works at WHE MH 9 and 9A.* • *Record that WHE MH 10 is an unsuitable location for an EOP and cannot comply with the discharge conditions of the NDC.* • *Prioritise network improvement works to achieve compliance.*
7.4. Siphons	• *Include the effects of the WHE MH 9A-9B siphon on overflow frequencies in Te Atatū Peninsula* • *Capacity constraints at the WHE MH 3-4 siphons be investigated as a potential cause of upstream surcharging.*
7.5.1. EOP 1604 10 Celsmere Lane	• *Review the Tonkin & Taylor's conclusions on the Recreational Class of the receiving environment.* • *Acknowledge the errors in the Celsmere Lane EOP 1604 BPO application* • *Reassess potential network improvements at EOP 1604.*
7.5.2 EOP 1583 Matipo Rd	• *Provide an ADF and details of sensors at EOP 1583 and TEN MH 6*

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Section	Recommendations
7.5.3 EOPs 748 and 749	• *Correct location of EOP 748 in the WWNS (2017).* • *Reprioritise improvement works at EOP 748.*
7.6 The Concourse Storage Tank	• *Reassess the claimed reduction of overflows from the Western PS 44 to the level permitted under the NDC.* • *Reassess the claimed reduction of Type 3 overflows to private and public land.* • *Assess the effects of reinstating design flow at GLE PS44 on the performance of The Concourse Storage Tank and overflow frequencies at PS 44 and WHE MH 10.*
7.8 Northern Interceptor – Anticipated Outcomes	• *Reconsider the WWNS (2017) statements on elimination of overflows at S25 (WHE MH10)* • *Recognise the effects of the continuing flow of wastewater from West Harbour and Massey East through Te Atatū Peninsula.*
7.9 Inflow and Infiltration	• *I&I modelling include West Harbour and Massey East .*
8.1 Faults Reporting	• *Watercare upgrade their reporting systems to record faults in network transmission lines on public land.*
8.2 GIS Omissions	• *Explain the location of St George PS 25 and its associated EOP 695*
8.3.1. Alternative Discharge Frequency	• *Confirm ADFs for EOPS, 690 (Western PS) ,692 (Te Atatū North), 748 (GLE MH 16), 2 and 15239 (Blethyn Place) and 1583 (16 Matipo Rd).*

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Section	Recommendations
8.3.2 Overflow Risk Scores Henderson Creek and Whau River Catchments	• *Reassess the comparative risk scores for the Whau River and Henderson Creek Catchment* • *Reconsider the priority of improvement works in the Henderson Creek Catchment*
9.4 Ammonia Monitoring	• *Review the status of ammonia concentrations in determining risk rating and spill response.*

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REFERENCES

[1] 1.01a WWNS Exec Summary Final 2017, Watercare

[2] Watercare's Comprehensive Wastewater Network Discharge Permit Patricia Paschke, Watercare Services Limited Padraig McNamara and Ann Maddox, Simpson Grierson https://www.waternz.org.nz/Attachment?Action=Download&Attachment_id=3574

[3] Auckland-wide Network Discharge Consent 2020-2021 Annual Report Final – Watercare October 2021

[4] Auckland Stormwater NDC Section 2 - Consenting Approach

[5] Auckland Governance Arrangements: Maps. Statistics New Zealand 2010

[6] Appendix B: Catchment Maps. Auckland-wide Network Discharge Consent 2020-2021, Annual Report Final – Watercare October 2021.

[7] Watercare GIS: https://www.arcgis.com/apps/webappviewer/index.html?id=7883e73aa9f747c893903f1a929b84f6

[8] Auckland-wide Network Discharge Consent 2020-2021 Annual Report Final – Watercare October 2021

[9] Assessment of Alternatives, Northern interceptor Wastewater Project. MWH, 2016

[10] Watercare RCG meeting 6 May 2022 (Nathan Donald)

[11] Watercare WWNS 2017 Part 3: Table 2

[12] Annual Performance Report Strategic Management Areas & Geographical Catchments Watercare 1 July 2018 to 30 June 2019: Section 2

[13] MEMO 1: Taipari Strand Overflow Investigation Watershed 2018

[14] Watercare response to Rivercare Group Briefing to Exec Meeting 30 November 2021

[15] Te Wai o Pareira & Watercare Meeting Minutes 17 February 2022

[16] R/REG/2013/3743 (overflows to land and water) Attachments 4 & 5: Methodology for the Assessment of Improvement Works and the Effects of Wet Weather Wastewater Overflows

[17] Building the Central Interceptor; Project Newsletter February 2022 Watercare

[18] Auckland-wide Network Discharge Consent 2020-2021 Annual Report Final - October 2021: Section 6.2

[19] Part 2.09a Mangere WWNS 2017

[20] Central Interceptor Bulletin: Pump station 25 Site (PS25), 32B Miranda St, Avondale. Issue 1 October 2021 Watercare

[21] Watercare presentation to the Wairau Catchment Working Group, June 2021

[22] Watercare response to Rivercare Group Briefing to Exec Meeting 30 November 2021

DocuSign Envelope ID: 315388FA-CC1A-4BAE-B9CD-49A9E999388B

[23] Te Wai o Pareira & Watercare Meeting Minutes 17 February 2022 and 6 May 2022

[24] Watercare Auckland Wastewater Network Section 1 Annual Performance Report 1 July 2018 to 30 June 2019

[25] Watercare GIS for land Development https://www.arcgis.com/apps/webappviewer/index.html?id=7883e73aa9f747c893903f1a929b84f6

[26] Notification Determination and Resource Consent Decision Report, Auckland Council, December 2010. Permit Number 38276

[27] Watercare: Auckland Wastewater Network Section 1 Annual Performance Report 1 July 2018 to 30 June 2019

[28] Meeting Minutes: Anin Nama. Construction of Engineered Overflow Point at 10 Celsmere Lane, Te Atatū Date: 5 September 2019

[29] Best Practicable Option Assessment for Alternative Discharge Frequency of Engineered Overflow Point 10 Celsmere Lane: Watercare Services Ltd., 14 February 2019

[30] Celsmere BPO Assessment Review Tonkin and Taylor Letter Report to Nathan Donald, Watercare (Job No, 1019526) May 2022

[31] Auckland Council Regional Plan: Coastal: 2014

[32] Auckland Unitary Plan: Operative 2019
[33] Auckland Council Navigational Bylaw 2021
[34] Auckland Wastewater Network Wastewater Network Strategy 2017 Strategic Management Area 9 – Mangere (Metropolitan Auckland) Watercare 2017

[35] Auckland Wastewater Network Application for Comprehensive Discharge Permit and Assessment of Effects on the Environment VOLUME 2.17 Henderson Creek Watercare 2013

[36] Part 3, 3.01 WWNS Final
[37] Te Wai o Pareira & Watercare Meeting Minutes 17 February 2022 and 6 May 2022

[38] Table 6-1, Annual Performance Report, Watercare 2020 –21

[39] Te Wai o Pareira & Watercare Meeting Minutes 6 May 2022

[40] WWNS 2017 2.09a Mangere Strategic Management Appendix 9.

[41] Attachment 12 Network Discharge Consent. Auckland-wide Wastewater Network Discharge Consent Applications Generic Assessment of Ecological and Recreational Effects Version 2 Prepared for Watercare Services Ltd March 2015

[42] Appendix D (Environmental Monitoring) of Attachment 8: The Wastewater Overflow Regional Response Manual

[43] Henry Atkinson - Philanthropist Conservationist Lobbyisthttps://westheritageconference.nz › 2017/10 › 1.

[44] The Water Supply From Henderson. New Zealand Herald, Volume Xxxvii, Issue 11379, 23 MAY 1900, PAGE 5 (digitised in partnership with Auckland Libraries and NZME.)