BEFORE INDEPENDENT HEARING COMMISSIONERS IN CHRISTCHURCH

TE MAHERE Ā-ROHE I TŪTOHUA MŌ TE TĀONE O ŌTAUTAHI

UNDER	the Resource Management Act 1991 (RMA)
AND	
IN THE MATTER	of the hearing of submissions on Plan Change 14 (Housing and Business Choice) to the Christchurch District Plan
AND	
IN THE MATTER	of Canterbury Regional Council (submitter 689)

SUMMARY OF STATEMENT OF EVIDENCE OF JESSICA NEWLANDS ON BEHALF OF THE CANTERBURY REGIONAL COUNCIL

STORMWATER (PORT HILLS)

22 April 2024

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Summary Statement

1 My name is Jessica Mary Newlands. I am a Resource Management Technical Lead at the Canterbury Regional Council (**Regional Council**) and have set out my qualifications and experience in my statement of evidence dated 20 September 2023.

2 I have prepared evidence on behalf of the Regional Council in relation to Plan Change 14 (**PC14**) to the Christchurch District Plan (**CDP**). My evidence addresses the expected adverse effects of PC14 on stormwater quantity and quality generated from development within the residential suburbs of the Port Hills. I have also engaged in expert witness conferencing, and am a signatory to the Joint Statement of Infrastructure Experts dated 27 September 2023.

Stormwater quantity effects

3 The intensification of housing enabled by PC14 will increase the imperviousness of residential land on the Port Hills, which will in turn generate higher stormwater flows and increased stormwater volumes. An increase in stormwater quantity can be partially mitigated by onsite storage, however there are physical and topographical limitations as to the range of storm events that can be effectively captured and mitigated. Most of the suburbs proposed to be affected by PC14 are located downstream of Christchurch City Council (**City Council**) owned stormwater management facilities.

4 An analysis of data provided from the City Council quantifying the area of land covered by the Residential Hills Zone, indicates that a change in impervious surface from 45%[1] to 70-80% may result in an increase in impervious surface of 370 hectares.

5 The Ōpāwaho / Heathcote River catchment has a history of flooding. The City Council has spent over 80 million dollars on a programme for floodplain management. Allowing for further residential densification may negate the positive outcomes on flooding in the Ōpāwaho/Heathcote River catchment that this project has achieved.

[1] Current assumed imperviousness based on the Council's Waterways, Wetlands and Drainage Guide (Part B, Ch 21 at Table 21-6).

6 The City Council commissioned a highly detailed flood model for the Ōpāwaho/Heathcote River which was completed in late 2023. This model could be used by the City Council to quantify the effects that changes in impervious surface area may have on water levels in the receiving environment and residential floor levels that may experience a heightened flood risk.

7 Other Port Hills catchments are also sensitive to changes in stormwater quantity. Whilst these catchments are not at the same scale as the Ōpāwaho/Heathcote River and Halswell/Huritini River, there are known drainage issues and areas prone to flooding which is discussed in more detail in the Ihutai/Estuary and Coastal Stormwater Management Plan June 2022. The flooding in these catchments is influenced by tides and coastal structures such as sea walls. Catchment specific issues as outlined in the Ihutai/Estuary and Coastal Stormwater Management Plan June 2022 are:

(a) McCormacks Bay - Stormwater flooding is not reported in this sub-catchment. Drainage issues include road or hillside runoff causing erosion during storms and road runoff spilling through private property, with potential to enter houses;

(b) Redcliffs - The secondary flow path is obstructed by a sea wall. Excess stormwater will pond when network capacity is exceeded, tides are extreme, or stormwater catchpits are obstructed. A number of houses in this ponding area are observed to have low floor levels;

(c) Moncks Bay - The secondary flow path across Main Road is seriously impeded by shorefront development and sea walls. Flows in excess of network capacity are retained on Main Road and side streets, and in large events may pond to a level that will flood some houses;

(d) Sumner - Runoff in excess of the Sumner Stream capacity spills out of the channel from time to time and ponds on the floodplain. Quite extensive ponding occurs at approximately a 10 year average recurrence interval. Some house flooding can be expected at approximately a 20 year average recurrence interval. Denser development has the potential to deliver more stormwater into Sumner Stream during flood events and worsen flooding.

Stormwater quality effects

8 The intensification of housing enabled by PC14 will increase the disturbance of highly erodible and dispersive (loess) soils during site preparation works and building construction. The construction phase stormwater generated from this disturbance is difficult to control on hill sites. An Auckland study conducted by NIWA and Auckland Regional Council concluded that in the Auckland Region, the erosion rate triples as the slope doubles. This shows that steeper slopes contribute a disproportionate amount of sediment for the same area disturbed.[2]

9 In my evidence, I addressed stormwater management under the Comprehensive Stormwater Network Discharge Consent (**CSNDC**). I referred to the attribute target levels for water quantity. For water quality, the CSNDC provides attribute target levels which are set to achieve the receiving environment objectives.

10 The attribute target levels (applying to all catchments) of relevance are:

(a) upper limit **fine sediment cover** of stream bed:

(i) 30% for urban spring-fed waterways, and

(b) upper limit of **total suspended solids** concentration:

(i) in waterways – 25 mg/l, or

(ii) for coastal waters - no statistically significant increase in TSS concentrations.

Monitoring results for the Ōpāwaho/Heathcote River

11 The City Council monitors the fine sediment cover in the Ōpāwaho/Heathcote River at five locations. According to the City Council Annual Fine Sediment Report 2022 (completed July 2023) only the monitoring site at Rose Street met the fine sediment target level with a median of 25% bed cover.

12 The City Council monitors the water quality in the Ōpāwaho/Heathcote River monthly at various locations. According to the City Council Surface Water Quality Annual Report 2022) the catchment with the worst water quality was the Ōpāwaho/Heathcote River. I have appended Figure vii(a)

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[2] Morphum Environmental Consultants Ltd Literature Review - Sediment Attributes and Urban Development prepared for Ministry for the Environment 2019

from the Surface Water Quality Annual Report 2022 as **Appendix 1** to this statement. It can be seen in this Figure that whilst the median of the sampling results for total suspended solids complied with the 25 mg/l limit level stipulated in the CSNDC, at times levels of total suspended solids exceeded guidelines values significantly. The report notes that total suspended solids concentrations were particularly high at Ōpāwaho-Heathcote catchment sites compared to the other catchments.

13 The report recommends that erosion and sediment control measures continue to be implemented as a priority, and further investigations are carried out to determine how to mitigate discharges of loess sediment into the Ōpāwaho/Heathcote River.

14 The Ōpāwaho/Heathcote River discharges into the Ihutai Estuary. The increase in the discharge of sediment laden stormwater from construction and after construction has finished is likely to result in an increase in sedimentation in receiving waterways. This will contribute to an ecological decline of natural waterways and coastal estuary systems, which, are already under pressure from rural and urban sediment laden discharges as evidenced by the monitoring that the City Council has undertaken.

Monitoring results for other Hill catchments affected by PC14

15 The City Council monitors water quality at four coastal sites - Ihutai – Avon-Heathcote Estuary, Lyttelton Port, Cass Bay, and Akaroa Harbour. According to the City Council Surface Water Quality Annual Report 2022 the Cass Bay site had notably higher total suspended solids than the other coastal and waterway sites, the highest concentration recorded was 580 mg/L in December 2021. The monitoring indicates that coastal sites have not demonstrated a statistically significant increase in total suspended concentrations, refer to Figure vii(b) in Appendix A.

16 Cass Bay and Heathcote at Ferrymead Bridge recorded higher turbidity values than the other sites. The three highest turbidity readings were recorded from Cass Bay (278 NTU in December 2021), Heathcote at Bowenvale Ave (174 NTU in December 2021), and Cass Bay (162 NTU in June 2020). All of these recordings were associated with rain. The monitoring indicates that coastal sites have not demonstrated an increase in turbidity over time, refer to Figure viii(b) in Appendix A.

17 Although coastal water monitoring results have not breached the CSNDC attribute target level, sediment discharge into coastal waters including Whakaraupō/Lyttelton Harbour remains a concern for the community and Runanga, and should be minimised. Whakaraupō/Lyttelton Harbour has cultural, spiritual, historical and traditional importance for Ngāi Tahu, particularly for the Te Hapū o Ngāti Wheke, who have mana whenua and mana moana (customary authority) over the harbour basin. Sedimentation has caused an ecological decline of Whakaraupō, and consequently erosion and sedimentation is a key focus area for the Whaka-Ora Healthy Harbour partnership.

18 According to the City Council Surface Water Quality Annual Report 2022, the Halswell River at Tai Tapu Road recorded the largest change in total suspended solids with a 6% increase over the period of record. The Ōpāwaho-Heathcote River and Huritini-Halswell River catchments recorded higher turbidity concentrations compared to the other sites.

19 The City Council monitors the fine sediment cover in two tributaries (Knights Stream and Nottingham Stream) to the Halswell/Huritini River. According to the City Council Annual Fine Sediment Report 2022 (completed July 2023) both the monitoring sites exceeded the 30% limit for fine sediment bed cover.

20 If the proposed re-development can occur as a permitted activity under the District Plan and the Regional Plan, then the only form of compliance and inspection for construction phase discharges will be at the building consent stages.

21 In his rebuttal evidence, Mr Kleynbos refers to Figure 1 showing the location of highly erodible loess soils in the context of the Port Hill suburbs (**loess soils map**). The loess mapping does not cover all of the Port Hills, there are some small areas that are not mapped as having loess soils (refer yellow areas on the loess soils map). However, I consider that medium density development should still be restricted across the entire Port Hills, including those areas not mapped as having loess soils, because:

(a) Steeper slopes contribute a disproportionate amount of sediment for the same area disturbed, and,

(b) Due to stormwater quantity issues detailed in paragraphs 3 to 5 of this statement and paragraphs 11 to 14 of my Statement of Evidence.

22 Therefore I support the concept included in Ms Buddle's Statement of Evidence[3], which was to retain the existing densities on the Port Hills.

Greenfield vs infill development

23 I have reviewed the legal submissions on behalf of Cashmere Land Developments Limited dated 11 April 2024 and the attached statement of Michal Glatz which relates to stormwater management on the Cashmere Estate site.

24 Stormwater quality effects from greenfield development can be better managed than for infill development. During the earthworks stage, the construction phase stormwater is directed to, and treated in centralised sediment retention ponds usually with the application of water treatment chemicals. A resource consent from Environment Canterbury is usually required for earthworks within the High Soil Erosion Risk area (the exception being for any works for which a building consent has been obtained), and for the discharge of residues of water treatment chemicals. Once the subdivision earthworks stage has been completed, typically the erosion and sediment controls are decommissioned. This means that individual sites then must install controls, at the building consent stage. If the developer has contoured the individual sites ready for construction, then this minimises the need for onsite earthworks and can reduce the likelihood of construction phase stormwater leaving the site.

25 On small steep redevelopment (infill) sites, such as those will be affected by PC14, it is not practical to construct impoundment devices, and therefore water treatment chemicals are not used. Erosion and sediment controls on hill sites are typically limited to silt fences and silt socks.

26 Stormwater quantity effects from greenfield development can also be better managed than for infill development. Typically, the City Council requires that developers construct centralised stormwater facilities, or, contribute to the development of a City Council owned facility that can

[3] Summary Statement of Evidence of Meg Buddle on behalf of Canterbury Regional Council (Planning) dated 14 April 2024.

service multiple developments. The performance of these facilities can be modelled, and the facilities designed to avoid exacerbating flooding downstream. Provided that the facility was designed for the imperviousness expected with intensification, then the effects can be managed. These facilities are maintained by the City Council once vested.

27 For much of the Port Hills, small steep redevelopment (infill) sites are located downstream of large scale facilities, and therefore must install their own stormwater storage device designed in accordance with the City Council Onsite Stormwater Mitigation Guide- which is based on short intense storms. The designs are not likely to effectively attenuate discharges for storms with longer durations, and lesser intensities. In addition, there are physical limitations to the positioning of these systems on hills sites. In some situations, it is too difficult to capture all impervious areas, and to direct it to a stormwater storage device. The installation of these devices also assumes that maintenance will be undertaken by the homeowner to remove leaves and debris that may build up in the system.

28 The legal submission on behalf of the Cashmere Land Developments Limited considers that there is no evidential basis for the Panel to apply the Port Hills Stormwater QM to the site. I agree that the stormwater generated from the Cashmere Estate site can be managed via:

(a) The Cashmere Worsleys flood storage basin (provided that this basin was designed for the expected imperviousness),

(b) For stormwater discharged during the subdivision earthworks, the existing resource consents held for the site, and

(c) For stormwater discharged during the subdivision earthworks, Cashmere Land Developments Limited's ability to treat construction phase stormwater via sediment retention ponds and the application of water treatment chemicals.

29 I have included in **Appendix 2**, maps showing the location of stormwater/flood facilities and contributing catchments. These maps were taken from the City Council Ōpāwaho-Heathcote River Stormwater Management Plan February 2024 (currently under review by the Regional Council).

Alternative rule frameworks

30 I am aware that the planning experts are conferencing for a second time on potential alternative rule frameworks for a Port Hills Stormwater QM to that proposed in Ms Buddle's Statement of Evidence and Mr Kleynbos' Rebuttal Evidence. However, at the time of lodging this summary statement, a second joint witness statement has not been finalised. Therefore, I will respond to potential alternative rule frameworks orally at the hearing if required.

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Jessica Newlands

22 April 2024

Appendix 1

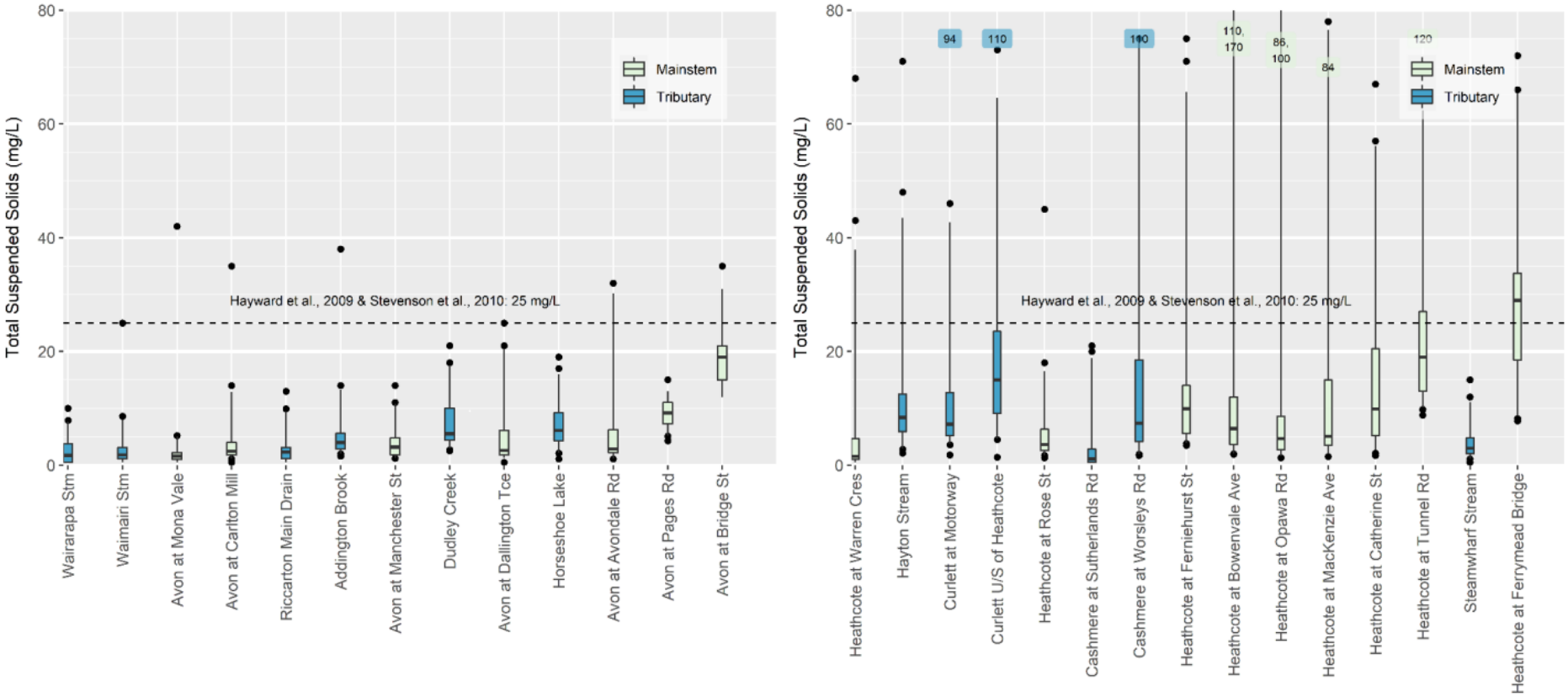


Figure vii (a). Total Suspended Solid (TSS) concentrations in water samples taken from the Ōtākaro-Avon (left graph) and Ōpāwaho-Heathcote (right graph) River sites, for the monitoring period January 2020 to December 2022. The dashed lines represent the guideline value of 25 mg/L (Hayward et al., 2009; Stevenson et al., 2010). There is no guideline for coastal sites. The Laboratory Limit of Detection was 1.0 mg/L – graphed as half this value (0.5 mg/L). The numbers in shaded boxes indicate samples that exceeded the v-axis.

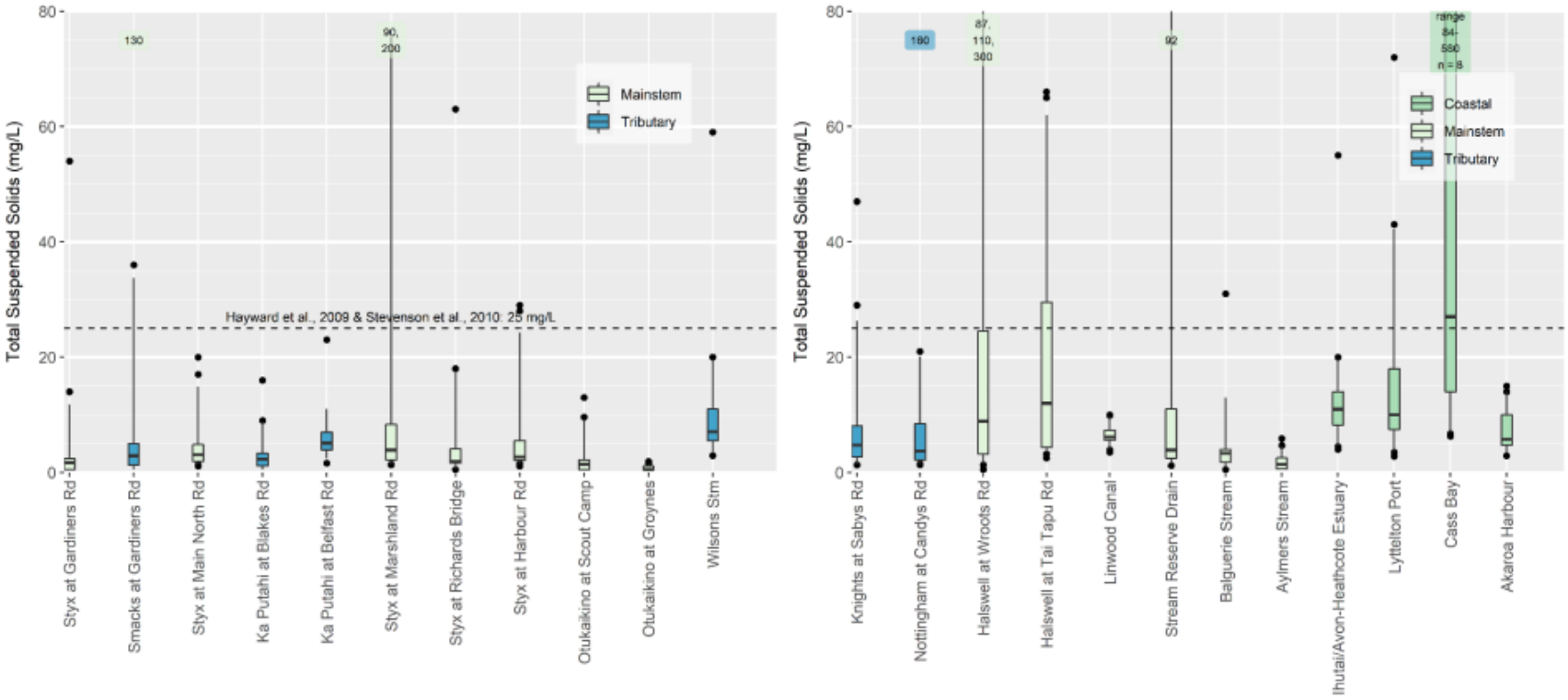


Figure vii (b). Total Suspended Solid (TSS) concentrations in water samples taken from the Pūharakekenui-Styx and Ōtūkaikino River (left graph), and the Huritini-Halswell River, Linwood Canal, Banks Peninsula and coastal sites (right graph), for the monitoring period January 2020 to December 2022. The dashed lines represent the waterway guideline value of 25 mg/L (Hayward et al., 2009; Stevenson et al., 2010). There is no guideline for coastal sites. The Laboratory Limit of Detection was 1.0 mg/L – graphed as half this value (0.5 mg/L). The numbers in shaded boxes indicate samples that exceeded the y-axis.

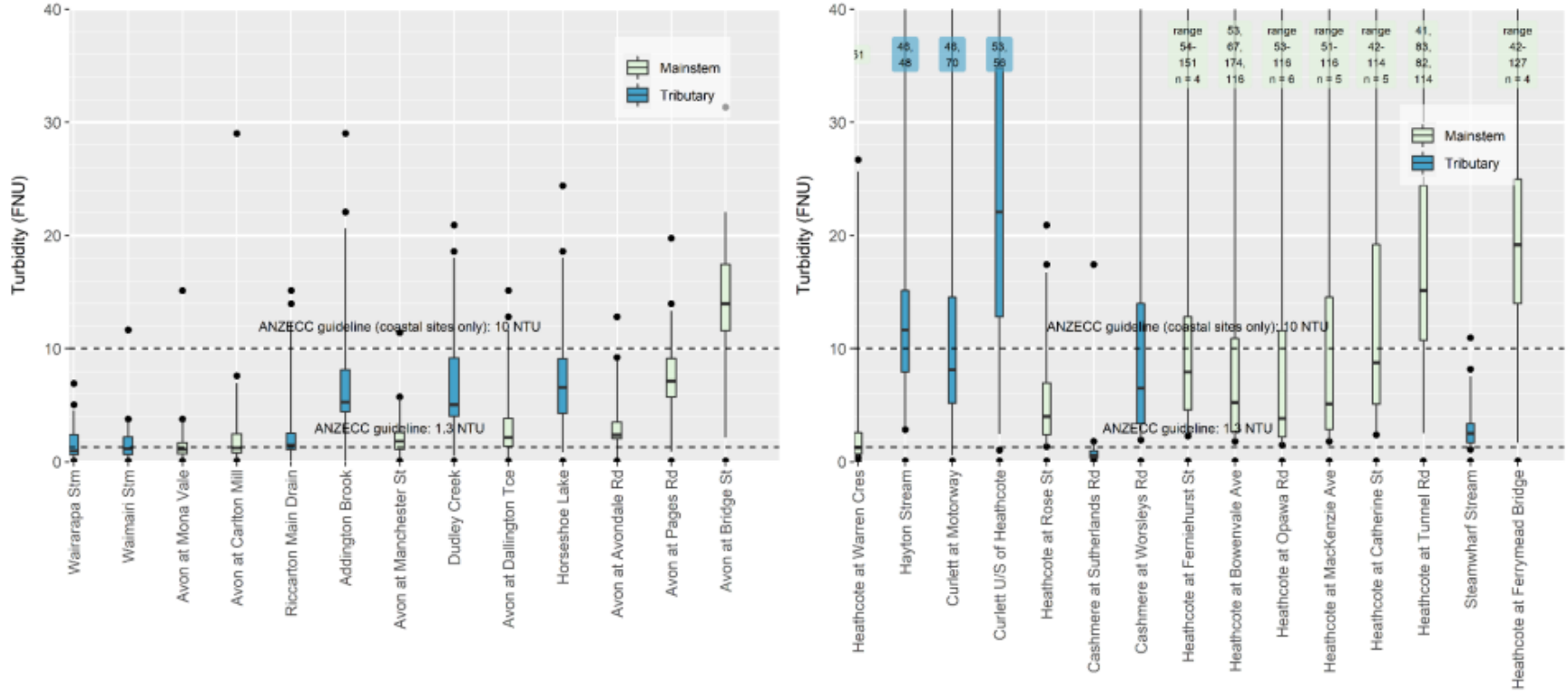


Figure viii (a). Turbidity concentrations in water samples taken from the Ōtākaro-Avon (left graph) and Ōpāwaho-Heathcote (right graph) River sites, for the monitoring period January 2020 to December 2022. The dashed lines represent the ANZECC (2000) guideline values of 1.3 Nephelometric Turbidity Units (NTU: comparable to Formazin Nephelometric Units (FNU)) for waterway sites, or 10 NTU for coastal sites. Strongly tidal sites (Avon at Bridge St, Heathcote at Tunnel Rd, and Heathcote at Ferrymead Bridge) should be compared to the coastal water guideline. The Laboratory Limit of Detection was 0.1 FNU – graphed as half this value (0.05 mg/L). The numbers in shaded boxes indicate samples that exceeded the y-axis.

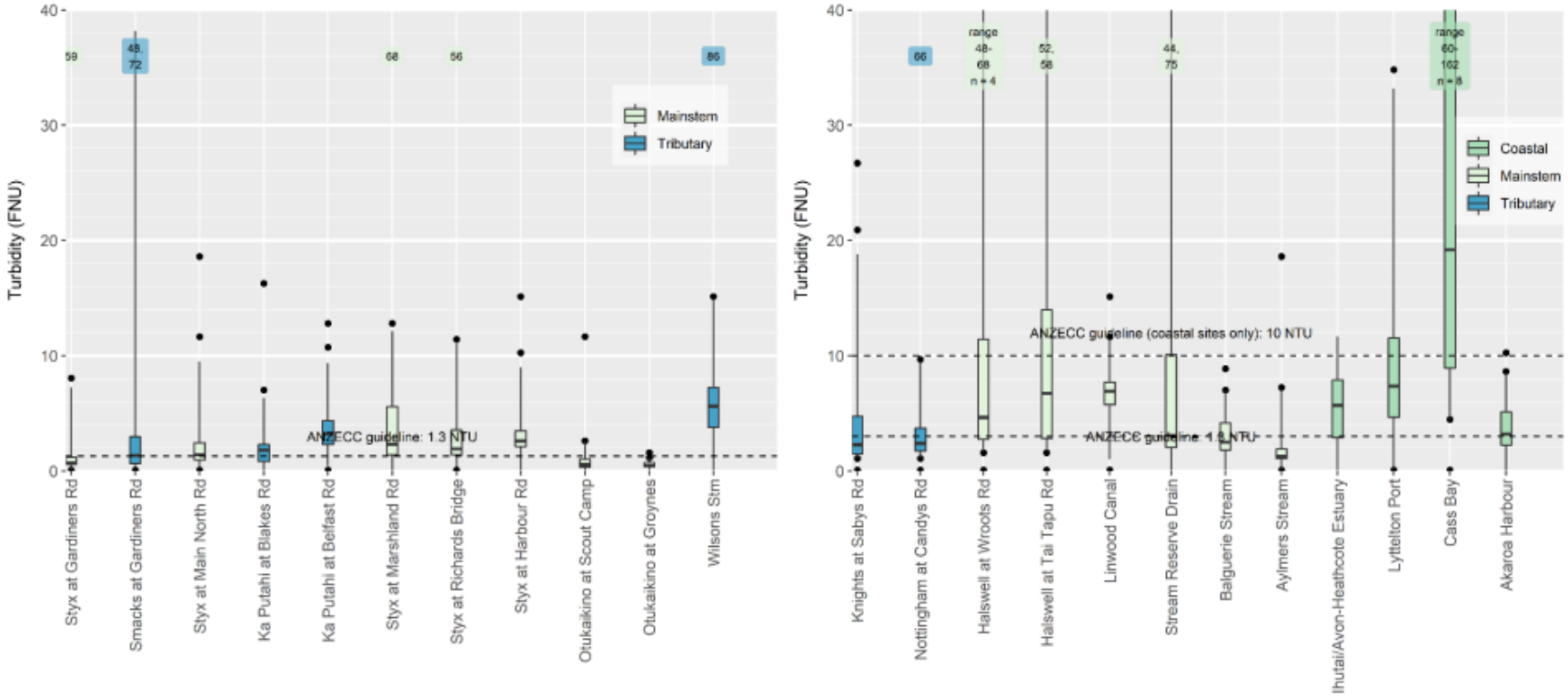
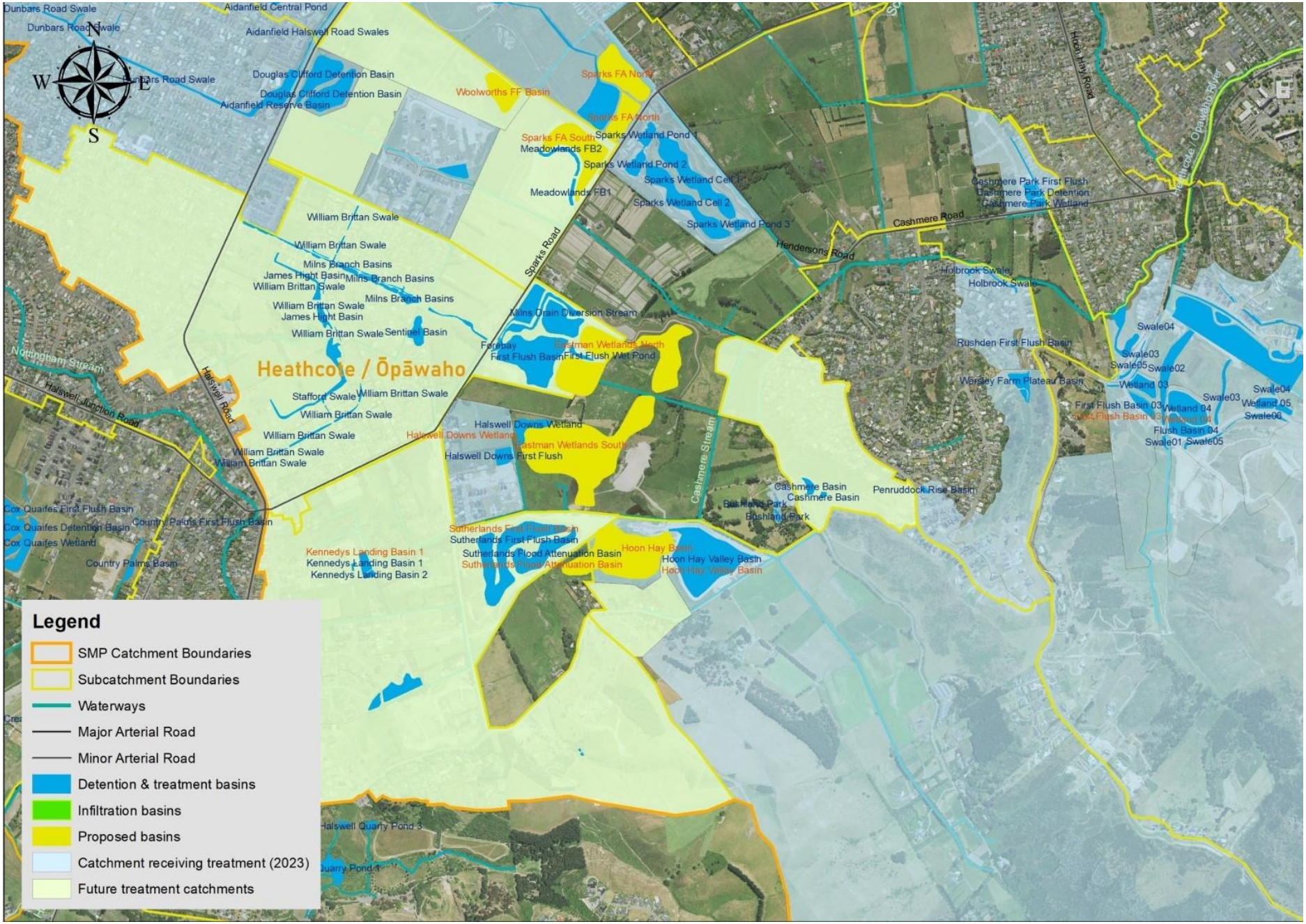


Figure viii (b). Turbidity concentrations in water samples taken from the Pūharakekenui-Styx and Ōtūkaikino River (left graph), and the Huritini-Halswell River, Linwood Canal, Banks Peninsula and coastal sites (right graph), for the monitoring period January 2020 to December 2022. The dashed lines represent the ANZECC (2000) guideline values of 1.3 Nephelometric Turbidity Units (NTU; comparable to Formazin Nephelometric Units (FNU)) for waterway sites, or 10 NTU for coastal sites. The strongly tidal Linwood Canal site should be compared to the coastal water guideline. The Laboratory Limit of Detection was 0.1 FNU – graphed as half this value (0.05 mg/L). The numbers in shaded boxes indicate samples that exceeded the y-axis.

Appendix 2


Heathcote / Ōpāwaho
Legend
SMP Catchment Boundaries
Subcatchment Boundaries
Waterways
Major Arterial Road
Minor Arterial Road
Detention & treatment basins
Infiltration basins
Proposed basins
Catchment receiving treatment (2023)
Future treatment catchments
Dunbars Road Swale
Aidanfield Central Pond
Aidanfield Halswell Road Swales
Douglas Clifford Detention Basin
Aidanfield Reserve Basin
Woolworths FF Basin
Sparks FA North
Sparks FA South
Meadowlands FB2
Sparks Wetland Pond 1
Sparks Wetland Pond 2
Sparks Wetland Cell 1
Meadowlands FB1
Sparks Wetland Cell 2
Sparks Wetland Pond 3
William Brittan Swale
Milns Branch Basins
James Hight Basin
Milns Drain Diversion Stream
Sentinel Basin
Farebay First Flush Basin
Eastman Wetlands North
First Flush Wet Pond
Stafford Swale
Halswell Downs Wetland
Eastman Wetlands South
Halswell Downs First Flush
Sutherlands First Flush Basin
Sutherlands Flood Attenuation Basin
Kennedys Landing Basin 1
Kennedys Landing Basin 2
Hoon Hay Basin
Hoon Hay Valley Basin
Cashmere Basin
Penruddock Rise Basin
Bushland Park
Cashmere Park First Flush
Cashmere Park Detention
Cashmere Park Wetland
Holbrook Swale
Rushden First Flush Basin
Wersley Farm Plateau Basin
First Flush Basin 03
Wetland 03
Wetland 04
Wetland 05
Swale01
Swale02
Swale03
Swale04
Swale05
Swale06
Flush Basin 04
Halswell Quarry Pond 3
Quarry Pond 1
Cox Quaifes First Flush Basin
Cox Quaifes Detention Basin
Cox Quaifes Wetland
Country Palms First Flush Basin
Country Palms Basin
Nottingham Stream
Halswell Junction Road
Halswell Road
Sparks Road
Hendersons Road
Cashmere Road
Hoon Hay Road
Cashmere Stream
Ōpāwaho / Heathcote River
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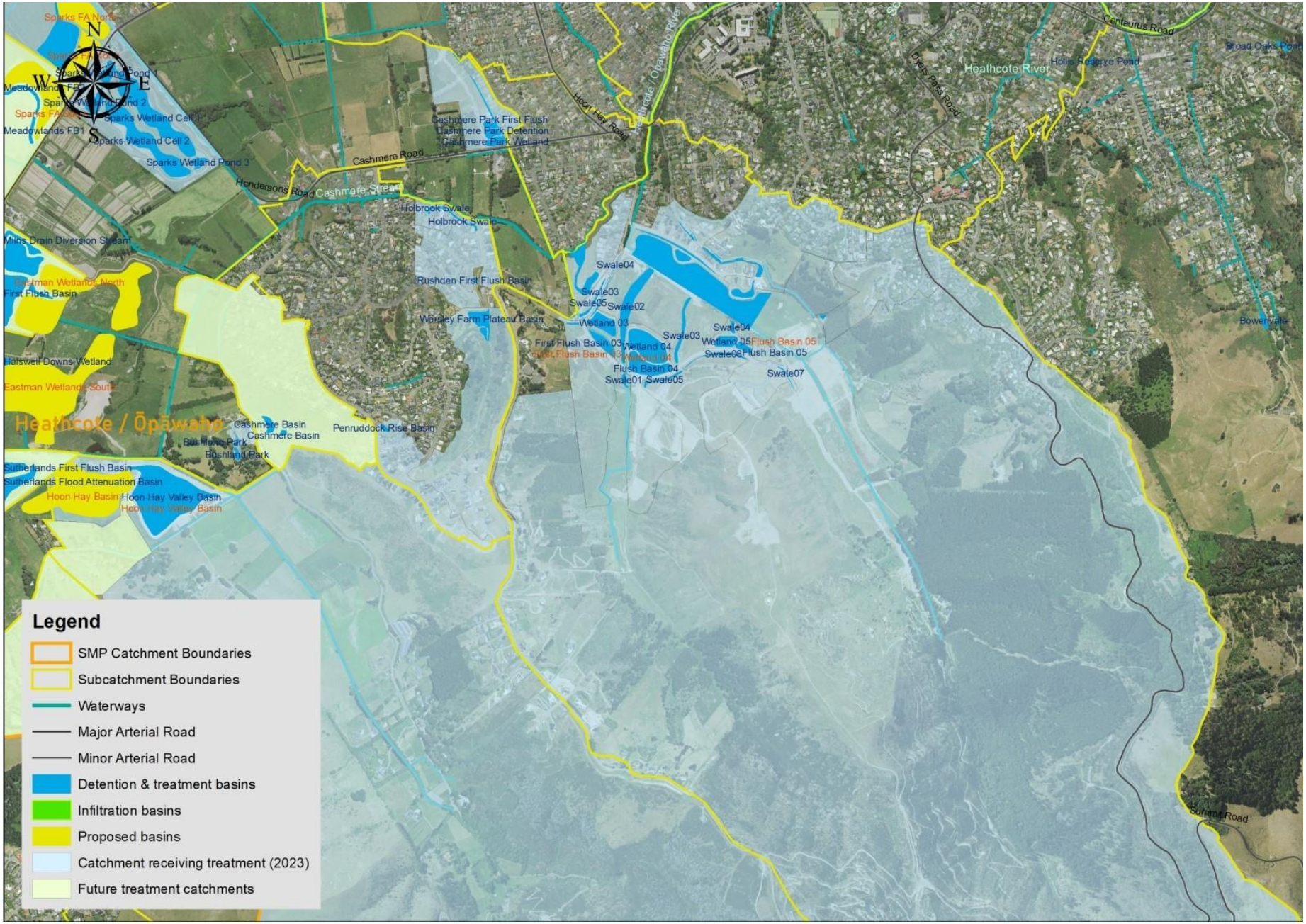
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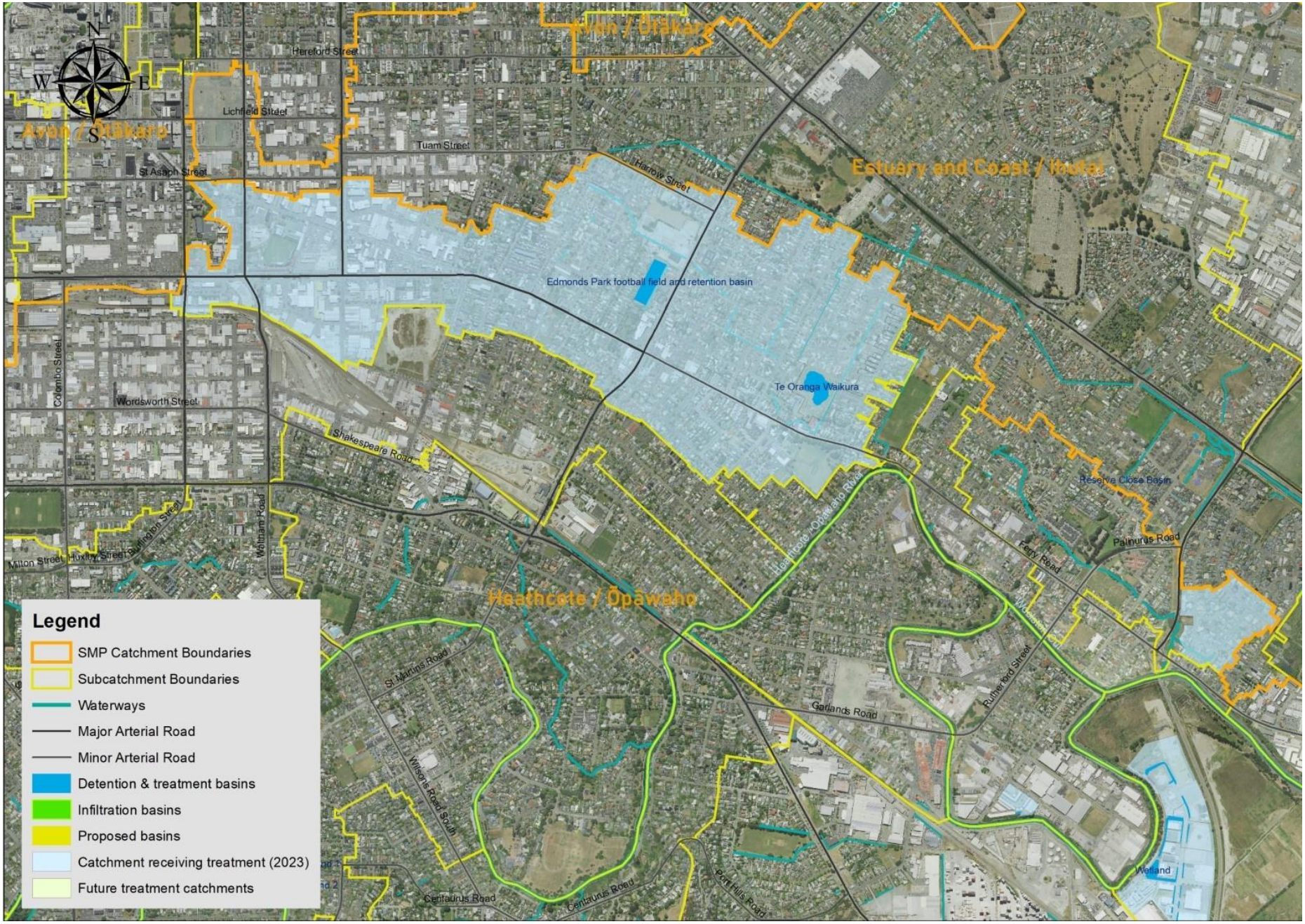
Centaurus Road
Dyers Pass Road
Hoon Hay Road
Sutherlands First Flush Basin
Sutherlands Flood Attenuation Basin
Hoon Hay Basin
Hoon Hay Valley Basin
Cashmere Basin
Penruddock Rise Basin
Rushden First Flush Basin
Worsley Farm Plateau Basin
Holbrook Swale
Cashmere Park First Flush
Cashmere Park Detention
Cashmere Park Wetland
Sparks Wetland Cell 1
Sparks Wetland Cell 2
Sparks Wetland Pond 2
Sparks Wetland Pond 3
Meadowlands FB1
Eastman Wetlands North First Flush Basin
Eastman Wetlands South
Halswell Downs Wetland
Mills Drain Diversion Stream
Swale04
Swale03
Swale05
Swale02
Wetland 03
First Flush Basin 03
Wetland 04
Flush Basin 04
Swale01
Swale06
Flush Basin 05
Wetland 05
Swale07
Bowenvale
Broad Oaks Pond
Hollis Reserve Pond
Summit Road


N
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Avon / Ōtākaro
Hereford Street
Lichfield Street
Tuam Street
St Asaph Street
Harrow Street
Estuary and Coast / Ihutai
Edmonds Park football field and retention basin
Te Oranga Waikura
Colombo Street
Wordsworth Street
Shakespeare Road
Milton Street
Huxley Street
Bullington Street
Waltham Road
Heathcote / Ōpāwaho
Heathcote / Opāwaho River
Reserve Close Basin
Ferry Road
Palnurus Road
St Martins Road
Wilsons Road South
Garlands Road
Rutherford Street
Centaurus Road
Port Hills Road
Wetland
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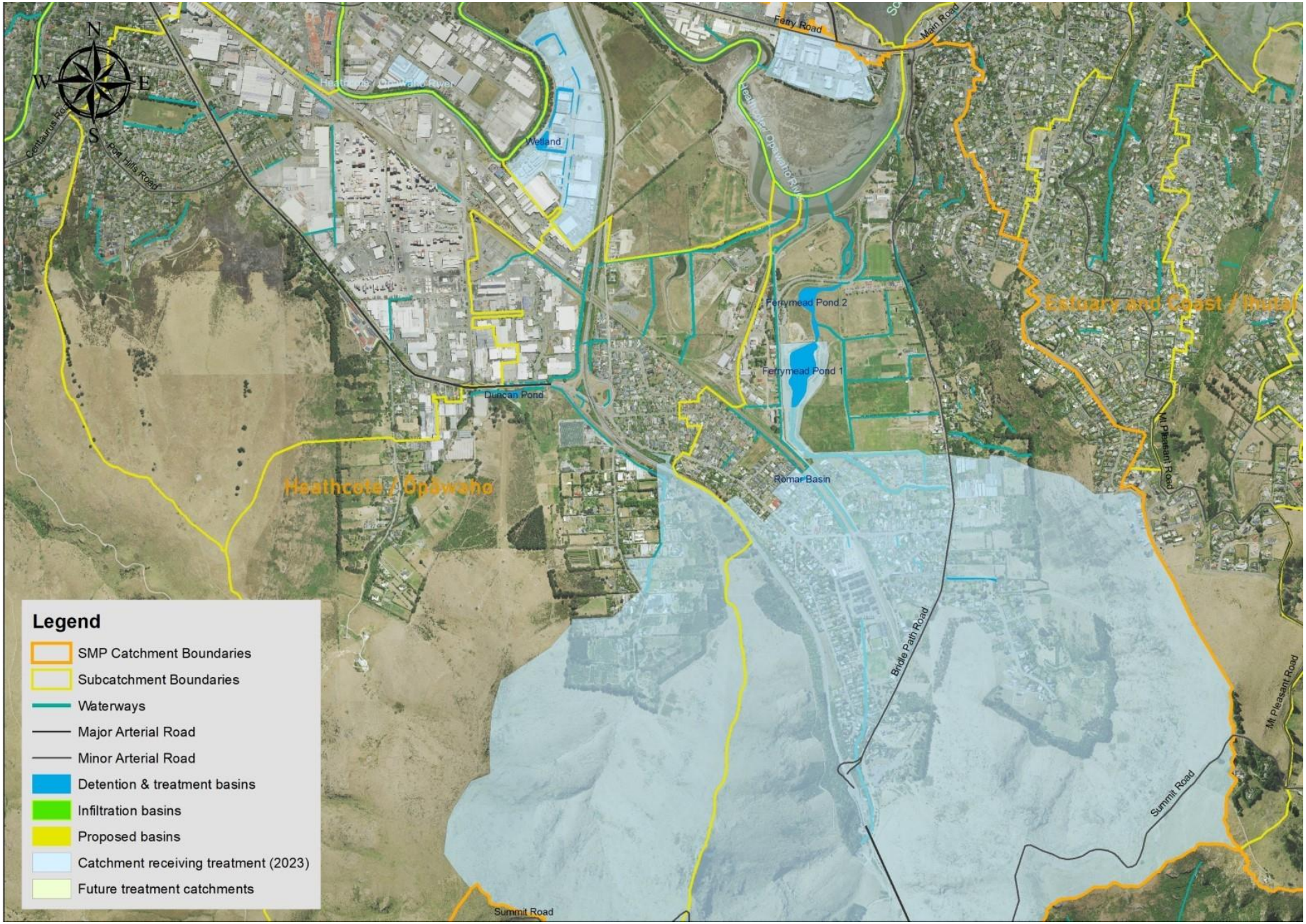
N
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Centaurus Road
Port Hills Road
Heathcote River / Opāwaho
Wetland
Ferry Road
Main Road
Estuary and Coast / Ihutai
Ferrymead Pond 2
Ferrymead Pond 1
Duncan Pond
Heathcote / Ōpāwaho
Romar Basin
Bridle Path Road
Mt Pleasant Road
Summit Road
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