1.0 TECHNICAL MEMO – STORMWATER

To:	Stacey Sharp & Blair Masefield, Beca (consultant planners)
From:	John McLaren, Senior Civil Engineer, Haigh Workman Limited
Date:	14 September 2023 – updated 15 November 2023

1.1 Background

NRC have asked to understand what source monitoring is required if sampling and monitoring from the mixing zone were to be changed to source monitoring. The planner has asked for comment on the proposed condition from the applicant if compliance parameters proposed from the applicant in condition 213 were to be adopted for source monitoring.

Currently, testing and sampling for excess contamination is taken from the mixing zone. Should a contaminate trigger be exceeded within the mixing zone, then at-source testing is executed until the problem is resolved.

1.2 Issues

Due to sampling and testing taken within the mixing zone, the diluted sample can be highly variable, therefore a less reliable measure of water discharge quality from the water quality pond.

Further to this, Maritime Holdings also discharge to the same combined outfall. The contaminant levels from Maritime Holdings have higher contaminant level thresholds that could indicate a breach of the Northport Consent, but not of the third party.

1.3 Proposed solution

A solution would be for at-source testing upstream of the outlet of the pond, in addition to current testing at the canals, be undertaken to monitor consent compliance. Under this regime there would be nil testing and monitoring within the mixing zone.

1.4 Recommended testing at source - Summary

The following testing at the pond discharge is recommended:

(i) 70 µg/L Total Petroleum Hydrocarbons;

(ii) 10 µg/L of total copper;

(iii) 44 µg/L of total lead;

(iv) 150 µg/L of total zinc;

(v) 100 mg/L of total suspended solids;

(vi) pH between 6.5 to 9.0; or

(vii) 1.86 mg/L ammoniacal nitrogen.

2.0 AT SOURCE TESTING

2.1 Existing consent – CON20090505532 – Mixing Zone Testing

Condition 4 (h) provides thresholds at or beyond the mixing zone. The threshold for copper is highlighted below.

4. Notwithstanding any other condition, the exercise of this consent shall not result in any of the following effects on coastal water quality at or beyond the mixing zone, as shown on Northland Regional Council Plan No: 3259A:

   (a) The temperature shall not be changed by more than 3°C;

   (b) The pH shall not be changed by more than 0.2;

   (c) The concentration of dissolved oxygen shall not be reduced below 80% saturation;

   (d) The visual clarity shall not be reduced by more than 20% of the median background visual clarity at the time of measurement, as measured by black disk or an authorised alternative method;

   (e) The hue shall not be changed by more than 10 Munsell units of the median background hue at the time of measurement;

   (f) There shall be no conspicuous oil or grease films, scums or foams, or floatable or suspended materials, or emissions of objectionable odour;

   (g) There shall be no destruction of natural aquatic life by reason of a concentration of toxic substances; and

   (h) The concentrations for the following determinands shall not be exceeded;

Determinands	Concentration in milligrams per cubic metre
Total copper	1.3
Total lead	4.4
Total zinc	15

2.2 Existing consent – CON20090505532 – At-source water quality testing

Condition 5 of the resource consent provides parameters for pH and total suspended solids.

5. The quality of stormwater discharged from the storage and settlement pond system by the pumps shall meet the following:

   (a) A pH within the range of 6.5 to 9.0;

   (b) A total suspended solids median concentration not greater than 50 grams per cubic metre and a 95 percentile concentration not greater than 100 grams per cubic metre.

Condition 10 of the consent refers to Schedule 1 for “Water quality of discharges from the stormwater settlement and storage pond system”. The copper threshold of the discharge is highlighted for a comparison to the copper threshold at or beyond the mixing zone.

10. The Consent Holder shall notify the Council Monitoring Manager as soon as practicable once the stormwater storage and settlement pond system reaches its design discharge level and shall then commence stormwater monitoring in accordance Schedule 1 (**attached)**. The Consent Holder may make changes to Schedule 1 with the written approval of the Council Monitoring Manager.

SCHEDULE 1

MONITORING PROGRAMME – RESOURCE CONSENT CON20090505532

The Consent Holder shall undertake the monitoring as follows:

1 WATER QUALITY OF DISCHARGES FROM THE STORMWATER SETTLEMENT AND STORAGE POND SYSTEM

1.1 Routine Water Monitoring for Discharges from the stormwater settlement and storage pond to Whangarei Harbour

The stormwater system and discharges shall be monitored in accordance with Table 1 attached below

If any of the following determinands in the stormwater being discharged to the coastal marine area exceed the Action Values specified in Table A, the Consent Holder will notify the NRC within two weeks of receiving the sample result and investigate the source of the contaminant and advise the NRC as to the findings of the investigation and any management response.

Table A

Determinands	Action values: Concentration in milligrams per cubic metre
Total Aluminium	5
Total copper	13
Total lead	44
Total zinc	150
PAHs	
– Acenaphthene	58
– Anthracene	0.1
– Benzo(α)anthracene	0.18
– Benzo(α)pyrene	0.1
– Fluoranthene	10
– Fluorene	30
– Napthalene	500
– Phenanthrene	6
– Pyrene	0.25

Note: ANZECC for PAH, 99% protection level as recommended in Section 8.3.7.7 and also CEQG (Canadian aquatic guidelines). For aluminium, ANZECC 8.3.7 Marine guidelines recommend 0.5 mg/m as an indicative low reliability figure.

Values in Table A are intended to act as an early warning to identify if concentrations are increasing relative to previously documented monitoring values/trends and warrant investigation notwithstanding that they may be well below levels of environmental concern taking into account mixing and dilution.

2.3 Testing Proposed by the Applicant – At Source

At source testing proposed by the Applicant in Condition 213 is as follows:

Attributable compliance parameters

213. IF a mixing zone trigger threshold(s) in condition 212 is exceeded:

(a) the consent holder must, as soon as practicable, undertake water quality testing in the location identified in (b) below; and

(b) for the period the threshold(s) in condition 212 remains exceeded water within the Northport site stormwater network directly upstream of the confluence with discharges from the Marsden Maritime Holdings site (i.e. at the downstream limit of the Northport 525mm gravity pipework), or prior to discharge from any proprietary system, must not exceed the following:

(i) 15 mg/L Total Petroleum Hydrocarbons;

(ii) 10 mg/L of total copper;

(iii) 10 mg/L of total lead;

(iv) 100 mg/L of total zinc; or

(v) 100 mg/L of suspended solids.

Advice Note: *The compliance parameters in condition 213 impose enforceable limits on Northport's "at source" stormwater discharges in the event – and for the duration that – a water quality effect(s) of potential environmental concern occurs at the mixing zone boundary (as evidenced by an exceedance of a threshold(s) in condition 212). For the avoidance of doubt, the stormwater quality attributable compliance parameters in condition 213 apply only in the event a mixing zone trigger threshold(s) in condition 212 is exceeded, in which case the compliance parameters in condition 213 apply only for the duration of the condition 212 threshold exceedance(s). The compliance parameters in condition 213 do not incorporate a mixing zone dilution effect.*

3.0 DISCUSSION AND REVIEW

3.1 Suspended Solids

The 100mg per litre of suspended solids is generally consistent with the underlying consent Condition 5 b) as follows:

> *"A total suspended solids median concentration not greater than 50 grams per cubic metre and a 95 percentile concentration not greater than 100 grams per cubic metre."*

The 'Auckland Unitary Plan stormwater management provisions: Technical basis of contaminant and volume management requirements' provides guidance for "*a reasonable expectation of the effluent water quality from most of the stormwater treatment practices currently regarded as 'best practice'. They have been developed using the best available international data on the effluent water quality from common stormwater treatment*

practices."[1]

Within this publication, expectations of "Design Effluent Quality Requirements" are provided for Total Suspended Solids, zinc and copper.

For total suspended solids, the publication provides guidance for heavily trafficked roads and paved surfaces of total suspended solids ranging between 18 and 195 mg/L. For industrial / commercial total suspended solids should be between 18 and 27 mg/L, specifically 18 mg/L for industrial areas which is the closest comparison to a port site[2].

Amending the condition to an absolute allowance (as opposed to 95th percentile or median) is acceptable. The condition of 100 mg per litre as proposed by the applicant is acceptable. This is a higher contaminant loading that might be recommended in the Auckland Region.

3.2 Total Zinc

The underlying consent, Condition 4 (h) specifies that zinc should not exceed 15 micrograms per litre at or beyond the mixing zone.

The underlying consent, Schedule 1, Table A indicates zinc discharges from the stormwater settlement and storage pond system should not exceed 150 mg/m^3 milligrams per cubic metre (micrograms per litre).

The applicant is proposing 100 milligrams per litre of zinc at the source.

The Auckland Council Technical Publication for stormwater management provisions[3] provides guidance for heavily trafficked roads and paved surfaces of zinc ranging between 4 and 729 micrograms per litre. For paved surfaces other than roads i.e. commercial / industrial areas, the recommended levels are 50 micrograms per litre.

Our recommendation is that zinc should not exceed 150 micrograms per litre at the source that would be generally consistent with the underlying consent. This is a higher contaminant loading that might be recommended in the Auckland Region.

3.3 Total Lead

The underlying consent, Condition 4 (h) specifies that lead should not exceed 4.4 milligrams per cubic metre at the mixing zone.

The underlying consent, Schedule 1, Table A indicates lead discharges from the stormwater settlement and storage pond system should not exceed 44 milligrams per

[1] Clause 4.3.1, p43, Auckland Unitary Plan stormwater management provisions: Technical basis of contaminant and volume management requirements; Technical Report 2013/035; *Auckland Council* (August 2013)

[2] Table 4, p45, Auckland Unitary Plan stormwater management provisions: Technical basis of contaminant and volume management requirements; Technical Report 2013/035; *Auckland Council* (August 2013)

[3] Table 6, p49, Auckland Unitary Plan stormwater management provisions: Technical basis of contaminant and volume management requirements; Technical Report 2013/035; *Auckland Council* (August 2013)

cubic metre.

The applicant is proposing 100 milligrams per litre of lead at the source.

Our recommendation is that lead should not exceed 44 micrograms per litre at the source that would be generally consistent with the underlying consent.

3.4 Total Copper

The underlying consent, Condition 4 (h) specifies that copper should not exceed 1.3 mg per cubic metre at the mixing zone.

The underlying consent, Schedule 1, Table A indicates copper discharges from the stormwater settlement and storage pond system should not exceed 13 mg per cubic metre.

The applicant is proposing 10 milligrams per litre of copper at the source.

The Auckland Council Technical Publication for stormwater management provisions[4] provides guidance for heavily trafficked roads and paved surfaces of copper ranging between 0.7 to 115 micrograms per litre. For paved surfaces other than roads i.e. commercial / industrial area, the recommended levels are 10 micrograms per litre.

Our recommendation is that copper should not exceed 10 micrograms per litre at the source that would be generally consistent with the Auckland technical publication. The 10 micrograms per litre is slightly more stringent than the current consent threshold of 13 micrograms per litre.

3.4 Total Petroleum Hydrocarbon

The underlying consent, Schedule 1, Table A could be interpretated that total petroleum hydrocarbon discharges from the stormwater settlement and storage pond system should not exceed (approximately) 70 milligrams per cubic metre.

The applicant is proposing 15 milligrams per litre of total petroleum hydrocarbons at the source.

In the *Australian and New Zealand Guidelines for Fresh and Marine Water Quality,* Tsvetnenko (1998) used the USEPA methods (Stephan et al. 1985, USEPA 1994d) to derive a final chronic value of 7 µg/L total petroleum hydrocarbons (TPH). Allowing for 10x dilution to the mixing zone, this would mean that the trigger criterion at source would be 70 micrograms per litre.

One of the issues here is that it is very difficult for hydrocarbons to be absorbed into water. They tend to float and repel each other. Considering the above our

[4] Table 5, p47, Auckland Unitary Plan stormwater management provisions: Technical basis of contaminant and volume management requirements; Technical Report 2013/035; *Auckland Council* (August 2013)

recommendation is 70 micrograms per litre at source as a trigger point which is generally consistent with the underlying consent.

4.0 OTHER TESTING AT SOURCE

4.1 Water pH

Condition 5 of the underlying consent recommends a pH within the range of 6.5 to 9.0. We recommend pH testing at the source to comply with the above.

4.2 Nitrogen

The concentration of ammoniacal nitrogen from the water quality pond discharge should not exceed 1.86 milligrams per litre.

5.0 SUMMARY AND RECOMMENDATION

5.1 Summary of Recommended Testing

The following testing is recommended:

(i) 70 µg/L Total Petroleum Hydrocarbons;

(ii) 10 µg/L of total copper;

(iii) 44 µg/L of total lead;

(iv) 150 µg/L of total zinc;

(v) 100 mg/L of total suspended solids;

(vi) pH between 6.5 to 9.0; or

(vii) 1.86 mg/L ammoniacal nitrogen.