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WAIHEKE ISLAND

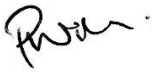
# WATER & SEDIMENT QUALITY MONITORING PLAN

For Kennedy Point Marina

November 2019

## REPORT INFORMATION AND QUALITY CONTROL

| | |
|---|---|
| **Prepared for:** | Kitt Littlejohn<br>Kennedy Point Boatharbour Ltd |

| | | |
|---|---|---|
| **Author:** | Dr Pete Wilson<br>Senior Coastal Scientist |  |
| **Reviewer:** | Mark Poynter<br>Principal Ecology Consultant |  |
| **Approved for Release:** | Mark Poynter<br>Manager/Northland Office |  |

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# 1 INTRODUCTION

Kennedy Point Boatharbour Ltd have consent to construct a marina at Kennedy Point, at the mouth to Putiki Bay on the south western side of Waiheke Island (consent no. R/REG/2016/4270). The Marina will provide permanent berthage for approximately 180 recreational boats in fully serviced berths ranging from 10 m to 30 m in length. Temporary berthage for smaller visiting boats will also be available along with a range of other facilities for the boating public. A plan of the proposed layout is shown in Appendix A.

Kennedy Point Boatharbour Ltd engaged 4Sight Consulting Ltd (4Sight) to develop a water and sediment quality monitoring plan to comply with its consent monitoring conditions (Appendix B).

The purpose of the consent monitoring is to provide information on water and sediment quality in regard to the following activities in the operating marina that could give rise to adverse effects:

1) Accidental discharges of human sewage from boats berthed in the marina; and

2) Discharges of trace metals and co-biocides from anti-fouling paints on the hulls of vessels berthed in the marina.

This plan details the monitoring approach, the guideline values that will be used to assess monitoring results and sets out the procedures to be followed if the guideline values are exceeded.

# 2 MONITORING LOCATIONS

Monitoring location descriptions were specified in the consent as "*three representative sites within the marina (inner, mid and outer); and for comparative purposes one site located adjacent to the existing commercial wharf, and one background site in the outer Kennedy Bay".*

Sediment and water quality samples should be collected from each site listed in Table 1 (locations shown in Figure 1 and in more detail in Appendix C). The exact locations may need to be adjusted to accommodate the structures once construction has been completed and the monitoring plan should be updated accordingly.

Table 1: Monitoring location names, descriptions, and GPS coordinate (NZTM and NZGD2000)

| Location | Description | Easting | Northing | Latitude | Longitude |
|---|---|---|---|---|---|
| Inner | Within the marina, closest to the shore | 1780550 | 5924269 | 175°1.444'E | 36°48.613'S |
| Mid | Within the marina, approximately in the middle | 1780629 | 5924194 | 175°1.498'E | 36°48.653'S |
| Outer | Within the marina, furthest away from the shore | 1780715 | 5924105 | 175°1.556'E | 36°48.700'S |
| Wharf | Adjacent to the existing commercial wharf | 1780758 | 5924299 | 175°1.583'E | 36°48.595'S |
| Bay | Background site in the outer Kennedy Bay | 1780426 | 5923779 | 175°1.367'E | 36°48.879'S |




Figure 1: Proposed water and sediment quality monitoring locations

# 3 MONITORING APPROACH

The consent conditions are explicit as to the frequency of monitoring, the water and sediment quality parameters to be measured, and the guideline values for each to be assessed against. Each of these aspects is described in this section.

All samples are to be collected using "clean sampling" techniques[1]. Briefly, sample containers are double bagged prior to arrival at the sampling site. Upon arrival at the sampling site, one member of the two-person sampling team is designated as "dirty hands"; the second member is designated as "clean hands." All operations involving contact with the sample bottle and transfer of the sample from the sample collection device to the sample bottle are handled by the individual designated as "clean hands." "Dirty hands" is responsible for preparation of the sampler (except the sample container itself), operation of any machinery, and for all other activities that do not involve direct contact with the sample. Sampling personnel are required to wear clean, powder-free gloves at all times when handling sampling equipment and sample containers.

Once collected, all samples are to be stored in a cooler bin with ice and delivered to an IANZ accredited laboratory within 24 hours of collection.

[1] Such as the clean hands/dirty hands sampling technique of EPA-1669

## 3.1 Frequency and Timing

Baseline monitoring as described in this plan shall be conducted prior to construction. Following construction, water and sediment quality monitoring shall be conducted annually during approximate peak occupancy.

During the summer months (December to March, inclusive), microbiological sampling shall be conducted monthly.

All sampling shall be conducted on slack low tide after at least 48 hours of no rainfall or minimal rainfall (<3mm).

## 3.2 Guideline Values

The consent conditions define the relevant documents and guidelines that are to be used to assess results. They are described in this section separately for water and sediment quality parameters.

### 3.2.1 Water Quality

Microbiological

The microbiological indicator, enterococci, is to be assessed against the Ministry for the Environment and Ministry of Health 2003 recreational water quality guidelines.[2] These guidelines were developed to assess water for its suitability for primary contact recreation (e.g., swimming) using enterococci as the indicator of the many potential pathogens in the water including bacteria and viruses in marine waters. The guideline value shown in Table 2 is the action trigger values from the guidelines. Results exceeding this guideline value indicate that the water is 'highly likely to be unsuitable for recreation'.

Water column contaminants

Water column heavy metals are assessed against the ANZG (2018) guidelines.[3] Copper is assessed against the trigger value for the 90% protection of species and zinc for the 95% protection of species (Table 2). It should be noted that the trigger values were developed to be applied to dissolved metal concentrations rather than total metals.

The co-biocide diuron guideline is set at the analytical detection level available from the laboratory (Table 2). This is slightly higher than the European Chemical Agency (ECHA) Predicted No Effect Concentrations (PNEC) for diuron of 0.000032 mg/L.

[2] MfE & MoH 2003. Microbiological water quality guidelines for marine and freshwater recreational areas. Available from https://www.mfe.govt.nz/publications/fresh-water/microbiological-water-quality-guidelines-marine-and-freshwater-0

[3] ANZG 2018. Australian and New Zealand Guidelines for Fresh and Marine Water Quality. Australian and New Zealand Governments and Australian state and territory governments, Canberra ACT, Australia. Available at www.waterquality.gov.au/anz-guidelines. Previously referred to as the ANZECC Guidelines.

Table 2: Water quality monitoring parameters, the guideline values they are to be assessed against, and their monitoring rationale

| Parameter | Guideline Value | Rationale |
|---|---|---|
| Enterococci | 280 MPN/100 mL* | Indicator of bacterial and viral pathogens |
| Total copper | 0.003 mg/L† | Heavy metal contaminants commonly associated with boating activities |
| Dissolved copper | 0.003 mg/L† | |
| Total zinc | 0.015 mg/L† | |
| Dissolved zinc | 0.015 mg/L† | |
| Diuron | 0.00004 mg/L‡ | Co-biocide in antifouling paint |

* MfE & MoH 2003

† ANZG (2018)

‡ Laboratory analytical limit of detection.

### 3.2.2 Sediment Quality

All sediment contaminant parameters, except for diuron, are assessed against the MacDonald et al. (1996) Threshold Effect Level (TEL) values. Sediment contaminants below the TEL are unlikely to have adverse environmental effects.

The co-biocide diuron guideline value is in agreement with the European Chemical Agency (ECHA) Predicted No Effect Concentrations (PNEC) in marine sediment.

Table 3: Sediment quality monitoring parameters, the guideline values they are to be assessed against, and their monitoring rationale

| Parameter | Guideline Value (mg/kg dry weight) | Rationale |
|---|---|---|
| High molecular weight polycyclic aromatic hydrocarbons (HW-PAH) | 0.655* | Primarily released from the combustion of fossil fuels |
| Total recoverable copper | 18.7* | Heavy metal and metalloid contaminants |
| Total recoverable zinc | 124* | |
| Total recoverable lead | 30.2* | |
| Total recoverable arsenic | 7.24* | |
| Total recoverable mercury | 0.13* | |
| Total recoverable chromium | 52.3* | |
| Total recoverable cadmium | 0.68* | |
| Total recoverable nickel | 15.9* | |
| Diuron | 0.005† | Co-biocide in antifouling paint |

* MacDonald et al. 1996. Threshold Effect Level (TEL)

† European Chemical Agency (ECHA) Predicted No Effect Concentrations (PNEC)

# 4 REPORTING AND RESPONSE

Monitoring will be conducted following this plan and the results will be provided to the Team Leader on an annual basis within three months of the completion of the sampling in a report. The report will also include any further responses and/or requirements based on any guideline exceedance as detailed below.

## 4.1 Exceedance of microbiological indicators

If the average faecal indicator bacterial (i.e., *E. coli* or enterococci) concentration from each of the three sampling locations within the marina exceeds its respective guideline value, the following actions will take place:

1) The exceedance will be reported in writing to the Team Leader within five working days of receiving the results from the laboratory.
2) One further round of monitoring will be conducted within five working days of receiving the results from the laboratory for the faecal indicator bacterial parameters.
3) If further sampling confirms that the faecal indicator bacteria concentrations are below the relevant guideline value, results will be reported to the Team Leader and no further action is required; otherwise, move to (4).
4) If the further sampling confirms that at least one of the faecal bacteria indicators exceeds the relevant guideline value, results will be reported to the Team Leader along with any further monitoring or responses related to the significance of the exceedance and whether the available data is able to indicate if it is related to discharge(s) from a vessel(s) berthed within the marina.

## 4.2 Exceedance of water column contaminants

If the average water column contaminant concentration from each of the three sampling locations within the marina exceeds a guideline value by more than 20%, the following actions will take place:

1) If desired, one further round of monitoring may be conducted for the parameter that breached the guideline; otherwise, move to (4).
2) If further sampling confirms that contaminant concentrations are below the relevant guideline value, results will be reported to the Team Leader and no further action is required; otherwise, move to (3).
3) If further sampling confirms that contaminant concentrations exceed a guideline value by >20%, move to (4) or carry out a bioavailability assessment for metals using site specific guidelines.[4]
4) If the contaminant concentration exceeds guideline values by >20%, results will be reported to the Team Leader for written approval and options for reducing sediment contaminant levels will be investigated.

This does not apply if baseline monitoring identified that contaminant levels were already above the guideline values or in the event that the post-construction reference sites also exceed the guideline value on that sampling occasion.

## 4.3 Exceedance of sediment contaminants

If the average sediment contaminant concentration from each of the three sampling locations within the marina exceeds a guideline value by more than 20%, the following actions will take place:

1) If desired, one further round of monitoring may be conducted for the parameter that breached the guideline; otherwise, move to (3).
2) If further sampling shows that contaminant concentrations are below the relevant guideline value, results will be reported to the Team Leader and no further action is required; otherwise, move to (3).

[4] Site specific guidelines may be calculated using dissolved organic matter (e.g., based on Arnold et al. 2006) or from the saltwater Biotic Ligand Model or similar if available.

3) If the contaminant concentration exceeds guideline values by >20%, results will be reported to the Team Leader for written approval and options for reducing sediment contaminant levels will be investigated.

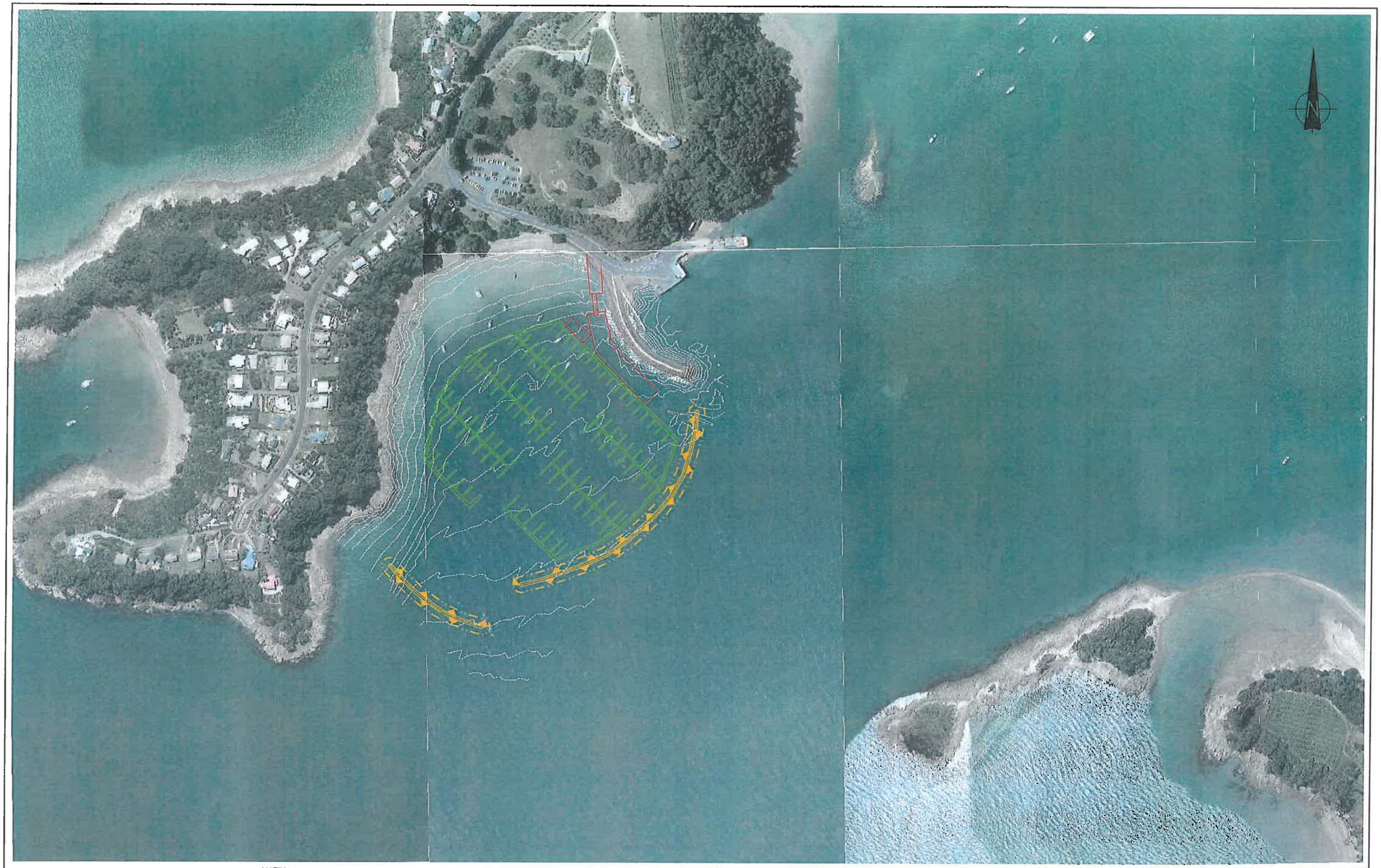
This does not apply if baseline monitoring identified that contaminant levels were already above the guideline values or in the event that the post-construction reference sites also exceed the guideline value on that sampling occasion.

# 5 MONITORING REVIEW

After five years of monitoring, the consent holder may seek approval from the Team Leader to modify the sampling frequency of parameters described in this plan where the results support such change (e.g., if the monitored levels are stable and/or are not of concern by reference to relevant trigger thresholds and/or by reference to sample data do not require continued sampling at the initial intensity).

## Appendix A:

# Marina Plan



NOTES.
1. Coordinate Datum: NZ Geodectic 2000 Mt Eden circuit.
2. Level Datum: Chart Datum, Waiheke Island.
3. Aerial photo sourced from Auckland Council GIS website.
4. Bathymetry supplied by Discovery Marine Ltd, surveyed 16 March 2016.

A3 SCALE 1:4000
0 40 80 120 160 200 (m)

Tonkin+Taylor
105 Carlton Gore Road, Newmarket, Auckland
www.tonkintaylor.co.nz

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| DRAWN | TJ | Apr. 16 |
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| SCALES (AT A3 SIZE) 1:4000 | | |
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KENNEDY POINT, WAIHEKE ISLAND
Aerial Photo

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**Appendix B:**

**Consent Conditions**

## WATER & SEDIMENT QUALITY MONITORING

39. At least sixty (60) working days prior to commencement of construction works, the consent holder shall submit to the Team Leader for approval a Water & Sediment Quality Monitoring Programme (W&SQMP) along with appropriate review provisions. The W&SQMP shall provide details of the water quality parameters that are to be monitored during operation of the marina with reference to pre- construction conditions, agreed 'indicator' or 'trigger' thresholds of acceptable effects, and the response procedures should those thresholds be breached.

40. The W&SQMP shall provide information on water and sediment quality conditions in relation to the following activities in the operating marina that could give rise to adverse effects:

    (a) Accidental discharges of human sewage from boats berthed in the marina or a failure of the sewage holding tank which is to be provided on the existing pontoon;

    (b) Discharges of trace metals and co-biocides from anti-fouling paints on the hulls of vessels berthed in the marina.

41. The W&SQMP shall provide for 'baseline' monitoring prior to commencement of works, and then monitoring during operation of the marina, as follows:

    (a) Pre-construction and annual post-construction measurement and analysis of:

        - bacteriological and viral indicators of human sewage;
        - water column monitoring for total and dissolved copper and zinc, and the co-biocide diuron;
        - sediment monitoring for total recoverable copper and zinc; and for High Molecular Weight Polycyclic Aromatic Hydrocarbons (HW-PAH);
        - sediment monitoring for total recoverable lead, arsenic, mercury, chromium, cadmium and nickel; and for the co-biocide diuron (or alternative co-biocide as agreed with the Team Leader);

    (b) The water and sediment quality monitoring shall be completed at three representative sites within the marina (inner, mid and outer); and for comparative purposes one site located adjacent to the existing commercial wharf, and one background site in the outer Kennedy Bay; and

    (c) All sampling shall be conducted during approximate peak occupancy on slack low tide after at least 48hrs of no rainfall or minimal rainfall (<3mm) using clean sampling techniques.

42. The W&SQMP shall be prepared with reference to the following guidelines:

    (a) Ministry for the Environment (MfE) guidelines for contact recreation including summer (peak period) monthly microbiological indicators (baseline and operational);

    (b) Water column metals: the ANZECC 90% trigger value for copper and the ANZECC 95% trigger value for all other metals;

    (c) Co-biocides: European Chemical Agency (ECHA) Predicted No Effect Concentrations (PNEC) for diuron or other agreed biocide in the water column (32 ng/L for diuron if commercial lab analysis can achieve this, otherwise 40 ng/L) and for diuron or other agreed biocide in the sediment (5.162 µg/kg for diuron); and

    (d) Sediment: the TELs for the relevant metals and HW-PAHs as detailed in the MacDonald et al. 1996.

43. The W&SQMP shall set out the procedures to be adapted for any guideline exceedances in the following manner:

    (a) Exceedance of the MfE guidelines for contact recreation shall be reported in writing to the Team Leader within five (5) working days, along with any further monitoring or responses related to the significance of the exceedance, if it is related to discharge(s) from a vessel(s) berthed within the marina.

    (b) Exceedance of any of the other guidelines outlined above by more than 20% (based on the average results for inside the marina, or the single result for outside the marina within the swing mooring area on the southern side of the commercial wharf), excluding where the preconstruction monitoring showed the

guideline already to be exceeded, or in the event that the post construction background site is shown to exceed the guideline for any sampling run, shall result in the following further course of action:

(A) If desired, confirm the result with one further round of sampling for the parameter breached, otherwise move direction to clause (F).

(B) If further sampling does not confirm guideline exceedance then report the results to the Team Leader. No further action is required.

(C) For the sediments, if further sampling confirms a greater than 20% exceedance of the Threshold Effects Level (TEL: see MacDonald eta al. 2996) for metals or High Molecular Weight Polycyclic Aromatic Hydrocarbons (HW-PAHs) or of the European Chemical Agency (ECHA) Predicted No Effect Concentration (PNEC) for diuron (or any other agreed co-biocide) then move to clause (F).

(D) For the water column: if further sampling confirms a greater than 20% exceedance of the guideline the move direction to clause (F) or carry out a bioavailability assessment for metals using site specific guidelines calculated from Dissolved Organic Carbon (DOC) (e.g. based on Arnold et al. 2006) or from the saltwater Biotic Ligand Model (BLM) or similar if available.

(E) If the bioavailability assessment does not breach site specific guidelines then report the results to the Team Leader. No further action is required.

(F) If the bioavailability assessment for metals confirms a breach of site specific chronic guidelines, or a >20% exceedance of the sediment TEL or co-biocide ECHA PNEC guidelines are confirmed, then results are to be reported to the Team Leader for written approval and options for reducing water column and sediment contaminant levels investigated.

44. The approved W&SQMP shall be implemented and the results shall be provided to the Team Leader on an annual basis within 3 months of the completion of the sampling and shall include any further requirements based on any guideline exceedance as detailed above.

45. After 5 years of monitoring, the consent holder may seek approval from the Team Leader to modify the regularity of sampling or matters to be sampled in the approved W&SQMP where the results support such change (e.g., if the monitored levels are stable and/or are not of concern by reference to relevant trigger thresholds and/or by reference to sample data do not require continued sampling at the initial intensity).

# Appendix C:

## Monitoring Locations




| Name | Easting | Northing | Latitude | Longitude |
|---|---|---|---|---|
| Inner | 1780550 | 5924269 | 175°1.444'E | 36°48.613'S |
| Mid | 1780629 | 5924194 | 175°1.498'E | 36°48.653'S |
| Outer | 1780715 | 5924105 | 175°1.556'E | 36°48.700'S |
| Wharf | 1780740 | 5924315 | 175°1.571'E | 36°48.586'S |
| Bay | 1780441 | 5923932 | 175°1.375'E | 36°48.796'S |

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AA1921 - Kennedy Point Marina

# Monitoring Locations

Prepared for Kennedy Point Boatharbour Ltd by 4Sight Consulting

Monitoring Locations
Approximate Footprint

Date: 12/11/2019
Version: 1.0
Author: PW
Checked: MP
Approved: ML

4SIGHT CONSULTING



## Kitt Littlejohn

**From:** Audric Kam <audric.kam@aucklandcouncil.govt.nz>
**Sent:** Friday, 13 March 2020 10:15 am
**To:** Pete Wilson
**Cc:** Kitt Littlejohn
**Subject:** RE: Kennedy Point Marina - Water & Sediment Quality Monitoring Plan (CST60082321)

Hello Pete,

Apologies for the lack of correspondence.

Kala has not responded, which in my view is not problematic anyway. I am happy to confirm that the plan has been accepted and Conditions 39-43 have been satisfied.

Thanks for your time on this.

Ngā mihi | Kind regards,

**Audric Kam | Compliance Monitoring Officer Central**
**Licensing and Regulatory Compliance**
Phone: 021 196 1629
Auckland Council, 35 Graham Street, Auckland Central, Auckland 1010
Private Bag 92300, Victoria Street West, Auckland 1142
Visit our website: www.aucklandcouncil.govt.nz

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Call Centre: 09 301 0101
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**From:** Pete Wilson <petew@4sight.co.nz>
**Sent:** Wednesday, 11 March 2020 1:38 PM
**To:** Audric Kam <audric.kam@aucklandcouncil.govt.nz>
**Cc:** Kitt Littlejohn <kitt@kpmarina.co.nz>
**Subject:** RE: Kennedy Point Marina - Water & Sediment Quality Monitoring Plan (CST60082321)

Hi Audric

I'm just following up on your previous email and would like to know whether there has been any further response from Kala. If there is no further response, are we able to assume that Council has formally approved the monitoring plan?

Thanks,
Pete

Dr Pete Wilson
Senior Coastal Scientist
Mobile: 021 243 7783

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**From:** Audric Kam <audric.kam@aucklandcouncil.govt.nz>
**Sent:** Tuesday, 28 January 2020 3:35 PM
**To:** Pete Wilson <petew@4sight.co.nz>
**Cc:** Kitt Littlejohn <kitt@kpmarina.co.nz>; Mark Poynter <markp@4sight.co.nz>; Mark Schmack <mark@kpmarina.co.nz>
**Subject:** RE: Kennedy Point Marina - Water & Sediment Quality Monitoring Plan (CST60082321)

Hello Pete,

Thanks for putting that in writing – it was great speaking to you.

I am now waiting for Kala's response. I'll contact you as soon as she responds.

Ngā mihi | Kind regards,

**Audric Kam | Compliance Monitoring Officer Central**
**Licensing and Regulatory Compliance**
Phone: 021 196 1629
Auckland Council, 35 Graham Street, Auckland Central, Auckland 1010
Private Bag 92300, Victoria Street West, Auckland 1142
Visit our website: www.aucklandcouncil.govt.nz

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**From:** Pete Wilson <petew@4sight.co.nz>
**Sent:** Thursday, 23 January 2020 1:01 PM
**To:** Audric Kam <audric.kam@aucklandcouncil.govt.nz>
**Cc:** Kitt Littlejohn <kitt@kpmarina.co.nz>; Mark Poynter <markp@4sight.co.nz>; Mark Schmack <mark@kpmarina.co.nz>
**Subject:** RE: Kennedy Point Marina - Water & Sediment Quality Monitoring Plan (CST60082321)

Hi Audric

No problems with the delay, December is a busy month for all.

Just to follow up and confirm our phone conversation:

- We will conduct the pre-construction monitoring following the Water and Sediment Quality Monitoring Plan as submitted on 13 December, 2019.
- We are happy to monitor for diuron in the beginning and replace it with an alternative co-biocide in future monitoring as suggested by Kala. Is there a specific co-biocide that Auckland Council prefers?
- Regarding bacterial and viral indicators, we agreed that measuring enterococci alone is sufficient for this purpose.

Thanks again for your time. I will be in touch when we have the pre-construction monitoring report for you to review.

Thanks,
Pete

Dr Pete Wilson
Senior Coastal Scientist
Mobile: 021 243 7783

**From:** Audric Kam <audric.kam@aucklandcouncil.govt.nz>
**Sent:** Wednesday, 22 January 2020 9:36 AM
**To:** Pete Wilson <petew@4sight.co.nz>
**Cc:** Kitt Littlejohn <kitt@kpmarina.co.nz>; Mark Poynter <markp@4sight.co.nz>; Mark Schmack <mark@kpmarina.co.nz>
**Subject:** RE: Kennedy Point Marina - Water & Sediment Quality Monitoring Plan (CST60082321)

Hello Pete,

Apologies for the delay. Our specialist, Kala Sivaguru, was inundated with work prior to the Christmas-New Year period.

Kala is satisfied that the plan meets the relevant RC conditions, however she has made some suggestions – I will copy them below:

1. In terms of co-biocide diuron, I understand that EPA recommended to phase out diuron over 4 years in 2013 during the re-assessment of a group of hazardous substances for anti fouling paints (AFP). Whilst the condition includes monitoring diuron in water and sediment samples, I suggest monitoring diuron in the beginning and replacing with the alternative co-biocide currently used instead of diuron as recommended by EPA. Diuron is short lived, so it will not be useful to monitor if it has not been used in the AFPs. The consent condition allows this.

2. In terms of bacterial and viral indicators, while I agree enterococci is appropriate to monitor, addition of a viral indicator (enteric viruses) would be useful as it has been used in human sewage related discharges.

Please let me know your thoughts. If you believe a more technical discussion is required, I will be happy to connect you with Kala.

Ngā mihi | Kind regards,

**Audric Kam | Compliance Monitoring Officer Central**
**Licensing and Regulatory Compliance**
Phone: 021 196 1629
Auckland Council, 35 Graham Street, Auckland Central, Auckland 1010
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**From:** Audric Kam
**Sent:** Monday, 16 December 2019 5:45 PM
**To:** Pete Wilson <petew@4sight.co.nz>
**Cc:** Kitt Littlejohn <kitt@kpmarina.co.nz>; Mark Poynter <markp@4sight.co.nz>; Mark Schmack <mark@kpmarina.co.nz>
**Subject:** RE: Kennedy Point Marina - Water & Sediment Quality Monitoring Plan

Thanks a lot Pete.

I have reviewed the plan and have forwarded it on to our specialists for their opinion. I have also forwarded the comments in your email relating to the proposed monitoring methodology required by Condition 41.

I'll be in touch if we have any questions or issues.

Ngā mihi | Kind regards,

**Audric Kam | Compliance Monitoring Officer Central**
**Licensing & Regulatory Compliance**
Phone: 021 196 1629
Auckland Council, 35 Graham Street, Auckland Central, Auckland 1010
Private Bag 92300, Victoria Street West, Auckland 1142
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**From:** Pete Wilson <petew@4sight.co.nz>
**Sent:** Friday, 13 December 2019 2:42 PM
**To:** Audric Kam <audric.kam@aucklandcouncil.govt.nz>
**Cc:** Kitt Littlejohn <kitt@kpmarina.co.nz>; Mark Poynter <markp@4sight.co.nz>; Mark Schmack <mark@kpmarina.co.nz>
**Subject:** Kennedy Point Marina - Water & Sediment Quality Monitoring Plan

Hi Audric

Please find attached the Water & Sediment Quality Monitoring Plan for Kennedy Point Marina. This is to fulfil the initial requirements of consent conditions 39–45 (no. R/REG/2016/4270).

I would like to highlight a decision we had to make developing plan due to uncertainty with the consent conditions. Condition 41(a) requires monitoring of "bacteriological and viral indicators of human sewage". We have included the faecal indicator bacteria, enterococci, in the monitoring plan as it is the recommended indicator in marine environments according to the 2003 MfE/MoH Microbiological water quality guidelines for marine and freshwater recreational areas. These guidelines are referenced in condition 42. Enterococci is measured as an indicator of the many potential pathogens in the water that may pose a risk to human health, including those from bacteria and viruses. We believe the measurement of enterococci is sufficient and appropriate to monitoring for potential adverse effects that could arise from accidental discharges of human sewage from boats berthed in the marina; however, we are aware that this is not a specific viral indicator, as specified in the above condition.

If you have any queries, please don't hesitate to get in touch.

Kind regards,
Pete

Dr Pete Wilson
Senior Coastal Scientist

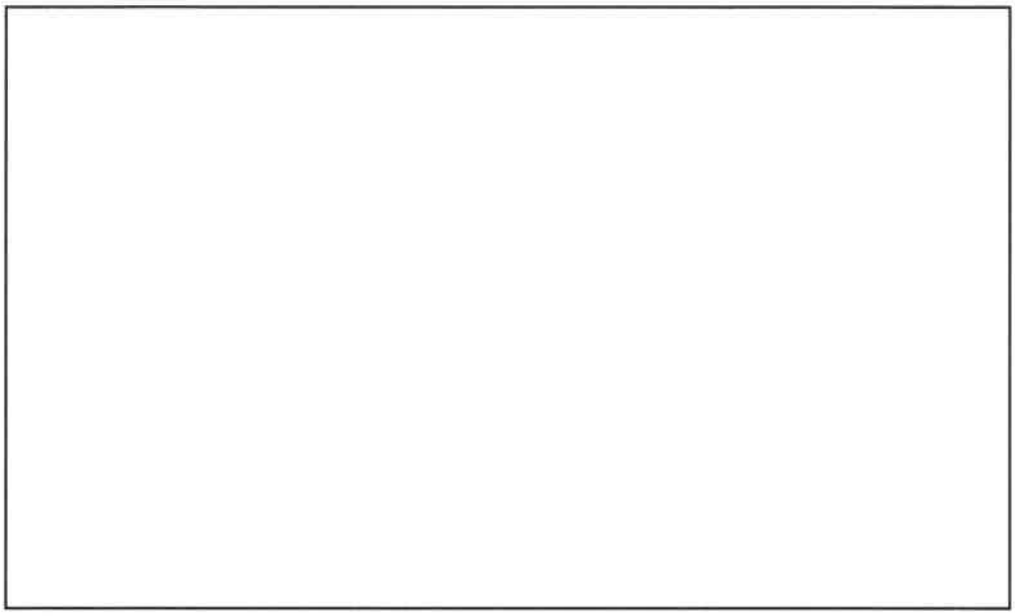
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