BAY OF PLENTY REGIONAL COUNCIL
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Monitoring plan report for use of herbicides over water – Alligator weed *(Alternanthera philoxeroides)*

Bay of Plenty Regional Council
Environmental Publication 2024/04

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Permission number:	STRG-06-06-2022-003
Monitoring Plan Report prepared by:	Josh Scarrow, Biosecurity Contractor, Bay of Plenty Regional Council

Contents

Definitions

Operational area	An area that encompasses the possible incursion of a target pest plant in an area where there is a target pest plant already present in that body of water. And an area that is inclusive of where a substance might end up in the water after a spray application.
Treatment area	An area where the pest plant is present, and a substance is applied
Spray application	An event in which a substance is applied to inhibit a target pest plants presence at a specific location within an operational area. One spray application may occur over multiple days.
Spray operation	A series of spray applications over the course of the season

1 Risk Assessment

Compliance with an RMA permitted rule.

In order for Bay of Plenty Regional Council (BOPRC) to undertake control operations under permission STRG-06-06-2018-021, it is required to undertake a risk assessment as detailed in the letter provided from the Environmental Protection Agency dated 15 July 2020.

There are two policies developed under the Resource Management Act that are relevant to this requirement, the Bay of Plenty Regional Coastal Environment Plan and the Operative Bay of Plenty Regional Air Plan. The control of aquatics weeds using herbicide is permitted in both plans under the rules listed below:

Bay of Plenty Regional Coastal Environment Plan

Rule CD1: Permitted – Discharge of aquatic herbicide over coastal water for weed control

The discharge of herbicides over coastal water for the purpose of spraying emergent aquatic plants, is a permitted activity, subject to the following conditions:

a) The application of herbicide shall only be for the purpose of controlling:
   i) Plant pest species listed in the Regional Pest Management Plan for the Bay of Plenty or the National Pest Plant Accord, or
   ii) Exotic vegetation for the purpose of maintaining or enhancing indigenous biodiversity.

b) Only herbicides that have been approved for use over water shall be used. Herbicides are approved under the Hazardous Substances and New Organisms Act 1996.

c) The herbicide shall be discharged in a manner that is consistent with the manufacturer's instructions.

d) The discharge shall not result in any fish kills.

e) The discharge shall not contaminate any authorised water take.

f) The discharge shall not result in any harmful concentration of herbicide beyond target area.

g) There shall be no discharge of herbicide in the tidal reach of any surface water body between 1 March and 31 May.

h) The discharge of herbicide shall comply with the requirements of the Operative Bay of Plenty Regional Air Plan.

Bay of Plenty Regional Air Plan

Rule 10: Permitted Activity – Use of agrichemicals for the eradication or management of organisms declared unwanted under Sections 143 and 144 of the Biosecurity Act 1993.

The discharge of agrichemical into air for the eradication or management of organisms declared unwanted under Sections 143 and 144 of the Biosecurity Act 1993 is a permitted activity provided the following conditions are complied with:

a) Any contractor using or applying any agrichemical by ground based application methods shall hold a minimum of a current GROWSAFE® Registered Chemical Applicators Certificate or equivalent.

b) Any person, other than any contractor provided for in (a) above, using or applying an agrichemical identified either on its product label, or in the First or Second Schedule of the Toxic Substances Regulations 1983 as containing a compound rated as either a:

"DANGEROUS POISON"; or

"DEADLY POISON",

shall hold a minimum of a current GROWSAFE® Introductory Certificate or equivalent.

c) Any person, other than any contractor provided for in (a) above, using or applying an agrichemical identified on its product label as containing a compound rated as either a:

"POISON"; or

"CAUTION",

or is listed in the Third or Fourth Schedules to the Toxic Substances Regulations 1983 as a:

"STANDARD POISON"; or

a "HARMFUL SUBSTANCE",

shall hold a minimum of a current GROWSAFE® Introductory Certificate or equivalent or be under the direct supervision of a person holding a current GROWSAFE® Applied Certificate or equivalent.

d) The agrichemical must be used under the direction of the Department whose responsibilities are adversely affected by the unwanted organism or Environment Bay of Plenty where unwanted organisms are managed.

e) There must be no harmful concentrations of agrichemical beyond the boundary of the subject property or into water.

f) When ground based application methods are used the occupier of any adjoining properties must be notified of the agrichemical use. Notification must be no earlier than 20 days and no later than 12 hours before the agrichemical use unless agreement on an alternative manner of notification can be reached with the adjoining occupier.

g) Agrichemical use from aircraft must be publicly notified not earlier than 20 days and no later than 12 hours before the agrichemical use.

h) Notwithstanding the requirements of this rule any person applying agrichemicals from an aircraft shall comply with Rule 13 of this plan.

Rule 11: Permitted Activity – Use of Agrichemicals – Non-Motorised Hand-held Application

The discharge of contaminants into air from the non-motorised hand-held application of agrichemical is a permitted activity provided the following conditions are complied with:

a)

i) Any contractor using or applying any agrichemical by ground based application methods shall, within twelve months of this plan becoming operative (15 December 2003), hold a current GROWSAFE® Registered Chemical Applicators Certificate or equivalent.

ii) Any person using or applying agrichemicals for commercial purposes (other than a contractor provided for in (a)(i) above) when using or applying an agrichemical identified on its product label, or in the First or Second Schedule of the Toxic Substances Regulations 1983 as containing a compound rated as either a:

"DANGEROUS POISON"; or

"DEADLY POISON",

shall within twelve months of this plan becoming operative (15 December 2003), hold a minimum of a current GROWSAFE® Introductory Certificate or equivalent or be under the direct supervision of a person holding a current GROWSAFE® Introductory Certificate or equivalent.

b) All persons discharging agrichemicals under this rule shall ensure that:

i) The agrichemical is discharged in a manner that does not contravene any requirement specified in the manufacturer's instructions.

ii) The commercial application of agrichemicals complies with NZS 8409: 1999 Code of Practice For The Management of Agrichemicals.

c) The agrichemical use must not result in any harmful concentration of agrichemical beyond the boundary of the subject property or into water.

Note: Extra care should be exercised when applying any phenoxy based herbicide. In particular, 2, 4-D butyl ester herbicide sprays have the potential to travel long distances through the air. Although butyl ester herbicide has not been manufactured since 1997, existing stocks can still legally be applied. Further information on spray drift hazard is included in Appendix Y of NZS 8409: 1999 Code of Practice for the Management of Agrichemicals.

d) Where agrichemical is applied on public land, public roads or railways, notification of that agrichemical use must comply with the requirements of Schedule 2.

Rule 13 Permitted Activity – Use of Agrichemicals – Other Application Techniques (Excluding Non-Motorised Hand-held and Aerial Application)

The discharge of contaminants into air from the use of agrichemicals, excluding non-motorised hand-held or aerial application, is a permitted activity provided the following conditions are complied with:

a) The discharge must not result in any harmful concentration of agrichemical beyond the boundary of the subject property or into water.

i) Any contractor using or applying any agrichemical by ground based application methods shall, within twelve months of this plan becoming operative (15 December 2003) hold a current GROWSAFE® Registered Chemical Applicators Certificate or equivalent.

ii) Any person using or applying agrichemicals for commercial purposes (other than a contractor provided for in (b)(i) above) when using or applying an agrichemical identified on its product label, or in the First or Second Schedule of the Toxic Substances Regulations 1983 as containing a compound rated as either a:

"DANGEROUS POISON" or

"DEADLY POISON",

shall within twelve months of this plan becoming operative (15 December 2003) hold a minimum of a current GROWSAFE® Introductory Certificate or equivalent or, be under the direct supervision of a person holding a current GROWSAFE® Applied Certificate or equivalent.

c) All persons discharging agrichemicals under this rule shall ensure that the agrichemical is used in a manner that complies with NZS 8409:1999 Code of Practice for the Management of Agrichemicals.

d) The owner/occupier or agent must notify the occupier of any adjoining properties within 50 m of that agrichemical use. Except that where agrichemicals are applied using a motorised boom, which meets the following design conditions, notification is only required when the agrichemical application occurs within 10 m of an adjoining property. The design conditions are:

i) the liquid pressure through the boom is less than 3 bar,

ii) the height of the discharge point on the boom is less than 1 metre from the ground,

iii) the nozzles point down,

iv) the nozzles are designed to create coarse droplets of greater than 250 microns in diameter.

If an agreed form of notification has not been reached, such as an annual spray or application plan and individual notification of certain chemicals to be used, notification must be no earlier than 20 days and no later than 12 hours before the agrichemical use. This condition does not apply to agrichemical use on public land, or land used for road or rail purposes (see Rule 13 condition (e)). Notification must include the following:

v) the site of proposed application;

vi) the date of proposed application;

vii) name and type of agrichemical to be applied;

viii) name, address and phone number of applicator.

Note: Extra care should be exercised when applying any phenoxy based herbicide. In particular, 2, 4-D butyl ester herbicide sprays have the potential to travel long distances through the air. Although butyl ester herbicide has not been manufactured since 1997, existing stocks can still legally be applied. Further

information on spray drift hazard is included in Appendix Y of NZS 8409: 1999 Code of Practice for the Management of Agrichemicals.

e) Where agrichemical is applied on public land, public roads, or railways, notification of that agrichemical use must comply with the requirements of Schedule 2.

f) Where agrichemicals are applied to land adjoining public roads and places, signs must be placed on the road boundary 24 hours before the time of application and removed by the applicator when the land is safe for re-entry. Where agrichemicals are applied using a boom the signs are only required when the application occurs within 6m of a public road or place, or if the boom does not meet the following design features:

(i) the liquid pressure through the boom is less than 3 bar;

(ii) the height of the discharge point on the boom is less than 1 metre from the ground;

(iii) the nozzles point down;

(iv) the nozzles are designed to create coarse droplets of greater than 250 microns in diameter.

The signs must include the following information:

(v) The agrichemical used;

(vi) The time of application;

(vii) The time for safe re-entry;

(viii) The name and contact details of the applicator.

Note: There are statutes that must be complied with when considering the use of agrichemicals. Compliance with the rules for the use of agrichemicals in the Bay of Plenty Regional Air Plan should not be construed as absolving users from complying with relevant statutes.

Environment Bay of Plenty strongly recommends that any person using or applying any agrichemical under this Rule, other than either a “dangerous poison” or a “deadly poison”, should hold a minimum of a current GROWSAFE® Introductory Certificate or equivalent or be under the direct supervision of a person holding a current GROWSAFE® Introductory Certificate or equivalent. Any person using or applying either a “dangerous poison” or a “deadly poison” must comply with the certification requirements of Rule 13(b).

2 Details of operations

2.1 Map of all locations where the substance has been applied

Find attached as Appendix 1 and Appendix 2, maps outlining where all sites where metsulfuron, under this permission, have been applied by BOPRC biosecurity staff and their contractors during the 2023/24 financial year, for the sole purpose of controlling Alligator Weed (*Alternanthera philoxeroides*) infestations within the scheme drains.

2.2 Details of the spray operation by location, including application method, quantity of the substance applied, rates of application, frequency of application and the dates of application

Control works were undertaken throughout scheme drains of the lower Rangitāiki and Tarawera catchments, as per maps provided in Appendix 1 and 2, on 11, 13 and 14 December 2023. Only one round of control (using metsulfuron and glyphosate) was undertaken.

A summary of control operations undertaken in the 2023/24 financial year is provided below. A total of 100 L of herbicide (glyphosate and metsulfuron combined) was applied over 15.4 km of drain length (8.7 km Rangitāiki; 6.7 km Tarawera); contractors' spray diaries do not differentiate between different drains, thus application rates are provided across the entire operation. For our calculations we have assumed an average drain width of 3 m; this is very conservative, with major drains (Reid's Canal) being much wider in places.

It is important to note that Alligator Weed infestations within the drains were generally small (<5 m^2 at any one location) and dispersed throughout the drain network.

The original submitted monitoring plan include Gordon Carmichael Reserve. Upon further assessment of the infestation(s) present there, no metsulfuron was used at this site; physical/manual removal was sufficient. As such, no monitoring was required at this site.

Spray operation location:	Scheme drains of the lower Rangitāiki and Tarawara catchments
Application method:	Gun and hose unit (via boat)
Herbicide used:	Metsulfuron-methyl (HSR00242)
Quantity of substance applied:	100 litres – 20 g ai
Rates of application:	0.2 grams per litre
Date/s or application:	11, 13 and 14 December 2023
Maps:	Appendix 1 and 2

3 Monitoring

Monitoring was completed at a total of seven (7) sites, each monitoring site being the confluence of two separate drains or the point at which the drain network discharges to the river proper.

Maps of monitoring locations are provided in Appendix 1 and 2; details of the monitoring sites are provided in Appendix 4.

3.1 Details (including results) of water sampling conducted to confirm compliance with EEL values

Baseline Sampling: We initially collected a series of baseline water quality samples from the predetermined monitoring locations on 27 September 2023. Unfortunately, due to hold ups and customs issues (analyses subcontracted to a laboratory in Australia), these samples were destroyed and never analysed. BOPRC were only notified of this fact the week that control operations were due to commence. As such, baseline samples were recollected on the morning of11 December 2023, immediately prior to spray operations.

Spray operations commenced in the absence of baseline data; if the original baseline samples were analysed as planned, it is unlikely that control operations would have included metsulfuron. This is an unfortunate incident and was both unforeseeable and out of BOPRC's control.

Methods: Water samples were collected from predetermined monitoring locations prior to application (Day 0), and no more than two days following application, as per the approved plan.

Whilst the original plan allowed for collection of water samples on the day of application at pre-determined monitoring locations, allowing for the flow rate of the drain, this was found to be unworkable due to very low flow rates observed, and the patchy nature of the application itself (small patches distributed far apart). As a compromise, three samples were collected during spray operations to collect indicative data of "worst-case" concentrations during application; samples were collected within 50 m (downstream) of the application location, within five minutes of spraying commencing.

Samples were collected directly into laboratory prepared glass containers, using a sampling pole as required, with care taken to ensure the sampler was positioned downstream of the sampled water to avoid disturbance/contamination of the sample. The samples were chilled and sent to (IANZ accredited) Hill laboratories under chain of custody documentation for analysis of metsulfuron-methyl (analysed by subcontract laboratory – Envirolab, Australia), with a methodology detection limit of 0.01 ug/L (we note that this detection limit is below the EEL, thus "non-detects" may or may not exceed the EEL).

Results: Results are summarised in Tables 1 and 2 below, with full laboratory reports provided in Appendix 3. A summary of field parameters measured during monitoring events is provided in Appendix 4. Metsulfuron herbicide concentrations in water samples were above the EEL at all sampling sites before spraying, and above the EEL in five of seven post-spray samples; only two samples from the original pre/post monitoring regime reported concentrations below the laboratory detection limit.

A further round of samples was collected from monitoring points on 24 January 2024 to elucidate the persistence of reported concentrations; these results are also included in Tables 1 and 2 below. It is important to note that no further use of metsulfuron over water was undertaken by the BOPRC biosecurity program after 15 December 2023.

In short, “high concentrations” of metsulfuron (i.e. - >EEL) were consistently found in the Tarawera drain network more than one month post-control. The concentrations and distribution of metsulfuron in the Rangitāiki were less consistent, and either at or below laboratory detection limits.

Analysis of three “during control” samples (refer Table 3) confirm generally higher concentrations (by an order of magnitude relative to post-spray samples) immediately adjacent to application locations, although it is worth noting that the highest concentration reported (0.39 µg/L; 231211.AWR3) was from a pre-spray sample, and in no way connected to biosecurity operations.

Sediment: Sediment sampling was initially proposed within the monitoring plan, although this is not a strict requirement under BOPRC permitted activity rules or the EPA permission. The nature of the drains (depth and substrate) hindered sediment sample collection, and consultation with local Iwi did not highlight any particular areas of significance to mana whenua to be monitored. Regardless, select sediment samples were collected during the pre-spray water sampling. Metsulfuron was below laboratory detection limits in all sediment samples analysed, regardless of concentrations reported from the overlying water column. Results are not tabulated but are included within Appendix 3. No further sediment sampling was undertaken during subsequent monitoring events.

Table 1 Metsulfuron in water samples from Tarawera Scheme Drain monitoring points; 2023/24.

Monitoring Event	Pre-Spray				Post-Spray				Post-Spray + 1 month			
Sample ID	**231211.AWT1**	**231211.AWT 2**	**231211.AWT3**	**231211.AWT 4**	**231215.AWT 1**	**231215.AWT2**	**231215.AWT 3**	**231215.AWT 4**	**240124.AWT 1**	**240124.AWT 2**	**240124.AWT 3**	**240124.AWT 4**
Lab Reference	3433042	3433042.2	3433042.3	3433042.4	3433042.12	3433042.13	3433042.1	3433042.2	3451378.4	3451378.5	3451378.6	3451378.7
Date Sampled	11/12/2023				15/12/2023				24/01/2024			
Metsulfuron Methyl (ng/L)	40	14	50	24	19	<10	16	87	<10	28	29	23
Metsulfuron Methyl (ug/L)	***0.04***	***0.014***	***0.05***	***0.024***	***0.019***	<0.01	***0.016***	***0.087***	<0.01	***0.028***	***0.029***	***0.023***

Notes: Orange cells exceed the EEL (0.0084 µg/L). The laboratory reports concentrations in ng/L, we have reported in both ng/L and µg/L for ease of comparison.

Table 2 Metsulfuron in water samples from Rangitāiki Scheme Drain monitoring points; 2023/24.

Monitoring Event	Pre-spray			Post-Spray			Post-Spray + 1 month		
Sample ID	**231211.AWR1**	**231211.AWR2**	**231211.AWR3**	**231213.AWR1**	**231213.AWR2**	**231215.AWR3**	**240124.AWR1**	**240124.AWR2**	**240124.AWR3**
Lab Reference	3433042.5	3433042.6	3433042.7	3433042.1	3433042.11	3433042.16	3451378.1	3451378.2	3451378.3
Date Sampled	11/12/2023			13/12/2023		15/12/2023	24/01/2024		
Metsulfuron Methyl (ng/L)	63	54	390	30	<10	110	<10	<10	10
Metsulfuron Methyl (ug/L)	***0.063***	***0.054***	***0.39***	***0.03***	<0.010	***0.11***	<0.010	<0.010	***0.01***

Notes: Orange cells exceed the EEL (0.0084 µg/L). The laboratory reports concentrations in ng/L, we have reported in both ng/L and µg/L for ease of comparison.

Table 3 Metsulfuron in water samples adjacent to control locations; 2023.

Monitoring Event	During-spraying		
Sample ID	**231211.AWR.S1**	**231211.AWR.S2**	**231213.AWT.S1**
Lab Reference	3433042.8	3433042.9	3433042.25
Date Sampled	11/12/2023	11/12/2023	13/12/2023
Metsulfuron Methyl (ng/L)	150	92	240
Metsulfuron Methyl (ug/L)	***0.15***	***0.092***	***0.24***

Notes: Orange cells exceed the EEL (0.0084 µg/L). The laboratory reports concentrations in ng/L, we have reported in both ng/L and µg/L for ease of comparison.

3.2 Conclusions from monitoring results.

Metsulfuron herbicide appears to be consistently elevated (above the EEL) throughout the scheme drains of the lower Tarawera catchment. High concentrations were present prior to any biosecurity (Alligator Weed) control and remain elevated more than a month after application ceased. Similarly, metsulfuron was elevated in Rangitāiki drains prior to control operations, although concentrations were generally reduced one month after.

Overall, there is evidence of pervasive metsulfuron residues within scheme drain waters within the lower Tarawera and Rangitāiki catchments. The presence of metsulfuron in samples collected prior to Alligator Weed control operations points to another input outside of BOPRC Biosecurity's control and is not solely driven by these works. Regardless, the use of metsulfuron within these systems has ceased, and ongoing use is being reviewed.

3.3 Details of pest plants targeted

The table below summarises current state of pest plant infestations prior to control and the amount of herbicide used during control operations:

Site name	Tarawera and Rangitāiki scheme drains
Date	8/02/2024
Site Area (m2)	46200 (4.62 ha)
Amount of pest plant present (m^2)	380
Herbicide used during control and rate	0.2 g/L Metsulfuron
Herbicide mixed volume used (l)	100
Quantity applied (kg of ai)	0.02
Rate of application (kg ai/ha)	4.33E-03

4 Engagement/Consultation

Council reviewed the notification list to ensure that all the appropriate stakeholders were accounted for and notified.

Emails were sent to all parties on the notification list with the request for a reply to show they are still requiring the notifications and the best mode of contact for future notifications. Additional information on the progress of the control program was included to update stakeholders that infestation sizes were reducing steadily. Face to face meetings were also held with five iwi across the Eastern Bay of Plenty to inform them of the programme and seek their support. There was unanimous support for BOPRC to continue to use the best tools available to effectively control Alligator weed.

Feedback from the notifications were supportive of the programme.

The table below documents parties that were formally consulted with prior to control in 2024:

EASTERN BAY OF PLENTY – ALLIGATOR WEED IWI CONSULTATION				
Name	**Organisation**	**1st Consultation**	**2nd Consultation**	**Comments**
Tu O'Brian, Marama Cook, Pohoira Iopata. Mithuna Sothieson	Te Rūnanga o Ngāi Awa	Email: 26/09/2023 Meeting: 13/10/2023	Email: 21/05/2024 Meeting: 24/06/2024	Initial meeting and email were to discuss programme and seek approval to try Metsulfuron in the scheme drain system. Second was to report on control programme, water testing results and to seek approval to expand methodology to include the Rangitāiki River. Second meeting included NIWA scientists, at the conclusion there was universal support for the programme and to expand into the Rangitāiki River in 2024/25.
Christopher Clarke, Frances Curtis, Destiny Wharewera.	Ngāti Rangitihi	Email: 26/09/2023 Meeting: 13/10/2023	Email: 21/05/2024 Meeting: 04//07/2024	Initial meeting and email were to discuss programme and seek approval to try Metsulfuron in the scheme drain system. Second was to report on control programme,

				water testing results and to seek approval to expand methodology to include the Rangitāiki River. Universal support to continue to use the control methodology in 2024/25.
Kimi Apiata, Maria Rolleston, Ngapera Rangiaho	Ngāi Tūhoe	Email: 26/09/2023 Meeting: Meeting not attended.	Email: 21/05/2024 Meeting: 24/06/2024	Initial meeting and email were to discuss programme and seek approval to try Metsulfuron in the scheme drain system. Second was to report on control programme, water testing results and to seek approval to expand methodology to include the Rangitāiki River. Second meeting included NIWA scientists, at the conclusion there was universal support for the programme and to expand into the Rangitāiki River in 2024/25.
Mere George, Earl Rewi	Te Rūnanga o Ngāti Whare	Email: 26/09/2023 Meeting: 13/10/2023	Email: 21/05/2024 Meeting: Politely declined invitation for meeting	Initial meeting and email were to discuss programme and seek approval to try Metsulfuron in the scheme drain system. Second was to report on control programme, water testing results and to seek approval to expand methodology to include the Rangitāiki River. Second meeting invitation was politely declined, they were happy to support the decision of the iwi with mandate for the lower Rangitaiki River.
Maramena Vercoe	Te Rūnanga o Ngāti Manawa	Email: 26/09/2023 Meeting: 13/10/2023	Email: 21/05/2024 Meeting: TBC	Initial meeting and email were to discuss programme and seek approval to try Metsulfuron in the scheme drain system. Second was

				to report on control programme, water testing results and to seek approval to expand methodology to include the Rangitāiki River. At the time of writing this report I am still trying to organise a meeting with Ngāti Manawa, they have been provided with a summary of the results, including water testing results and have not expressed concern at this stage.

EASTERN BAY OF PLENTY – ALLIGATOR WEED NOTIFICATION			
Name	**Organisation**	**1st Consultation**	**Comments**
Jessyca Bernard	Department of Conservation	27/10/2023	Email sent with details of control operations
Office email address	Eastern Region Fish and Game	30/10/2023	Email sent with details of control operations
Hamish	New Zealand Eel Company	30/10/2023	Email sent with details of control operations

5 Incidents

No operational incidents were recorded during the 2023/24 spray season.

6 Overall assessment and proposed follow up spraying for next year

Overall, there is evidence of pervasive metsulfuron residues within scheme drain waters within the lower Tarawera and Rangitāiki catchments. The presence of metsulfuron in samples collected prior to Alligator Weed control operations points to another input outside of BOPRC Biosecurity's control and is not solely driven by these works. Regardless, the use of metsulfuron within these systems has ceased, and ongoing use is being reviewed. Metsulfuron is a commonly used chemical across a number of commercial sectors in the catchments including forestry and farming.

Bay of Plenty Regional Council will provide an updated Monitoring Plan to the EPA before the end of September 2024 detailing all sites marked for control and incorporating mitigation methods outlined in the permission.

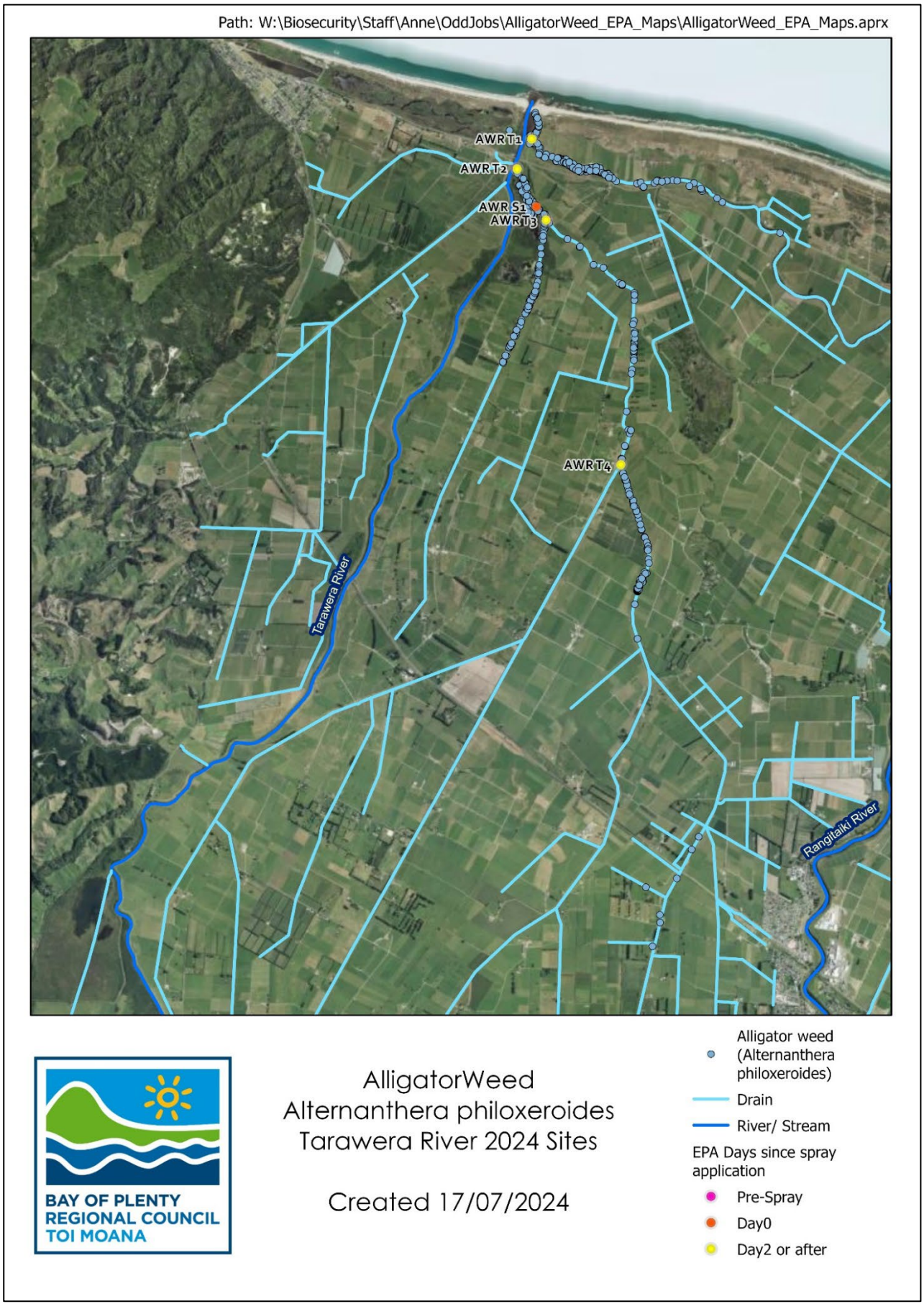
7 Potential new incursions requiring the use of herbicides outside of the operations outlined in this plan

No additional operations were undertaken using this permission in 2023/24.

8 Spray operations for 2024/25 financial year

Bay of Plenty Regional Council will submit a monitoring plan to the EPA outlining our intent to use Metsulfuron in 2024/25. The limits are currently being assessed and we await the outcome of those results. Recent research from NIWA, presented to iwi, show the use of Metsulfuron is by far the most effective control methodology for aquatic Alligator weed. Iwi are unanimously supportive of this approach and we believe its continued use will lead to more effective control and less reliance and quanitities of herbicide needed to manage the plant in time. While there are elevated levels of metsulfuron in the scheme drains already, we believe our inputs are minimal and have not influenced the water testing results.

Appendix 1 – Tarawera map



Appendix 2 – Rangitāiki map

Appendix 3 – Laboratory reports

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Private Bag 3205
Hamilton 3240 New Zealand

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+64 7 858 2000
mail@hill-labs.co.nz
www.hill-labs.co.nz

Certificate of Analysis

Client:	Bay of Plenty Regional Council	**Lab No:**	3433042	SPv1
Contact:	Josh Scarrow	**Date Received:**	19-Dec-2023	
	C/- Bay of Plenty Regional Council	**Date Reported:**	09-Jan-2024	
	1 Elizabeth Street	**Quote No:**	126326	
	Tauranga 3110	**Order No:**	100000208	
		Client Reference:	EPA-Alligator weed	
		Submitted By:	Josh Scarrow	

Sample Type: Soil

Sample Name:	231211.AWT1 11-Dec-2023	231211.AWT2 11-Dec-2023	231211.AWT3 11-Dec-2023	231211.AWR2 11-Dec-2023	231211.AWR3 11-Dec-2023
Lab Number:	3433042.18	3433042.19	3433042.20	3433042.21	3433042.22
Metsulfuron‡	See attached report	See attached report	See attached report	See attached report	See attached report

Sample Name:	231215.AWT1 15-Dec-2023	231016.AWGC1 16-Dec-2023
Lab Number:	3433042.23	3433042.24
Metsulfuron‡	See attached report	See attached report

Sample Type: Aqueous

Sample Name:	231211.AWT1 11-Dec-2023	231211.AWT2 11-Dec-2023	231211.AWT3 11-Dec-2023	231211.AWT4 11-Dec-2023	231211.AWR1 11-Dec-2023
Lab Number:	3433042.1	3433042.2	3433042.3	3433042.4	3433042.5
Metsulfuron‡	See attached report	See attached report	See attached report	See attached report	See attached report

Sample Name:	231211.AWR2 11-Dec-2023	231211.AWR3 11-Dec-2023	231211.AWR.S1 11-Dec-2023	231211.AWR.S2 11-Dec-2023	231213.AWR1 13-Dec-2023
Lab Number:	3433042.6	3433042.7	3433042.8	3433042.9	3433042.10
Metsulfuron‡	See attached report	See attached report	See attached report	See attached report	See attached report

Sample Name:	231213.AWR2 13-Dec-2023	231215.AWT1 15-Dec-2023	231215.AWT2 15-Dec-2023	231215.AWT3 15-Dec-2023	231215.AWT4 15-Dec-2023
Lab Number:	3433042.11	3433042.12	3433042.13	3433042.14	3433042.15
Metsulfuron‡	See attached report	See attached report	See attached report	See attached report	See attached report

Sample Name:	231215.AWR3 15-Dec-2023	231016.AWGC1 16-Dec-2023	231213.AWT.S1 13-Dec-2023
Lab Number:	3433042.16	3433042.17	3433042.25
Metsulfuron‡	See attached report	See attached report	See attached report

Analyst's Comments

‡ Analysis subcontracted to an external provider. Refer to the Summary of Methods section for more details.

Appendix No.1 - Envirolab Report

Summary of Methods

The following table(s) gives a brief description of the methods used to conduct the analyses for this job. The detection limits given below are those attainable in a relatively simple matrix. Detection limits may be higher for individual samples should insufficient sample be available, or if the matrix requires that dilutions be performed during analysis. A detection limit range indicates the lowest and highest detection limits in the associated suite of analytes. A full listing of compounds and detection limits are available from the laboratory upon request. Unless otherwise indicated, analyses were performed at Hill Labs, 28 Duke Street, Frankton, Hamilton 3204.

Sample Type: Aqueous

Test	Method Description	Default Detection Limit	Sample No
Metsulfuron	Subcontracted to Envirolab, Perth, Australia. See attached report.	-	1-25

These samples were collected by yourselves (or your agent) and analysed as received at the laboratory.

Testing was completed on 09-Jan-2024. For completion dates of individual analyses please contact the laboratory.

Samples are held at the laboratory after reporting for a length of time based on the stability of the samples and analytes being tested (considering any preservation used), and the storage space available. Once the storage period is completed, the samples are discarded unless otherwise agreed with the customer. Extended storage times may incur additional charges.

This certificate of analysis must not be reproduced, except in full, without the written consent of the signatory.

Martin Cowell - BSc
Client Services Manager - Environmental

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ph +61 8 9317 2505
lab@mpl.com.au
www.mpl.com.au

Certificate of Analysis PEL1643

Client Details

Client	Hill Laboratories Ltd
Contact	Env Job
Address	28 Duke Street, HAMILTON, NZ, 3240

Sample Details

Your Reference	EnvSubEnvirolab 60
Number of Samples	7 Soil, 18 Surface Water
Date Samples Received	27/12/2023
Date Instructions Received	27/12/2023

Analysis Details

Please refer to the following pages for results, methodology summary and quality control data.
Samples were analysed as received from the client. Results relate specifically to the samples as received.
Results are reported on a dry weight basis for solids and on an as received basis for other matrices.

Report Details

Date Results Requested by	08/01/2024
Date of Issue	08/01/2024

NATA Accreditation Number 2901. This document shall not be reproduced except in full.
Accredited for compliance with ISO/IEC 17025. Tests not covered by NATA are denoted with *.

Authorisation Details

Results Approved By	Travis Carey, Organics Supervisor
Laboratory Manager	Michael Kubiak

Certificate of Analysis PEL1643

Samples in this Report

Envirolab ID	Sample ID	Matrix	Date Sampled	Date Received
PEL1643-01	3433042.1	Surface Water	27/12/2023	27/12/2023
PEL1643-02	3433042.2	Surface Water	27/12/2023	27/12/2023
PEL1643-03	3433042.3	Surface Water	27/12/2023	27/12/2023
PEL1643-04	3433042.4	Surface Water	27/12/2023	27/12/2023
PEL1643-05	3433042.5	Surface Water	27/12/2023	27/12/2023
PEL1643-06	3433042.6	Surface Water	27/12/2023	27/12/2023
PEL1643-07	3433042.7	Surface Water	27/12/2023	27/12/2023
PEL1643-08	3433042.8	Surface Water	27/12/2023	27/12/2023
PEL1643-09	3433042.9	Surface Water	27/12/2023	27/12/2023
PEL1643-10	3433042.10	Surface Water	27/12/2023	27/12/2023
PEL1643-11	3433042.11	Surface Water	27/12/2023	27/12/2023
PEL1643-12	3433042.12	Surface Water	27/12/2023	27/12/2023
PEL1643-13	3433042.13	Surface Water	27/12/2023	27/12/2023
PEL1643-14	3433042.14	Surface Water	27/12/2023	27/12/2023
PEL1643-15	3433042.15	Surface Water	27/12/2023	27/12/2023
PEL1643-16	3433042.16	Surface Water	27/12/2023	27/12/2023
PEL1643-17	3433042.17	Surface Water	27/12/2023	27/12/2023
PEL1643-18	3433042.18	Soil	27/12/2023	27/12/2023
PEL1643-19	3433042.19	Soil	27/12/2023	27/12/2023
PEL1643-20	3433042.20	Soil	27/12/2023	27/12/2023
PEL1643-21	3433042.21	Soil	27/12/2023	27/12/2023
PEL1643-22	3433042.22	Soil	27/12/2023	27/12/2023
PEL1643-23	3433042.23	Soil	27/12/2023	27/12/2023
PEL1643-24	3433042.24	Soil	27/12/2023	27/12/2023
PEL1643-25	3433042.25	Surface Water	27/12/2023	27/12/2023

Certificate of Analysis PEL1643

Sulfonyl Ureas (Surface Water)

Envirolab ID	Units	PQL	PEL1643-01	PEL1643-02	PEL1643-03	PEL1643-04	PEL1643-05
Your Reference			3433042.1	3433042.2	3433042.3	3433042.4	3433042.5
Date Sampled			27/12/2023	27/12/2023	27/12/2023	27/12/2023	27/12/2023
Metsulfuron Methyl	ng/L	10	40	14	50	24	63

Envirolab ID	Units	PQL	PEL1643-06	PEL1643-07	PEL1643-08	PEL1643-09	PEL1643-10
Your Reference			3433042.6	3433042.7	3433042.8	3433042.9	3433042.10
Date Sampled			27/12/2023	27/12/2023	27/12/2023	27/12/2023	27/12/2023
Metsulfuron Methyl	ng/L	10	54	390	150	92	30

Envirolab ID	Units	PQL	PEL1643-11	PEL1643-12	PEL1643-13	PEL1643-14	PEL1643-15
Your Reference			3433042.11	3433042.12	3433042.13	3433042.14	3433042.15
Date Sampled			27/12/2023	27/12/2023	27/12/2023	27/12/2023	27/12/2023
Metsulfuron Methyl	ng/L	10	<10	19	<10	16	87

Envirolab ID	Units	PQL	PEL1643-16	PEL1643-17	PEL1643-25
Your Reference			3433042.16	3433042.17	3433042.25
Date Sampled			27/12/2023	27/12/2023	27/12/2023
Metsulfuron Methyl	ng/L	10	110	29	240

Certificate of Analysis PEL1643

LC-MS-MS SVOC - Sulfonyls (Soil)

Envirolab ID	Units	PQL	PEL1643-18	PEL1643-19	PEL1643-20	PEL1643-21	PEL1643-22
Your Reference			3433042.18	3433042.19	3433042.20	3433042.21	3433042.22
Date Sampled			27/12/2023	27/12/2023	27/12/2023	27/12/2023	27/12/2023
Metsulfuron Methyl	µg/kg	20	<20	<20	<20	<20	<20
Surrogate Terbuthylazine-d5	%		*95.2*	*70.5*	*67.3*	*62.2*	*64.6*

Envirolab ID	Units	PQL	PEL1643-23	PEL1643-24
Your Reference			3433042.23	3433042.24
Date Sampled			27/12/2023	27/12/2023
Metsulfuron Methyl	µg/kg	20	<20	<20
Surrogate Terbuthylazine-d5	%		*72.1*	*71.8*

Certificate of Analysis PEL1643

Inorganics - Moisture (Soil)

Envirolab ID	Units	PQL	PEL1643-18	PEL1643-19	PEL1643-20	PEL1643-21	PEL1643-22
Your Reference			3433042.18	3433042.19	3433042.20	3433042.21	3433042.22
Date Sampled			27/12/2023	27/12/2023	27/12/2023	27/12/2023	27/12/2023
Moisture	%	0.10	28	47	68	36	65

Envirolab ID	Units	PQL	PEL1643-23	PEL1643-24
Your Reference			3433042.23	3433042.24
Date Sampled			27/12/2023	27/12/2023
Moisture	%	0.10	30	47

Certificate of Analysis PEL1643

Method Summary

Method ID	Methodology Summary
INORG-008	Moisture content determined by heating at 105+/-5 °C for a minimum of 12 hours.
ORG-029_SU	Determination of semi-volatile organic compounds (SVOCs) by LC-MS-MS. Water samples are extracted by LLE and soils using DCM/Acetone/Methanol.
ORG-029_SVOC_VOC_LCMSMS	Water samples are run directly, soils are extracted using an aqueous buffer and plant material using solvent extraction/cleanup. Further cleanup maybe necessary. Analysis using LC-MSMS.

Certificate of Analysis PEL1643

Result Definitions

Identifier	Description
NR	Not reported
NEPM	National Environment Protection Measure
NS	Not specified
LCS	Laboratory Control Sample
RPD	Relative Percent Difference
>	Greater than
<	Less than
PQL	Practical Quantitation Limit
INS	Insufficient sample for this test
NA	Test not required
NT	Not tested
DOL	Samples rejected due to particulate overload (air filters only)
RFD	Samples rejected due to filter damage (air filters only)
RUD	Samples rejected due to uneven deposition (air filters only)
##	Indicates a laboratory acceptance criteria outlier, for further details, see Result Comments and/or QC Comments

Quality Control Definitions

Blank

This is the component of the analytical signal which is not derived from the sample but from reagents, glassware etc, and is determined by processing solvents and reagents in exactly the same manner as for samples.

Surrogate Spike

Surrogates are known additions to each sample, blank, matrix spike and LCS in a batch, of compounds which are similar to the analyte of interest, however are not expected to be found in real samples.

LCS (Laboratory Control Sample)

This comprises either a standard reference material or a control matrix (such as a blank sand or water) fortified with analytes representative of the analyte class. It is simply a check sample.

Matrix Spike

A portion of the sample is spiked with a known concentration of target analyte. The purpose of the matrix spike is to monitor the performance of the analytical method used and to determine whether matrix interferences exist.

Duplicate

This is the complete duplicate analysis of a sample from the process batch. The sample selected should be one where the analyte concentration is easily measurable.

Certificate of Analysis PEL1643

Laboratory Acceptance Criteria

Duplicate sample and matrix spike recoveries may not be reported on smaller jobs, however, were analysed at a frequency to meet or exceed NEPM requirements. All samples are tested in batches of 20. The duplicate sample RPD and matrix spike recoveries for the batch were within the laboratory acceptance criteria. Filters, swabs, wipes, tubes and badges will not have duplicate data as the whole sample is generally extracted during sample extraction. Spikes for Physical and Aggregate Tests are not applicable. For VOCs in water samples, three vials are required for duplicate or spike analysis.

General Acceptance Criteria (GAC) - Analyte specific criteria applies for some analytes and is reflected in QC recovery tables.

Duplicates: >10xPQL - RPD acceptance criteria will vary depending on the analytes and the analytical techniques but is typically in the range 20%-50% - see ELN-P05 QAQC tables for details (available on request); <10xPQL - RPD are higher as the results approach PQL and the estimated measurement uncertainty will statistically increase. Matrix Spikes, LCS and Surrogate recoveries: Generally 70-130% for inorganics/metals; 60-140% for organics (+/-50% surrogates) and 10-140% for labile SVOCs (including labile surrogates), ultra trace organics and speciated phenols is acceptable.

In circumstances where no duplicate and/or sample spike has been reported at 1 in 10 and/or 1 in 20 samples respectively, the sample volume submitted was typically insufficient in order to satisfy laboratory QA/QC protocols.

Miscellaneous Information

When samples are received where certain analytes are outside of recommended technical holding times (THTs), the analysis has proceeded. Where analytes are on the verge of breaching THTs, every effort will be made to analyse within the THT or as soon as practicable.

Where sampling dates are not provided, Envirolab are not in a position to comment on the validity of the analysis where recommended technical holding times may have been breached. We have taken the sampling date as being the date received at the laboratory.

Two significant figures are reported for the majority of tests and with a high degree of confidence, for results <10*PQL, the second significant figure may be in doubt i.e. has a relatively high degree of uncertainty and is provided for information only.

Measurement Uncertainty estimates are available for most tests upon request.

Analysis of aqueous samples typically involves the extraction/digestion and/or analysis of the liquid phase only (i.e. NOT any settled sediment phase but inclusive of suspended particles if present), unless stipulated on the Envirolab COC or by correspondence. Notable exceptions include certain Physical Tests (pH/EC/BOD/COD/Apparent Colour etc.), Solids testing, Total Recoverable metals and PFAS where sediment/solids are included by default.

Urine Analysis - The BEI values listed are taken from the 2022 edition of *TLVs and BEIs Threshold Limits by ACGIH*.

Air volume measurements are not covered by Envirolab's NATA accreditation.

Data Quality Assessment Summary PEL1643

Client Details

Client	Hill Laboratories Ltd
Your Reference	EnvSubEnvirolab 60
Date Issued	08/01/2024

Recommended Holding Time Compliance

No recommended holding time exceedances

Quality Control and QC Frequency

QC Type	Compliant	Details
Blank	Yes	No Outliers
LCS	Yes	No Outliers
Duplicates	Yes	No Outliers
Matrix Spike	Yes	No Outliers
Surrogates / Extracted Internal Standards	Yes	No Outliers
QC Frequency	Yes	No Outliers

Surrogates/Extracted Internal Standards, Duplicates and/or Matrix Spikes are not always relevant/applicable to certain analyses and matrices. Therefore, said QC measures are deemed compliant in these situations by default. See Laboratory Acceptance Criteria for more information

Data Quality Assessment Summary PEL1643

Recommended Holding Time Compliance

Analysis	Sample Number(s)	Date Sampled	Date Extracted	Date Analysed	Compliant
Sulfonyl Ureas LL | Water	1-17, 25	27/12/2023	03/01/2024	04/01/2024	Yes
Sulfonyl Ureas LL | Soil	18-24	27/12/2023	03/01/2024	04/01/2024	Yes
Moisture | Soil	18-24	27/12/2023	03/01/2024	04/01/2024	Yes

Quality Control PEL1643

ORG-029_SU|Sulfonyl Ureas (Water) | Batch BFA0142

Analyte	Units	PQL	Blank	DUP1 PEL1643-01 Samp | QC | RPD %	DUP2 PEL1643-10 Samp | QC | RPD %	LCS %	Spike % PEL1643-02
Metsulfuron Methyl	ng/L	10	<10	40.1 | 36.5 | 9.40	29.7 | 27.8 | 6.67	96.0	92.2

ORG-029_SVOC_VOC_LCMSMS|LC-MS-MS SVOC - Sulfonyls (Soil) | Batch BFA0141

Analyte	Units	PQL	Blank	DUP1 PEL1643-18 Samp | QC | RPD %	LCS %	Spike % PEL1643-19
Metsulfuron Methyl	µg/kg	20	<20	<20 | <20 | [NA]	96.2	93.9

INORG-008|Inorganics - Moisture (Soil) | Batch BFA0146

Analyte	Units	PQL	Blank	DUP1 PEL1643-18 Samp | QC | RPD %	LCS %
Moisture	%	0.1		28.0 | 30.7 | 9.02	[NA]

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Hamilton 3240 New Zealand

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mail@hill-labs.co.nz
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Certificate of Analysis

Client:	Bay of Plenty Regional Council	**Lab No:**	3451378	SPv1
Contact:	Josh Scarrow	**Date Received:**	25-Jan-2024	
	C/- Bay of Plenty Regional Council	**Date Reported:**	07-Feb-2024	
	1 Elizabeth Street	**Quote No:**		
	Tauranga 3110	**Order No:**	Alligator Weed (E)	
		Client Reference:	Alligator Weed (E)	
		Submitted By:	Josh Scarrow	

Sample Type: Aqueous

Sample Name:	240124.AWR1 24-Jan-2024	240124.AWR2 24-Jan-2024	240124.AWR3 24-Jan-2024	240124.AWT1 24-Jan-2024	240124.AWT2 24-Jan-2024
Lab Number:	3451378.1	3451378.2	3451378.3	3451378.4	3451378.5
Metsulfuron*‡	See attached report	See attached report	See attached report	See attached report	See attached report
Carbonaceous Biochemical Oxygen Demand ($cBOD_5$) g O_2/m^3	< 2	< 2	< 2	< 2	< 2
Chemical Oxygen Demand (COD) g O_2/m^3	16	22	33	< 60 #1	12

Sample Name:	240124.AWT3 24-Jan-2024	240124.AWT4 24-Jan-2024
Lab Number:	3451378.6	3451378.7
Metsulfuron*‡	See attached report	See attached report
Carbonaceous Biochemical Oxygen Demand ($cBOD_5$) g O_2/m^3	< 2	< 2
Chemical Oxygen Demand (COD) g O_2/m^3	24	26

Analyst's Comments

‡ Analysis subcontracted to an external provider. Refer to the Summary of Methods section for more details.

#1 Severe matrix interferences required that a dilution be performed prior to analysis, resulting in a detection limit higher than that normally achieved for the Total COD analysis.

Appendix No.1 - Envirolab Report

Summary of Methods

The following table(s) gives a brief description of the methods used to conduct the analyses for this job. The detection limits given below are those attainable in a relatively simple matrix. Detection limits may be higher for individual samples should insufficient sample be available, or if the matrix requires that dilutions be performed during analysis. A detection limit range indicates the lowest and highest detection limits in the associated suite of analytes. A full listing of compounds and detection limits are available from the laboratory upon request. Unless otherwise indicated, analyses were performed at Hill Labs, 28 Duke Street, Frankton, Hamilton 3204.

Sample Type: Aqueous

Test	Method Description	Default Detection Limit	Sample No
Metsulfuron*	Subcontracted to Envirolab, Perth, Australia. See attached report.	-	1-7
Carbonaceous Biochemical Oxygen Demand ($cBOD_5$)	Incubation 5 days, DO meter, nitrification inhibitor added, seeded. APHA 5210 B (modified) : Online Edition.	2 g O_2/m^3	1-7
Chemical Oxygen Demand (COD), trace level	Dichromate/sulphuric acid digestion in Hach tubes, colorimetry. Trace Level method. APHA 5220 D : Online Edition.	6 g O_2/m^3	1-7

These samples were collected by yourselves (or your agent) and analysed as received at the laboratory.

Testing was completed between 30-Jan-2024 and 05-Feb-2024. For completion dates of individual analyses please contact the laboratory.

Samples are held at the laboratory after reporting for a length of time based on the stability of the samples and analytes being tested (considering any preservation used), and the storage space available. Once the storage period is completed, the samples are discarded unless otherwise agreed with the customer. Extended storage times may incur additional charges.

This certificate of analysis must not be reproduced, except in full, without the written consent of the signatory.

Kim Harrison MSc
Client Services Manager - Environmental

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Certificate of Analysis PFA1367

Client Details

Client	Hill Laboratories Ltd
Contact	Env Job
Address	28 Duke Street, HAMILTON, NZ, 3240

Sample Details

Your Reference	EnvSubEnvirolab 64
Number of Samples	7 Surface Water
Date Samples Received	29/01/2024
Date Instructions Received	29/01/2024

Analysis Details

Please refer to the following pages for results, methodology summary and quality control data.
Samples were analysed as received from the client. Results relate specifically to the samples as received.
Results are reported on a dry weight basis for solids and on an as received basis for other matrices.

Report Details

Date Results Requested by	05/02/2024
Date of Issue	02/02/2024

Accredited for compliance with ISO/IEC 17025. Tests not covered by NATA are denoted with *.

Authorisation Details

Results Approved By	Travis Carey, Organics Supervisor
Laboratory Manager	Michael Kubiak

Certificate of Analysis PFA1367

Samples in this Report

Envirolab ID	Sample ID	Matrix	Date Sampled	Date Received
PFA1367-01	3451378.1	Surface Water	24/01/2024	29/01/2024
PFA1367-02	3451378.2	Surface Water	24/01/2024	29/01/2024
PFA1367-03	3451378.3	Surface Water	24/01/2024	29/01/2024
PFA1367-04	3451378.4	Surface Water	24/01/2024	29/01/2024
PFA1367-05	3451378.5	Surface Water	24/01/2024	29/01/2024
PFA1367-06	3451378.6	Surface Water	24/01/2024	29/01/2024
PFA1367-07	3451378.7	Surface Water	24/01/2024	29/01/2024

Certificate of Analysis PFA1367

Sulfonyl Ureas (Surface Water)

Envirolab ID	Units	PQL	PFA1367-01	PFA1367-02	PFA1367-03	PFA1367-04	PFA1367-05
Your Reference			3451378.1	3451378.2	3451378.3	3451378.4	3451378.5
Date Sampled			24/01/2024	24/01/2024	24/01/2024	24/01/2024	24/01/2024
Metsulfuron Methyl	ng/L	10	<10	<10	10	<10	28
Surrogate Terbuthylazine-d5	%		*111*	*104*	*105*	*65.8*	*90.8*

Envirolab ID	Units	PQL	PFA1367-06	PFA1367-07
Your Reference			3451378.6	3451378.7
Date Sampled			24/01/2024	24/01/2024
Metsulfuron Methyl	ng/L	10	29	23
Surrogate Terbuthylazine-d5	%		*101*	*73.3*

Certificate of Analysis PFA1367

Method Summary

Method ID	Methodology Summary
ORG-029_SU	Determination of semi-volatile organic compounds (SVOCs) by LC-MS-MS. Water samples are extracted by LLE and soils using DCM/Acetone/Methanol.

Certificate of Analysis PFA1367

Result Definitions

Identifier	Description
NR	Not reported
NEPM	National Environment Protection Measure
NS	Not specified
LCS	Laboratory Control Sample
RPD	Relative Percent Difference
>	Greater than
<	Less than
PQL	Practical Quantitation Limit
INS	Insufficient sample for this test
NA	Test not required
NT	Not tested
DOL	Samples rejected due to particulate overload (air filters only)
RFD	Samples rejected due to filter damage (air filters only)
RUD	Samples rejected due to uneven deposition (air filters only)
##	Indicates a laboratory acceptance criteria outlier, for further details, see Result Comments and/or QC Comments

Quality Control Definitions

Blank

This is the component of the analytical signal which is not derived from the sample but from reagents, glassware etc, and is determined by processing solvents and reagents in exactly the same manner as for samples.

Surrogate Spike

Surrogates are known additions to each sample, blank, matrix spike and LCS in a batch, of compounds which are similar to the analyte of interest, however are not expected to be found in real samples.

LCS (Laboratory Control Sample)

This comprises either a standard reference material or a control matrix (such as a blank sand or water) fortified with analytes representative of the analyte class. It is simply a check sample.

Matrix Spike

A portion of the sample is spiked with a known concentration of target analyte. The purpose of the matrix spike is to monitor the performance of the analytical method used and to determine whether matrix interferences exist.

Duplicate

This is the complete duplicate analysis of a sample from the process batch. The sample selected should be one where the analyte concentration is easily measurable.

Certificate of Analysis PFA1367

Laboratory Acceptance Criteria

Duplicate sample and matrix spike recoveries may not be reported on smaller jobs, however, were analysed at a frequency to meet or exceed NEPM requirements. All samples are tested in batches of 20. The duplicate sample RPD and matrix spike recoveries for the batch were within the laboratory acceptance criteria. Filters, swabs, wipes, tubes and badges will not have duplicate data as the whole sample is generally extracted during sample extraction. Spikes for Physical and Aggregate Tests are not applicable. For VOCs in water samples, three vials are required for duplicate or spike analysis.

General Acceptance Criteria (GAC) - Analyte specific criteria applies for some analytes and is reflected in QC recovery tables.

Duplicates: >10xPQL - RPD acceptance criteria will vary depending on the analytes and the analytical techniques but is typically in the range 20%-50% - see ELN-P05 QAQC tables for details (available on request); <10xPQL - RPD are higher as the results approach PQL and the estimated measurement uncertainty will statistically increase. Matrix Spikes, LCS and Surrogate recoveries: Generally 70-130% for inorganics/metals; 60-140% for organics (+/-50% surrogates) and 10-140% for labile SVOCs (including labile surrogates), ultra trace organics and speciated phenols is acceptable.

In circumstances where no duplicate and/or sample spike has been reported at 1 in 10 and/or 1 in 20 samples respectively, the sample volume submitted was typically insufficient in order to satisfy laboratory QA/QC protocols.

Miscellaneous Information

When samples are received where certain analytes are outside of recommended technical holding times (THTs), the analysis has proceeded. Where analytes are on the verge of breaching THTs, every effort will be made to analyse within the THT or as soon as practicable.

Where sampling dates are not provided, Envirolab are not in a position to comment on the validity of the analysis where recommended technical holding times may have been breached. We have taken the sampling date as being the date received at the laboratory.

Two significant figures are reported for the majority of tests and with a high degree of confidence, for results <10*PQL, the second significant figure may be in doubt i.e. has a relatively high degree of uncertainty and is provided for information only.

Measurement Uncertainty estimates are available for most tests upon request.

Analysis of aqueous samples typically involves the extraction/digestion and/or analysis of the liquid phase only (i.e. NOT any settled sediment phase but inclusive of suspended particles if present), unless stipulated on the Envirolab COC or by correspondence. Notable exceptions include certain Physical Tests (pH/EC/BOD/COD/Apparent Colour etc.), Solids testing, Total Recoverable metals and PFAS where sediment/solids are included by default.

Urine Analysis - The BEI values listed are taken from the 2022 edition of *TLVs and BEIs Threshold Limits by ACGIH*.

Air volume measurements are not covered by Envirolab's NATA accreditation.

Data Quality Assessment Summary PFA1367

Client Details

Client	Hill Laboratories Ltd
Your Reference	EnvSubEnvirolab 64
Date Issued	02/02/2024

Recommended Holding Time Compliance

No recommended holding time exceedances

Quality Control and QC Frequency

QC Type	Compliant	Details
Blank	Yes	No Outliers
LCS	Yes	No Outliers
Duplicates	Yes	No Outliers
Matrix Spike	Yes	No Outliers
Surrogates / Extracted Internal Standards	Yes	No Outliers
QC Frequency	Yes	No Outliers

Surrogates/Extracted Internal Standards, Duplicates and/or Matrix Spikes are not always relevant/applicable to certain analyses and matrices. Therefore, said QC measures are deemed compliant in these situations by default. See Laboratory Acceptance Criteria for more information

Data Quality Assessment Summary PFA1367

Recommended Holding Time Compliance

Analysis	Sample Number(s)	Date Sampled	Date Extracted	Date Analysed	Compliant
Sulfonyl Ureas LL | Water	1-3, 5-6	24/01/2024	30/01/2024	01/02/2024	Yes
	4, 7	24/01/2024	30/01/2024	02/02/2024	Yes

Quality Control PFA1367

ORG-029_SU|Sulfonyl Ureas (Water) | Batch BFA2647

Analyte	Units	PQL	Blank	DUP1 BFA2647-DUP1# Samp | QC | RPD %	DUP2 PFA1367-01 Samp | QC | RPD %	LCS %	Spike % BFA2647-MS1#
Metsulfuron Methyl	ng/L	10	<10	25.5 | 25.5 | 0.183	<10 | <10 | [NA]	106	85.6

The QC reported was not specifically part of this workorder but formed part of the QC process batch.

Appendix 4 – Summary of monitored field parameters

Sample ID	Latitude	Longitude	Sample Taken	Sample Purpose	Water Temperature (°C)	Dissolved Oxygen (mg/L)	pH	Electrical Conductivity (µS/cm)
231211.AWT1	-37.893393	176.788795	11/12/2023	Pre-Spray	19.3	5.1	7.53	5145
231211.AWT2	37.896454	176.78699	11/12/2023	Pre-Spray	19.6	3.35	7.61	283
231211.AWT3	37.901639	176.79115	11/12/2023	Pre-Spray	19.5	3.26	7.49	270.1
231211.AWR1	176.87461	176.87461	11/12/2023	Pre-Spray	17.9	8.05	7.3	624
231211.AWR2	-37.93262	176.86962	11/12/2023	Pre-Spray	19.4	1.01	7.28	2220
231211.AWR3	37.945445	176.879254	11/12/2023	Pre-Spray	22.3	0.97	7.67	349
231211.AWR.S1	-37.94465152	176.8687081	11/12/2023	During Application	22	1.75	7.2	1154
231211.AWR.S2	-37.96888188	176.8435998	11/12/2023	During Application	20.8	0.19	7.1	385.5
231213.AWT.S1	-37.9003179	176.7897337	13/12/2023	During Application	17.2	8.22	7.12	286
231213.AWR1	176.87461	176.87461	13/12/2023	Post-Spray	17	9.41	6.68	2385
231213.AWR2	-37.93262	176.86962	13/12/2023	Post-Spray	17.2	9.3	6.8	403
231215.AWT1	-37.893393	176.788795	15/12/2023	Post-Spray	18.5	6.84	7.51	3009
231215.AWT2	37.896454	176.78699	15/12/2023	Post-Spray	17.7	7.78	7.47	206.5
231215.AWT4	-37.92645887	176.802038	15/12/2023	Post-Spray	20.8	4.5	7.33	195.9
231215.AWT3	37.901639	176.79115	15/12/2023	Post-Spray	18.9	5.23	7.53	210.9
231215.AWR3	-37.926413	176.802065	15/12/2023	Post-Spray	20.6	4.16	7.53	2508
240124.AWR3	-37.9455184	176.8792156	24/12/2023	Post-Spray	24.5	0.28	7.6	4709
240124.AWR2	-37.93262	176.86962	24/12/2023	Post-Spray	23.5	0.29	7.54	4822
240124.AWR1	176.87461	176.87461	24/12/2023	Post-Spray	21.7	0.3	7.34	3799
240124.AWT1	-37.893393	176.788795	24/12/2023	Post-Spray	25.1	0.27	8.15	17691
240124.AWT2	37.896454	176.78699	24/12/2023	Post-Spray	22.4	0	7.75	286.4
240124.AWT3	37.901639	176.79115	24/12/2023	Post-Spray	25.9	0.06	7.9	305.8
240124.AWT4	-37.926413	176.802065	24/12/2023	Post-Spray	25.7	0.16	7.52	266