



# Melbourne Water Blue-Green Algae Risk Management Plan

2016-17

## Abbreviations

BGA	Blue-Green Algae
DELWP	Department Environment Land Water and Planning
DHHS	Department of Health and Human Services
RC	Regional Coordinator
LWM	Local Water Manager
RCP	Regional Coordination Plan (regional bloom)
RMP	Risk Management Plan (local bloom)
EPA	Environmental Protection Authority
CMA	Catchment Management Authority
SDWA	Safe Drinking Act Water (VIC) 2003
NATA	National Association of Testing Authorities
EMMV	Emergency Management Manual Victoria
NHMRC	National Health and Medical Research Council
AIIMS	Australasian Inter-Service Incident Management System

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## Introduction

### 1.1. Objective

The objective of the Melbourne Water Blue Green Algae Risk Management Plan (RMP) is to outline a strategic approach to blue green algae (BGA) management within Melbourne Water's area of responsibility in order to protect public health and minimise social, environmental and economic impacts.

The Plan details the methodology of preparedness for and management of a local bloom including the roles and responsibilities of Melbourne Water as the Local Water Manager (LWM) and other agencies to ensure consistent and effective management action before, during and after a BGA bloom.

The Plan is updated annually as an internal Melbourne Water operational document to reflect;

- any changes to management arrangements at a location,
- changes in the distribution and severity of blooms across Melbourne Waters area,
- update internal and external stakeholder contact lists and
- any changes in State guidance.

### 1.2. Links to other documents and strategies

This plan adopts the framework of the Emergency Management Manual Victoria (EMMV) concepts of preparedness, response and recovery. This approach should be adopted by BGA response plans for consistency and because it provides a robust framework for response to an event.

Pursuant to the *Emergency Management Act 1986* and the EMMV, the management of incidents should be based on three key areas:

1. Prevention and Preparedness
2. Response
3. Recovery

The Plan also allows for the structure of the Regional Response Group to be compatible with the Australasian Inter-service Incident Management System (AIIMS). The AIIMS has been adopted by all major emergency management agencies in Victoria.

This Plan fits into the broader Melbourne Blue Green Algae Regional Coordination Plan 2016-17, follows the guidance outlined by DELWP in the Annual BGA Circular 2016-17 and has adopted the broad structure of the "sample BGA Risk management plan" provided by DELWP.

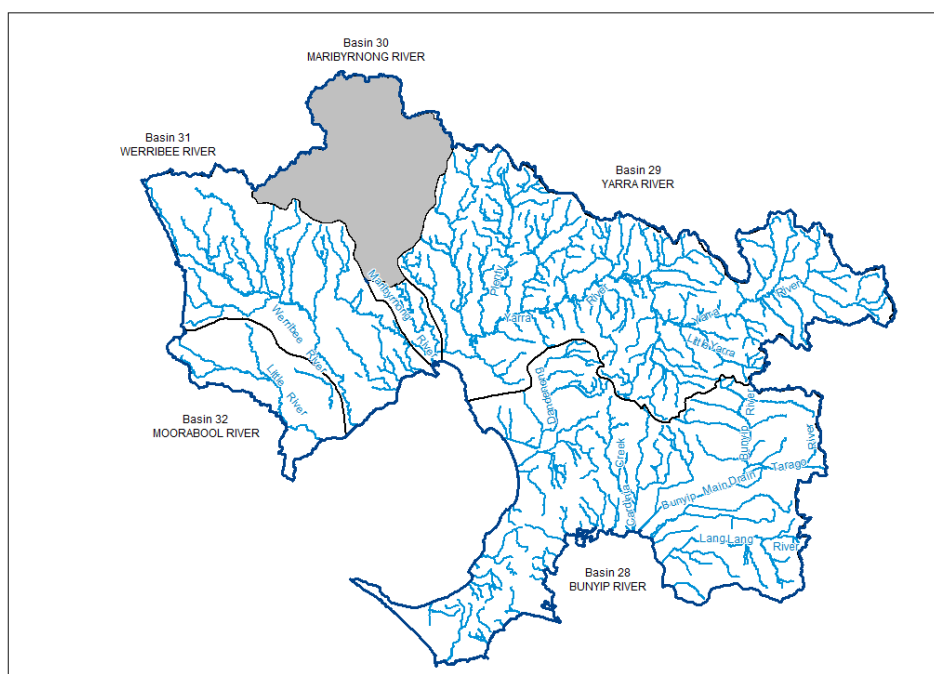
## 2. Definitions

- **Blue Green Algae Bloom:** An increase in algal numbers to such an extent as to: discolour the water, impart taste, odours, toxins and/or other compounds to the water, to adversely affect the other biotic components of the aquatic ecosystem (ie fish, birds, amphibians, etc) or generally render the water unsuitable for its intended use (ie drinking, irrigation, recreation, stock watering, ecosystem maintenance etc). (Queensland Harmful Algal Bloom Response Plan Version 1 Dec 2002)
- **Local Bloom** - Confined to a single water body.

- **Regional BGA Bloom** Affects multiple interconnected water bodies and algae is present at the public health alert levels as defined in the DELWP Blue-Green Algae Circular.
- **Drinking Water** - Water that is intended for human consumption or for purposes connected with human consumption, such as the preparation of food or the making of ice for consumption or for the preservation of unpackaged food, whether or not the water is used for other purposes (*Safe Drinking Water Act 2003*).
- **Recreational Water Bodies** - Any areas where a significant number of people use the water for recreation (NHMRC 2008). The recreational trigger levels defined in the DELWP Blue-Green Algae Circular are based on primary contact recreation.
- **Primary Contact Recreation:** Includes all water-related activities where immersion in water is the intended action or probable outcome of the activity (for example swimming, water skiing, surfing or whitewater canoeing)
- **Incident Management Response (IMR) Levels:** IMR levels have been established for once a blue-green algae bloom is detected. Actions arising from these various levels are a response to the evaluation of the risk of the bloom to users. Refer to **Appendices 1 and 2** – Incident Management Response Levels for Recreational Waters and Drinking Water.

### 3. Scope

The plan covers the waterways and waterbodies for which Melbourne Water is the waterway manager and the LWM (with respect to BGA).



**Figure 1: Basins in which MW has waterways that may experience BGA blooms. Note that MW is not the manager with respect to BGA response for all waterways and waterbodies within this region. Shaded area is where Western Water is RC and LWM for reservoirs and MW is LWM for waterway-based BGA blooms.**

## 4. Roles and Responsibilities

### 4.1. Summary of Roles and Responsibilities

Figure 2: Summary of BGA Coordination Roles and Responsibilities

	State-wide Coordinator DELWP	Regional Coordinator (RC)	Local Water Manager (LWM)	Support Agency
<b>P R E V E N T I O N</b>	Identify high risk water bodies/reaches with Regional coordinators	Liaise with CMAs and LWMs regarding water quality plans to reduce risk of algae blooms	Review BGA risk for water body /reach and determine and implement any practicable preventative measures	CMAs develop Regional River Health Strategies
<b>P P R E P A R D N E S</b>	Maintain database of History of BGA blooms to monitor trends Annual update of DELWP BGA Circular Ensure RCs have prepared and updated RCPs Assist RCs in allocation of LWMs if required	RCs liaise with CMAs and others to encourage river and catchment improvement works Prepare, update and distribute Regional Coordination Plans (RCPs) annually Convene a pre-season RC meeting and undertake exercise to test RCPs and RMPs	Prepare and update Risk Management Plans (RMPs) annually Monitor and sample for BGA in accordance with RMP Participate in pre-season RCs meeting and undertake exercise to test plans	Tourism Victoria to assist with preparation of tourism industry for BGA blooms DHHS provides input into to BGA Circular
<b>R E S P O N S E</b>	Monthly summary reports on significant blooms on (DELWP website) Liaise with DHHS where required Provide advice to Minister where required	Be informed of local Declare a bloom regional Manage regional blooms in accordance with RCP Convene Response Group Appoint Incident Controller Develop Communications Plan, Operations Plan Monitoring Plan Report to DELWP and DHHS	Report to RC DELWP and DHHS on local blooms (where required) Manage local blooms in accordance with RMP including monitoring, signage, media releases Notify the RC if a local bloom has or becomes a Regional bloom Participate in Regional Bloom Response Group as required	DHHS, EPA, DELWP, CMAs members of Regional Bloom Response Group DHHS provides advice on public health and seafood safety with respect to BGA DHHS is control agency for drinking water contamination in EMMV Tourism Victoria provides contact in the relevant Regional Tourism Response and Recovery Group
<b>R E C O V E R Y</b>	Ensure debrief report is prepared for blooms above public health alert level Annual BGA report for season	Prepare debrief report for regional blooms	Prepare debrief report for blooms above public health alert level	DHHS assessment of social and environment impacts in accordance with EMMV

## 4.2. Roles and responsibilities in the risk management plan

- Department of Environment, Land Water and Planning (DELWP) – is the Statewide Coordinator for blue-green algae management. DELWP collects data on blue-green algae to monitor trends throughout the State to assist in the management of blue-green algae.
- Department of Health and Human Services (DHHS) - provides advice about the potential public health effects of algae blooms and enforces the Victorian Safe Drinking Water Act 2003.
- Regional Coordinator (RC) - oversees the management of local blooms, nominate local water managers and coordinate preparations for and the management of regional blooms.
- Local Water Managers (LWMs) - Responsible for the management of blue-green algae blooms in a local water body. LWM's are responsible for developing a Risk Management Plan for water bodies under their responsibility and to monitor for signs of blue-green algae and respond in accordance with this Plan. The Plans shall be reviewed annually and shall link to the Regional Coordination Plan.

## 5. Background Information

The following tables were extracted from the DELWP Water Resources web portal <http://waterportal.dse.vic.gov.au/> and reflect

- The amount of information that has been entered on the portal (*not all of the historic bloom data is necessarily entered*)
- The blooms that have been logged within the area of the nominated basins where Melbourne Water is the LWM.
- The blooms triggered between 01 October 2000 and 01 July 2016.

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## 5.1. Basin 28 Bunyip

### Blooms Triggered Between 01 Oct 2000 and 30 June 2016

Water Body	Uses	Last Report Received	Total No. Reports	No. Reports Over Trigger Levels				Duration (Days)	
				D	R	O	Any	Total	Triggered
Greaves Rd Retarding Basin /Beaumont Waters/Berwick Springs Estate	Recreation, Storm Water	18 Mar 2014	10	0	7	4	7	64	49
Greaves Rd Retarding Basin /Beaumont Waters/Berwick Springs Estate	Recreation, Storm Water	02 May 2014	6	0	3	3	3	37	21
Greaves Rd Retarding Basin /Beaumont Waters/Berwick Springs Estate	Recreation, Storm Water	26 May 2015	18	0	9	7	9	118	61
Greaves Rd Retarding Basin	Recreation, Storm Water	03 Feb 2016	6	0	2	1	2	35	16
Greaves Rd Retarding Basin	Recreation, Storm Water	19 Apr 2016	9	0	5	5	5	71	42
Monbulk Retarding Basin	Recreation, Storm Water	24 Feb 2006	3	0	3	2	3	35	35
Monbulk Retarding Basin	Recreation, Storm Water	30 May 2007	2	0	1	0	1	30	30
Monbulk Retarding Basin	Recreation, Storm Water	20 Mar 2008	3	0	1	0	1	23	16
National Water Sports Centre - Patterson River	Recreation	27 Mar 2013	7	0	3	0	3	42	21
National Water Sports Centre - Patterson River	Recreation	18 Mar 2014	3	0	1	0	1	11	5
Quiet Lakes	Recreation/ Storm Water	09 Apr 2014	4	0	1	0	1	22	8
Quiet Lakes	Recreation/ Storm Water	28 May 2014	4	0	1	0	1	21	7
Quiet Lakes	Recreation/ Storm Water	19 Mar 2015	2	0	1	0	1	22	7
Quiet Lakes	Recreation/ Storm Water	22 Jun 2015	11	0	5	0	5	70	37
Troup's Creek Retarding Basin	Possible recycled water, Storm Water	27 Mar 2013	6	0	1	1	1	34	8



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## 5.2. Basin 29 Yarra

Blooms Triggered Between 01 Oct 2000 and 30 June 2016

Water Body	Uses	Last Report Received	Total No. Reports	No. Reports Over Trigger Levels				Duration (Days)	
				D	R	O	Any	Total	Triggered
Yan Yean Reservoir	(Offline) Drinking water supply	10 May 2006	2	1	0	0	1	30	30
		18 Apr 2007	2	2	0	0	2	64	64
		27 Feb 2009	2	1	0	0	1	280	280
		13 Jul 2010	10	4	0	0	4	473	188
		20 Apr 2012	7	2	0	0	2	15	8
		10 Jun 2014	8	2	0	0	2	29	14

## 5.3. Basin 30 Maribyrnong

Blooms Triggered Between 01 Oct 2000 and 30 June 2016

Water Body	Uses	Last Report Received	Total No. Reports	No. Reports Over Trigger Levels				Duration (Days)	
				D	R	O	Any	Total	Triggered
Jackson Creek	Irrigation, Recreation	05 May 2008	11	0	7	4	7	110	91
Maribyrnong River	Domestic & Stock, Irrigation, Recreation	24 Feb 2006	3	0	3	2	3	8	8
		23 Mar 2007	2	0	1	1	1	28	28
		18 Mar 2009	8	0	4	3	4	50	27

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## 5.4. Basin 31 Werribee

Blooms Triggered Between 01 Oct 2000 and 30 June 2016

Water Body	Uses	Last Report Received	Total No. Reports	No. Reports Over Trigger Levels				Duration (Days)	
				D	R	O	Any	Total	Triggered
Navan Lake	Recreation	07 Mar 2013	4	0	1	0	1	27	7
Werribee River	Domestic & Stock, Irrigation, Recreation	28 Jun 2007	8	0	5	0	5	154	130
		02 Sep 2008	9	0	2	2	2	237	64
		13 May 2015	6	0	2	2	2	93	31
		01 Feb 2016	5	0	1	1	1	20	2
		17 May 2016	13	0	8	7	8	78	46
Werribee Irrigation Weir (shared arrangements with Southern Rural Water)	Flood Mitigation, Irrigation, Recreation	21 Oct 2013	6	0	3	0	3	35	21
		08 Apr 2014	4	0	1	0	1	152	4

## 5.5. Basin 32 Moorabool

Blooms Triggered Between 01 Oct 2000 and 30 June 2016

Water Body	Uses	Last Report Received	Total No. Report	No. Reports Over Trigger Levels				Duration (Days)	
				D	R	O	Any	Total	Triggered
Western Treatment Plant	Recycled water, Sewage Treatment Ponds	15/04/2013	32	0	20	13	20	119	67
		4/01/2011	3	0	1	1	1	732	397
		27/01/2008	2	0	1	1	1	31	31
		27/03/2007	6	0	1	0	1	89	14

## 6. Monitoring

### 6.1. Preamble

Melbourne Water monitors for Blue Green Algae at a variety of locations using a risk hierarchy framework consistent with the DELWP BGA circular. The principles around our BGA monitoring are outlined in 6.2.

Surveillance activities are undertaken by both MW Waterways and Land Regional Delivery staff and contracted waterway samplers.

Sample collection, identification and enumeration is undertaken by trained and NATA accredited contract staff.

### 6.2. Site Location and Frequency of Monitoring

#### *Broad scale surveillance:*

Visual BGA surveillance monitoring occurs at all monitoring sites in the MW waterways water quality monitoring network and is undertaken at the time of sampling by trained contract laboratory samplers. Additionally staff in the MW Waterways and Land Regional Delivery teams are trained in BGA visual surveillance and report any symptoms of blooms they detect to the MW BGA coordinator. When a report is received, the contract laboratory samplers are sent out to collect a sample for identification and enumeration.

#### *Summer monitoring program at key sites:*

Summer-based monitoring (beginning Dec to end of March or longer if blooms initiate before or extend beyond this time) is conducted fortnightly by trained contract laboratory samplers and occurs at a) key sites with a recent history of bloom or b) sites that are frequently accessed for recreational purposes.

#### *Ad hoc monitoring based on notifications:*

Melbourne Water acts on any community reports of suspected algal blooms by deploying a sampling team to collect a sample for identification and enumeration.

#### *Bloom detection and action*

Once a bloom has been detected, sampling is increased to weekly consistent with the guidance provided in the DELWP BGA Circular until three weeks of clear results are received. This is an additional week beyond the recommended two weeks stipulated by the DELWP BGA circular. Three clear weeks is a more conservative approach but has proven to be more consistent in ensuring the bloom has died-off prior to signage being removed.

### 6.3. Algae Collection for Counts

Blue-green algae can be patchy in space and time and being buoyant tend to accumulate near or at the shoreline on the leeward side (down-wind) of lakes and rivers or downstream bends of rivers.

When BGA has been observed, professionally trained staff collect samples by a grab sampling method. This involves sampling at a depth of 20 cm below any surface scum and choosing an area of water to sample that is most representative of the broader condition of the location. OHS procedures are followed when sampling and handling BGA samples.

### 6.4. Treatment of Samples after Collection

Samples for identification and enumeration (counting) are generally preserved by adding Lugol's iodine preservative solution to the sample as soon as possible after collection. Sufficient Lugol's iodine solution should be added to render the sample a colour resembling weak tea (i.e. 0.5 mL Lugol's iodine per 100 mL of sample). A small sample of live cells should

also be taken and provided to the laboratory to assist with identification. All samples (including for toxin analysis) should be kept cool and dark.

## 7. Response

When a BGA trigger has been identified through the above outlined monitoring procedure, the following site specific response procedures are actioned.

1. Erect signage on site
2. Notify external and internal stakeholders:
  - External*
    - DHHS
    - DELWP
    - Council
    - Key Stakeholders eg. community groups, PV, scouts
    - EPA Recreational Waters (for posting alert to Cleaner Yarra and Bay website)
  - Internal*
    - Manager and Team Leader, Waterways and Land Regional Services Team
    - Local Customer Response Officer (CRO) (who arranges for signage to be erected)
    - Communications team (who prepares media release and post to MW website)
3. Prepare media release (If required)
4. Input bloom info into DELWP BGA portal
5. Continue weekly sampling until three weeks of clear results are received
6. Continue to update DELWP, DHHS, Council, stakeholders, EPA (Yarra and Bay website) and portal
7. Inform all internal and external stakeholders when bloom is clear
8. Remove on site signage.

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At some locations, Melbourne Water has arranged to share monitoring and response responsibilities with other LWMs (see below for particulars).

## National Water Sports Centre (NWSC) - Patterson River

The official LWM for the NWSC is Parks Victoria. However Melbourne Water are the broader waterway manager for the Dandenong Creek/Patterson River catchment and the majority of the waterway. MW monitor at the NWSC for *E.coli* during the summer months and so have agreed to conduct a visual surveillance for BGA at the same time. From this an arrangement has formed whereby Melbourne Water conduct the monitoring while Parks Victoria are responsible for the response actions such as signage, press releases and appropriate management such as closing the site or cancelling events. The key contact for this location is Reece Taranto (PV).

[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
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## Werribee Diversion Weir (Riverbend Park)

The official LWM for the Werribee (irrigation offtake) Weir is Southern Rural Water. However, in consultation with MW it was determined that SRW only monitor BGA within the irrigation offtake pipe, not the broader weir pool. Consequently SRW inform MW when they detect a bloom in the offtake and conduct a visual inspection of the site. MW responds by sending out a sampler to confirm the extent of the bloom. During the summer of 2015 MW began monitoring *E.coli* at the irrigation weir in acknowledgement of the recreational use of the area and so conduct BGA surveillance monitoring at the same time. If a bloom is detected, Melbourne Water are responsible for notifying the relevant stakeholders such as SRW, diverters, council etc. and erecting signage.

[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]

## 8. Reporting of Blue Green Algae

### 8.1. Notification by Local Water Manager to DELWP and Regional Coordinator

- In most of instances for the MW area the LWM and the RC are the same person so no formal notification to the RC is required.
- The LWM/RC should inform DELWP and DHHS via both email and by opening the bloom in the Water Industry Portal (<http://waterportal.dse.vic.gov.au/WIPHome.aspx>) A login for this website is required and can be obtained by contacting the DELWP Blue-Green Algae State Coordinator (refer to Appendix D for contact details). Once logged into the website the details of the bloom can be recorded. The Regional Coordinator and the DELWP State-wide coordinator will be able to view the details of the bloom via this database. If you are experiencing problems with the Water Industry Portal website please contact the DELWP State-wide Coordinator.
- When sampling and testing has confirmed the existence of BGA at or in excess of a biovolume of  $0.2\text{mm}^3/\text{L}$ , LWMs are to advise the Regional Coordinator and the DELWP.
- The Water Industry Portal and email should be used for this notification.

The RC is responsible for notifications to internal and external stakeholders and for entering results into the DELWP portal.

When reporting local blooms, LWMs are requested to provide advice via the portal (or notification form) as to whether the bloom:

- has already been notified to DELWP and the information provided is an update on the bloom status. LWMs are asked to enter bloom updates as new results become available and when the bloom has ceased;
- is likely to become a regional problem;
- has caused a water supply to be interrupted, public warnings to be issued or water bodies to close; and
- will or has resulted in the need to treat a water body with an algicide

### 8.2. Additional Notifications

In some circumstances, other organisations, groups or individuals will need to be notified of BGA blooms. This will depend on the use of the water body and density and nature of the bloom. These additional notifications are illustrated in the flowchart in Figure 2 and discussed in more detail in this section.

## 8.2.1. Drinking Water

Blue-green algal blooms in drinking water supplies that may pose a risk to public health or may result in widespread public complaint (for example through taste and odour) must be notified to the DHHS using the notification arrangements under Section 22 of the SDWA. This notification should be made immediately via telephone (on **1300 761 874** during business hours or **1300 790 733** after hours) and followed up with written notification using the formal notification form (refer to Guidance Note No. 7: Notifications Required under the SDWA, available from ([www.health.vic.gov.au/environment/water/d-guidelines](http://www.health.vic.gov.au/environment/water/d-guidelines))).

DHHS must be notified when:

Water supplied for drinking<sup>1</sup> may place public health at risk due to one or more of the following:

- ↘ Total microcystins are detected at  $\geq 1.3$  ug/L (microcystin-LR toxicity equivalents)
- ↘ *Microcystis aeruginosa* is present at  $\geq 6,500$  cells/mL
- ↘ Total combined biovolume of known toxic cyanobacterial species  $\geq 0.6$  mm<sup>3</sup>/L
- ↘ Total combined biovolume of all cyanobacterial species  $\geq 10$  mm<sup>3</sup>/L

**OR**

BGA are present in drinking water at levels that may cause widespread public complaint, for example through taste and odour.

As water storage managers (as defined under the SDWA) do not generally treat and supply drinking water to the public in Victoria, they may not be best placed to determine whether BGA in the raw water of a drinking water supply may place public health at risk. This means that the water supplier (as defined under the SDWA) may be the most appropriate entity to notify DHHS of BGA incidents under Section 22.

As there are exceptions to this generalisation, and the SDWA places obligations on both water storage managers and water suppliers, the Circular is not prescriptive about who should notify DHHS of Section 22 incidents.

In all cases, DHHS expects the Risk Management Plans of the water storage manager and water supplier to be integrated such that a suitable communication protocol is in place. This protocol must clearly outline how details of BGA blooms are communicated between the water storage manager and water supplier, and who will notify DHHS if such a notification is required. This is a requirement under the Safe Drinking Water legislation.

A recommended framework for monitoring and managing BGA in drinking water supplies can be found in Management Strategies for Cyanobacteria (BGA): a Guide for Water Utilities (Water Quality Research Australia 2010).

## 8.2.2. Recreational Water

Notifications are required when a blue-green algal bloom poses a health risk in water bodies used for primary contact recreation.

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<sup>1</sup> DHHS does not need to be notified where:

- Drinking water is not, or has not been, supplied from the water body during the period when the algal bloom occurred (i.e. the water body has been isolated from supply).
- Drinking water treatment processes are in place that will effectively remove blue-green algal toxins or the potential cause of widespread public complaint.

Blooms in recreational water bodies are considered to pose a potential public health risk, for primary contact recreation, when one or more of the following is true:

- ↘ Microcystis aeruginosa is present at  $\geq 50,000$  cells/mL
- ↘ Total combined biovolume of **known toxic** cyanobacterial species is  $\geq 4$  mm<sup>3</sup>/L
- ↘ Total combined biovolume of **all** cyanobacterial species is  $\geq 10$  mm<sup>3</sup>/L
- ↘ Cyanobacterial scums are consistently present

In the case of these algal blooms, the following groups should be notified:

- ↘ Recreational users of the water body (for example, through signage or media, as appropriate).
- ↘ DHHS (on **1300 761 874** during business hours).
- ↘ Relevant stakeholders (such as local government, tourism bodies and recreation clubs)

Additional information on, and a framework of alert levels for monitoring and managing blue-green algae risks in recreational water bodies can be found in the Guidelines for Managing Risks in Recreational Water (NHMRC 2008).

### 8.2.3. Other Water Supplies

Currently there is insufficient data to set risk-based trigger levels for BGA in water bodies used for other purposes, such as stock and domestic supplies or irrigation water. The LWM should undertake a risk assessment for blue-green algal blooms in these water bodies to determine whether the water is potentially hazardous. If it is considered that a risk may be posed due to the presence of BGA, then all relevant users of the water should be notified. For domestic water uses (such as showering and bathing, cooking or other kitchen purposes and domestic garden watering), the use of the drinking water trigger levels for BGA are recommended. While this is likely to be conservative, it can be used in the absence of a more detailed risk assessment for the specific scenario in question.

## 9. References

### Standards and Related Documents

BGA Circular 2016-17 –final (DELWP, <https://www.water.vic.gov.au/waterways-and-catchments/rivers-estuaries-and-waterways/blue-green-algae> )

[2016-17 Melbourne BGA Regional Coordination Plan final.docx](#)



## APPENDIX 1: Risk Based management of BGA blooms in Recreational Waters

### Risk based management of BGA blooms for RECREATIONAL WATER supplies

Incident Management Level (and characteristics of blooms)	Consequences of Bloom	Control Agency	Monitoring Required	Field Actions Required	Communication Response
<p>1</p> <p><i>Minor</i></p> <p><i>Bloom detected and</i>  <math>\geq 0.2 \text{ mm}^3/\text{L}</math> Biovolume</p>	<p>There is no likely adverse publicity, human health, or environmental impacts</p>	Local Water Manager	Visual Observations of extent	None	None
<p>2</p> <p><i>Moderate</i></p> <p><math>\geq 4 \text{ mm}^3/\text{L}</math> BioVolume Toxic BGA or  <math>&gt;50,000</math> cells/ml  <i>Microcystis aeruginosa</i>                      or  <math>&gt;10 \text{ mm}^3/\text{L}</math> BioVolume Total BGA</p> <p>and                      One location</p>	<p>Adverse publicity</p> <p>May have waterway environmental or potential public health impacts.</p> <p>Can be dealt with by on site resources of a single agency</p>	Local Water Manager	<p>Increase monitoring BGA cell counts and biovolume (frequency)</p> <p>Visual Observations of extent and potential for off-site contamination</p>	Erect Signs on Site informing people to avoid contact with water	<p>Inform DHHS</p> <p>Inform DELWP</p> <p>Notify other concerned agencies and stakeholders</p> <p>Inform EPA Recreation website</p> <p>Post media information on website</p>
<p>3</p> <p><i>Major</i></p> <p><math>\geq 4 \text{ mm}^3/\text{L}</math> BioVolume Toxic BGA or  <math>&gt;50,000</math> cells/ml  <i>Microcystis aeruginosa</i>                      or  <math>&gt;10 \text{ mm}^3/\text{L}</math> BioVolume Total BGA</p> <p>and                      Many Locations</p>	<p>Adverse publicity</p> <p>Could involve substantial risk of serious injury or death if water is ingested, may have serious environmental impacts, or could have public health implications.</p> <p>Executive level management of the issues and implications that may flow from the event.</p> <p>Needs the resources of multiple agencies to deal with issues and actions</p>	Regional Co-ordinator OR EMV	<p>Increase monitoring BGA cell counts and biovolume (frequency and locations)</p> <p>Visual Observations of extent and potential for off-site contamination</p>	Erect Signs on Site informing people to avoid contact with water	<p>Inform DHHS</p> <p>Inform DELWP</p> <p>Notify other concerned agencies And stakeholders</p> <p>Inform EPA Recreation website</p> <p>Post media information on website</p> <p>Undertake assessment of likely cause of bloom</p>

## APPENDIX 2: Risk Based management of BGA blooms in Drinking Water Supplies

A risk based approach to manage BGA blooms is underpinned by the Australian Drinking Water Guidelines (2004).

### Risk based management of BGA blooms for DRINKING WATER or RAW WATER (BULK WATER RESERVOIRS) supplies (DEPI 2008)

Incident Management Level (and characteristics of blooms)	Consequences of Bloom	Control Agency	Monitoring Required	Field Actions Required	Communication Response
<p>1</p> <p><i>Minor</i></p> <p>Bloom detected and <math>\geq 0.2 \text{ mm}^3/\text{L}</math> BioVolume</p>	<p>May have waterway environmental or potential public health impacts.</p> <p>Can be dealt with by on site resources of a single agency</p> <p>There is no adverse publicity, injury, or environmental impacts</p> <p>No involvement of the Emergency Services</p>	Local Water Manager	<p>Routine cell count monitoring</p> <p>Visual Observations of extent and potential for off-site contamination</p>	None	<p>Inform DELWP</p> <p>Inform Regional Co-ordinator</p>
<p>2</p> <p><i>Moderate</i></p> <p><math>\geq 0.4 \text{ mm}^3/\text{L}</math> BioVolume Toxic BGA or</p> <p><math>&gt;5000</math> cells/ml <i>Microcystis aeruginosa</i> or</p> <p><math>&gt;1.3\mu\text{g}/\text{L}</math> microcystins or</p> <p><math>&gt;10 \text{ mm}^3/\text{L}</math> BioVolume Total BGA</p> <p>And One location</p>	<p>Adverse publicity</p> <p>May have waterway environmental or potential public health impacts.</p> <p>Can be dealt with by on site resources of a single agency</p>	Local Water Manager	<p>Increase monitoring BGA cell counts (frequency)</p> <p>Toxicity testing</p> <p>Visual Observations of extent and potential for off-site contamination</p>	<p>Erect Signs on Site</p> <p>Alter treatment</p>	<p>Inform DHHS</p> <p>Inform DELWP</p> <p>Inform Regional Co-ordinator</p> <p>Notify other concerned agencies</p> <p>Inform Press and users</p>
<p>3</p> <p><i>Major</i></p> <p><math>\geq 0.4 \text{ mm}^3/\text{L}</math> BioVolume Toxic BGA or</p> <p><math>&gt;5000</math> cells/ml <i>Microcystis aeruginosa</i> or</p> <p>or</p> <p><math>&gt;1.3\mu\text{g}/\text{L}</math> microcystins or</p> <p><math>&gt;10 \text{ mm}^3/\text{L}</math> BioVolume Total BGA</p> <p>and</p> <p>Many Locations</p>	<p>Adverse publicity</p> <p>Could involve substantial risk of serious injury or death, may have serious environmental impacts, or could have public health implications.</p> <p>Executive level management of the issues and implications that may flow from the event.</p> <p>Needs the resources of multiple agencies to deal with issues and actions</p>	Regional Co-ordinator	<p>Increase monitoring BGA cell counts (frequency and locations)</p> <p>Toxicity testing</p> <p>Visual Observations of extent and potential for off-site contamination</p>	<p>Erect Signs on Site</p> <p>Alter management to avoid BGA</p> <p>Alter treatment to reduce risk</p>	<p>Inform DHHS</p> <p>Inform DELWP</p> <p>Inform Regional Co-ordinator</p> <p>Notify other concerned agencies</p> <p>Inform Press and users</p> <p>Inform Public</p>

# Melbourne Water Blue-Green Algae Risk Management Plan 2016-17



<p>Emergency</p> <p>Many Locations</p>	<p>Catastrophic</p> <p>As per Emergency Management Plan</p> <p>Emergency due to the actual or imminent occurrence of an event which in any way endangers or threatens to endanger the safety or health of any person in Victoria or which destroys or damages, or threatens to destroy or damage any property in Victoria, including, without limiting the generality of the foregoing.</p>	<p>Dept of Health and Human Services</p>	<p>As per Emergency Management Plan</p>	<p>As per Emergency Management Plan</p>	<p>As per Emergency Management Plan</p>
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