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Dr Andrew Robertson
Chief Health Officer
Department of Health
Government of Western Australia

Dear Dr Robertson

Thank you for your invitation to make a written submission to the Chief Health Officer Inquiry into the impacts of climate change on health in Western Australia. The role of Chief Health Officers in protecting and improving the health of our communities means we must advocate for and drive action on climate change in Australia. I am pleased to contribute to efforts that could inform and align complementary state-based approaches and support more action at the national level.

Climate change poses significant risks to the health and wellbeing of all Australians. It affects the community both directly, through the increased intensity and frequency of extreme events, and indirectly, through worsening air, land and water quality, changes in the spread of infectious diseases, threats to the safety of food and water, effects on mental health, and impacts on the social determinants of health. This includes risks to human health from emerging pathogens that may impact food and water supplies.

Victoria has already experienced direct health impacts from extreme events such as heatwaves, floods and bushfires, which are expected to occur with greater frequency and intensity as a result of climate change. Victoria has also experienced events expected to have significant indirect impacts on health. The following are examples, several of which are described in more detail in Attachment 1:

- Bushfires in early 2019 in the Thompson catchment complex threatened Melbourne's water supply, and bushfires in 2019 in Victoria's Gippsland region resulted in significant air quality issues.
- In 2019 a blue-green algal bloom in the raw water storage for the Tongala water supply system impacted the water filtration system. The removal of microorganisms could not be assured, and a boil water notice was issued to customers.
- Increased incidence of environmental *Escherichia coli* blooms in water catchments that have impacted on recreational access to water supplies in 2019.
- Following widespread flooding in 2016, Victoria experienced its largest Ross River Virus outbreak since 1993, with 1,974 human cases reported between October 2016 and April 2017. This was nearly ten-fold greater than the historical mean.
- In 2016 Victoria was impacted by a significant blue-green algal bloom in the Murray River which lasted for 115 days (from February through to the middle of July). There

were approximately 41 townships within the affected area with a population base of approximately 120,538. The bloom resulted in impacts on drinking water and recreational water supplies, impacts on the tourism industry, and reduced access to water for livestock and crops.

- Toxin producing algal blooms in the Gippsland Lakes in 2011/12 and 2012/13 impacted the tourism, commercial and recreational fishing industry in the region with an estimated economic impact of \$15.03 million.
- Victorian heatwaves in 2009 and 2014 resulted in 374 and 167 excess deaths respectively, and significant increases in heat-related emergency department presentations.

Governments play a key role in overseeing, leading and coordinating efforts to mitigate the scope and scale of climate change and to support adaptation to its effects. I am pleased to say that the Victorian Government is driving a transition to a net zero emissions economy and supporting adaptation to the impacts of climate change. Information on the whole-of-Victorian Government approach is available at <https://www.climatechange.vic.gov.au/>.

Victoria's *Climate Change Act 2017* includes a range of provisions that could be considered in the Western Australian context, including:

- a long-term emissions reduction target of net zero emissions by 2050
- preparation of whole-of-government and sector emission reduction pledges
- a requirement that a Victorian Climate Change Strategy is prepared every five years from 2020
- requirements for the development of adaptation action plans for a range of key systems, including the health and human services system

In addition, the Victorian Department of Health and Human Services recently included tackling climate change and its impacts on health as a focus area in the *Victorian public health and wellbeing plan 2019-2023* (August 2019). This focus aims to increase action to reduce greenhouse gas emissions and realise associated health co-benefits, and to drive action to promote resilient and safe communities that are adapting to the public health impacts of climate change. The plan and supporting guidance are available from: <https://www2.health.vic.gov.au/public-health-wellbeing-plan>

Local councils in Victoria are also required to have regard to climate change in their Municipal Public Health and Wellbeing Plans, and the department will be providing updated guidance to support implementation of this requirement at a local level. Local government is well placed to work with communities to promote the health co-benefits of climate change mitigation activities and to support adaptation to its impacts.

The department has recently published new climate change and health community resources, including a series of animations, which include the health co-benefits of emission reduction as a key focus. We trust that these resources will prove useful for other territories and states as well, including Western Australia. These new resources are available from: <https://www.betterhealth.vic.gov.au/health/HealthyLiving/climate-change-and-health>.

I note the recent publication of the *State Public Health Plan for Western Australia: Objectives and policy priorities for 2019-2024*, which also recognises the need to plan and respond to health impacts associated with climate change.

In terms of providing mutual support and encouraging a national approach, there is an opportunity to work together to better understand the burden of disease from climate change and the subsequent use of health and human services, both historically and into the future. More data and analysis are required to investigate, evaluate and explain the effects that climate change is already having and will increasingly have on community health and wellbeing, and the capacity of services to manage and respond to these increased risks. This will support awareness and understanding of the issues and strengthen motivations and incentives for action. Any opportunity to share information and coordinate processes would assist efforts to protect Australians from the changing climate.

The determination of the Western Australian Government to consider and address the effects of the changing climate on public health is commendable. The development and implementation of a dedicated program of work in Western Australia will complement those activities undertaken by Victoria. I look forward to continuing to work together with Western Australia and other Australian states and territories through the Australian Health Protection Principal Committee on this important issue.

Should any of these matters be of further interest to the Chief Health Officer inquiry into the impacts of climate change on health in Western Australia, please contact my office on [REDACTED]

Thank you again for the invitation to make a submission.

Yours sincerely

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Dr Brett Sutton
Chief Health Officer
Department of Health and Human Services

30 / 08 / 2019

Attachment 1 – Victorian case studies

Bushfires and their impact on drinking water

Bushfires affect drinking water supplies, in terms of both quantity and quality of water, and in both the short and long term. Climate change will bring more frequent and intense bushfires to Victoria's drinking water catchments, and affect the majority of Victoria's population.

After fires, water supply catchments show long term reductions in the quantity of water that can be harvested. The timeframes of these risks can be decades to over 100 years.

Water quality can be affected by ash and fire debris runoff when heavy rain falls after the fire and prior to revegetation and stabilisation of affected areas. Risk can be present for one to 2 years after the fire event.

Where water quality is affected after a bushfire, there are a number of risks to the community. These risks can compound to have multiple impacts such as:

- Inability to safely treat poor quality water thereby requiring a boil water advisory
- Increase in sediment and/or discolouration of water
- Operational issues in maintaining acceptable water quality in distribution systems
- Decreased customer confidence in drinking water quality and the choice of less healthy packaged drinks
- Difficulty maintaining a safe and secure supply of water to health services and/or industrial and food manufacturers
- Impacts on jobs, tourism, manufacturing, exports and other economic sectors.

All of these could result in adverse outcomes to health and wellbeing, in both the short term (acute illness from unsafe drinking water) or longer term (substitution of tap water with less healthy packaged drinks).

Through effective contingency planning and preparation, the above risks to drinking water were avoided in both of the case studies below. However, the costs and effort in mitigation are significant and require skilled and experienced teams to protect drinking water systems.

East Gippsland Water Buchan Bushfire 2019

East Gippsland Water provides drinking water to the Buchan township (109 water connections). The water is sourced from the Buchan River and treated via the Buchan Water Treatment Plant (WTP). In mid-January 2019, a bushfire in the area north of Buchan started as a result of lightning strikes and quickly grew in size and intensity to what was described as an "active and dangerous" fire. By early February 2019, approximately 20% of the forested catchment area that supplies the Buchan River was affected by fire. The river water quality deteriorated significantly after rainfall from the fire debris. While the WTP at Buchan is designed to treat river water of varying quality, the poor river water quality restricted the treatment plant operation. The Buchan WTP was temporarily turned off as it was not able to cope with the poor river water quality.

East Gippsland Water carted drinking water from several other water supply systems to Buchan to supply the township.

East Gippsland Water relocated a pre-treatment unit from an existing site to improve the quality of source water to the treatment plant which required significant on-site works to commission. For over a month, East Gippsland Water operated the treatment plant intermittently, when permitted by river water quality, with water carting providing the alternative drinking water supply as needed.

Increasing bushfires in small water system catchments serving a small community may be manageable in the short term by water carting. However this solution is not viable in the long term and is vulnerable to road closures from fire risks. East Gippsland Water's was able to install a pre-treatment unit to the Buchan WTP, albeit with reduced plant capacity, however readily installing additional treatment barriers for larger water supply systems is not feasible. East Gippsland Water recognises the vulnerability of this system to dirty water events and plans to build a raw water storage during 2021/22.

Planning for a greater variability in source water quality through increased frequency of bushfires or increased algal blooms that may require additional treatment systems at treatment plants is being investigated. If required, these additional systems will increase capital and operating costs to the water supplier and community. These measures may be required as fires return more frequently and are succeeded by high intensity rainfall events.

The costs of maintaining a safe drinking water supply for Buchan were significant for the size of population served and affected service delivery in some other neighbouring systems.

Melbourne's water supply and 2019 fires in the catchments of the Upper Yarra and Thomson reservoirs

Melbourne's water supply is predominantly sourced from the catchments of the Upper Yarra and Thomson reservoirs. These reservoirs amount to approximately 70% of Melbourne's total water storage capacity, with other resources coming from ten other major storages and the Victorian Desalination Plant.

In late January 2019, a lightning strike started a bushfire in the Thomson catchment which burnt over 13% of the total catchment area. The adjacent Upper Yarra catchment also experienced a bushfire due to lightning strikes with approximately 5% of the catchment being burnt. Due to the importance of these two reservoirs for Melbourne's water supply, both fires caused significant concern for the Victorian Government, Melbourne Water, other drinking water suppliers and the wider community.

The initial concerns with bushfires in the Thomson catchment was of a possible long period of poor water quality if heavy rain followed the fire, which could last for 1 to 2 years. This would have made the water quality in the reservoir either unsuitable for use or would have significantly reduced its usability by Melbourne. As the Thomson reservoir is also the largest reservoir for Melbourne (1,068 GL) the longer-term water availability for Melbourne would have been significantly affected.

There were several other fires occurring in Victoria at the time and the demand for resources was high. Given the criticality of these water supply catchments, significant fire-fighting efforts were employed by the combined resources of fire agencies, forest fire crews and Melbourne Water to minimise the fire impact to the catchment area and subsequently to water quality. Some of these contingency activities were temporarily impeded by the in-field fire conditions and safety considerations.

Before the Thomson fire was controlled, a second fire ignited from lightning strikes in the Upper Yarra catchment. This raised the level of concern further as the risk of a decline in water quality in the Upper Yarra reservoir could have been affected. Also, as much water from the Thomson reservoir was being transferred to the Upper Yarra reservoir as a contingency measure. A refocussed effort to contain the fire resulted in a peripheral catchment area of approximately 5% being affected. Where poor water quality in Thomson reservoir is able to be isolated from the supply system for periods of time, this is not possible for the Upper Yarra reservoir, and a deterioration in quality would essentially make any stored water resources in both the Thomson and Upper Yarra unusable for a significant timeframe. Other water sources for Melbourne would have been under extreme strain to cope with demands if the above situation was realised.

The Victorian Government ordered 125 GL of desalinated water from the Victorian Desalination Plant in 2019/20 in response to the expected long-term weather forecast of reduced rainfall in catchment areas.

Increased fire events bring a change in catchment vegetation that affects the long-term amount of water that can be harvested from forested catchments. Following these two fires, Melbourne Water has undertaken significant protection and revegetation works within the affected areas to protect water quality, completed works to improve predictive models of fire impacts on water quality and commenced planning for future significant events. Melbourne Water's bushfire contingency planning and management and experienced staff helped ensured water quality was not impacted over this critical time.

The costs to Melbourne Water and the State of Victoria from these specific catchment fires was many millions of dollars, with remedial works lasting many years into the future.

The predicted increase in fires under climate change scenarios for Victoria threaten the safety, security and affordability of drinking water supplies. A continued state-wide concerted effort is needed to enhance protections for water supply catchments.

Algal blooms impacting on drinking water supplies

Murray River blue-green algae bloom 2016

In 2016 Victoria was impacted by a significant blue-green algal bloom in the Murray River which lasted for 115 days (from February through to the middle of July). It impacted 41 Victorian townships and resulted in a range of impacts including reduced access to water for livestock and crops, impacts on the tourism industry and impacts on drinking water supplies. In particular, where drinking water treatment plants were not capable of removing the blue-green algae, water had to be carted into the towns, and in some other towns, Stage 4 water restrictions were introduced.

Blue-green algae within the Goulburn System and Tongala boil water notice 2019

Water agencies in Victoria have expertise with treating algae affected water, however as algae is a living organism its behaviour can change in different environments. In early 2019 algae bloomed in areas which have historically been unaffected by algae. The algae had a rapid early growth stage which meant the water agency experienced water treatment challenges at the Tatura, Kyabram, Rushworth and Tongala water treatment plants that sourced water from the Goulburn Weir and Waranga basin. In addition to the challenges to treat the algae, the ability to operate the water treatment plant at Tongala was significantly impacted. The treatment process was removing the algae, however due to the unusual behaviour of the algae, the filters were unable to operate effectively. The removal of other microorganisms could not be assured, and a boil water notice was issued for almost 48 hours to the Tongala township (population 1,926).

Other impacts included water carting from other storages to major (food production) customers and alternative water supplies to critical customers (nursing home). To date the cost of asset response improvements to this algal bloom is estimated to be \$800,000 which includes an investment in water treatment plant improvements in the Goulburn system.

A significant amount of investigative work has also occurred to correctly speciate and confirm the toxicity of the algae. Analysis is ongoing; however the molecular data indicates that it is a new species to the area.

Climate change and warmer temperatures are likely to result in more harmful algal blooms creating challenges for managing drinking water supplies. These case studies highlight the significant impact of algal blooms on the water supply system, the ongoing need for research and surveillance to keep abreast emerging species, and the need to better understand the causal factors including catchment management practices to minimise the prevalence of algal blooms.

Ross River Virus outbreak 2016-2017

In September 2016, above-average rainfall occurred in Australia. This rainfall anomaly led to widespread flooding across large parts of Victoria, particularly in the northeast and northwest. Above average rainfall also occurred during the following month, causing the flooding to persist or reoccur in some areas. Persistent standing water, coupled with warmer weather in the ensuing months, led to ideal mosquito breeding conditions in large parts of the state. On-field reports from selected local government areas indicated that mosquito abundance was high.

The Department of Health and Human Services funded an enhanced public health action plan to mitigate and manage the anticipated Ross River Virus outbreak, including disease surveillance and control measures, and a public messaging campaign, 'Beat the Bite', to inform the public about the risks of mosquito-borne diseases, and to provide health advice relating to personal protective measures to avoid mosquito bites.

Despite implementing an extensive public health action plan in response to the flooding event, Victoria experienced the largest Ross River Virus outbreak since 1993. Between October 2016 and April 2017, there were 1,974 human cases reported, which was nearly ten times greater than the historical mean of 204 cases per year.

As the incidence of flooding and warmer climate conditions increases in Victoria, it is highly likely that outbreaks of Ross River Virus and other endemic vector-borne diseases such as Barmah forest Virus and Murray Valley Encephalitis will increase. This, coupled with the migration of previously unseen vectors capable of carrying other pathogens, are a major concern.