

The Senate

Community Affairs References
Committee

Investigations into a possible cancer cluster
on the Bellarine Peninsula, Victoria

June 2021

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Terms of Reference

Investigations into a possible cancer cluster on the Bellarine Peninsula, Victoria, with particular reference to:

- (a) the health concerns of local residents;
- (b) the incidence of cancer cases in the area, and any possible environmental or other contributing factors;
- (c) the evidence, approach and outcomes concerning the Victorian Chief Health Officer's investigation of cancer rates on the Bellarine Peninsula; and
- (d) any other related matter.

Abbreviations

ABS	Australian Bureau of Statistics
agvet	agricultural and veterinary
APVMA	Australian Pesticides and Veterinary Medicines Authority
Atlas	Australian Cancer Atlas
Bti	<i>Bacillus thuringiensis israelensis</i>
CAPHR	Campaign for Accuracy in Public Health Research
CHO	Victorian Chief Health Officer
City	City of Greater Geelong
committee	Senate Community Affairs References Committee
DDT	dichlorodiphenyltrichloroethane
department	Victorian Department of Health
Expert Advisory Group	Potential Cancer Cluster Expert Advisory Group
FAQs	frequently asked questions
framework document	2004 <i>Framework for Mosquito Management in Victoria</i>
FRCS	fixed retrospective cohort study
IARC	International Agency for Research on Cancer
IBD	inflammatory bowel disease
IMM	integrated mosquito management
OCP	organochlorine pesticide
OP	organophosphate pesticide
SIR	standardised incidence ratio
SA1	Statistical Areas Level 1
SA2	Statistical Areas Level 2
ULV	ultra-low volume

List of Recommendations

Recommendation 1

5.107 The committee recommends that the Victorian Government urgently undertake to:

- prepare and release a comprehensive report which explains clearly and carefully the findings of the epidemiological studies and responds to the concerns in relation to chemicals used in mosquito management programs; and
- meet with concerned community members at Barwon Heads to present the report and address any remaining concerns.

Recommendation 2

5.109 The committee recommends that the Victorian Government review and update the *Framework for mosquito management in Victoria* published by the Victorian Department of Sustainability and Environment in 2004.

Chapter 1

Introduction

- 1.1 In December 2018, reports of a possible cancer cluster on the Bellarine Peninsula in Victoria came to light through an article in *The Age*, which reported that a number of young people in the Bellarine area had recently died of cancer, many from blood-related cancers.¹ This was followed by an article in the *Sunday Age* which discussed the possible links between cancer incidence and use of a pesticide called dieldrin.²
- 1.2 Over the following months, multiple media articles reported young people in the Bellarine area being diagnosed and, in some cases, dying of different types of cancer.³
- 1.3 In January 2019, the Victorian Chief Health Officer (CHO) undertook an investigation into a possible cancer cluster on the Bellarine Peninsula. The CHO's review found no evidence of a cancer cluster. Despite this conclusion, some residents of the Bellarine Peninsula continued to raise concerns about the possibility of a cancer cluster as well as perceived higher rates of autoimmune disease in the area.⁴
- 1.4 The community raised concerns about what might be the cause of a perceived higher rate of cancer on the Bellarine Peninsula.⁵ Some believe it is linked to an organochlorine pesticide (OCP) called dieldrin, previously used for

¹ Debbie Cuthbertson, [‘You’ve got to think it’s environmental’: Questions over cancer deaths’](#), *The Age*, 29 December 2018 (accessed 8 June 2021).

² Debbie Cuthbertson, [‘School tested for toxic pesticide as test case looms amid cancer fears’](#), *The Age*, 30 December 2018 (accessed 8 June 2021).

³ Debbie Cuthbertson, [‘Explainer: Concern over cancer cases on the Bellarine Peninsula’](#), *The Age*, 6 January 2019 (accessed 8 June 2021); Debbie Cuthbertson, ‘Cancer mystery bedevils Barwon’, *Sunday Age*, 6 January 2019, p. 1; Anthony Colangelo, ‘Health chief to probe Bellarine cancer deaths’, *The Age*, 11 January 2019, p. 12; Debbie Cuthbertson, ‘Barwon Heads community seeks MP briefing on cancer concerns’, *Sunday Age*, 13 January 2019, p. 2; Benjamin Preiss, [‘Law firm lashes chief health officer’s report on cancer in Bellarine’](#), *The Age*, 4 March 2019 (accessed 8 June 2021); Benjamin Preiss, ‘Cancer rate report criticised’, *The Age*, 5 March 2019, p. 2; Georgia Holloway, [‘Is there a cancer cluster in Barwon Heads, and is mossie spraying to blame?’](#), Dscribe, 13 May 2019 (accessed 8 June 2021); Debbie Cuthbertson, ‘Coalition, Labor vow probe into Bellarine cancer cases’, *The Age*, 17 May 2019, p. 14; ‘Cancer inquiry’, *The Herald-Sun*, 18 October, p. 6.

⁴ See, for example, Discovery 3227, *Submission 32.1*, pp. 1–4 and 7–10; Nicholas Guyett, *Submission 16*, p. 1.

⁵ See, for example, Discovery 3227, *Submission 32*, pp. 1–2; St Leonards Progress Association, *Submission 33*, p. 1; Name withheld, *Submission 25*, p. 1.

agricultural purposes on the Bellarine Peninsula.⁶ Other residents are concerned that the possible cause is the chemicals used for mosquito control by the City of Greater Geelong and former local councils.⁷

- 1.5 During 2019, the Victorian Department of Health⁸ and the CHO continued to respond to these concerns by convening the Potential Cancer Cluster Expert Advisory Group, engaging with the community, and commissioning the Cancer Council Victoria to conduct a more extensive epidemiological study, which also found no evidence of increased cancer rates in the Barwon Heads region.⁹
- 1.6 However, some members of the Barwon Heads community remain concerned about the possibility of a cancer cluster or autoimmune disease cluster and about potential links between these diseases and certain chemicals that were historically used for mosquito control in the area.
- 1.7 It is in this context that Senate Community Affairs References Committee (committee) embarked on this inquiry, seeking to listen to the community's concerns and to explore the extent and appropriateness of the investigations to date. In doing so, the committee has engaged with the community, with local and state authorities, and with medical and chemicals experts.

Structure of the report

- 1.8 The report consists of five chapters, including this introductory chapter:
 - Chapter 1 provides background information about cancer clusters, the Bellarine Peninsula and the conduct of the inquiry.
 - Chapter 2 explores the health concerns and possible causes raised by the Bellarine Peninsula community.
 - Chapter 3 examines the investigations to date into the possibility of a cancer cluster on the Bellarine Peninsula.
 - Chapter 4 discusses the use of chemical insecticides on the Bellarine Peninsula for mosquito control.

⁶ See, for example, Gordon Legal, *Submission 27*; Debbie Cuthbertson, '[You've got to think it's environmental: Questions over cancer deaths](#)', *The Age*, 29 December 2018.

⁷ See, for example, Name withheld, *Submission 5*, [p. 1]; Name withheld, *Submission 8*, [p. 1]; Mr Ross Harrison, Spokesperson and member, *Discovery 3227, Committee Hansard*, 20 April 2021, pp. 10–11; Ms Kristie Ainsworth, private capacity, *Committee Hansard*, 20 April 2021, p. 18; Name withheld, *Submission 39*, [p. 1].

⁸ On 1 February 2021 the then Victorian Department of Health and Human Services became two departments, the Department of Health and the Department of Families, Fairness and Housing. References to the department use its current name, except where required in footnotes.

⁹ Professor Roger Milne, Head of Cancer Epidemiology, Cancer Council Victoria, *Committee Hansard*, 1 May 2020, p. 1.

- Chapter 5 discusses issues raised by inquiry participants about chemical insecticides and disease causation. It also considers whether any further epidemiological or exposure studies would be beneficial.

Role of the committee

- 1.9 The committee has been tasked by the Senate to undertake an inquiry into investigations into a possible cancer cluster on the Bellarine Peninsula, Victoria, with particular reference to:
- (a) the health concerns of local residents;
 - (b) the incidence of cancer cases in the area, and any possible environmental or other contributing factors;
 - (c) the evidence, approach and outcomes concerning the Victorian Chief Health Officer's investigation of cancer rates on the Bellarine Peninsula; and
 - (d) any other related matter.¹⁰
- 1.10 The committee recognises the significant impact that cancer has on the community and acknowledges the concerns raised by residents about the incidence of cancer and autoimmune disease cases on the Bellarine Peninsula.
- 1.11 The committee acknowledges it does not have scientific expertise in epidemiology, toxicology or cancer causation. As such, the committee has sought evidence from a range of witnesses, including experts in cancer epidemiology and chemical carcinogens, concerned members of the public, and government agencies.
- 1.12 Throughout the inquiry, the committee has remained mindful that providing a forum for local residents to express their views, share concerns with others and be heard by all levels of government was central to this inquiry. An important part of the committee's role has been to provide the community with the opportunity to reflect on the investigations previously undertaken and to suggest new ways to examine the possibility of a cancer cluster in the Bellarine Peninsula region.

Bellarine Peninsula

- 1.13 The Bellarine Peninsula region is located south-west of Melbourne, around 30 minutes' drive south of Geelong. Barwon Heads lies in the Bellarine ward of the City of Greater Geelong local government area. Barwon Heads, formerly a quiet village, is now a town of almost 4,000 permanent residents, located on the west side of the Barwon River and adjacent to the town of Ocean Grove. Along with the nearby town of St Leonards, Barwon Heads was the location for the filming of the well-loved ABC television series *Sea Change* in the 1990s.

¹⁰ *Journals of the Senate*, No. 23, 17 October 2019, p. 700.

1.14 Barwon Heads is a popular holiday destination, with nearby beaches Raafs Beach and Thirteenth Beach and other locations for water sports including snorkelling and surfing. It hosts Parks Victoria's Barwon Bluff Marine Sanctuary, Jirrahlinga Koala & Wildlife Sanctuary, Barwon Heads Primary School and the Bop Bop Karrong Child and Family Centre health service, and it has an active community life and a number of community organisations and sporting clubs. The town has a much bigger population during the warmer months, with some holidaymakers returning every year.

Cancer clusters

1.15 Cancer is the name of a category of around 200 different diseases,¹¹ with prostate cancer, breast cancer and bowel cancer the most common types in Australia.¹² In 2016, cancer was the leading cause of death in Australia and was the cause of around three in 10 deaths.¹³ Due to improved cancer screening, early diagnosis and treatment, survival rates have increased over time for many types of cancer.¹⁴ However, even for those who survive cancer, a cancer diagnosis always has a severe and lasting impact on the individual, their family and friends, and their community. Cancer has been described as 'the most feared illness'.¹⁵

1.16 The Australian National Health and Medical Research Council defines a cancer cluster as follows:

A cancer cluster is the occurrence of a greater than expected number of cancer cases within a group of people in a geographical area over a period of time. The identification of a cluster using this definition does not necessarily imply that there is a causal agent, because cancer events can occur by chance. It does, however, indicate the need to assess whether the cluster can be related to factors other than chance.¹⁶

¹¹ Terry Slevin, *What are cancer clusters?*, 10 February 2014, www.cancer.org.au/blog/what-are-cancer-clusters (accessed 8 June 2021); United Kingdom and Ireland Association of Cancer Registries, *Factsheet: Cancer clusters*, June 2017, p. 3 (accessed 8 June 2021).

¹² Australian Institute of Health and Welfare, *Cancer in Australia: 2019*, March 2019, p. 42, www.aihw.gov.au/reports/cancer/cancer-in-australia-2019/data (accessed 8 June 2021).

¹³ Australian Institute of Health and Welfare, *Cancer in Australia: 2019*, March 2019, p. 92.

¹⁴ Cancer Council, *Facts and figures: Cancer statistics in Australia*, www.cancer.org.au/cancer-information/what-is-cancer/facts-and-figures (accessed 8 June 2021); Australian Institute of Health and Welfare, *Cancer in Australia: In brief 2019*, March 2019, p. 14 (accessed 8 June 2021).

¹⁵ Terry Slevin, *What are cancer clusters?*, 10 February 2014, www.cancer.org.au/blog/what-are-cancer-clusters; see also Ron Borland, Ngaire Donaghue and David Hill (1994), 'Illnesses that Australians most feared in 1986 and 1993'. *Australian Journal of Public Health*, 18, 366–369, <https://doi.org/10.1111/j.1753-6405.1994.tb00266.x>.

¹⁶ National Health and Medical Research Council, *National Health and Medical Research Council statement on cancer clusters*, p. 2, www.nhmrc.gov.au/about-us/publications/nhmrc-statement-cancer-clusters (accessed 8 June 2021).

- 1.17 Community concern and media reports about a suspected cancer cluster can lead to formal scientific investigations by health authorities. These investigations aim to determine the actual incidence of cancer in that population—that is, whether there is a true cluster—and, in some cases, to identify whether there is a plausible cause for the cancer and reduce any risk of further harm. These kinds of investigations will be further discussed in chapter 3 of the report.
- 1.18 Most assessments and investigations of possible cancer clusters do not find a true statistical cluster (where the cancer incidence is greater than expected). One of the most well-known Australian cancer cluster investigations is the ‘ABC breast cancer cluster’ investigation, relating to breast cancers diagnosed in a group of ABC employees in Brisbane between 1994 and 2006. Extensive investigations into this cluster eventually established that it could be considered a true chance cluster and that the breast cancers appeared to be unrelated to each other.¹⁷
- 1.19 An American academic scientific review of 428 investigations of suspected cancer clusters found that one in eight (72 cases, or 13 per cent) of the reported cases were true cancer clusters. Of these 72, there was only one case (0.23 per cent of the total number) where the investigation found a clear cause for the cancer.¹⁸ These results are consistent with the current scientific consensus that cancer cluster investigations are highly unlikely to establish a single clear cause for the cancers under investigation in that population.¹⁹
- 1.20 This differs from investigations of suspected clusters of other diseases. For example, investigations of infectious diseases often lead to the identification of a clear cause for the disease.²⁰
- 1.21 A study of Australian print media and cancer cluster investigations between May 2006 and February 2008 found that 13 possible cancer clusters in workplace and community settings were identified across three states; however, this period of time also coincided with increased media coverage of cancer clusters, linked to the ABC cancer cluster in Brisbane.²¹ This study

¹⁷ Professor Bernard Stewart, *Submission 35*, pp. 24–25. See also Queensland Health, [Cancer cluster frequently asked questions](#), pp. 2–3 (accessed 8 June 2021).

¹⁸ Michael Goodman, Joshua S. Naiman, Dina Goodman and Judy S. LaKind, 2012, ‘Cancer clusters in the USA: What do the last twenty years of state and federal investigations tell us?’, *Critical Reviews in Toxicology*, vol. 42, no. 6, pp. 474–490, <https://doi.org/10.3109/10408444.2012.675315>.

¹⁹ National Health and Medical Research Council, *National Health and Medical Research Council statement on cancer clusters*, p. 1; Professor Bernard Stewart, *Submission 35*, pp. 27–30; [Queensland Health non-communicable disease cluster assessment guidelines 2019](#), p. 7 (accessed 8 June 2021).

²⁰ See, for example, Professor Bernard Stewart, private capacity, *Submission 35*, p. 28.

²¹ Margaret Stebbing, Evie Katz, Brian Priestly and Michael Abramson, ‘Cancer clusters in the news: Risk perception, risk communication and the media’, *Australasian Epidemiologist*, vol. 15, no. 2,

suggests that media coverage may have amplified the community's perception of risk from suspected cancer clusters.²²

- 1.22 There is very little data available on the total number of suspected cancer clusters in Australia. Queensland Health receives around 20 inquiries about suspected cancer clusters each year.²³ The Victorian Department of Health averages one inquiry about a suspected cancer cluster every two years.²⁴

Conduct of the inquiry

- 1.23 On 17 October 2019, the Senate referred an inquiry into investigations into a possible cancer cluster on the Bellarine Peninsula, Victoria to the committee for inquiry and report by 12 August 2020. The committee was granted an extension to report by 18 March 2021. The committee was granted further extensions to report by 17 June 2021, by 22 June 2021, by 24 June 2021 and by 30 June 2021.
- 1.24 The inquiry was advertised on the committee's website and the committee wrote to stakeholders inviting them to make submissions, to be lodged by 27 March 2020.²⁵ Submissions continued to be accepted after this date. The committee received 43 submissions, which can be accessed via the committee's website.
- 1.25 The committee held three public hearings:
- 1 May 2020, Canberra, ACT
 - 20 November 2020, Canberra, ACT
 - 20 April 2021, Barwon Heads, Victoria

Acknowledgements

- 1.26 The committee thanks all of the individuals and organisations who submitted to the inquiry and appeared as witnesses.

September 2008, pp. 19–34, <https://aea.asn.au/documents/ae/11-15-2-population-health-conference-2008-an-aea-precis/file> (accessed 15 February 2021).

²² Margaret Stebbing, Evie Katz, Brian Priestly and Michael Abramson, 'Cancer clusters in the news: Risk perception, risk communication and the media', *Australasian Epidemiologist*, vol. 15, no. 2, September 2008, p. 29.

²³ New Zealand Ministry of Health, *Investigating clusters of non-communicable disease: Guidelines for public health units*, 2015, p. 2 (accessed 8 June 2021).

²⁴ Dr Brett Sutton, Chief Health Officer, Department of Health and Human Services Victoria, *Committee Hansard*, 1 May 2020, p. 39.

²⁵ The inquiry website is available at: www.aph.gov.au/Parliamentary_Business/Committees/Senate/Community_Affairs/Bellarinecancercluster.

Notes on references

1.27 References to *Committee Hansard* in this report are to the proof transcripts. Page numbers may vary between the proof and official transcripts.

Chapter 2

Community concerns

- 2.1 The chapter examines the concerns expressed by members of the Barwon Heads community in relation to their health and possible exposure to chemical pesticides used on the Bellarine Peninsula for agricultural and mosquito-control purposes.
- 2.2 It starts with reviewing the health concerns and lived experiences of people and families who have lived or holidayed or still reside in Barwon Heads.
- 2.3 It then discusses the community concerns in relation to the historical use of pesticides in some specific locations. In particular, Barwon Heads residents talked about the mosquito-spraying program, which they see as a plausible cause of the cancers and autoimmune diseases that have been diagnosed in people who they contend have been repeatedly exposed to the chemicals alleged to have been used in the program.
- 2.4 The chapter also briefly outlines the responses of the health authorities and local council in relation to these community concerns. Their actions and responses are explored in detail in later chapters of the report.

Health concerns

- 2.5 In late 2016, the Victorian legal firm Gordon Legal, at the request of one individual, started to investigate the incidence of cancer amongst former teachers and students at the Drysdale campus of Bellarine Secondary College.¹ Later, two other individuals approached Gordon Legal and a test case is now underway.²
- 2.6 Reports of a possible cancer cluster on the Bellarine Peninsula started in the media in late 2018.³ Over the following months, further media articles reported cases of young people and others in the Bellarine area being diagnosed and, in some cases, dying of different types of cancer.⁴ For example, in early 2019 the *Geelong Advertiser* reported there were:

¹ Gordon Legal, *Submission 27*, p. 1.

² Gordon Legal, *Submission 27*, p. 1.

³ Debbie Cuthbertson, *The Age*, ["You've got to think it's environmental": Questions over cancer deaths](#), 29 December 2018 (accessed 4 December 2020).

⁴ See, for example, Debbie Cuthbertson, ['Explainer: Concern over cancer cases on the Bellarine Peninsula'](#), *The Age*, 6 January 2019 (accessed 7 April 2021); Debbie Cuthbertson, 'Cancer mystery bedevils Barwon', *Sunday Age*, 6 January 2019, p. 1; Anthony Colangelo, ['State health officer to probe Bellarine cancer death data'](#), *The Age*, 9 January 2019 (accessed 6 April 2021); Anthony Colangelo, 'Health chief to probe Bellarine cancer deaths', *The Age*, 11 January 2019, p. 12; Debbie

... fears of a cancer scare amid revelations families of former students who have died from cancer are seeking legal advice.⁵

- 2.7 Some later media reports also noted concerns about a high incidence of autoimmune disease.⁶
- 2.8 Based on the media reports, the Victorian Chief Health Officer (CHO) reviewed the scientific literature and cancer incidence rates within the Bellarine Peninsula and produced a report which was made public on 30 January 2019.⁷ Subsequently, the then Department of Health and Human Services (department) initiated and coordinated an interagency group to respond to the community's concerns.⁸
- 2.9 At around the same time, a community group, Discovery 3227, was set up to undertake its own investigations. The group collected health data in 2019 and 2020 by talking to community members about their health concerns. Discovery 3227 provided the committee with a register of cancer and immunological diagnoses for 196 individuals. It also submitted this same health data plotted on a map of Barwon Heads.⁹
- 2.10 At a hearing, Mr Ross Harrison, the spokesperson for Discovery 3227, explained that this spike in illnesses had affected the community as a whole:

We are talking about a very large group of people out that small township, our village, who have become ill and suffered. It's not inconsequential. There is not one person in Barwon Heads that is untouched by what's happened. Everybody knows somebody.¹⁰

Cuthbertson, 'Barwon Heads community seeks MP briefing on cancer concerns', *Sunday Age*, 13 January 2019, p.2; Benjamin Preiss, '[Law firm lashes chief health officer's report on cancer in Bellarine](#)', *The Age*, 4 March 2019 (accessed 18 March 2021); Benjamin Preiss, 'Cancer rate report criticised', *The Age*, 5 March 2019, p. 2; Georgia Holloway, '[Is there a cancer cluster in Barwon Heads, and is mossie spraying to blame?](#)', DScibe, 13 May 2019 (accessed 6 April 2021); Debbie Cuthbertson, 'Coalition, Labor vow probe into Bellarine cancer cases', *The Age*, 17 May 2019, p. 14; 'Cancer inquiry', *The Herald-Sun*, 18 October, p. 6.

- ⁵ 'Families of former Bellarine Secondary College students seek legal advice over cancer', *Geelong Advertiser*, 1 January 2019.
- ⁶ See, for example, Georgia Holloway, '[Is there a cancer cluster in Barwon Heads, and is mossie spraying to blame?](#)', DScibe, 13 May 2019; Nicole Mills, '[Senate inquiry into possible Bellarine Peninsula cancer cluster now open](#)', ABC News, 9 February 2020 (accessed 23 March 2021); '[I exposed my children to this': Locals' fears over young deaths in 'toxic' town](#)', A Current Affair, 2020 (accessed 23 March 2021); Department of Health and Human Services, *Submission 2*, p. 4.
- ⁷ Department of Health and Human Services, *Submission 2*, p. 3. Findings of the CHO report are discussed in chapter 3.
- ⁸ Department of Health and Human Services, *Submission 2*, pp. 4–5.
- ⁹ Discovery 3227, *Submission 32*, pp. 1, 4–5 and 9–12.
- ¹⁰ Mr Ross Harrison, Member, Discovery 3227, *Committee Hansard*, 1 May 2020, p. 21.

Incidence of cancers

- 2.11 Concerns about a possible cancer cluster started with a series of media reports about young people from Barwon Heads being affected by different types of cancers. In December 2018, *The Age* reported that a young woman living on the Bellarine Peninsula had died of acute myeloid leukaemia and that five other young people who lived on the Bellarine Peninsula had also recently died of cancer.¹¹
- 2.12 The next day, the *Sunday Age* published a second article.¹² This expanded on the first, and it reported that a local family had:

... heard of more than 20 young people in the area, many of whom attended the high school and are now in their late 20s and early 30s, who have been diagnosed with cancer, mainly blood disorders, in recent years.¹³

Cancers in young people

- 2.13 Some inquiry participants also identified that they were particularly concerned about cancer in young people.¹⁴ For example, Gordon Legal noted that 'the affected cohort comprises to a large extent young adults'.¹⁵
- 2.14 One submitter, a local health professional, shared her experience of seeing young people with certain types of cancer:

I had noticed that many young people in Barwon Heads were my patients and they were dying. The most common types that I was seeing were breast, brain and blood cancers.¹⁶

- 2.15 Ms Kristie Ainsworth, a long-term resident of Barwon Heads who was diagnosed with Hodgkin's lymphoma in 1999 at the age of 17, gave evidence to the committee, stressing that she was one of many young people who have suffered from poor health in the area:

In my own primary school class, nine of us were diagnosed with either a cancer or an autoimmune disease, and this is a small school in a small town. In this small town, I have eight of my own friends who have died of cancer.¹⁷

¹¹ Debbie Cuthbertson, *The Age*, ["You've got to think it's environmental": Questions over cancer deaths](#), 29 December 2018.

¹² Debbie Cuthbertson, *Sunday Age*, ["Toxic pesticide test for school"](#), 30 December 2018 (accessed 4 December 2020).

¹³ Debbie Cuthbertson, *Sunday Age*, ["Toxic pesticide test for school"](#), 30 December 2018.

¹⁴ See, for example, Discovery 3227, *Submission 32*, p. 2; Name withheld, *Submission 8*, p. 2; Nicholas Guyett, *Submission 16*, [p. 1].

¹⁵ Gordon Legal, *Submission 27*, Attachment 5, p. 3.

¹⁶ Name withheld, *Submission 8*, p. 2.

¹⁷ Ms Kristie Ainsworth, private capacity, *Committee Hansard*, 20 April 2021, p. 18.

2.16 Mr Campbell Stephenson lost his sister to acute myeloid leukaemia when she was 26. He explained to the committee that in their street also lived a mother who had lost a child to congenital leukaemia and that, nearby, a friend of his sister's had also been diagnosed with acute myeloid leukaemia. He concluded:

These blood cancers get seen as just cancer, and I can understand that, but the statistics behind them don't add up. It's got to get to a point where you need to think that this is more than bad luck.¹⁸

Types of cancer

2.17 Submitters also expressed concerns about cancer incidence in older adults and about different kinds of cancers, including cases of breast cancer, colon cancer, leukaemia, Hodgkin's lymphoma and brain cancer.¹⁹

2.18 For example, Discovery 3227 identified concerns about cases of leukaemia, non-Hodgkin's lymphoma, brain cancer, breast cancer and other cancers.²⁰

2.19 Gordon Legal submitted that the test case that is underway relates to cases of non-Hodgkin's lymphoma, Hodgkin's lymphoma and neuroendocrine cancer.²¹

2.20 In its submission, St Leonards Progress Association mentioned that at least four recent deaths were caused by lung cancer.²²

2.21 At a hearing in Barwon Heads, community members shared their experiences with the committee, including Ms Kate Bailey, who was diagnosed with cancer last year:

I worked at Barwon Heads Primary School for seven years [...] Last year, I ended up in hospital and diagnosed with cancer. I was told that I've got tumours in my brain, my spine, lymphoma. [...] They said that they have probably been developing for the last 10 to 15 years, which coincide when I was working at Barwon Heads Primary School.²³

¹⁸ Mr Campbell Stephenson, private capacity, *Committee Hansard*, 20 April 2021, p. 35.

¹⁹ See, for example, Name withheld, *Submission 25*, p. 1; Name withheld, *Submission 29*, p. 1; Samantha Judge, *Submission 20*, p. 1; Name withheld, *Submission 19*, pp. 1–2; Wayne Lockyer, *Submission 24*, p. 1; Name withheld, *Submission 39*, p. 1; Name withheld, *Submission 40*, p. 1; Name withheld, *Submission 41*, p. 1. The committee also received confidential submissions identifying other cancers of concern.

²⁰ Mr Ross Harrison, Member, Discovery 3227, *Committee Hansard*, 1 May 2020, p. 17; Discovery 3227, *Submission 32*, [p. 16].

²¹ Gordon Legal, *Submission 27*, Attachment 5, p. 1.

²² St Leonards Progress Association, *Submission 33*, p. 1.

²³ Ms Kate Bailey, private capacity, *Committee Hansard*, 20 April 2021, p. 34.

Autoimmune diseases

2.22 Community members also raised concerns about the incidence of autoimmune disorders in Barwon Heads.²⁴ In its submission, Discovery 3227 contended that many people have presented with:

... a vast array of autoimmune disease i.e. gut disease (Crohns, Ulcerative Colitis, Inflammable Bowel Disease), thyroid disease.²⁵

2.23 Danielle, a mother of two children with autoimmune diseases who moved to Barwon Heads in 1997 when her children were very young, expressed the view that 'ulcerative colitis, Crohn's and irritable bowel syndrome have a very high incidence in this area'.²⁶

2.24 Ms Kristie Ainsworth also talked about her belief that Barwon Heads has a very high incidence of autoimmune diseases:

In this small town I have 24, and counting almost daily, friends who have got autoimmune diseases. These are just my close friends and this is just my story. I'm standing here today because something is seriously wrong with this town and it needs to be fixed. I've been a local resident for 39 years and, over this time, I've watched friends die and struggle with autoimmune diseases.²⁷

Geographic locations

2.25 The early media coverage reported community concerns about a possible cancer cluster among former students at either Barwon Heads Primary School or the Drysdale campus of Bellarine Secondary College.²⁸

Barwon Heads Primary School and Village Park

2.26 Discovery 3227 told the committee that it believed the incidence of cancer and autoimmune disease was very high in the areas of the Barwon Heads township surrounding the 58-acre Village Park.²⁹

2.27 Mr Ross Harrison of Discovery 3227 explained to the committee that many local children had played in the Village Park, an area that he alleges was sprayed regularly with a variety of chemicals to kill mosquitoes:

²⁴ See, for example, Samantha Judge, *Submission 20*, p. 1; Name withheld, *Submission 4*, p. 1; Name withheld, *Submission 6*, p. 1; Name withheld, *Submission 8*, pp. 1–3.

²⁵ Discovery 3227, *Submission 32*, p. 1.

²⁶ Danielle, private capacity, *Committee Hansard*, 20 April 2021, p. 24.

²⁷ Ms Kristie Ainsworth, private capacity, *Committee Hansard*, 20 April 2021, p. 18.

²⁸ See, for example, Anthony Colangelo, '[State health officer to probe Bellarine cancer death data](#)', *The Age*, 9 January 2019; Debbie Cuthbertson, '[It's gut-wrenching': Barwon Heads cancer toll mounts](#)', *The Age*, 5 January 2019 (accessed 7 April 2021); Debbie Cuthbertson, '[Kristie Ainsworth is lucky to be alive, but feels guilty every day](#)', *The Age*, 13 January 2019 (accessed 7 April 2021).

²⁹ Mr Ross Harrison, Member, Discovery 3227, *Committee Hansard*, 1 May 2020, p. 20.

It was like a backyard for many of the locals, in 1991/92 the Geelong Council revamped the basin in the Village Park and built playgrounds and structures to encourage many of the community in that area to stay and recreate in park, many played and made cubby houses in the trees.³⁰

2.28 Discovery 3227 said it had identified 37 children who had played in the Village Park and later been diagnosed with cancer or an autoimmune disease.³¹

2.29 Other community members also talked about the Village Park and its vicinities, including Barwon Heads Primary School, as key locations where people now diagnosed with cancers or autoimmune diseases had previously lived or recreated.³² For example, Ms Ainsworth explained how as children they spent much of their time in the Village Park:

We didn't just ride our bikes through this park. We played in it; basically lived in it. [...] It was just Barwon Heads' playground, really.³³

Drysdale campus of Bellarine Secondary College

2.30 Another area mentioned during the inquiry was the Drysdale campus of Bellarine Secondary College. This location is linked to the Gordon Legal test case, which relates to three cases of cancer connected with the Drysdale campus of Bellarine Secondary College between 1997 and 2007.³⁴

2.31 In its written submission, Gordon Legal concluded:

... a reasonable assessment of the available evidence suggests there was an elevated risk of, and incidence of, cancers for the school population of the Drysdale campus of Bellarine Secondary College in the first decade of its operation; (i.e. from 1997,) probably because of the presence in and around the site of multiple organochlorine pesticides.³⁵

Responses to community concerns about cancer incidence rates

2.32 As mentioned previously, the department was made aware of the health concerns of the community through the media reports in late 2018 and early 2019. The department and the CHO started to engage with the community through the production of a first epidemiological report in January 2019, using data from the Australian Cancer Atlas. In February 2019 an interagency group

³⁰ Mr Ross Harrison, *Submission 31*, pp. 3–4.

³¹ Discovery 3227, *Submission 32*, p. 3.

³² See, for example, Ms Kristie Ainsworth, private capacity, *Committee Hansard*, 20 April 2021, p. 18; Ms Samantha Wigmore, private capacity, *Committee Hansard*, 20 April 2021, p. 21; Danielle, private capacity, *Committee Hansard*, 20 April 2021, p. 24.

³³ Ms Kristie Ainsworth, private capacity, *Committee Hansard*, 20 April 2021, p. 18.

³⁴ Gordon Legal, *Submission 27*, p. 1; Mr Peter Gordon, Senior Partner, Gordon Legal, *Committee Hansard*, 1 May 2020, p. 9.

³⁵ Gordon Legal, *Submission 27*, p. 17.

was established and a Community Open House event was held in Barwon Heads to directly respond to community questions and concerns.³⁶

- 2.33 Both the CHO's report and the independent expert advice provided by the Potential Cancer Cluster Expert Advisory Group concluded that there appeared to be no evidence of a cancer cluster.³⁷
- 2.34 A number of individuals and community organisations criticised the January 2019 investigations initiated by the CHO.³⁸ Issues identified included a perceived failure to interrogate rates of cancer for the appropriate age cohort of young adults,³⁹ a 'flawed methodology',⁴⁰ and an apparent mismatch between the community's experience of local cancer cases and the findings of the epidemiological analysis suggesting there was no cancer cluster.⁴¹
- 2.35 In response to these criticisms, a second epidemiological analysis was carried out by Cancer Council Victoria at the request of the CHO. This analysis used data from the Victorian Cancer Registry from 2001 to 2016, including data for young people aged 10 to 34.⁴² It reported in October 2019 that there was 'no material evidence of excess cancer rates'.⁴³
- 2.36 Following the public hearing held on 1 May 2020, at which the committee raised concerns about the period of time considered by Cancer Council Victoria, the CHO agreed to extend the Cancer Council Victoria analysis back as far as 1982.⁴⁴ In April 2021 the CHO released the updated report, and he presented the findings at the hearing held in Barwon Heads on 20 April 2021.⁴⁵

³⁶ See, Professor Brett Sutton, Chief Health Officer, Department of Health and Human Services Victoria, *Committee Hansard*, 1 May 2020, p. 37; Department of Health and Human Services, *Submission 2*, p. 3; Professor Brett Sutton, Chief Health Officer, Department of Health and Human Services Victoria, answer to written question on notice, 1 May 2020 (received 25 September 2020), p. 1. The investigations to date are discussed in chapter 3.

³⁷ Department of Health and Human Services, *Submission 2*, p. 8. The Potential Cancer Cluster Expert Advisory Group is discussed in chapter 3.

³⁸ See, for example, Discovery 3227, *Submission 32*, p. 3; Nicholas Guyett, *Submission 16*; Name withheld, *Submission 8*, p. 2; Name withheld, *Submission 29*.

³⁹ See, for example, Nicholas Guyett, *Submission 16*, [p.1]; Gordon Legal, *Submission 27*, Attachment 5, pp. 2–3.

⁴⁰ Discovery 3227, *Submission 32*, p. 3.

⁴¹ See, for example, Name withheld, *Submission 8*, p. 2; Name withheld, *Submission 29*, [p. 1].

⁴² Department of Health and Human Services, *Submission 2*, p. 4.

⁴³ Department of Health and Human Services, *Submission 2*, p. 4.

⁴⁴ Professor Brett Sutton, Chief Health Officer, Department of Health and Human Services Victoria, *Committee Hansard*, 20 April 2021, p. 27.

⁴⁵ Professor Brett Sutton, Chief Health Officer, Department of Health and Human Services Victoria, *Committee Hansard*, 20 April 2021, p. 27.

- 2.37 The report update found no substantive evidence of increased incidence other than for breast cancer. For breast cancer, there was an estimated 24 per cent excess incidence relative to the Victorian average.⁴⁶
- 2.38 Chapter 3 examines in detail the department's responses and investigations into the community's health concerns. Chapter 3 also discusses the community's responses to the investigations and their interactions with the department and local authorities.

Historical use of pesticides

- 2.39 Overall, submitters expressed the view that the cases of cancer and autoimmune disease in Barwon Heads were linked to the historical use of pesticides.⁴⁷
- 2.40 Initially, community concerns related to the possibility that organochlorine pesticides (OCPs), especially dieldrin, may have caused many cases of cancer in the community.⁴⁸ Over time, other concerns emerged, mostly related to the mosquito-spraying programs conducted by the City of Greater Geelong Council (City) and former council entities. Of most concern is the alleged extensive use of organophosphate pesticides (OPs) for mosquito control.⁴⁹

Organochlorine pesticides (OCPs)

- 2.41 Between November 2016 and September 2018, concerns were raised by Gordon Legal, by Bellarine Secondary College parents, and by other community members about possible historical exposures to multiple OCPs including dieldrin.⁵⁰

⁴⁶ Cancer Council Victoria, *Bellarine Peninsula cancer incidence report: Update*, 15 March 2021, p. 5. The report update is discussed in chapter 3.

⁴⁷ See, for example, Mr Wayne Lockyer, *Submission 24*, p. 1; Gordon Legal, *Submission 27*, p. 4; Mr Ross Harrison, *Submission 31*, p. 4.

⁴⁸ See, for example, Gordon Legal, *Submission 27*, p. 3; Professor Brett Sutton, Chief Health Officer, Department of Health and Human Services, *Committee Hansard*, 1 May 2020, p. 37; Debbie Cuthbertson, *The Age*, ['"You've got to think it's environmental': Questions over cancer deaths'](#), 29 December 2018 (accessed 4 December 2020); Debbie Cuthbertson, 'Explainer: Concern over cancer cases on the Bellarine Peninsula', *The Age*, 6 January 2019.

⁴⁹ See, for example, Department of Health and Human Services, *Submission 2*, p. 4; City of Greater Geelong, *Submission 3*, p. 3.

⁵⁰ See, for example, Gordon Legal, *Submission 27*, pp. 6–7; Department of Health and Human Services, *Submission 2*, Attachment 1 (The Chief Health Officer's investigation of cancer rates on the Bellarine Peninsula), p. 4; Debbie Cuthbertson, ['School tested for toxic pesticide as test case looms amid cancer fears'](#), *The Age*, 30 December 2018.

- 2.42 Between the mid-1940s and the 1980s, up to 150 commercial OCPs were registered for use in Australia.⁵¹ The active ingredients in these pesticides were chlorinated hydrocarbon derivatives known as organochlorines. During this period, OCPs such as dieldrin and dichlorodiphenyltrichloroethane (DDT) were widely used across Australia and around the world to protect agricultural assets and homes from insect damage.⁵²
- 2.43 During this time dieldrin was used by potato farmers on the Bellarine Peninsula, who rotated potato cropping with grazing beef cattle.⁵³
- 2.44 Dieldrin was largely withdrawn from use in Australia in 1987. In 1987, United States testing of Australian beef exports revealed unsafe levels of dieldrin, including from farms on the Bellarine Peninsula. This led to trade restrictions, the quarantining of 200 farms on the peninsula, and, later, a \$1.75 million payout after a successful class action by 51 farmers against the Victorian government for its advice on dieldrin use.⁵⁴
- 2.45 Since then there has been extensive soil testing on the Bellarine Peninsula which has consistently found very low risks of exposure to OCPs, including dieldrin.⁵⁵
- 2.46 Gordon Legal submitted its concerns about dieldrin and 12 other OCPs, as well as concerns about the effects of exposure to combinations of these chemicals.⁵⁶

Mosquito-spraying program

- 2.47 Most submitters were concerned about the chemical insecticides used by local government for mosquito control and a possible link between these chemicals and cancer and autoimmune diseases.⁵⁷

⁵¹ Department of Agriculture, Water and the Environment, [Organochlorine pesticides \(OCPs\): Trade or common use names](#), April 1997 (accessed 13 May 2021).

⁵² Department of Agriculture, Water and the Environment, *Organochlorine pesticides (OCPs): Trade or common use names*, Scheduled Wastes Fact Sheet No. 5 (revised), April 1997; Cardinia Shire Council, *Northern Ranges Green Wedge Management Plan: Issues paper*, June 2010, p. 12.

⁵³ City of Greater Geelong, [Dieldrin and cancer concerns on the Bellarine Peninsula: Community information](#), February 2019, p. 2 (accessed 8 June 2021).

⁵⁴ Department of Health and Human Services, *Submission 2*, Attachment 1 (The Chief Health Officer's investigation of cancer rates on the Bellarine Peninsula), p. 7; City of Greater Geelong, *Dieldrin and cancer concerns on the Bellarine Peninsula: Community information*, February 2019, p. 2.

⁵⁵ Department of Health and Human Services, *Submission 2*, Attachment 1 (The Chief Health Officer's investigation of cancer rates on the Bellarine Peninsula), p. 7.

⁵⁶ Gordon Legal, *Submission 27*, p. 3.

⁵⁷ See, for example, Mr Ross Harrison, *Submission 31*, p. 5; Ms Kristie Ainsworth, private capacity, *Committee Hansard*, 20 April 2021, p. 18; Name withheld, *Submission 6*, p. 1; Name withheld, *Submission 25*, [p. 1].

2.48 The department acknowledged that, at the Community Open House event in February 2019, 'community members raised concerns about the historical mosquito-spraying program in the local area of Barwon Heads'.⁵⁸

2.49 For example, one submitter, after reading information about the health concerns people have experienced in the community, stated:

I wonder if my sickness and gut health was damaged from mosquito spray runoff into the Barwon River which flows out and onto Ocean Grove main beach.⁵⁹

Organophosphate insecticides and pyrethroid insecticides

2.50 In particular, inquiry participants identified possible exposures to a number of specific organophosphate-based insecticides which they believe were used widely for mosquito control by local councils over the years.⁶⁰

2.51 Mr Harrison of Discovery 3227 alleged that the council used a range of organophosphates including temephos, malathion, dichlorvos, fenthion, diazinon and chlorpyrifos from the mid-1970s to 2008 and asserted:

These pesticides and chemicals, used over a long period of time by the City of Greater Geelong and its former agencies, are deemed likely carcinogens by IARC [the International Agency for Research on Cancer]. They are known endocrine disruptors and currently acknowledged for DNA methylation, as previously suggested.⁶¹

2.52 At a hearing, Ms Kristie Ainsworth, who was diagnosed with Hodgkin's lymphoma in 1999, expressed a similar view, stating that: 'the town's cancer and autoimmune cluster is a direct result of the organophosphates used to treat mosquitoes'.⁶²

2.53 Another perspective was offered by a local resident who believed that community concerns about organophosphate pesticides were unfounded and not supported by scientific evidence.⁶³

2.54 Discovery 3227 also raised concerns about the use of synthetic pyrethroid insecticides.⁶⁴ Mr Harrison expressed the view that the disease burden

⁵⁸ Department of Health and Human Services, *Submission 2*, p. 9. The Community Open House event is discussed in chapter 3.

⁵⁹ Name withheld, *Submission 4*, p. 1.

⁶⁰ See, for example, Mr Ross Harrison, *Submission 31*, p. 5; Discovery 3227, *Submission 32*, p. 1; Name withheld, *Submission 5*, pp. 1–2; Name withheld, *Submission 8*, p. 1.

⁶¹ Mr Ross Harrison, Spokesperson and member, Discovery 3227, *Committee Hansard*, 20 April 2021, p. 10.

⁶² Ms Kristie Ainsworth, private capacity, *Committee Hansard*, 20 April 2021, p. 18.

⁶³ Name withheld, *Submission 10*, [pp. 1–2].

⁶⁴ Mr Ross Harrison, Spokesperson and member, Discovery 3227, *Committee Hansard*, 20 April 2021, p. 10.

experienced by Barwon Heads residents was 'not the result of one pesticide but a group of OP pesticides and synthetic pyrethroids'.⁶⁵

Methods of application for mosquito-control chemicals

2.55 Mr Harrison of Discovery 3227 told the committee that he believed that OPs and other insecticides were applied by the council through various methods:

The City of Greater Geelong and its former agencies sprayed, fumigated, fogged with residual organophosphate pesticides and man-made pyrethroid insecticides.⁶⁶

2.56 In his written submission to the inquiry, Mr Harrison explained his understanding of the methods of application in more detail, stating his belief that there was a 'rotation of chemicals used on a periodic basis':

... the methods of controlling mosquito's and its larvae come in basically 3 methods, water treatment, barrier spraying (where mosquito's roost) and fogging, both of the latter which requires vaporisation of the chemical to target the adult mosquito. The latter methodology took place on a systematic basis for nearly 35 years, of a variety of chemicals but the OP's spraying continued for 25 years or so [...].⁶⁷

Fogging

2.57 A number of other submitters also spoke of their concerns about the methods used by the City to apply mosquito-control chemicals, making reference to regular spraying and 'fogging' in particular.⁶⁸

2.58 Ms Samantha Wigmore, a resident of Barwon Heads since 1996, talked about her experience:

I do remember smelling strange odours when walking through the park on numerous occasions ... We were aware of the mosquito spraying around town although the council didn't inform us when and where it was taking place.⁶⁹

⁶⁵ Mr Ross Harrison, Spokesperson and member, Discovery 3227, *Committee Hansard*, 20 April 2021, p. 11.

⁶⁶ Mr Ross Harrison, Spokesperson and member, Discovery 3227, *Committee Hansard*, 20 April 2021, p. 10.

⁶⁷ Mr Ross Harrison, *Submission 31*, [p. 3].

⁶⁸ See, for example, Name withheld, *Submission 8*, p. 1; Ms Kristie Ainsworth, private capacity, *Committee Hansard*, 20 April 2021, p. 19; Name withheld, *Submission 38*, p. 1; Name withheld, *Submission 39*, p. 1; Name withheld, *Submission 40*, p. 1.

⁶⁹ Ms Samantha Judge, *Submission 20*, p. 2.

- 2.59 Some submitters expressed the view that fogging was done regularly.⁷⁰ For example, Danielle, a Barwon Heads resident between 1997 and 2008, talked about the fogging around the Village Park:

The fogging was definitely a regular feature of the early mornings and going to school. When we woke up in the morning, there was fog clinging around the mangroves.⁷¹

- 2.60 Mr Wayne Lockyer, a former resident of Barwon Heads, described his experience of the mosquito-spraying program:

The fog was as thick as smoke whilst it was being pumped out and I assumed that they were fogging for mosquitos ... The spraying was always done at night time and I never really gave it much consideration as to what they were spraying.⁷²

- 2.61 However, at a hearing, the City told the committee that fogging was not part of the core program for mosquito control:

Regarding the fogging or application, particularly around Barwon Heads Village Park and the like, it wasn't a part of the core program.[...] The suggestion that [it was] done continuously, all year round over a long period of time, is not true on all the information and evidence we have.⁷³

- 2.62 Additionally, the City explained that pyrethrum, a natural insecticide, was the active ingredient for the fogging, which was used to kill flying, live insects.⁷⁴

Larvicides

- 2.63 The City told the committee that Abate (temephos) is a larvicide used in water bodies to target mosquito larvae, and that it is not used for fogging adult mosquitoes.⁷⁵

- 2.64 A former employee of the City who worked on the mosquito-control program in the mid-1990s detailed spraying of marshlands with *Bacillus thuringiensis*

⁷⁰ See, for example, Ms Kristie Ainsworth, private capacity, *Committee Hansard*, 20 April 2021, p. 20; Ms Samantha Judge, *Submission 20*, p. 22; Mr Ross Harrison, *Submission 31*, [p. 3]; Name withheld, *Submission 39*, [p. 1].

⁷¹ Danielle, private capacity, *Committee Hansard*, 20 April 2021, p. 24.

⁷² Mr Wayne Lockyer, *Submission 24*, p. 1.

⁷³ Mr Gareth Smith, Director City Planning & Economy, City of Greater Geelong, *Committee Hansard*, 20 April 2021, p. 7.

⁷⁴ Mr Lyndon Ray, Coordinator Environmental Health, City of Greater Geelong, *Committee Hansard*, 20 April 2021, p. 4.

⁷⁵ Mr Lyndon Ray, Coordinator Environmental Health, City of Greater Geelong, *Committee Hansard*, 20 April 2021, p. 4.

israelensis (Bti).⁷⁶ He stated that the team mainly used natural products such as VectoBac (Bti) and pyrethrum-based products.⁷⁷

- 2.65 This individual also submitted that Abate (temephos) granules were used in locations where spraying was difficult to undertake, either in paper bags in wetland areas away from the community, or in canvas fire hose sections placed in storm water drains.⁷⁸

Scepticism

- 2.66 Not all submitters believed there was a possible link between the historical mosquito-spraying programs and cancer and other diseases.⁷⁹ One submitter, a long-term resident of Barwon Heads with qualifications in toxicology, epidemiology and chemical exposures stated:

I am very sceptical about the claims that have been made regarding higher cancer and other disease rates in Barwon Heads (and the broader Bellarine) and any involvement from past mosquito spraying practices. Like many people in the community I have watched the media reports and posts regarding these claims with some disbelief and concern. I have some major problems with the line of investigation of the people raising the concerns, and as far as I can see they have not provided any credible evidence to back-up their accusations.⁸⁰

Responses to community concerns about a link between cancer and the historical use of pesticides

- 2.67 Both state and local government authorities have responded to the concerns raised by residents about the use of agricultural chemicals and other pesticides on the Bellarine Peninsula and especially in the Barwon Heads area.⁸¹
- 2.68 In January 2019, the City undertook a complete review of soil contamination assessments associated with rezoning of farming land to residential land in the Bellarine Peninsula area. This review found that concentrations of organochlorine pesticides including dieldrin and DDT were below the recommended safe levels.⁸²

⁷⁶ Name withheld, *Submission 36*, [p. 1].

⁷⁷ Name withheld, *Submission 36*, [p. 1].

⁷⁸ Name withheld, *Submission 36*, [p. 1].

⁷⁹ See, for example, Name withheld, *Submission 10*, p. 1; Department of Health and Human Services, *Response by the Victorian Chief Health Officer, Professor Brett Sutton, to submissions 31 and 32* (received 25 September 2020), p. 7.

⁸⁰ Name withheld, *Submission 10*, p. 1.

⁸¹ See, for example, Department of Health and Human Services, *Submission 2*, pp. 8–9; City of Greater Geelong, *Submission 3*, [pp. 3–4].

⁸² City of Greater Geelong, *Submission 3*, [pp. 3–4].

- 2.69 Also in early 2019, soil testing at Barwon Heads Primary School, commissioned by the Victorian Department of Education and Training in response to community concern, found no concerning residual pesticide levels in the soil.⁸³
- 2.70 Chapter 3 further discusses the initial community concerns about a suspected cancer cluster and the historical use of dieldrin and other organochlorine pesticides and the developing concerns about the incidence of autoimmune diseases. It details the state and local government responses to these concerns, and communications between the community and the authorities.
- 2.71 Chapter 4 examines the historical use of mosquito insecticides on the Bellarine Peninsula. Chapter 5 discusses issues raised by inquiry participants relating to the alleged use of organophosphate insecticides and pyrethroid insecticides. Chapter 5 also considers whether there may have been any past community exposures to these chemical insecticides, and whether these exposures were likely to have been at levels that could have caused cancer or autoimmune diseases in the Barwon Heads population.

Committee view

Health concerns

- 2.72 The committee recognises the suffering, stress and sadness experienced by Barwon Heads residents who have experienced cancer either personally or within close family or social networks. Similarly, being diagnosed with an autoimmune disease is very distressing for the person affected and for their family and friends. In a small town like Barwon Heads, each cancer or autoimmune diagnosis can affect the whole community. It is understandable that people question why cancers and autoimmune diseases are happening in their community, especially amongst young people.
- 2.73 The committee again thanks the Barwon Heads residents who shared their lived experiences with the committee at the Barwon Heads Community Hall. The committee recognises how difficult it can be to share such intimate and painful experiences. These testimonies are important and cannot be underestimated.
- 2.74 The committee acknowledges that the members of the community who participated in the inquiry have not been satisfied with the Victorian Department of Health's investigations to date in relation to their health concerns. Some community members remain of the view that there is an abnormally high incidence of cancer and autoimmune diseases in Barwon Heads.

⁸³ City of Greater Geelong, *Submission 3*, [pp. 3–4].

Mosquito-spraying program

- 2.75 The committee acknowledges that the pesticides allegedly used in the mosquito-spraying program, especially organophosphate pesticides, are the main source of concern for the Barwon Heads community. Furthermore, the committee understands that the community is particularly concerned that it is the methods of application, especially fogging, that may have caused cancers or autoimmune disorders.
- 2.76 The committee acknowledges that the Victorian Department of Health and the City of Greater Geelong do not agree with some of the evidence given by community members and by the community group Discovery 3227.

Chapter 3

Responses to community concerns

- 3.1 This chapter examines investigations by the Victorian Department of Health (department) and Chief Health Officer (CHO) into the possible cancer cluster on the Bellarine Peninsula.
- 3.2 The chapter first considers recommended approaches to investigating suspected cancer clusters and the difficulties inherent in such investigations. It then details the approaches taken by the department and the CHO in responding to the community's concerns about the incidence of cancer and autoimmune diseases on the Bellarine Peninsula. It also discusses the responses of the authorities in relation to the concerns raised about the historical use of pesticides. Finally, it outlines some of the potential gaps in the responses and investigations to date, which are further explored in chapters 4 and 5.

Cancer cluster assessments

Process for investigating suspected cancer clusters

- 3.3 In Australia, reports of suspected cancer clusters are assessed by the relevant state/territory agency (usually the health department) according to its own procedures.¹ The National Health and Medical Research Council recommends that, in determining whether a cluster is present, the agency's first investigative step should include both epidemiology and hazard assessment and that:

... the detection of significant epidemiological and exposure concerns would indicate the need for further assessment.²

- 3.4 In other words, an agency should assess both the incidence of cancer in a given population (epidemiological concerns) and whether there is a plausible cause of cancer in the given population (exposure concerns). The findings of this first step will determine whether any further investigations are necessary. *The National Health and Medical Research Council Statement on Cancer Clusters*

¹ For example, NSW Minister of Health, [Responding to cancer clusters in NSW](#), 2020 (accessed 1 March 2021); Queensland Health, [Queensland Health non-communicable disease cluster assessment guidelines 2019](#) (accessed 1 March 2021); Department of Health, Western Australia, [Guidelines for the investigation of cancer clusters in Western Australia](#), February 2017 (accessed 1 March 2021).

² [National Health and Medical Research Council Statement on Cancer Clusters](#) 2012, p. 2 (accessed 8 June 2021).

states that: 'most reports of a suspected cancer cluster can be resolved when they are first reported'.³

- 3.5 The first step should collect detailed information about the individual cases that make up the suspected cancer cluster, both in relation to the diagnosis and type of cancer for each individual and in relation to each individual's possible exposure to specific environmental or occupational hazards.⁴ This has been called 'establishing the facts' and partly relies on information provided directly to the agency by members of the concerned community.⁵ This step gives the investigating agency the key information about the geographic area of concern; the number of individuals, their diagnoses and other health data; and any possible chemical exposures and the time frame for these.⁶ These facts assist the health agency to assess the two elements of epidemiology and exposure.
- 3.6 In his submission, Professor Bernard Stewart, a leading expert in cancer clusters, carcinogens and cancer data, confirmed that an initial investigation of a suspected cancer cluster should consider the two elements identified above, increased incidence and plausible causation, and, importantly, that equal attention should be paid to both elements.⁷ At the hearing on 20 November 2020, Professor Stewart emphasised the importance of the second element:

Even if the incidence of cancer is greater than expected, that's not the problem. It doesn't establish the causal relationship ...

The crucial question is not, 'What is the cancer incidence in the affected population?' but, 'Is there a plausible cause of cancer that has affected this population?'⁸

- 3.7 Professor Stewart also confirmed the importance of determining the details of the individual cancer cases in question, for example, the types of cancer that are of concern to the community. He explained that true cancer clusters caused by a carcinogen will consist of either a single type of cancer or a group of cancers that are known to be related. He concluded:

... no authority in the world recognises as requiring thorough investigation cancer clusters that involve multiple tumour types, because every specific known carcinogen causes a particular group of cancers.⁹

³ National Health and Medical Research Council Statement on Cancer Clusters, 2012, p. 2.

⁴ National Health and Medical Research Council Statement on Cancer Clusters, 2012, p. 3.

⁵ Public Health England, [Guidance for investigating non-infectious disease clusters from potential environmental causes](#), February 2019, p. 11.

⁶ Public Health England, *Guidance for investigating non-infectious disease clusters from potential environmental causes*, February 2019, p. 11.

⁷ Professor Bernard Stewart, Private capacity, *Submission 35*, p. 4.

⁸ Professor Bernard Stewart, Private capacity, *Committee Hansard*, 20 November 2020, p. 12.

- 3.8 If epidemiological or exposure concerns are not resolved at this first step, the National Health and Medical Research Council recommends a staged approach, with each later step being taken only if required by the findings of the previous step. These further steps are cluster assessment, further assessment (if a cluster is present), and monitoring.¹⁰ The NHRMC also recommends reporting of suspected cancer cluster assessments.¹¹ This staged approach reflects international best practice on how to approach reports of suspected cancer clusters.¹²
- 3.9 If required, the further assessment may include more focused epidemiological and statistical analysis to determine whether a true cluster exists; and a more in-depth analysis of the cancers of concern and any occupational or environmental exposures that might represent a plausible causation.¹³ In rare cases, an aetiological study may be undertaken to determine whether a true cluster can be explained by any of the possible exposures.¹⁴
- 3.10 Good communication with concerned individuals and communities at every stage is a fundamental element of Australian¹⁵ and international¹⁶ best practice for investigating suspected cancer clusters. The UK *Guidance for investigating non-infectious disease clusters from potential environmental causes* explains the reasons for this:

⁹ Professor Bernard Stewart, Private capacity, *Committee Hansard*, 20 November 2020, p. 12.

¹⁰ *National Health and Medical Research Council Statement on Cancer Clusters*, 2012, p. 2.

¹¹ *National Health and Medical Research Council Statement on Cancer Clusters*, 2012, pp. 3–4.

¹² *National Health and Medical Research Council Statement on Cancer Clusters*, 2012, p. 3. See also Centers for Disease Control and Prevention (United States), [Investigating suspected cancer clusters and responding to community concerns: Guidelines from CDC and the Council of State and Territorial Epidemiologists](#), September 2013; Public Health England, *Guidance for investigating non-infectious disease clusters from potential environmental causes*, February 2019.

¹³ See, for example, Public Health England, *Guidance for investigating non-infectious disease clusters from potential environmental causes*, February 2019; Centers for Disease Control and Prevention (United States), *Investigating suspected cancer clusters and responding to community concerns: Guidelines from CDC and the Council of State and Territorial Epidemiologists*, September 2013.

¹⁴ See, for example, Public Health England, *Guidance for investigating non-infectious disease clusters from potential environmental causes*, February 2019, pp. 9 and 20–25; *National Health and Medical Research Council Statement on Cancer Clusters*, 2012, p. 3; Department of Health and Human Services, *Submission 2*, p. 7–8.

¹⁵ See, for example, *National Health and Medical Research Council Statement on Cancer Clusters*, 2012, p. 3; NSW Minister of Health, *Responding to cancer clusters in NSW*, 2020, p. 20–22; Queensland Health, *Queensland Health non-communicable disease cluster assessment guidelines 2019*, p. 61–62.

¹⁶ See, for example, New Zealand Ministry of Health, [Investigating clusters of non-communicable disease: Guidelines for public health units](#), 18 May 2015, pp. 29–33; Centers for Disease Control and Prevention (United States), *Investigating Suspected Cancer Clusters and Responding to Community Concerns: Guidelines from CDC and the Council of State and Territorial Epidemiologists*, September 2013, Appendix B.

In addition to having epidemiological and statistical investigations, it is important to understand the social dimensions of a cluster: the community's perception of risk, potential legal ramifications and the role or influence of the media. Addressing communication activities at each stage of the cluster investigation and developing and maintaining community relationships and trust will help the credibility and understanding of the investigation¹⁷

- 3.11 Professor Stewart submitted that communications should be clear about the limitations of suspected cancer cluster investigations with regard to identifying a plausible cause, highlighting the fact that 'there is complete agreement that cluster investigations do not provide insight regarding cancer causation'.¹⁸ His submission states that:

Communication is fundamental to the perception of cancer clusters and the related failure to understand what (apart from smoking and asbestos) causes cancer. Health authorities can declare what is proven to cause cancer but can't list what is proven not to.¹⁹

Difficulties with assessing suspected cancer clusters

- 3.12 Reports of suspected cancer clusters are notoriously difficult to investigate. The US Centers for Disease Control and Prevention website says:

The complex nature of cancer makes it inherently challenging to identify, interpret, and address cancer clusters.²⁰

- 3.13 Inquiry participants also highlighted the difficulties associated with assessing a suspected cancer cluster.²¹ For example, Distinguished Professor of Epidemiology Lin Fritschi told the committee:

Cancer cluster investigations are extraordinarily difficult. They end up being, I think, very unsatisfactory for everybody involved.²²

- 3.14 Submitters to the inquiry and expert witnesses identified a number of known difficulties with suspected cancer cluster investigations, including:

¹⁷ Public Health England, *Guidance for investigating non-infectious disease clusters from potential environmental causes*, February 2019, p. 5.

¹⁸ Professor Bernard Stewart, private capacity, *Submission 35*, p. 29 (Appendix 2).

¹⁹ Professor Bernard Stewart, private capacity, *Submission 35*, p. 30 (Appendix 2).

²⁰ Centers for Disease Control and Prevention (United States), [About cancer clusters](#), 14 May 2019 (accessed 8 June 2021).

²¹ See, for example, Department of Health and Human Services, *Submission 2*, p. 6.; Department of Health and Human Services, *Response by the Victorian Chief Health Officer, Professor Brett Sutton, to submissions 31 and 32* (received 25 September 2020), pp. 3–4; Professor Lin Fritschi, Private capacity, *Committee Hansard*, 20 November 2020, p. 9; Professor Bernard Stewart, Private capacity, *Committee Hansard*, 20 November 2020, p. 12; Professor Andrew Watterson, Private capacity, *Committee Hansard*, 20 November 2020, p. 26.

²² Professor Lin Fritschi, Private capacity, *Committee Hansard*, 20 November 2020, p. 9.

- the latency period, or time lag, of at least five but up to 45 years between exposure to a possible cause and the appearance of cancer;²³
- identifying the cohort of interest, and the related issue of population mobility, which means it may not be possible to locate the entire cohort;²⁴
- the question of identifying and quantifying historical exposures for each person in the cohort;²⁵
- the limitations of statistical analysis of a small population in the area of interest;²⁶
- the possibility of alternative explanations (for example, genetic or lifestyle risk factors) for each particular cancer or alternative exposures for a particular individual, (for example, any exposures that occurred away from a person's home address);²⁷
- the likelihood that the investigation will fail to establish either a true statistical cluster or a cause for the cluster;²⁸ and
- the difficulty of assessing the value of further investigations, given that these are resource-intensive and unlikely to provide definitive answers and may cause further distress to the community.²⁹

3.15 Investigations of suspected cancer clusters are very unlikely to completely explain any individual case of cancer. To this effect, Professor Fritschi told the committee:

... there aren't ways to say, 'This cancer in this person was caused by this exposure to this chemical'—we don't know how to do that, and that's unfortunate.³⁰

²³ See, for example, Professor Tim Driscoll, Potential Cancer Cluster Expert Advisory Group, *Committee Hansard*, 1 May 2020, p. 26; Dr Brett Sutton, Chief Health Officer, Department of Health and Human Services Victoria, *Committee Hansard*, 1 May 2020, p. 40.

²⁴ See, for example, Department of Health and Human Services, *Submission 2*, p. 6; Professor Lin Fritschi, Private capacity, *Committee Hansard*, 11 November 2020, p. 9.

²⁵ Professor Lin Fritschi, Private capacity, *Committee Hansard*, 20 November 2020, p. 8.

²⁶ See, for example, Professor Roger Milne, Head of Cancer Epidemiology, Cancer Council Victoria, *Committee Hansard*, 1 May 2020, p. 5; Professor Lin Fritschi, Private capacity, *Committee Hansard*, 20 November 2020, p. 7.

²⁷ See, for example, Department of Health and Human Services *Response by the Victorian Chief Health Officer, Professor Brett Sutton, to submissions 31 and 32* (received 25 September 2020), p. 37; Professor Andrew Watterson, *Submission 37*, p. 5.

²⁸ Dr Roger Drew, Private capacity, *Committee Hansard*, 20 November 2020, p. 19.

²⁹ See, for example, Dr Brett Sutton, Chief Health Officer, Department of Health and Human Services Victoria, *Committee Hansard*, 1 May 2020, p. 40; Potential Cancer Cluster Expert Advisory Group, answer to written question on notice, 1 May 2020 (received 26 May 2020), pp. 1–2.

³⁰ Professor Lin Fritschi, Private capacity, *Committee Hansard*, 20 November 2020, p. 10.

Government responses to community concerns

- 3.16 The Victorian CHO has a statutory function under the *Public Health and Wellbeing Act 2008* (Vic) to provide expert clinical and scientific advice and leadership on issues impacting public health. The department advised that it not uncommonly examines concerns about potential non-communicable disease clusters in the community, particularly if the concern is related to an environmental hazard or contaminant.³¹
- 3.17 As the municipal authority for the Bellarine Peninsula, the City of Greater Geelong (City) advised that its role has been to respond to community inquiries and support the department in the dissemination of information. The City informed the committee that it was not in a position to investigate or comment on whether or not a cancer cluster exists, as this is not within its expertise or jurisdiction.³² Responses by the City to community concerns about chemicals used in the Bellarine Peninsula region are considered in chapter 5.
- 3.18 In January 2019, the Victorian Government, through the CHO and the department, began to investigate a suspected cancer cluster on the Bellarine Peninsula. This action was prompted by media reports of community concerns about the incidence of cancer on the Bellarine Peninsula and a possible link to the historical use of dieldrin, an agricultural chemical. The Victorian Government's responses to these concerns were as follows:
- the initial investigation by the CHO (January 2019);
 - the Community Open House event in Barwon Heads (February 2019);
 - convening the Potential Cancer Cluster Expert Advisory Group (March 2019); and
 - commissioning the epidemiological analysis by Cancer Council Victoria and its review by the Potential Cancer Cluster Expert Advisory Group (October 2019).
- 3.19 During the inquiry, the committee asked Cancer Council Victoria about the feasibility of conducting further epidemiological analysis of cancer rates going back to the 1980s.³³ The committee asked the CHO to commission this additional analysis from Cancer Council Victoria.³⁴ This additional analysis, *Bellarine Peninsula cancer incidence report: Update*, was completed in March 2021 and reviewed by the Potential Cancer Cluster Expert Advisory Group in

³¹ Department of Health and Human Services, *Submission 2*, Attachment 1 (The Chief Health Officer's investigation of cancer rates on the Bellarine Peninsula), p. 7.

³² City of Greater Geelong, *Submission 3*, p. 1.

³³ *Committee Hansard*, 1 May 2020, pp. 3–4 and 7–8.

³⁴ *Committee Hansard*, 1 May 2020, p. 41.

April 2021. The report update and the expert review were both made public via the department's website and via the City's website in April 2021.³⁵

3.20 Each of these responses will be considered in turn.

Chief Health Officer's initial investigation of cancer rates on the Bellarine Peninsula: January 2019

3.21 The committee heard that the department would normally become aware of a suspected cancer cluster through a report from one or more individuals.³⁶ This is consistent with other jurisdictions.³⁷

3.22 However, in the case of the suspected cancer cluster on the Bellarine Peninsula, no direct approaches were made to the department. The CHO explained that the department had instead responded proactively to community concerns reported in the media, telling the committee:

... we did see the concerns that were expressed through media and therefore we tried to respond to them with the information that we had through those media stories, bearing in mind that's really all we had. We were trying to piece together where the concerns were focused in terms of the types of cancers, the period of time that it seemed to be concerned with and the geographical area or the particular setting that concerns were expressed about, and that did change over time.³⁸

3.23 Based on that information, in early January 2019 the CHO undertook an initial investigation into cancer incidence rates on the Bellarine Peninsula for each of the cancers identified in media reports, and into the carcinogenicity of dieldrin, which was the chemical reported by the media to be of concern to the community.³⁹

³⁵ Cancer Council Victoria, *Bellarine Peninsula cancer incidence report: Update*, 15 March 2021; Potential Cancer Cluster Expert Advisory Group, *Report of Expert Advisory Group (EAG) on management of potential cancer cluster investigations: Department of Health and Human Services, Victoria*, 9 April 2021. Available at City of Greater Geelong, [Bellarine Peninsula cancer cluster concerns](#), 3 June 2021 (accessed 11 June 2021) and at Victorian Department of Health, [Cancer rates on the Bellarine Peninsula](#) (accessed 11 June 2021).

³⁶ Dr Brett Sutton, Chief Health Officer, Department of Health and Human Services Victoria, *Committee Hansard*, 1 May 2020, p. 37.

³⁷ See, for example, Department of Health, Western Australia, *Guidelines for the investigation of cancer clusters in Western Australia*, February 2017, p. 5; NSW Minister of Health, *Responding to cancer clusters in NSW*, 2020, p. 4.

³⁸ Professor Brett Sutton, Chief Health Officer, Department of Health and Human Services Victoria, *Committee Hansard*, 1 May 2020, p. 37.

³⁹ Department of Health and Human Services, *Submission 2*, p. 3.

Methodology and approach

- 3.24 The CHO's investigation sourced epidemiological cancer incidence data from the Australian Cancer Atlas (Atlas). The CHO's report explained that the Atlas includes comprehensive coverage of all cancers diagnosed from 2010 to 2014.⁴⁰ The Atlas reports cancer incidence by geographical area using Statistical Areas Level 2 (SA2s) relative to the Australian population, using standardised incidence ratios (SIRs).⁴¹
- 3.25 SIRs are calculated by dividing the number of observed cases in that area by the number of expected cases, based on the average age- and sex-specific incidence rates for the Australian population.⁴² In plain language, the SIR indicates whether people living in that area have a greater or lesser risk of being diagnosed with cancer when compared with the Australian average risk.⁴³
- 3.26 The CHO's report noted that, with no generally agreed geographical boundaries for the area known as the Bellarine Peninsula, the investigation included the broad region to ensure no area was missed.⁴⁴ It also noted that SA2s are the appropriate sized area to 'capture' sufficient cases of cancer to avoid the random fluctuation in rates that can appear when looking at smaller areas.⁴⁵
- 3.27 The CHO explained to the committee that using the Atlas data had several other benefits:
- ... it was publicly available, it could be checked by the community if they had an interest in doing so and we could do an initial investigation that was quick and could provide some kind of answer with all the caveats around what the limitations of that investigation were, which I put upfront in the foreword of that report. I did it because I could provide an early indication and say that we would continue to investigate.⁴⁶

⁴⁰ Department of Health and Human Services, *Submission 2*, Attachment 1 (The Chief Health Officer's investigation of cancer rates on the Bellarine Peninsula), p. 8.

⁴¹ See Australian Bureau of Statistics, [Australian Statistical Geography Standard](#) (accessed 8 June 2021).

⁴² Department of Health and Human Services, *Submission 2*, Attachment 1 (The Chief Health Officer's investigation of cancer rates on the Bellarine Peninsula), p. 8.

⁴³ Australian Cancer Atlas, [Cancer diagnosis](#) (accessed 8 April 2021).

⁴⁴ Department of Health and Human Services, *Submission 2*, Attachment 1 (The Chief Health Officer's investigation of cancer rates on the Bellarine Peninsula), p. 10.

⁴⁵ Department of Health and Human Services, *Submission 2*, Attachment 1 (The Chief Health Officer's investigation of cancer rates on the Bellarine Peninsula), p. 6.

⁴⁶ Dr Brett Sutton, Chief Health Officer, Department of Health and Human Services Victoria, *Committee Hansard*, 1 May 2020, p. 38.

3.28 The CHO used the standard incidence data for all geographic areas in the Bellarine Peninsula to analyse incidence rates in that region for the following categories of cancer:

- each of the four specific cancer types mentioned in media reports (multiple myeloma, leukaemia, non-Hodgkin's lymphoma and brain cancer);
- each of the two cancer types possibly linked to dieldrin (breast cancer and liver cancer); and
- all cancer types.⁴⁷

3.29 The CHO's investigation also included a toxicological review of scientific evidence to assess whether dieldrin was a plausible cause for the reported cancer types.⁴⁸

Key findings

3.30 Published in January 2019, the CHO's investigation reported there was:

- no evidence of a higher rate of cancer overall in any geographical areas of the Bellarine Peninsula than elsewhere in Australia;
- no higher number of the specific cancers of interest (breast, liver, non-Hodgkin lymphoma, multiple myeloma, brain cancers and leukaemia) than would be expected (based on the average cancer rates in Australia).⁴⁹

3.31 The CHO's report on this investigation also acknowledged that '[c]ancer in young people is unusual and particularly distressing'.⁵⁰

3.32 The CHO's report found no evidence linking dieldrin to any of the cancers mentioned in media reports:

... the hazard of concern (dieldrin) has not been identified as an agent that results in the cancers cited in the media.⁵¹

Limitations

3.33 The CHO's report identified two limitations of this investigation. First, to ensure statistical validity for the small population for each geographic area, the

⁴⁷ Professor David Hill, Chair, Potential Cancer Cluster Expert Advisory Group, *Committee Hansard*, 1 May 2020, p. 25; Department of Health and Human Services, *Submission 2*, Attachment 1 (The Chief Health Officer's investigation of cancer rates on the Bellarine Peninsula), p. 11.

⁴⁸ Dr Brett Sutton, Chief Health Officer, Department of Health and Human Services Victoria, *Committee Hansard*, 1 May 2020, p. 38.

⁴⁹ Department of Health and Human Services, *Submission 2*, Attachment 1 (The Chief Health Officer's investigation of cancer rates on the Bellarine Peninsula), p. 6.

⁵⁰ Department of Health and Human Services, *Submission 2*, Attachment 1 (The Chief Health Officer's investigation of cancer rates on the Bellarine Peninsula), p. 6.

⁵¹ Department of Health and Human Services, *Submission 2*, Attachment 1 (The Chief Health Officer's investigation of cancer rates on the Bellarine Peninsula), p. 6. Chapters 4 and 5 further discuss other pesticides of concern to the community.

Atlas combines data from several years, which may mask some differences across areas or across years. Second, this data is based on the address at the time of diagnosis for each individual and so may not accurately reflect the cohort of interest (for example, if a person uses a non-residential address or has only recently moved to the area).⁵²

- 3.34 The CHO's report acknowledged that the use of SA2 data limited the study's findings to some extent. SA2 data combines available data from smaller geographic areas known as Statistical Areas Level 1 (SA1s). However, the report also noted that, even at SA2 level, the numbers of people diagnosed with cancer each year are often very small and need to be grouped together with data from other years in order to conduct reliable calculations.⁵³
- 3.35 The CHO also told the committee that his initial investigation, using the Atlas data, could not be precisely targeted to the specific concerns of the community at that time. The CHO explained that this was because no detailed demographic, health or exposure information about the individual cases of concern had been provided to the department.⁵⁴ In an answer to a question on notice, the CHO advised the committee:

I, and the Department, sought to obtain information from other sources to further the investigation of cancer rates on the Bellarine Peninsula, with limited success. There was a reluctance from some individuals and other parties to provide the Department with information. Both Gordon Legal and Mr Ross Harrison were approached, but no information was forthcoming.⁵⁵

- 3.36 In an answer to a question on notice, the CHO advised that this investigation had been based on the information available to the department at the time, stating that 'the information from media reports was the best information available'.⁵⁶

⁵² Department of Health and Human Services, *Submission 2*, Attachment 1 (The Chief Health Officer's investigation of cancer rates on the Bellarine Peninsula), p. 11.

⁵³ Department of Health and Human Services, *Submission 2*, Attachment 1 (The Chief Health Officer's investigation of cancer rates on the Bellarine Peninsula), p. 11.

⁵⁴ Dr Brett Sutton, Chief Health Officer, Department of Health and Human Services Victoria, *Committee Hansard*, 1 May 2020, pp. 37 and 39; Professor Brett Sutton, Chief Health Officer, Department of Health and Human Services Victoria, answer to written question on notice, 1 May 2020 (received 25 September 2020), p. 1.

⁵⁵ Professor Brett Sutton, Chief Health Officer, Department of Health and Human Services Victoria, answer to written question on notice, 1 May 2020 (received 25 September 2020), p. 1.

⁵⁶ Professor Brett Sutton, Chief Health Officer, Department of Health and Human Services Victoria, Answer to written question on notice, 1 May 2020 (received 25 September 2020), p. 1.

Issues raised by submitters in relation to the epidemiological studies

3.37 Most issues raised by submitters about the CHO's investigation related to its use of Atlas data. There were concerns that this data set:

- did not capture the relevant geographic or demographic cohort;⁵⁷
- did not capture all relevant populations, such as holidaymakers;⁵⁸ and
- did not capture the relevant time period, as it only included cancer diagnoses from 2010 to 2014.⁵⁹

Failure to capture relevant geographic or demographic cohort

3.38 Community group Discovery 3227 submitted that the CHO's investigation had used a 'flawed methodology', including the Atlas data's use of SA2s, and therefore did not accurately determine cancer rates for Barwon Heads specifically.⁶⁰

3.39 Some submitters were concerned that, since the Atlas data reports age-standardised cancer incidence rates and not age-specific rates,⁶¹ the CHO's investigation did not consider cancer incidence specifically in young people on the Bellarine Peninsula, despite community concern about a number of younger people diagnosed with cancer.

3.40 For example, one submitter stated:

Concerns around a potential cancer cluster on the Bellarine Peninsula are not based around a representative age sample of the wider population. Concerns centre on a specific cohort of age, typically being 24-34 years old at the time of diagnosis. Across Australia, this age cohort experiences a very small incidence of cancer, as per the Australian Cancer Atlas.⁶²

Failure to capture population variability and mobility

3.41 The Bellarine Peninsula is a popular holiday destination and its population almost triples on weekends and in the warmer months.⁶³ Discovery 3227 suggested that the CHO's use of Atlas data was therefore inadequate, as the Atlas uses location data based on a person's primary residence and does not capture part-time populations.⁶⁴

⁵⁷ See, for example, Discovery 3227, *Submission 32*, p. 18; Nicholas Guyett, *Submission 16*, pp. 1–2.

⁵⁸ Mr Ross Harrison, Member, Discovery 3227, *Committee Hansard*, 1 May 2020, p. 18.

⁵⁹ See, for example, Gordon Legal, *Submission 27*, p. 2; Mr Ross Harrison, Member, Discovery 3227, *Committee Hansard*, 1 May 2020, p. 18.

⁶⁰ Discovery 3227, *Submission 32*, p. 18.

⁶¹ Australian Cancer Atlas, [National summary of measures](#), Diagnosis.

⁶² Mr Nicholas Guyett, private capacity, *Submission 16*, p. 1.

⁶³ See, for example, City of Greater Geelong, [Peak overnight population: Barwon Region](#), 2019.

⁶⁴ Mr Ross Harrison, Member, Discovery 3227, *Committee Hansard*, 1 May 2020, p. 18.

3.42 Discovery 3227 also commented that the CHO's investigation failed to account for population mobility before or after the time period covered by the Atlas data (from 2010 to 2014). Discovery 3227 told the committee:

The Cancer Atlas fails to capture those residents exposed to mosquito OP chemicals that develop cancer at a later date, as their new postcode will be the registry area for the illness.⁶⁵

3.43 On the other hand, another submitter suggested that part-time residents were less likely to have developed cancers connected with any chemical exposures in the Barwon Heads area, stating:

The argument by the accusers that disease data for people who are in the region for holidays periods should be included only weakens their argument, since the doses associated with such transient exposures will be much less than for those living in the area.⁶⁶

Failure to capture relevant time period

3.44 The Atlas uses data from the Australian Cancer Database to report either a five-year incidence rate (for each of the most common cancers and for 'all cancers') or a ten-year incidence rate (for each of the less common cancers).⁶⁷ Some submitters considered that the five-year time span for the cancers investigated by the CHO was not sufficient for investigating the specific cases of concern to the community.⁶⁸ At the hearing on 1 May 2020, Discovery 3227 stated:

This time span fails the core chemical exposure period of 1980 to 2000 in Barwon Heads. Even with a latency of five, 10 or 15 years for cancer to develop, that is 30 years of lost immune and cancer data being ignored, which is of the utmost importance to establishing whether a cancer cluster exists.⁶⁹

Issues raised by submitters in relation to chemical exposures

3.45 Some submitters were not satisfied with the findings of the CHO's investigation in relation to possible chemical exposures. Gordon Legal argued that some in the community had been exposed to unsafe levels of dieldrin and other organochlorine pesticides (OCPs) in the environment between 1997 and 2007.⁷⁰

⁶⁵ Mr Ross Harrison, Member, Discovery 3227, *Committee Hansard*, 1 May 2020, p. 18.

⁶⁶ Name withheld, *Submission 10*, pp. 2–3.

⁶⁷ Australian Cancer Atlas, *National summary of measures*, Diagnosis.

⁶⁸ See, for example, Gordon Legal, *Submission 27*, p. 2.

⁶⁹ Mr Ross Harrison, Member, Discovery 3227, *Committee Hansard*, 1 May 2020, p. 18.

⁷⁰ Mr Peter Gordon, Senior Partner, Gordon Legal, *Committee Hansard*, 1 May 202, p. 10; see also Department of Health and Human Services, *Submission 2*, Attachment 1 (The Chief Health Officer's investigation of cancer rates on the Bellarine Peninsula), p. 8.

3.46 Most individual submitters and Discovery 3227 were concerned not about OCPs such as dieldrin but about organophosphorus pesticides (OPs) and synthetic pyrethroids.⁷¹ Discovery 3227 believes that the CHO insufficiently investigated the carcinogenicity of certain chemicals alleged to be used by the City for mosquito control, such as organophosphate insecticides containing temephos, malathion or fenthion.⁷²

Exposures to organochlorine pesticides (OCPs)

3.47 Until the 1980s, the OCPs dieldrin and DDT (dichlorodiphenyltrichloroethane) were widely used as insecticides, both for agricultural purposes, such as crop pest control and building pest management, and for domestic purposes, such as garden pest control. For example, as mentioned in chapter 2, dieldrin was used by farmers on the Bellarine Peninsula.⁷³

3.48 OCPs were phased out of use in Australia during the 1980s because of concerns about toxicity, short-term and long-term health impacts, and environmental persistence; in some cases, OCPs have taken decades to break down.⁷⁴ The sale and use of dieldrin was banned in Victoria in 1987.⁷⁵ Since 1997 OCPs have been internationally recognised as ‘persistent organic pollutants’.⁷⁶

3.49 In 2016, the World Health Organization's International Agency for Research on Cancer (IARC) classified dieldrin as ‘probably carcinogenic’ to humans.⁷⁷ The IARC has explained that this terminology relates only to the strength of the scientific evidence and does not quantify the cancer risk.⁷⁸

3.50 In late 2016 the law firm Gordon Legal began investigations for a possible legal case on behalf of Corinne Beyer in relation to the incidence of cancer in former

⁷¹ See, for example, Discovery 3227, *Submission 32*, pp. 1–2; Name withheld, *Submission 5*, pp. 1–2; Name withheld, *Submission 8*, p. 1.

⁷² Discovery 3227, *Submission 32*, [p. 18].

⁷³ Victorian Government, [*Dieldrin and cancer concerns on the Bellarine Peninsula: Community information*](#), February 2019 (accessed 15 May 2021).

⁷⁴ Department of Agriculture, Water and the Environment, [*Organochlorine pesticides \(OCPs\): Trade or common use names*](#), April 1997 (accessed 7 May 2021).

⁷⁵ Victorian Government, *Dieldrin and cancer concerns on the Bellarine Peninsula: Community information*, February 2019.

⁷⁶ Department of Agriculture, Water and the Environment, [*Stockholm Convention on Persistent Organic Pollutants \(POPs\)*](#), 13 October 2020 (accessed 7 May 2021).

⁷⁷ Group 2A; International Agency for Research on Cancer, [*IARC Monographs on the identification of carcinogenic hazards to humans*](#) (accessed 15 May 2021); Department of Health and Human Services, *Submission 2*, p. 3.

⁷⁸ International Agency for Research on Cancer, *IARC Monographs on the identification of carcinogenic hazards to humans: Preamble*, amended January 2019, p. 31.

students and staff at the Drysdale campus of Bellarine Secondary College.⁷⁹ In 2019 Gordon Legal issued media releases announcing plans for a test case claiming that soil residues of dieldrin and other OCPs may have caused cancers in three individuals.⁸⁰

- 3.51 In late 2018 and early 2019, media articles reported that individual community members shared these concerns about a connection between possible historical exposures to OCPs and cases of cancer in the community.⁸¹
- 3.52 Gordon Legal disagrees with the CHO's finding that there was no plausible association between the historical use of dieldrin in the region and local cases of cancer.⁸² Gordon Legal submitted that the CHO's investigation should have calculated historical soil contamination levels by using the known half-life of dieldrin.⁸³ Gordon Legal also criticised the CHO's investigation for failing to closely examine possible exposures to 12 other OCPs in addition to dieldrin, or the potential combined effects of such exposures.⁸⁴
- 3.53 Gordon Legal alleged there was an 'increased risk to the BSC cohort on account of exposure to a multiplicity of OCPs'.⁸⁵ Mr Gordon told the committee that he believed that these exposures to OCPs were likely to have been similar to occupational exposures, through 'pretty heavy exposure to dust'.⁸⁶
- 3.54 Mr Gordon explained to the committee that the law considers the question of 'probable cause' and that he believed that question was satisfied by the circumstances of the BSC cohort and the three individuals in question.⁸⁷ This test case is currently under way in the Victorian Supreme Court.

⁷⁹ Gordon Legal, *Submission 27*, p. 1.

⁸⁰ Gordon Legal, '[Serious concerns about Chief Health Officer's report](#)', media release, 5 March 2019 (accessed 16 May 2021); Gordon Legal, '[Federal Labor's Promised Probe into Bellarine Cancer Cluster a Breakthrough](#)', media release, 16 May 2019 (accessed 16 May 2021).

⁸¹ See, for example, Debbie Cuthbertson, '[Explainer: Concern over cancer cases on the Bellarine Peninsula](#)', *The Age*, 6 January 2019 (accessed 7 April 2021); Debbie Cuthbertson, 'Cancer mystery bedevils Barwon', *Sunday Age*, 6 January 2019, p. 1; Anthony Colangelo, '[State health officer to probe Bellarine cancer death data](#)', *The Age*, 9 January 2019 (accessed 6 April 2021); Anthony Colangelo, 'Health chief to probe Bellarine cancer deaths', *The Age*, 11 January 2019, p. 12.

⁸² Gordon Legal, *Submission 27*, pp. 2–3.

⁸³ Gordon Legal, *Submission 27*, p. 5–6; Mr Peter Gordon, Senior Partner, Gordon Legal, *Committee Hansard*, 1 May 2020, pp. 10–11.

⁸⁴ Gordon Legal, *Submission 27*, p. 6–7; Mr Peter Gordon, Senior Partner, Gordon Legal, *Committee Hansard*, 1 May 2020, pp. 9–10.

⁸⁵ Gordon Legal, *Submission 27*, p. 4.

⁸⁶ Mr Peter Gordon, Senior Partner, Gordon Legal, *Committee Hansard*, 1 May 202, p. 12.

⁸⁷ Mr Peter Gordon, Senior Partner, Gordon Legal, *Committee Hansard*, 1 May 202, p. 15.

Responses from the authorities

- 3.55 As mentioned above, in January 2019 the department reviewed cancer incidence data and the scientific literature, which it reported 'did not identify dieldrin as a chemical associated with the specific types of cancers cited in the media.'⁸⁸ It further advised that 'some pesticides (like DDT) have previously been associated with non-Hodgkin lymphoma, chronic lymphocytic leukaemia and multiple myeloma' but that 'this association has not been found for dieldrin'.⁸⁹
- 3.56 The committee heard similar evidence from Professor Stewart, who advised that the IARC evaluation of dieldrin does not associate occupational exposure to dieldrin with non-Hodgkin lymphoma, other types of lymphoma or leukaemia, or any other specific malignancy.⁹⁰ Professor Stewart told the committee that scientific scholarship on dieldrin has established that '[t]here is limited evidence in humans for the carcinogenicity of dieldrin'.⁹¹
- 3.57 Also in January 2019, the City reviewed all previous soil contamination assessments for organochlorine pesticide residues, in particular dieldrin, in soil across the Bellarine Peninsula.⁹² Its submission stated that both dieldrin and DDT levels were found to be safe.⁹³

Exposures to chemical insecticides used for mosquito control

- 3.58 Discovery 3227 and some individual submitters believed that the CHO should have more closely investigated the carcinogenicity of specific chemicals that Discovery 3227 alleged had been used by the City for mosquito control. These included OPs such as fenthion, temephos and malathion and synthetic pyrethroids.⁹⁴
- 3.59 Many individual submitters were worried about whether they had been exposed to OPs through mosquito spraying or fogging, and whether these exposures could have caused their cancers or autoimmune diseases.⁹⁵

⁸⁸ Department of Health and Human Services, *Submission 2*, p. 3.

⁸⁹ Department of Health and Human Services, *Submission 2*, Attachment 1 (The Chief Health Officer's investigation of cancer rates on the Bellarine Peninsula), p. 2.

⁹⁰ Professor Bernard Stewart, *Submission 35*, p. 8.

⁹¹ Professor Bernard Stewart, *Submission 35*, p. 8.

⁹² City of Greater Geelong, *Submission 3*, p. 2.

⁹³ City of Greater Geelong, *Submission 3*, p. 3.

⁹⁴ Discovery 3227, *Submission 32*, [pp. 17–18]. These concerns are further discussed in chapter 5.

⁹⁵ See, for example, Name withheld, *Submission 4*, p. 1; Name withheld, *Submission 5*, pp. 1–2; Name withheld, *Submission 6*, p. 1; Name withheld, *Submission 8*, p. 1; Name withheld, *Submission 19*, p. 1.

- 3.60 Gordon Legal submitted that the CHO should have considered the possibility of additional ‘background exposure’ to OPs, such as malathion, for individuals living on the Bellarine Peninsula.⁹⁶
- 3.61 Chapter 4 discusses the pesticides used for mosquito control on the Bellarine Peninsula. Chapter 5 discusses community concerns about exposures to the chemical insecticides used for mosquito control on the Bellarine Peninsula and considers the responses from authorities.

Interagency group: January 2019

- 3.62 In mid-January 2019, the department established an interagency group to communicate with and respond to the community.⁹⁷ The interagency group developed an information sheet with FAQs (frequently asked questions) about the possible cancer cluster, which was published on the City’s website.⁹⁸
- 3.63 The group also considered soil-testing data provided by a number of agencies, This included results from recent testing for dieldrin levels in the soil at both Bellarine Secondary College and Barwon Heads Primary School and from previous soil testing done in the area, for example, for land redevelopment purposes.⁹⁹ The group excluded the possibility of any current soil contamination or risk to public health from organochlorine residues in soil.¹⁰⁰

Community Open House event: February 2019

- 3.64 In response to ongoing community concerns, on Monday 25 February 2019 the interagency group held a drop-in Community Open House event in Barwon Heads.
- 3.65 The event was hosted by the City and was advertised through social media, print media articles and flyers, with an information sheet and promotional material were published on the City’s website.¹⁰¹ The department liaised with the Barwon Heads Association community group before and after this event, and the association also promoted the event in its newsletter and through its

⁹⁶ Gordon Legal, *Submission 27*, p. 11–12.

⁹⁷ Department of Health and Human Services, *Submission 2*, pp. 3–5.

⁹⁸ City of Greater Geelong, [Bellarine cancer concerns: FAQs](#), 15 October 2019 (accessed 18 February 2021).

⁹⁹ Department of Health and Human Services, *Submission 2*, p. 8.

¹⁰⁰ Department of Health and Human Services, *Submission 2*, p. 5.

¹⁰¹ Professor Brett Sutton, Chief Health Officer, Department of Health and Human Services Victoria, answer to written question on notice, 1 May 2020 (received 25 September 2020), pp. 2–7.

website and social media presence.¹⁰² Forty-five community members attended the event.¹⁰³

3.66 The purpose of the Community Open House event was for the CHO and relevant government agencies to present the findings of the CHO's recent investigation, to provide information, and to answer questions from community members who were concerned about a suspected cancer cluster possibly caused by environmental exposures to dieldrin.¹⁰⁴

3.67 Some key community concerns identified by the department at this event were:

- 'methods and limitations of the Chief Health Officer's investigation of cancer rates on the Bellarine Peninsula';
- 'potential spray drift from local golf clubs and maintenance of the Barwon Heads Primary school oval'; and
- 'the mosquito spraying program in the area, particularly the chemicals and processes used historically'.¹⁰⁵

3.68 The 25 government representatives at the Community Open House event provided information about these concerns to community members in person.¹⁰⁶ After the event, the department updated the FAQs published on the City's website with information responding to these community concerns.¹⁰⁷ The department prepared a formal report of the event which was also published on the City's website.¹⁰⁸

3.69 At the end of the event the department solicited feedback from attendees, which is summarised in its report as follows:

The feedback on the Open House event itself indicated that in general, the open house format was useful, friendly, helpful and effective, and concerns and issues were understood but not always able to be answered. It is

¹⁰² Professor Brett Sutton, Chief Health Officer, Department of Health and Human Services Victoria, answer to written question on notice, 1 May 2020 (received 25 September 2020), pp. 5–6.

¹⁰³ Department of Health and Human Services, *Submission 2*, Attachment 1 (The Chief Health Officer's investigation of cancer rates on the Bellarine Peninsula), p. [21].

¹⁰⁴ Professor Brett Sutton, Chief Health Officer, Department of Health and Human Services Victoria, answer to written question on notice, 1 May 2020 (received 25 September 2020), p. 2.

¹⁰⁵ Department of Health and Human Services, *Submission 2*, Attachment 1 (The Chief Health Officer's investigation of cancer rates on the Bellarine Peninsula), p. 2.

¹⁰⁶ Professor Brett Sutton, Chief Health Officer, Department of Health and Human Services Victoria, answer to written question on notice, 1 May 2020 (received 25 September 2020), pp. 1–2.

¹⁰⁷ City of Greater Geelong, *Bellarine cancer concerns: FAQs: February 2019*, updated 15 October 2019.

¹⁰⁸ City of Greater Geelong, [Community Open House report: Bellarine cancer concerns](#), 22 May 2019; see also Department of Health and Human Services, *Submission 2*, Attachment 1 (The Chief Health Officer's investigation of cancer rates on the Bellarine Peninsula), [p. 22].

intended that the Open House and follow-up processes are the beginning of an ongoing engagement that keeps communications open and timely.¹⁰⁹

- 3.70 Discovery 3227 submitted that this event was a ‘concerning knee-jerk reaction’ in response to community fears of chemical exposure, and that the department and the City did not address community concerns about historical exposures to chemicals other than dieldrin.¹¹⁰
- 3.71 One submitter mentioned his appreciation for the time and effort taken by the CHO and the department at this event.¹¹¹
- 3.72 After the event, the *Geelong Advertiser* reported the CHO, Professor Brett Sutton, as saying:

‘There are some people who I think won’t be reassured, they have further questions. ... We want to be an open portal to see if we can explore further.’¹¹²

Potential Cancer Cluster Expert Advisory Group: March 2019

- 3.73 On 20 March 2019, the department convened the Potential Cancer Cluster Expert Advisory Group (Expert Advisory Group) to provide the CHO with high quality, impartial advice from an independent panel of scientific experts on cancer cluster investigations.
- 3.74 The Expert Advisory Group comprised Dr David Hill AO (Cancer Council Victoria, University of Melbourne, University of Newcastle), Dr Tim Driscoll (Professor of Occupational and Environmental Medicine at the Sydney School of Public Health, University of Sydney) and Professor Brian Priestly (Director of the Australian Centre for Human Health Risk Assessment, Monash University).¹¹³
- 3.75 The Expert Advisory Group Chair, Professor Hill, explained the group’s role to the committee at the public hearing on 1 May 2020:

... the ongoing role of the [Expert Advisory Group] is to independently review the work done by and for the Chief Health Officer of the [Victorian Department of Health] in assessing evidence about a cluster, comment on

¹⁰⁹ Department of Health and Human Services, *Submission 2*, Attachment 1 (The Chief Health Officer’s investigation of cancer rates on the Bellarine Peninsula), [p. 22].

¹¹⁰ Discovery 3227, *Submission 32.1*, p. 2.

¹¹¹ Mr Nicholas Guyett, *Submission 16*, p 1.

¹¹² ‘State on Bellarine fears: “We may do more cancer testing”’, *Geelong Advertiser*, 28 February 2019.

¹¹³ Department of Health and Human Services, *Submission 2*, pp. 3–4. Dr Kelly-Anne Phillips (Professor of Medical Oncology at The University of Melbourne and Peter MacCallum Cancer Centre) replaced Professor Priestly in mid-2019 when he retired.

its quality, and possibly suggest future work, including whether a full research study would be needed and justified.¹¹⁴

- 3.76 Expert Advisory Group members expressed the view that the CHO's initial investigation and other responses by the department had been appropriate.¹¹⁵ For example, Professor Hill stated:

I think the department has followed a fairly logical and standard public health approach to responding to community concerns about a cancer cluster.¹¹⁶

- 3.77 However, the Expert Advisory Group recognised that some community members still held concerns about the possibility of a cancer cluster linked to chemical exposures in the Barwon Heads region. The group recommended to the CHO that an epidemiological analysis of Victorian Cancer Registry data would provide a more targeted response to these concerns.¹¹⁷ Professor Hill told the committee that:

... the [Expert Advisory Group] advised [the Chief Health Officer] that a more fine-grained analysis on a more limited geographical area would be possible, and this would more directly address community concerns about exposure at the two schools in question.¹¹⁸

- 3.78 In relation to this further analysis, the Expert Advisory Group advised that SA1 (Statistical Areas Level 1) data should be combined, to ensure 'that any relevant epidemiological trends that might be detectable on the Bellarine Peninsula could be identified'.¹¹⁹

¹¹⁴ Professor David Hill, Chair, Potential Cancer Cluster Expert Advisory Group, *Committee Hansard*, 1 May 2020, pp. 24–25.

¹¹⁵ Department of Health and Human Services, *Submission 2*, Attachment 4 (Statement from Expert Advisory Group), pp. 1–2.

¹¹⁶ Professor David Hill, Chair, Potential Cancer Cluster Expert Advisory Group, *Committee Hansard*, 1 May 2020, p. 27.

¹¹⁷ Dr Brett Sutton, Chief Health Officer, Department of Health and Human Services Victoria, *Committee Hansard*, 1 May 2020, p. 39.

¹¹⁸ Professor David Hill, Chair, Potential Cancer Cluster Expert Advisory Group, *Committee Hansard*, 1 May 2020, p. 25. The two schools were Bellarine Secondary College and Barwon Heads Primary School.

¹¹⁹ Department of Health and Human Services, *Submission 2*, Attachment 4 (Potential Cancer Cluster Expert Advisory Group: Opinion provided to the Department of Health and Human Services, October 25th, 2019), p. 1.

Cancer Council Victoria report: October 2019

Methodology and approach

3.79 The Expert Advisory Group explained to the committee that Dr Roger Milne of the Cancer Epidemiology Division of Cancer Council Victoria was therefore asked to undertake a new analysis and to:

... prepare a report on a slightly expanded number of tumours for this more constrained geographical area nearer the schools for the period 2001 to 2016 ...¹²⁰

3.80 The Cancer Council Victoria report sourced cancer data from the Victorian Cancer Registry and population data from the Australian Bureau of Statistics (ABS).¹²¹ Analyses were conducted for the period from 2001 to 2016.¹²² Dr Milne advised the committee that cancer registry data and the relevant ABS data from pre-2001 are not directly compatible, because the ABS has only been using statistical areas such as SA1s and SA2s since 2001.¹²³

3.81 The department and Cancer Council Victoria agreed that analysis of the available data from this time period would address some of the community concerns that had been identified in media reports.¹²⁴ These concerns were about a specific cohort of the community, described to the committee as being mostly 'people in their 20s and 30s who had been diagnosed in the 2000s'.¹²⁵

3.82 The CHO told the committee he had asked Cancer Council Victoria to undertake this analysis by using Victorian Cancer Registry data to examine cancer incidence rates in a smaller geographical area, for a greater number of specific cancers and for younger people specifically.¹²⁶

¹²⁰ Professor David Hill, Chair, Potential Cancer Cluster Expert Advisory Group, *Committee Hansard*, 1 May 2020, p. 25.

¹²¹ Department of Health and Human Services, *Submission 2*, Attachment 3 (Cancer Council Victoria, Bellarine Peninsula cancer incidence report), p. 2.

¹²² Department of Health and Human Services, *Submission 2*, Attachment 3 (Cancer Council Victoria, Bellarine Peninsula cancer incidence report), p. 2.

¹²³ Professor Roger Milne, Head of Cancer Epidemiology, Cancer Council Victoria, *Committee Hansard*, 1 May 2020, p. 2.

¹²⁴ Dr Brett Sutton, Chief Health Officer, Department of Health and Human Services Victoria, *Committee Hansard*, 1 May 2020, pp. 39–40; Professor Roger Milne, Head of Cancer Epidemiology, Cancer Council Victoria, *Committee Hansard*, 1 May 2020, p. 4; see also Department of Health and Human Services, *Submission 2*, Attachment 4 (Statement from Expert Advisory Group), p. 1.

¹²⁵ Dr Brett Sutton, Chief Health Officer, Department of Health and Human Services Victoria, *Committee Hansard*, 1 May 2020, p. 39.

¹²⁶ Dr Brett Sutton, Chief Health Officer, Department of Health and Human Services Victoria, *Committee Hansard*, 1 May 2020, p. 38.

- 3.83 The Cancer Council Victoria report analysed the incidence in each of the following categories of cancer: liver cancer, breast cancer, testis cancer, cancer of the brain and central nervous system, Hodgkin lymphoma, non-Hodgkin lymphoma, multiple myeloma, leukaemia, other haematopoietic cancers, and all cancers combined.¹²⁷
- 3.84 Cancer Council Victoria analysed the incidence of these cancers as diagnosed in residents of a defined area on the Bellarine Peninsula over the period from 2001 to 2016 and compared it with the expected incidence based on the average incidence for Victoria.¹²⁸ This area was defined using ABS data at SA1 level, which captures the Barwon Heads area and some land to the west of Barwon Heads.¹²⁹ This geographical area does not include Ocean Grove.¹³⁰
- 3.85 The Cancer Council Victoria report included a specific analysis of cancer rates for young people aged 10 to 34 years during that period of time, to address concerns reported in the media about a number of younger people living in the Barwon Heads region who had been diagnosed with cancer.¹³¹

Key findings

- 3.86 The Cancer Council Victoria report found that there was no substantive evidence of increased rates of cancer in Bellarine Peninsula residents between 2001 and 2016.¹³² The report was published on 17 October 2019.¹³³ The report states:

For all cancer groupings considered, the number of observed cases was very similar to the number expected, indicating no excess cancer incidence.¹³⁴

¹²⁷ Department of Health and Human Services, *Submission 2*, Attachment 3 (Cancer Council Victoria, Bellarine Peninsula cancer incidence report), p. 2.

¹²⁸ Department of Health and Human Services, *Submission 2*, Attachment 3 (Cancer Council Victoria, Bellarine Peninsula cancer incidence report), p. 5.

¹²⁹ Professor Roger Milne, Head of Cancer Epidemiology, Cancer Council Victoria, *Committee Hansard*, 1 May 2020, p. 2.

¹³⁰ Professor Roger Milne, Head of Cancer Epidemiology, Cancer Council Victoria, *Committee Hansard*, 1 May 2020, p. 2.

¹³¹ Professor Brett Sutton, Chief Health Officer, Department of Health and Human Services Victoria, *Committee Hansard*, 1 May 2020, p. 38; Professor Roger Milne, Head of Cancer Epidemiology, Cancer Council Victoria, *Committee Hansard*, 1 May 2020, p. 1.

¹³² Department of Health and Human Services, *Submission 2*, Attachment 3 (Cancer Council Victoria, Bellarine Peninsula cancer incidence report), p. 4. This finding is for residents of a defined area of Bellarine Peninsula.

¹³³ Department of Health and Human Services, [Bellarine Peninsula cancer incidence report](#), 22 October 2019 (accessed 18 February 2021).

¹³⁴ Department of Health and Human Services, *Submission 2*, Attachment 3 (Cancer Council Victoria, Bellarine Peninsula cancer incidence report), p. 4.

3.87 Professor Milne, who conducted the analysis, told the committee:

... the analysis that we did was well defined and quite straightforward in terms of statistical analyses, and we found no evidence of increased incidence of any of the individual cancers considered, cancers of any type—that is, all cancers combined in all people—and cancers of any type in younger people between the ages of 10 and 34.¹³⁵

Limitations

3.88 The Cancer Council Victoria report notes three limitations to its findings.

- the time period covered (2001–2016);
- the effects of population mobility; and
- the effects of known lifestyle risk factors for cancer.¹³⁶

3.89 As mentioned above, the availability of compatible ABS data limited the report to the period from 2001 to 2016.¹³⁷ This meant that any cases of cancer diagnosed before 2001 or after 2016 were not captured by this analysis.

3.90 There is a typical time lag of 10 to 20 years between a possible exposure and a diagnosis of cancer.¹³⁸ The ABS data used by Cancer Council Victoria are based on resident populations¹³⁹ and therefore do not reflect any population movement into or out of the Barwon Heads region between 2001 and 2016. This means that the Cancer Council Victoria analysis could not capture every potential case of concern, since it could not trace individual changes of address over that period. For example, the results do not include people who moved out of the area since a possible exposure but before contracting cancer.¹⁴⁰

3.91 Finally, Cancer Council Victoria was unable to make any individual adjustments for known cancer risk factors, such as smoking, alcohol consumption or obesity.¹⁴¹ As mentioned above, detailed information about

¹³⁵ Professor Roger Milne, Head of Cancer Epidemiology, Cancer Council Victoria, *Committee Hansard*, 1 May 2020, p. 1.

¹³⁶ Department of Health and Human Services, *Submission 2*, Attachment 3 (Cancer Council Victoria, Bellarine Peninsula cancer incidence report), p. 4–5.

¹³⁷ Department of Health and Human Services, *Submission 2*, Attachment 3 (Cancer Council Victoria, Bellarine Peninsula cancer incidence report), p. 2.

¹³⁸ Professor Roger Milne, Head of Cancer Epidemiology, Cancer Council Victoria, *Committee Hansard*, 1 May 2020, p. 5.

¹³⁹ Department of Health and Human Services, *Submission 2*, Attachment 3 (Cancer Council Victoria, Bellarine Peninsula cancer incidence report), p. 2.

¹⁴⁰ Department of Health and Human Services, *Submission 2*, Attachment 3 (Cancer Council Victoria, Bellarine Peninsula cancer incidence report), p. 4–5.

¹⁴¹ Department of Health and Human Services, *Submission 2*, Attachment 3 (Cancer Council Victoria, Bellarine Peninsula cancer incidence report), p. 5.

each individual case of concern was not made available to the department.¹⁴²
The data available was mostly limited to the information in media reports.¹⁴³

- 3.92 At the hearing on 1 May 2020, Professor Milne explained to the committee that the statistical analysis provided by Cancer Council Victoria in its report is only one part of the equation and that other kinds of expertise would be needed to investigate other considerations, such as environmental assessment and testing for possible carcinogens.¹⁴⁴

Expert Advisory Group view

- 3.93 The Expert Advisory Group independently reviewed the Cancer Council Victoria report and provided a written opinion to the CHO on 27 October 2019:

The [Expert Advisory Group] has concluded that Professor Milne's analysis provides no material evidence of excess cancer rates in the area examined between 2001 and 2016 for the specific cancer types that were examined ... There was also no material evidence of excess rates suggested by the additional analyses of all those cancers combined, for all ages combined, and for all those cancers combined in 10-34 year-olds.¹⁴⁵

- 3.94 The Expert Advisory Group opinion to the CHO remarked on the accuracy and scientific integrity of the Victorian Cancer Registry data.¹⁴⁶ The group advised the CHO that, despite the possible effects of population mobility, the use of cancer registry data is nonetheless considered valuable for detecting cancer incidence rates that are connected to environmental carcinogens.¹⁴⁷

- 3.95 At the hearing on 1 May 2020, Professor Hill commented on the methods used by Cancer Council Victoria in its analysis:

... the data used in this report are of a very high quality, the methods of analysis are appropriate and appear well executed, and the conclusions are valid. Based on this, the [Expert Advisory Group] does not see any evidence of a cancer cluster on the Bellarine Peninsula.¹⁴⁸

¹⁴² Paragraphs 3.35 to 3.36. See also Professor Roger Milne, Head of Cancer Epidemiology, Cancer Council Victoria, *Committee Hansard*, 1 May 2020, p. 4.

¹⁴³ Department of Health and Human Services, *Submission 2*, Attachment 1 (The Chief Health Officer's investigation of cancer rates on the Bellarine Peninsula), [p. 27].

¹⁴⁴ Professor Roger Milne, Head of Cancer Epidemiology, Cancer Council Victoria, *Committee Hansard*, 1 May 2020, p. 5.

¹⁴⁵ Department of Health and Human Services, *Submission 2*, Attachment 4 (Statement from Expert Advisory Group), p. 1.

¹⁴⁶ Department of Health and Human Services, *Submission 2*, Attachment 4 (Statement from Expert Advisory Group), p. 1.

¹⁴⁷ Department of Health and Human Services, *Submission 2*, Attachment 4 (Statement from Expert Advisory Group), p. 1.

¹⁴⁸ Professor David Hill, Chair, Potential Cancer Cluster Expert Advisory Group, *Committee Hansard*, 1 May 2020, p. 25.

3.96 In response to a question on notice, the Expert Advisory Group again confirmed this assessment, stating:

The study adequately addressed the question of whether there was any evidence of ‘clusters’ i.e., unusual variation in the incidence of breast , liver cancer, brain & CNS cancer, non-Hodgkin lymphoma, Hodgkin lymphoma, multiple myeloma, leukaemia and other haematopoietic [sic] malignancies in people at all ages combined and separately in 10-34 year-olds living in the area studied.¹⁴⁹

3.97 The Cancer Council Victoria report and the Expert Advisory Group’s opinion on the report were both published on the department’s website in October 2019.¹⁵⁰ These two documents were also made publicly available on the City’s website.¹⁵¹

Issues raised by submitters

Inadequate methodology

3.98 Community group Discovery 3227 submitted that the new analysis by Cancer Council Victoria was flawed.¹⁵² Discovery 3227 submitted that, since the methodology used by Cancer Council Victoria was limited in its ability to capture population variability and mobility, it was not appropriate for the investigation of a cancer cluster:

... the Cancer registry is incapable of identifying a cancer & immune cluster or spikes due to the fact as previously stated in the Senate Inquiry, assumed static population, inward and outward migration, floating permanent holiday make[r]s with other postcodes ...¹⁵³

3.99 Gordon Legal submitted that the use of SIRs for cancer did not adequately address the possibility of a true cancer cluster among former students of Bellarine Secondary College specifically.¹⁵⁴ Mr Gordon told the committee:

I think that the overall incidence of cancer on the Bellarine Peninsula is a very poor guide to whether anything untoward was going [on] at Bellarine Secondary College from 1997 in the first years of its operation.¹⁵⁵

¹⁴⁹ Potential Cancer Cluster Expert Advisory Group, answer to written question on notice, 1 May 2020 (received 26 May 2020), p. 1.

¹⁵⁰ Department of Health and Human Services, *Submission 2*, p. 4; see Department of Health, *Bellarine Peninsula cancer incidence report*, 22 October 2019; Department of Health, [Bellarine potential cancer cluster: Expert Advisory Group report](#), 27 October 2019.

¹⁵¹ City of Greater Geelong, *Bellarine Peninsula cancer cluster concerns*, 26 April 2019.

¹⁵² Discovery 3227, *Submission 32.1*, p. 3.

¹⁵³ Discovery 3227, *Submission 32.1*, p. 3.

¹⁵⁴ Gordon Legal, *Submission 27*, p. 2; Mr Peter Gordon, Senior Partner, Gordon Legal, *Committee Hansard*, 1 May 2020, p. 9.

¹⁵⁵ Mr Peter Gordon, Senior Partner, Gordon Legal, *Committee Hansard*, 1 May 2020, p. 12.

Time period insufficient to capture cases of concern

3.100 Discovery 3227 also stated its concern that the Cancer Council Victoria report had failed to consider cancer incidence rates from before 2001. Mr Harrison told the committee that Discovery 3227 had collected health data from many community members and that ‘the bulk of the data starts from 1980 onwards into the mid-2000s’.¹⁵⁶

Cancer Council Victoria report update: March 2021

Further epidemiological analysis

3.101 At the hearing on 1 May 2020, the committee asked Professor Roger Milne, Head of Cancer Epidemiology at Cancer Council Victoria, and the CHO about the feasibility of conducting further epidemiological analysis.¹⁵⁷ The committee asked the CHO about cancer incidence rates for 1985–2001 for the Barwon Heads region, noting that the Cancer Council Victoria report of October 2019 analysed cancer incidence rates for 2001–2016.¹⁵⁸

3.102 At the hearing on 1 May 2020, the CHO advised that he would seek Professor Milne’s expert advice on the kinds of statistical data available for further epidemiological investigation from 1985 onwards and on the feasibility of such an investigation.¹⁵⁹ The committee received the following advice from Professor Milne of Cancer Council Victoria on 29 May 2020:

I have contacted the Australian Bureau of Statistics (ABS) and confirmed that the population data ... could be generated by the ABS on request. The ABS would need to (i) confirm that the population in the geographical area to be assessed can be consistently determined by combining collection districts, as defined at each census (i.e. in 1981, 1986, 1991 and 1996, noting that these collection districts can change between census years), and, assuming it can, (ii) combine data to generate the estimated residential population for each calendar year, by sex and age (in five-year categories).¹⁶⁰

... it appears (but will need to be confirmed by the ABS once they have collated all the data) it would be methodologically feasible to carry out the analysis using data prior to 2001, and as far back as 1982 ...¹⁶¹

3.103 In response to a question on notice, the CHO stated:

¹⁵⁶ Mr Ross Harrison, Member, Discovery 3227, *Committee Hansard*, 1 May 2020, p. 21.

¹⁵⁷ *Committee Hansard*, 1 May 2020, pp. 3–4, 7–8 and 39–41.

¹⁵⁸ *Committee Hansard*, 1 May 2020, pp. 39–41.

¹⁵⁹ Professor Brett Sutton, Chief Health Officer, Department of Health and Human Services, *Committee Hansard*, 1 May 2020, p. 41.

¹⁶⁰ Cancer Council Victoria, answers to questions on notice, 1 May 2020 (received 29 May 2020), p. 2.

¹⁶¹ Cancer Council Victoria, answers to questions on notice, 1 May 2020 (received 29 May 2020), p. 2.

It is now clear from the issues raised at this Inquiry that there are concerns about the agents used in the mosquito spraying program in the Barwon Heads area between 1980 and the late 2000s. Noting this, it may be of value to some members of the community for the analysis to extend back to 1982. It is, nonetheless, highly unusual to explore evidence for changes in cancer rates simply on the basis of concerns about environmental contaminants rather than specific concerns about cancer rates relevant to the period of alleged exposure.¹⁶²

3.104 In September 2020, the CHO agreed to the committee's request to ask Cancer Council Victoria to conduct additional analysis. After noting the limitations that would apply to these further investigations, in particular relating to population mobility, the CHO advised:

In response to questions asked at the hearing of this Inquiry on 1 May 2020 by Senators Bilyk and Henderson, I have provided my support in commissioning further epidemiological analysis of Victorian Cancer Registry data by Professor Milne, extending back to 1982, and in re-engaging the Expert Advisory Group to provide advice as to the methodology involved. The further report by Professor Milne will be made public.¹⁶³

3.105 The additional analysis was completed in March 2021 (Cancer Council Victoria report update). The CHO then re-engaged the Expert Advisory Group to peer-review the report update. The Expert Advisory Group provided its review to the CHO in April 2021 (Expert Advisory Group review). On 15 April 2021 the report update and the peer review report were provided to the committee and were also made publicly available online.¹⁶⁴

Cancer Council Victoria report update (15 March 2021)

Methodology and approach

3.106 The Cancer Council Victoria report update significantly extends the analysis done in October 2019. It uses Victorian Cancer Registry data from 1982 (when records began) through to 2019 (the most recent data available) and calculates incidence rates for one additional cancer type (prostate cancer).¹⁶⁵

¹⁶² Professor Brett Sutton, Chief Health Officer, Department of Health and Human Services Victoria, answer to written question on notice no. 2, 1 May 2020 (received 25 September 2020), p. 2.

¹⁶³ Department of Health and Human Services, *Response by the Victorian Chief Health Officer, Professor Brett Sutton, to submissions 31 and 32* (received 25 September 2020).

¹⁶⁴ Cancer Council Victoria, *Bellarine Peninsula cancer incidence report: Update*, 15 March 2021; Potential Cancer Cluster Expert Advisory Group, *Report of Expert Advisory Group (EAG) on management of potential cancer cluster investigations: Department of Health and Human Services, Victoria*, 9 April 2021. Available at City of Greater Geelong, [Bellarine Peninsula cancer cluster concerns](#), 3 June 2021 (accessed 11 June 2021) and at Victorian Department of Health, [Cancer rates on the Bellarine Peninsula](#) (accessed 11 June 2021).

¹⁶⁵ Cancer Council Victoria, *Bellarine Peninsula cancer incidence report: Update*, 15 March 2021, [pp. 2–4].

The report update provides estimated SIRs for the periods 1982–2000 and 2002–2019 and for the total period 1982–2019 for the Barwon Heads region.¹⁶⁶

Key findings

3.107 The report update showed no increased incidence of cancer in the Barwon Heads region for ‘all cancers’, for ‘all cancers (10–34 years)’, or for any of the individual cancers identified except for breast cancer.¹⁶⁷

3.108 The estimated SIR for breast cancer was calculated to be 1.24, with a 95 per cent confidence interval of 1.01–1.50.¹⁶⁸ This means there was an estimated 24 per cent excess incidence of breast cancer in the region for 1982–2019 compared with the Victorian average.¹⁶⁹ The report update explained that this estimated SIR represents ‘an excess incidence [of breast cancer] beyond what might be explained by chance’.¹⁷⁰

3.109 At the hearing in Barwon Heads, the committee questioned the CHO about the estimated SIR for leukaemia of 1.42 and whether this represented an above-average incidence of leukaemia in Barwon Heads. Professor Tim Driscoll, a member of the Expert Advisory Group, explained that this estimated SIR does not mean there is an increased incidence of leukaemia. He advised the committee that the associated confidence interval of 0.85 to 1.89 indicated that the estimated SIR could be due to chance:

The standard approach with this sort of thing is that, where the confidence interval is fairly wide and crosses 1, like it does for leukaemia, all we conclude is that we're not sure.¹⁷¹

3.110 In response to questions asked on notice at the hearing, the CHO confirmed that ‘the analysis by Cancer Council Victoria did not find that the incidence of leukaemia was statistically significant’.¹⁷² Also in response to the questions on notice, the Expert Advisory Group advised that there was no data suggesting that carcinogens were present at levels that may have caused leukaemia, and that the community should be reassured that the Barwon Heads area does not have an above-average incidence of leukaemia.¹⁷³

¹⁶⁶ Cancer Council Victoria, *Bellarine Peninsula cancer incidence report: Update*, 15 March 2021, [pp. 5–6].

¹⁶⁷ Cancer Council Victoria, *Bellarine Peninsula cancer incidence report: Update*, 15 March 2021, [pp. 5–6].

¹⁶⁸ Cancer Council Victoria, *Bellarine Peninsula cancer incidence report: Update*, 15 March 2021, [p. 6].

¹⁶⁹ Cancer Council Victoria, *Bellarine Peninsula cancer incidence report: Update*, 15 March 2021, [pp. 5–6].

¹⁷⁰ Cancer Council Victoria, *Bellarine Peninsula cancer incidence report: Update*, 15 March 2021, [p. 5].

¹⁷¹ Professor Tim Driscoll, Member, Potential Cancer Cluster Expert Advisory Group, Victorian Department of Health and Human Services, Committee Hansard, 20 April 2021, p. 30.

¹⁷² Professor Brett Sutton, Chief Health Officer, Department of Health, Victoria, answers to questions on notice, 20 April 2021 (received 31 May 2021), p. 2.

¹⁷³ Professor Brett Sutton, Chief Health Officer, Department of Health, Victoria, answers to questions on notice, 20 April 2021 (received 31 May 2021), p. 10.

Limitations

3.111 The report update identifies that this analysis (using cancer registry data and ABS data) is limited by being unable to control for individual lifestyle-related cancer risk factors; reproductive or hormonal factors; or population mobility. These factors could at least in part explain the estimated SIR for breast cancer.¹⁷⁴

Expert Advisory Group review

3.112 The Expert Advisory Group conducted a scientific peer review of the report update on 9 April 2021. The Expert Advisory Group review found that Cancer Council Victoria adopted appropriate and scientifically conventional methodology for data selection and for calculating the estimated SIRs and confidence intervals for each SIR, and that the analysis in the report update was 'of a high standard'.¹⁷⁵

3.113 The Expert Advisory Group noted that the estimated SIRs for breast cancer for 1982–2000 and for 2001–2019 are very similar, and that this suggests that any causative factors remained stable before and during 1982–2019.¹⁷⁶ The Expert Advisory Group found that these results do not suggest that current or former environmental exposures caused the 'moderately greater' observed incidence of breast cancer in Barwon Heads.¹⁷⁷ The Expert Advisory Group also noted Census data indicating that the Barwon Heads region is a very high socioeconomic status area, and that high socioeconomic status is a recognised risk factor for breast cancer.¹⁷⁸

¹⁷⁴ Cancer Council Victoria, *Bellarine Peninsula cancer incidence report: Update*, 15 March 2021, [p. 5].

¹⁷⁵ Potential Cancer Cluster Expert Advisory Group, *Report of Expert Advisory Group (EAG) on management of potential cancer cluster investigations: Department of Health and Human Services, Victoria*, 9 April 2021, pp. 2–3.

¹⁷⁶ Potential Cancer Cluster Expert Advisory Group, *Report of Expert Advisory Group (EAG) on management of potential cancer cluster investigations: Department of Health and Human Services, Victoria*, 9 April 2021, p. 2.

¹⁷⁷ Potential Cancer Cluster Expert Advisory Group, *Report of Expert Advisory Group (EAG) on management of potential cancer cluster investigations: Department of Health and Human Services, Victoria*, 9 April 2021, p. 3.

¹⁷⁸ Potential Cancer Cluster Expert Advisory Group, *Report of Expert Advisory Group (EAG) on management of potential cancer cluster investigations: Department of Health and Human Services, Victoria*, 9 April 2021, p. 3. See also Professor David Hill, Chair, Expert Advisory Group on Management of Potential Cancer Cluster Investigations, Victorian Department of Health and Human Services, *Committee Hansard*, 20 April 2021, pp. 30–31; Australian Bureau of Statistics, [Census of population and housing: Socio-economic indexes for areas \(SEIFA\): Australia](#), 2016 (accessed 28 June 2021).

Gaps in investigations to date

Autoimmune disease

- 3.114 As discussed in chapter 2, some submitters raised concerns about the incidence of autoimmune disease on the Bellarine Peninsula,¹⁷⁹ and there were some media reports that covered these concerns.¹⁸⁰ Some submitters were concerned about rates of inflammatory bowel disease (IBD) in particular.¹⁸¹ Discovery 3227 also expressed concerns about possible links between autoimmune disease and cancer.¹⁸²
- 3.115 In response to these community concerns, the department advised that it had received no clinical reports of increased rates of autoimmune disease on the Bellarine Peninsula.¹⁸³ It also reviewed the scientific literature and found that IBD rates in the Barwon area are either lower than or comparable to rates in other developed Western countries.¹⁸⁴
- 3.116 The department directly consulted specialist clinicians at the local public hospital, University Hospital Geelong, who did not report concern about increases in the incidence of any autoimmune illness.¹⁸⁵ The department also prepared a community information sheet responding to specific community concerns about IBD, which is available on the City's website.¹⁸⁶

Insufficient analysis of possible chemical exposures for Barwon Heads residents

- 3.117 Many submissions suggested that community members were exposed to environmental carcinogens in the Barwon Heads region in the 1980s

¹⁷⁹ See, for example, Name withheld, *Submission 8*; Name withheld, *Submission 25*; Discovery 3227, *Submission 32*, p. 1.

¹⁸⁰ See, for example, A Current Affair, 'I exposed my children to this': Locals' fears over young deaths in 'toxic' town, 2020, <https://9now.nine.com.au/a-current-affair/cancer-cluster-barwon-heads-victoria-residents-claim/b5d5c81a-b6ee-4ac0-a667-98da30584b8e> (accessed 23 February 2021).

¹⁸¹ See, for example, Name withheld, *Submission 4*; Name withheld, *Submission 8*, p. 2; Discovery 3227, *Submission 32*, p. 2. The committee also received confidential submissions raising this issue.

¹⁸² Discovery 3227, *Submission 32*, pp. 2 and 15–17.

¹⁸³ Department of Health and Human Services, *Submission 2*, p. 10.

¹⁸⁴ Department of Health and Human Services, *Response by the Victorian Chief Health Officer, Professor Brett Sutton, to submissions 31 and 32* (received 25 September 2020), p. 5.

¹⁸⁵ Specialists in dermatology, endocrinology, rheumatology, gastroenterology, haematology, nephrology, neurology, ophthalmology and respiratory medicine were consulted; Professor Brett Sutton, Chief Health Officer, Department of Health and Human Services, *Committee Hansard*, 1 May 2020, p. 38.

¹⁸⁶ Department of Health and Human Services Health Protection Branch, *FAQs for City of Greater Geelong website re Bellarine Cancer Cluster concerns and IBD*, February 2020. www.geelongaustralia.com.au/common/public/documents/8d7b547f1308b97-bellarine-inflammatoryboweldiseaseibdinformation.pdf (accessed 18 February 2021).

and 1990s.¹⁸⁷ Submitters referred to exposures to ‘disturbing levels of organochlorine pesticides, of which dieldrin was one’,¹⁸⁸ to dust pollution containing ‘dieldrin and other pesticides’,¹⁸⁹ and to ‘multiple chemicals such as temephos, malathion and others’.¹⁹⁰

3.118 Submitters suggested that past environmental exposures to one or more chemical pesticides may be the cause of many cases of cancer and autoimmune disease in Barwon Heads.¹⁹¹

3.119 Some submitters raised concerns about the carcinogenicity of a number of organophosphate insecticides and synthetic pyrethroid insecticides and about the methods of application historically used for mosquito control by the City and former council entities.¹⁹²

3.120 In 2019, state and local government authorities responded to concerns about possible historical exposures to chemical pesticides, especially dieldrin.¹⁹³

3.121 However, these responses did not allay community concerns about possible historical exposures to the chemicals used for mosquito control.¹⁹⁴ Chapter 5 discusses the ongoing concerns of some in the community about the historical use of chemical insecticides used in mosquito-control programs on the Bellarine Peninsula.

Trust and communication

3.122 Discovery 3227 submitted that the community had a ‘complete distrust’ of the department due to its role in the establishment of the *Framework for mosquito*

¹⁸⁷ See, for example, Name withheld, *Submission 8*, p. 3; Ms Samantha Judge, *Submission 20*, p. 3; Gordon Legal, *Submission 27*, pp. 4–7; Mr Ross Harrison, *Submission 31*, pp. 2–5; Discovery 3227, *Submission 32*, pp. 2–3 and 15–17; St Leonards Progress Association, *Submission 33*, pp. 2–4.

¹⁸⁸ Gordon Legal, *Submission 27*, p. 3.

¹⁸⁹ St Leonards Progress Association, *Submission 33*, p. 2.

¹⁹⁰ Name withheld, *Submission 8*, p. 1.

¹⁹¹ See, for example, Name withheld, *Submission 8*, p. 3; Ms Samantha Judge, *Submission 20*, p. 3; Gordon Legal, *Submission 27*, pp. 4–7; Mr Ross Harrison, *Submission 31*, pp. 2–5; Discovery 3227, *Submission 32*, pp. 2–3 and 15–17; St Leonards Progress Association, *Submission 33*, pp. 2–4.

¹⁹² See, for example, Name withheld, *Submission 8*, p. 1; Ms Samantha Judge, *Submission 20*, p. 2, p. 4.

¹⁹³ Department of Health and Human Services, *Submission 2*, Attachment 1 (The Chief Health Officer’s investigation of cancer rates on the Bellarine Peninsula), p. 6; City of Greater Geelong, *Submission 3*, pp. 2–3.

¹⁹⁴ See, for example, Mr Ross Harrison, *Submission 31*, pp. 2–4; Discovery 3227, *Submission 32*, p. 2; Benjamin Preiss, ‘[Law firm lashes chief health officer’s report on cancer in Bellarine](#)’, *The Age*, 4 March 2019 (accessed 18 March 2021); Debbie Cuthbertson, ‘[Coalition and Labor vow Senate probe into Bellarine cancer cases](#)’, *The Age*, 17 May 2019, p. 14 (accessed 18 March 2021).

management in Victoria,¹⁹⁵ which mentions the use of organophosphate and pyrethroid insecticides.¹⁹⁶ It also stated:

We believe to restore community confidence it is vitally important to have a truly independent epidemiological study, free of the Department of Human Services interference, free of Victorian State Government interference ...¹⁹⁷

3.123 Mr Harrison told the committee that Discovery 3227 had shared its soil-testing results with the City and with the department.¹⁹⁸ However, Discovery 3227 submitted that it considered both the department and the City to have conflicts of interest, and that it therefore did not collaborate further with state or local government authorities.¹⁹⁹

3.124 The department advised the committee that it had written to individuals, to the Barwon Heads Association, and to Discovery 3227, and that there remains an 'open and ongoing invitation' for community members to discuss their concerns with the department.²⁰⁰ The CHO also advised the committee:

It is a matter of great regret to me that Mr Harrison and Discovery 3227 refused to engage with me and the Department so that we could seek to understand and explore the situation together.²⁰¹

3.125 The committee also received evidence from the Expert Advisory Group explaining that the absence of detailed information about the cases of concern meant that it was not possible to precisely identify the optimal time frame for analysis, and that this had also limited other aspects of the investigations to date.²⁰² Professor Hill told the committee:

¹⁹⁵ Discovery 3227, *Submission 32*, p. 2.

¹⁹⁶ See Victorian Department of Health, [Framework for mosquito management in Victoria: DSE 2004](#), July 2004, p. 17.

¹⁹⁷ Discovery 3227, *Submission 32*, [p. 21].

¹⁹⁸ Mr Ross Harrison, *Submission 31*, p. 2; Mr Ross Harrison, Member, Discovery 3227, *Committee Hansard*, 1 May 2020, pp. 21–22.

¹⁹⁹ Discovery 3227, *Submission 32.1*, p. 1. See also City of Greater Geelong, answer to question on notice no. 3, 1 May 2020 (received 29 May 2020), Attachments 5 and 6; Department of Health and Human Services, *Response by the Victorian Chief Health Officer, Professor Brett Sutton, to submissions 31 and 32* (received 25 September 2020), pp. 1 and 7.

²⁰⁰ Dr Brett Sutton, Chief Health Officer, Department of Health and Human Services Victoria, *Committee Hansard*, 1 May 2020, p. 37.

²⁰¹ Department of Health and Human Services, *Response by the Victorian Chief Health Officer, Professor Brett Sutton, to submissions 31 and 32* (received 25 September 2020), p. 7.

²⁰² Professor Tim Driscoll, Member, Potential Cancer Cluster Expert Advisory Group, *Committee Hansard*, 1 May 2020, pp. 26–27; Professor David Hill, Chair, Potential Cancer Cluster Expert Advisory Group, *Committee Hansard*, 1 May 2020, p. 26; Professor Kelly-Anne Phillips, Member, Potential Cancer Cluster Expert Advisory Group, *Committee Hansard*, 1 May 2020, p. 28.

... it would be extremely helpful to know what the community's, I guess, evidence of a cluster is. That evidence really needs to be based on the number of patients, the types of cancers they had, their date of diagnosis and their age ...²⁰³

Committee view

- 3.126 The committee acknowledges the difficulties associated with any investigation of a suspected cancer cluster. The committee noted the detailed expert evidence to this inquiry from epidemiological, toxicological, and cancer cluster experts about the scientific limitations of suspected cancer cluster investigations, both in relation to epidemiological concerns and in relation to exposure concerns. Unfortunately, investigations of suspected cancer clusters rarely fully explain or provide answers about individual cases of cancer.
- 3.127 The committee acknowledges that the Victorian Department of Health and Chief Health Officer's work and investigations to date have not alleviated the concerns raised by some of the Barwon Heads residents. For some residents, the investigations to date have not provided clear answers or brought a sense of closure. In some instances, there have been doubts and misunderstanding around the methodology undertaken to do the epidemiological assessment. Discovery 3227 and a group of residents expressed the view that the Victorian Department of Health and Chief Health Officer have failed to address the community concerns about historical exposures to chemicals other than dieldrin.

Responses from the Victorian Department of Health

- 3.128 The committee is of the view that in early 2019 the Victorian Department of Health and Chief Health Officer acted promptly in responding to the Barwon Heads community's concerns about a suspected cancer cluster, noting the additional difficulty for the Victorian Department of Health and Chief Health Officer of working with only the limited information available from media reports.
- 3.129 The committee recognises the willingness of the Chief Health Officer to acknowledge the shortcomings of the first investigation and to undertake additional rounds of more detailed epidemiological analysis in response to the community's ongoing concerns and in response to this inquiry. In particular, the committee thanks the Chief Health Officer for agreeing to its request to commission further epidemiological analysis from Cancer Council Victoria, despite the prevailing circumstances of the COVID-19 pandemic and its impacts on Victoria in particular at that time.

²⁰³ Professor David Hill, Chair, Potential Cancer Cluster Expert Advisory Group, *Committee Hansard*, 1 May 2020, p. 28.

3.130 The committee notes that the additional epidemiological analysis completed by Cancer Council Victoria in March 2021 extended the analysis to use data from 1982 to 2019. The committee heard that the updated analysis showed no increased incidence of cancer for 'all cancers', for 'all cancers (10–34 years)', or for any of the individual cancers identified except breast cancer. This latest analysis is publicly available online.²⁰⁴ However, it could be beneficial if the Victorian Department of Health offered community members the opportunity to discuss these results with officials. Research translation and scientific translation are paramount to ensure that people can understand and interpret the data correctly, and that they understand, for example, how standardised incidence ratios (SIRs) are estimated.

Gaps in information and analysis

3.131 As stated at the beginning of the report, the committee does not have scientific expertise in epidemiology or toxicology. As such, the committee will not further comment about the analysis undertaken to date by the leading experts engaged by Cancer Council Victoria. However, the committee has identified several shortcomings in the approach taken by the Victorian Department of Health and Chief Health Officer, which may have contributed to the community not being satisfied with the types and levels of investigations to date.

Autoimmune diseases

3.132 At the hearing in Barwon Heads, the committee noted that many of the residents who came to talk to the committee expressed grave concerns in relation to the rates of autoimmune diseases in the community. The committee acknowledges that the Victorian Department of Health prepared an information sheet responding to specific concerns about IBD. However, the committee is of the view that it may have been an insufficient and inadequate response to the issues raised by community members. The range of autoimmune diseases present in Barwon Heads is far greater than IBD. The committee sees value in the Victorian Department of Health developing communication and information materials about the prevalence of autoimmune diseases and potential causes and risk factors.

Exposure to chemicals

3.133 The committee heard from experts about the importance of undertaking an assessment of both the epidemiological concerns and the exposure concerns when investigating whether or not a cluster is present. After initially investigating the exposure concerns in relation to dieldrin, the Chief Health

²⁰⁴ Available at City of Greater Geelong, [Bellarine Peninsula cancer cluster concerns](#), 3 June 2021 (accessed 11 June 2021) and at Victorian Department of Health, [Cancer rates on the Bellarine Peninsula](#) (accessed 11 June 2021).

Officer failed to allay the deep concerns expressed by some in the community about the potential for harm caused by various chemicals that may have been used in the mosquito program.

- 3.134 The committee is of the view that the Victorian Department of Health should have considered as part of its responses whether specific kinds of chemical exposures might be related to a higher incidence of diseases in the region, including autoimmune diseases. Chapter 5 specifically considers the issues pertaining to the chemical insecticides used in mosquito programs on the Bellarine Peninsula.

Communication issues

- 3.135 From early on, it appears that very little communication occurred between the concerned residents and the Victorian Department of Health. This may have contributed to the total breakdown in communication that occurred over time between Discovery 3227 and the Victorian Department of Health. This has also likely contributed to the fact that Discovery 3227 and some residents have developed significant distrust towards the authorities. Without restoring a level of trust and information sharing, it is unlikely that any answers or explanations will be satisfactory to the community members who have been affected directly or indirectly by cancer or autoimmune diseases.

Chapter 4

Pesticide use on the Bellarine Peninsula

- 4.1 This chapter first outlines the processes for registration and use of pesticides in Australia, including risk assessment by the Australian Pesticides and Veterinary Medicines Authority. It then discusses approaches to mosquito control and the role played by chemical insecticides.
- 4.2 The chapter details all mosquito-control products used on the Bellarine Peninsula since the 1980s and their current and historical methods of application.

Pesticide regulation in Australia

- 4.3 Between 1945 and 1993, the approval or registration of agricultural and veterinary (agvet) chemical products in Australia was covered by state and territory legislation.¹ In 1993, the national Australian Pesticides and Veterinary Medicines Authority (APVMA) became responsible for regulating pesticides and veterinary medicines up to the point of retail sale, and state and territory governments became responsible for controlling their use.²

APVMA role

Registration and safety

- 4.4 Before a product can be registered, the APVMA conducts a product evaluation, including a scientific assessment of whether the product meets statutory criteria for safety³ and a review of the applicant's proposed safety and use directions for the product label, according to the *Agricultural Labelling Code*.⁴ The APVMA told the committee:

The APVMA will not approve a product unless it is safe when used according to label directions. The Australian public can be assured that their use of registered agvet chemicals in accordance with the label instructions will not result in exposure considered likely to have an effect that is harmful to human beings.⁵

¹ Australian Pesticides and Veterinary Medicines Authority, [History of the Chemical Review Program](#), 21 September 2017 (accessed 14 May 2021).

² Australian Pesticides and Veterinary Medicines Authority, *Submission 34*, p. 2.

³ Australian Pesticides and Veterinary Medicines Authority, [Registration of an agricultural chemical product](#), 1 July 2014, (accessed 16 April 2021).

⁴ Australian Pesticides and Veterinary Medicines Authority, [Agricultural Labelling Code](#), 1 July 2014, (accessed 16 April 2021).

⁵ Dr Jason Lutze, Executive Director, Australian Pesticides and Veterinary Medicines Authority, *Committee Hansard*, 20 November 2020, p. 2.

Risk assessment

- 4.5 The APVMA does not assess the cancer hazard of any given pesticide product or its individual ingredients; rather, the APVMA assesses the cancer risk.⁶ Dr Jason Lutze, Executive Director at the APVMA, explained how the APVMA evaluates products compared with the International Agency for Research on Cancer (IARC):

When we consider risk, we consider both hazard and exposure. The IARC considerations consider the hazard part but not the exposure part of the risk calculations.⁷

- 4.6 The Campaign for Accuracy in Public Health Research (CAPHR) explains that the IARC's work is focused exclusively on assessing the cancer hazard of a substance or action, and that the IARC does not evaluate or determine cancer risk.⁸ The CAPHR also explains, however, that evaluating cancer risk is key:

Unlike a simple hazard analysis, a risk assessment takes into account factors such as dose/concentration, exposure pathways, and probability of exposure to determine the likelihood that any given hazard will actually cause harm. Therefore, evaluations of cancer risks are far more relevant to policymakers and the public than IARC-reviewed cancer hazards.⁹

- 4.7 Dr Sheila Logan, Deputy Executive Director, Risk Assessment Team, and a toxicologist, explained to the committee the margins of safety that the APVMA applies to pesticide risk assessments:

When we are looking at agvet chemicals, if we were to find one that was carcinogenic, we would look at an exposure which is associated with the one-in-a million risk, as that is determined to be indistinguishable from background.¹⁰

- 4.8 Dr Logan further advised the committee that the APVMA also adds margins of safety to its risk calculations:

Part of the assessment we do here in imposing safety limits is to look at a level which does not cause any problems, which is what we would call a threshold level, and impose safety margins on that.¹¹

⁶ Australian Pesticides and Veterinary Medicines Authority, [APVMA Risk assessment manual: Human health](#), March 2019, pp. 16–18 (accessed 25 May 2021).

⁷ Dr Jason Lutze, Executive Director, Australian Pesticides and Veterinary Medicines Authority, *Committee Hansard*, 20 November 2020, p. 2.

⁸ Campaign for Accuracy in Public Health Research, [IARC](#), (accessed 7 May 2021).

⁹ Campaign for Accuracy in Public Health Research, *IARC*.

¹⁰ Dr Sheila Logan, Deputy Executive Director, Australian Pesticides and Veterinary Medicines Authority, *Committee Hansard*, 20 November 2020, p. 3.

¹¹ Dr Sheila Logan, Deputy Executive Director, Australian Pesticides and Veterinary Medicines Authority, *Committee Hansard*, 20 November 2020, p. 3.

Chemical review process

4.9 The APVMA process of chemical review involves the formal reconsideration of a prior product assessment.¹² The APVMA told the committee that there were a number of potential pathways to a reconsideration: a notification under its Adverse Experience Reporting Program; a scientifically valid submission made by a member of the public; the APVMA's own monitoring of scientific literature; or a compulsory notification from a product registrant.¹³ The outcome of a formal reconsideration may be to affirm, vary, suspend or cancel a product approval or registration.¹⁴

Role of state and territory governments

4.10 Since 1993, state and territory governments have been responsible for regulating the use of pesticides beyond the point of retail sale.¹⁵ Any approved pesticide product is approved by the APVMA 'for the purposes and uses stated on the product's label' and it is a condition of use that label instructions be followed by all users.¹⁶

4.11 Regulation of pesticide use occurs through legislation, codes of practice and/or standard operating procedures.¹⁷ For example, the use of pesticides in Victoria is now governed by legislation and Australian Standards,¹⁸ state guidelines,¹⁹ and local council operating procedures. This is similar to the regulatory framework in place for pesticide use in other Australian jurisdictions.²⁰

¹² Australian Pesticides and Veterinary Medicines Authority, [Chemical review](#), 28 May 2020 (accessed 7 May 2021).

¹³ Dr Jason Lutze, Executive Director, Australian Pesticides and Veterinary Medicines Authority, *Committee Hansard*, 20 November 2020, p. 2.

¹⁴ Australian Pesticides and Veterinary Medicines Authority, [The reconsideration process](#), 4 December 2020 (accessed 7 May 2021).

¹⁵ Australian Pesticides and Veterinary Medicines Authority, [Management of use of pesticides and veterinary medicines](#), (accessed 15 May 2021).

¹⁶ Australian Pesticides and Veterinary Medicines Authority, [Registrations and permits](#) (accessed 7 May 2021).

¹⁷ Australian Pesticides and Veterinary Medicines Authority, *Submission 34*, p. 2.

¹⁸ [AS 2507-1998 The storage and handling of agricultural and veterinary chemicals](#) (accessed 16 April 2021); see also Victorian Government, [Pesticide use and pest control](#), (accessed 16 April 2021).

¹⁹ Victorian Department of Human Services, [Guidelines for the safe use of pesticides in non-agricultural workplaces](#), 2007.

²⁰ See, for example, SA Environment Protection Agency, [EPA Guidelines for Responsible Pesticide Use](#) April 2017, pp. 8–9 and 13–17 (accessed 25 May 2021); NT Environmental Defenders Office, [Introduction to regulation of fertilisers and pesticides in the NT](#), 24 April 2020 (accessed 25 May 2021); NSW Environment Protection Agency, [Pesticide use in NSW](#), 18 March 2021 (accessed 25 May 2021).

Pesticides used for mosquito control

- 4.12 Pesticides used for mosquito control are classified as insecticides and may be chemical or biological in origin. Chemical insecticides include organophosphates, such as temephos, and synthetic pyrethroids, such as biomesrethrin. Biological insecticides (sometimes called 'biocides') include plant-based pyrethrum, bacteria such as *Bacillus thuringiensis israelensis* (Bti), and s-methoprene.²¹
- 4.13 An insecticide may be either a larvicide (targeting mosquito larvae) or an adulticide (targeting adult mosquitoes). Larvicides are used to reduce numbers of mosquito larvae in bodies of water.²² These are applied directly to water at mosquito breeding sites where larvae are likely to be present, either in solid form, usually as pellets or powder, or in liquid form by spraying. An example of a chemical larvicide historically used on the Bellarine Peninsula is temephos.
- 4.14 Adulticides are used as a second line of attack and are therefore less commonly used than larvicides. Adulticides reduce numbers of flying adult mosquitoes and are applied by spraying and/or fogging methods.²³ The technique known as ultra-low volume (ULV) fogging (also known as 'cold' fogging) uses air pressure to create a fine spray of the product, while 'thermal' fogging uses heat to convert the liquid product into a fog.²⁴ Adulticides can also be sprayed onto a hard surface such as a wall or a fence as a residual barrier treatment.²⁵
- 4.15 Best practice for mosquito control is known as integrated mosquito management (IMM) and incorporates a number of techniques including surveillance of mosquito populations; the use of insecticides; health and environmental considerations; record keeping; and community education and involvement.²⁶ The aim of IMM is to reduce reliance on chemical approaches.²⁷

²¹ S-methoprene is classified as a biological insecticide based on its method of action.

²² US National Pesticide Information Center, [Pesticides used in mosquito control](#), 2 August 2019 (accessed 16 May 2021).

²³ US National Pesticide Information Center, *Pesticides used in mosquito control*, 2 August 2019.

²⁴ See, for example, Entech Systems, [Thermal vs. ULV \(cold\) foggers](#) (accessed 20 June 2021).

²⁵ Western Australia Department of Health, [Chemical control of mosquitoes](#), 30 January 2020 (accessed 16 May 2021).

²⁶ See, for example, Local Government Association of Queensland, [Mosquito Management Code of Practice](#), August 2014, p. 6 (accessed 2 June 2021); Department of Sustainability and Environment (Victoria), [Framework for mosquito management in Victoria](#), July 2004, p. 13 (accessed 4 May 2021).

²⁷ Local Government Association of Queensland, *Mosquito Management Code of Practice*, August 2014, p. 6.

Framework for mosquito management in Victoria

- 4.16 While the Victorian Government has adopted IMM approaches to mosquito control since 1974,²⁸ the 2004 *Framework for mosquito management in Victoria* (framework document) established a state-wide IMM approach to mosquito control. It provides information and policy guidance ‘to assist councils and State government agencies to implement local mosquito management programs in an effective and environmentally appropriate manner’.²⁹
- 4.17 Under the framework document, responsibility for mosquito management is shared between state and local governments and communities, with councils acting as agents of the Victorian Department of Health (department). The framework document also outlines requirements for monitoring and record keeping, including at municipal level.³⁰
- 4.18 The framework document describes the usual approach to mosquito control in Victoria as follows:
- Most mosquito management programs focus on treating mosquito larvae, although for emergency situations a quick knockdown of adult mosquitoes may be needed to restrict the spread of disease.³¹
- 4.19 The framework document identifies the main types of mosquito larvicides used in Victoria as temephos, Bti and s-methoprene (insecticides).³² Written in 2004, the framework document clarifies that temephos use was declining at that time:
- Temphos [sic] is increasingly being replaced by Bti and smethoprene [sic] which have been shown to be more targeted to mosquito larvae with little impact on some indicator species of crustaceans, birds or frogs.³³
- 4.20 The framework document specifies that the environmental sensitivity of a site should determine which materials and methods are appropriate for mosquito management. For example, it specifies that Bti and s-methoprene are the only

²⁸ Victorian Department of Health, [Vector-borne infectious disease control](#) (accessed 2 June 2021).

²⁹ Department of Sustainability and Environment (Victoria), *Framework for mosquito management in Victoria*, July 2004, p. 1; also provided by Professor Brett Sutton, Chief Health Officer, Department of Health Victoria, answers to questions on notice 20 April 2021 (received 31 May 2021), Attachment 2.

³⁰ Department of Sustainability and Environment (Victoria), *Framework for mosquito management in Victoria*, July 2004, p. 18.

³¹ Department of Sustainability and Environment (Victoria), *Framework for mosquito management in Victoria*, July 2004, p. 17.

³² Department of Sustainability and Environment (Victoria), *Framework for mosquito management in Victoria*, July 2004, p. 17.

³³ Department of Sustainability and Environment (Victoria), *Framework for mosquito management in Victoria*, July 2004, p. 33.

suitable pesticides for use in areas of high or very high environmental sensitivity.³⁴

- 4.21 Similarly in South Australia, by 2006 the use of temephos for mosquito control had largely been replaced by the use of biological insecticides such as Bti and s-methoprene.³⁵ While temephos was still registered for use as a mosquito larvicide at that time, concerns existed over its toxicity to non-target species.³⁶
- 4.22 The 2004 Victorian framework document states that the chemical adulticides malathion and pyrethroids were registered for use in Victoria at that time but that their use is 'not common'.³⁷

Mosquito control on the Bellarine Peninsula

- 4.23 Local councils first implemented a mosquito-control program on the Bellarine Peninsula in the 1980s.³⁸ Since its establishment in 1993, the City of Greater Geelong (City) has been the responsible authority for delivering the mosquito-control program. In 2004 the City had the largest annual mosquito-control program budget in Victoria, totalling \$120,000.³⁹
- 4.24 The Barwon Heads area includes six wetland areas of different types, two of which are Wetlands of International Importance under the Ramsar Convention (known as Ramsar Sites)⁴⁰ and therefore subject to additional environmental protections.⁴¹ These wetland areas and nearby lakes, such as Lake Connewarre and Murtnaghurt Lagoon, are recognised as prime mosquito-breeding territory.⁴² Mr Gareth Smith explained to the committee that permits are needed for the City's mosquito-control activities within the Ramsar Sites:

³⁴ Department of Sustainability and Environment (Victoria), *Framework for mosquito management in Victoria*, July 2004, p. 18.

³⁵ *South Australian Integrated Mosquito Management Resource Package 2006*.

³⁶ *South Australian Integrated Mosquito Management Resource Package 2006*.

³⁷ Department of Sustainability and Environment (Victoria), *Framework for mosquito management in Victoria*, July 2004, p. 33.

³⁸ Professor Brett Sutton, Chief Health Officer, Department of Health Victoria, answers to questions on notice 20 April 2021 (received 31 May 2021), p. 16.

³⁹ Department of Sustainability and Environment (Victoria), *Framework for mosquito management in Victoria*, July 2004, p. 7.

⁴⁰ Ramsar Sites Information Service, [Port Phillip Bay & Bellarine Peninsula](#), 1 January 1998 (accessed 25 May 2021).

⁴¹ Department of Sustainability and Environment (Victoria), *Framework for mosquito management in Victoria*, July 2004, p. 2.

⁴² Department of Sustainability and Environment (Victoria), *Framework for mosquito management in Victoria*, July 2004, pp. 2 and 4.

Keep in mind we're also working on public land managed by Parks Victoria for the state government, and they're Ramsar sites as well ... So we actually have permits to undertake the programs we have.⁴³

4.25 As well as its permanent urban population, the region has a large influx of holidaymakers during the summer season, who stay in holiday homes and caravan parks. Mosquito management is thus considered an essential local service for health and liveability, for residents and visitors alike.⁴⁴ The City responds to more than 100 enquiries each year from members of the public concerned about high numbers of mosquitoes and mosquito management.⁴⁵

4.26 Mr Gareth Smith, Director City Planning and Economy, City of Greater Geelong, told the committee:

The city's program operates to reduce mosquito levels in the community. This minimises health risks associated with mosquito-borne diseases and reduces the impact of biting insects on community health and wellbeing and an ability to enjoy the environment.⁴⁶

4.27 The City commented that it needed a holistic approach, given that their purview includes 400 hectares of mosquito-breeding territory in the form of the nearby wetlands. Mr Lyndon Ray provided the committee with an example of the City's IMM based approach to larvicide application:

... when we apply the product, we've got triggers for the larvae level. If there are small numbers of larvae in the wetland, we wouldn't apply it. We wait till we get significant numbers.⁴⁷

4.28 The City also reported that its activities include community education about mosquito-control measures.⁴⁸

4.29 The City advised the committee that it has always used approved products:

All products used in the mosquito treatment program, both historically and currently, have been approved by the Australian Pesticides and Veterinary Medicines Authority as suitable products for such uses.⁴⁹

⁴³ Mr Gareth Smith, Director City Planning & Economy, City of Greater Geelong, *Committee Hansard*, 20 April 2021, p. 6.

⁴⁴ Department of Sustainability and Environment (Victoria), *Framework for mosquito management in Victoria*, July 2004, p. 2.

⁴⁵ City of Greater Geelong, answers to questions on notice, 1 May 2021 (received 29 May 2020), Attachment 8 (Community awareness and engagement material examples since 1997, *FAQs: Mosquito management program 13 August 2019*, p. 2), [p. 42].

⁴⁶ Mr Gareth Smith, Director City Planning & Economy, City of Greater Geelong, *Committee Hansard*, 20 April 2021, p. 2.

⁴⁷ Mr Lyndon Ray, Coordinator Environmental Health, City of Greater Geelong, *Committee Hansard*, 20 April 2021, p. 6.

⁴⁸ See City of Greater Geelong, answers to questions on notice, 1 May 2021 (received 29 May 2020), Attachment 8 (Community awareness and engagement material examples since 1997).

Historical mosquito-control programs

4.30 Due to the amalgamation of six smaller council areas in 1993, the City submitted that council records prior to 1993 are limited. The City has nonetheless investigated mosquito-management programs prior to that date.⁵⁰

It submitted:

Limited information is available regarding mosquito treatment activities undertaken prior to amalgamation, however City officers have carefully examined all recorded products and procedures used in wetland locations throughout the municipality.⁵¹

4.31 At a hearing in Barwon Heads, the City gave evidence to the committee about past practices of mosquito control. Mr Gareth Smith advised that the City's primary approach to mosquito control has always been source reduction—that is, the use of larvicides to kill mosquito larvae, which in turn reduces the numbers of adults hatching.⁵²

4.32 Mr Smith told the committee that fogging with adulticides was not part of the City's core program and was only conducted in response to community concerns about high numbers of adult mosquitoes.⁵³

Insecticides used

4.33 The City stated that, in response to community concerns about which chemical insecticides had been used for mosquito control on the Bellarine Peninsula, it had reviewed all available records relating to historical mosquito-control programs.⁵⁴

4.34 Throughout 2019 and 2020, the City has also published information on its website about its use of mosquito-control chemicals⁵⁵ and responded to individual queries.⁵⁶

⁴⁹ Mr Gareth Smith, Director City Planning & Economy, City of Greater Geelong, *Committee Hansard*, 20 April 2021, p. 2.

⁵⁰ City of Greater Geelong, *Submission 3*, p. 3.

⁵¹ City of Greater Geelong, *Submission 3*, p. 3.

⁵² Mr Gareth Smith, Director City Planning & Economy, City of Greater Geelong, *Committee Hansard*, 20 April 2021, p. 7.

⁵³ Mr Gareth Smith, Director City Planning & Economy, City of Greater Geelong, *Committee Hansard*, 20 April 2021, p. 8.

⁵⁴ City of Greater Geelong, *Submission 3*, p. 3.

⁵⁵ See, for example, City of Greater Geelong, [Mosquito management products table](#), (accessed 27 April 2021); and City of Greater Geelong, [Common questions: Barwon Heads mosquito control: How are the treatments applied?](#) (accessed 27 April 2021); City of Greater Geelong, [Bellarine Peninsula cancer cluster concerns](#), *Common questions*, Barwon Heads mosquito control: What chemicals are used in your mosquito management program?, 26 April 2019 (accessed 27 April 2021).

⁵⁶ City of Greater Geelong, *Submission 3*, p. 3.

4.35 The City also provided the committee with a historical timeline consolidating all available information for mosquito-control products used by the City and by former councils.⁵⁷ The City explained the methodology for this review as follows:

The City has no records of detailed program schedules from the 1980s to 2004 but does have detailed records from 2005 to the present time. The City has reviewed all financial and written records relating to the mosquito program in Barwon Heads and has developed a summary table ... of documents relevant to the mosquito control program since 1984.⁵⁸

4.36 This review found there has been little use of chemical insecticides on the Bellarine Peninsula compared with the use of biological pesticides.⁵⁹

4.37 The department also provided the committee with a list of all mosquito-control products used on the Bellarine Peninsula between 1984 and the present.⁶⁰ This list includes both chemical and biological products and also shows more use of biological than chemical insecticides.⁶¹

4.38 An overview of the evidence to the committee from the department and the City about mosquito-control products used on the Bellarine Peninsula is provided in Table 1.1.⁶²

4.39 This documentation provided by the City and the department identifies that the following chemical insecticides have been used on the Bellarine Peninsula:

- Abate (temephos), a chemical larvicide used in powder or pellet form for direct application to mosquito-breeding sites such as stagnant water and drains; and
- Reslin (biomesrethrin) and Twilight (phenothrin), both pyrethroid-based chemical adulticides used in liquid form for misting or 'fogging' of adult mosquitoes.⁶³

⁵⁷ City of Greater Geelong, answers to questions on notice, 1 May 2020 (received 29 May 2020), Attachment 7 (Historical timeline of products used in mosquito management by the City of Greater Geelong: 1984–2020); see also City of Greater Geelong, *Submission 3*, p. 4.

⁵⁸ City of Greater Geelong, answers to question on notice, 1 May 2020 (received 29 May 2020), [p. 5].

⁵⁹ City of Greater Geelong, answers to questions on notice, 1 May 2020 (received 29 May 2020), Attachment 7 (Historical timeline of products used in mosquito management by the City of Greater Geelong: 1984–2020).

⁶⁰ Department of Health and Community Services, *Submission 2*, p. 9.

⁶¹ Department of Health and Community Services, *Submission 2*, p. 9.

⁶² See Appendix 1, *Mosquito-control products used on the Bellarine Peninsula*.

⁶³ Department of Health and Community Services, *Submission 2*, p. 9; City of Greater Geelong, answers to questions on notice, 1 May 2020 (received 29 May 2020), Attachment 7 (Historical timeline of products used in mosquito management by the City of Greater Geelong: 1984–2020). This documentation also identifies the biological larvicides *Bacillus thuringiensis israelensis* (Bti) and s-methoprene, and a number of biological adulticides containing pyrethrum.

- 4.40 Mr Steve Sodomaco, the City's Manager, Health and Local Laws, told the committee that there was increasing use by the then Bellarine Shire Council of biological larvicides towards the end of the 1980s.⁶⁴ He stated that the council's shift from chemical insecticides to biological insecticides, including Bti, at this time coincided with increasing use of Bti elsewhere in Australia, including in Queensland.⁶⁵
- 4.41 Mr Lyndon Ray, the City's current Coordinator Environmental Health, confirmed that pyrethrum was the active ingredient in the adulticides historically used for fogging adult mosquitoes in the 1980s and 1990s.⁶⁶

Dates and methods of application

Current methods

- 4.42 At the hearing in Barwon Heads, the City described the two main methods of application currently used for mosquito insecticides, both using larvicides. The first method is manual treatment by council employees:
- The program involves ground treatment, where our crew can treat an area manually, such as drains, pits, constructed wetlands ...⁶⁷
- 4.43 The second method is aerial treatment, which is conducted under a permit during the mosquito-breeding season. The City explained:
- Approval from the Commonwealth government permits aerial treatment for mosquito larvae in wetlands on the Bellarine Peninsula between 15 August and 15 March each year. ... Aerial treatment only takes place over wetlands and never occurs over townships. Products used in our aerial treatments are in solid form, not liquid spraying, and are dropped from a helicopter flying at a low height.⁶⁸
- 4.44 Mr Ray explained that it is the City's standard procedure for applying any chemical product to follow the instructions on the product label.⁶⁹
- 4.45 Mr Ray also commented that the reduction over time in the use of fogging techniques for adult mosquitoes was likely due to the more effective aerial

⁶⁴ Mr Steve Sodomaco, Manager, Health and Local Laws, City of Greater Geelong, *Committee Hansard*, 1 May 2020, p. 31.

⁶⁵ Mr Steve Sodomaco, Manager, Health and Local Laws, City of Greater Geelong, *Committee Hansard*, 1 May 2020, p. 31.

⁶⁶ Mr Lyndon Ray, Coordinator Environmental Health, City of Greater Geelong, *Committee Hansard*, 20 April 2021, p. 4.

⁶⁷ Mr Gareth Smith, Director City Planning & Economy, City of Greater Geelong, *Committee Hansard*, 20 April 2021, p. 2.

⁶⁸ Mr Gareth Smith, Director City Planning & Economy, City of Greater Geelong, *Committee Hansard*, 20 April 2021, p. 2.

⁶⁹ Mr Lyndon Ray, Coordinator Environmental Health, City of Greater Geelong, *Committee Hansard*, 20 April 2021, p. 6.

treatments used in wetland areas to reduce mosquito numbers before the larvae develop into adults.⁷⁰ The City's website advises that the practice of fogging stopped completely in 2010.⁷¹

Historical methods

4.46 Historical records sourced by the department and the City do not fully document the methods used by local councils to apply mosquito insecticides in the 1980s and 1990s. However, the City explained that additional details had been provided by long-term staff who had conducted mosquito-control activities on the Bellarine Peninsula under the previous council's operations. Mr Smith told the committee:

We haven't been able to find that written record of those activities. We are working on the knowledge of staff who have been in [the mosquito] programs for a long period of time.⁷²

4.47 The City provided the committee with copies of historical public information campaigns and community advice about its mosquito-spraying activities. For example, a 1998 media release advises:

The chemical used in the operation is *Bacillus thuringiensis* which targets the mosquito larvae prior to hatching and is not harmful to humans or other aquatic species.

If this treatment process doesn't prove entirely effective, a follow up program of 'fogging' is carried out. This involves misting the coastal marshlands with Pyrethrum.⁷³

4.48 The City further detailed its historical methods of larvicide application in evidence:

The focus of the program was the application of Bti (*Bacillus thuringiensis*) in pellet form in outlying wetland areas which were largely inaccessible to the community. Small boats and punts were used by the City to access these various sites that were inaccessible by other means. In evidence given before the Committee, Abate was a secondary product and not routinely used since 1987 given the existence of other and better products that were more effective against mosquito larvae control.⁷⁴

⁷⁰ Mr Lyndon Ray, Coordinator Environmental Health, City of Greater Geelong, *Committee Hansard*, 20 April 2021, p. 5.

⁷¹ City of Greater Geelong, [Mosquito management program: Frequently asked questions](#), 13 August 2019 (accessed 3 June 2021).

⁷² Mr Gareth Smith, Director City Planning & Economy, City of Greater Geelong, *Committee Hansard*, 20 April 2021, p. 8.

⁷³ City of Greater Geelong, answers to question on notice, 1 May 2020 (received 29 May 2020), Attachment 8 (Community awareness and engagement material examples since 1997), [p. 5].

⁷⁴ City of Greater Geelong, *Response from City of Greater Geelong to submission 31* (received 7 July 2020), pp. 2–3.

- 4.49 Mr Sodomaco, a long-term staff member, confirmed to the committee that the City's mosquito program in the early 1990s focused on the treatment of stagnant water bodies outside the townships, which were breeding areas for mosquito larvae.⁷⁵ He explained that this treatment was done by individuals, either on foot or using all-terrain vehicles, but that, in the late 1990s, the council began investigating the use of aerial application methods, including a trial of helicopter use in 1998.⁷⁶
- 4.50 Adulticides were applied by 'fogging' to kill live flying insects post larval stage. Adulticide treatments were conducted in areas where there were high numbers of adult mosquitoes. For example, the City's records show that in 2005 each of four caravan parks was sprayed for 30 minutes with Py Fog, a pyrethrum-based product.⁷⁷
- 4.51 Mr Sodomaco also confirmed this evidence, stating that in the 1980s and 1990s the council sometimes fumigated using pyrethrum-based products around the perimeter of town, either in bushland or for stormwater, but that this spraying was 'minimally effective' compared with the application of larvicides to breeding areas.⁷⁸
- 4.52 The Victorian Chief Health Officer (CHO) explained that these fogging practices were consistent with best practice and were similar to the use of flyspray.⁷⁹
- 4.53 Mr Ray told the committee that a helicopter access permit was finally granted in 2005, and that this increased the impact of the biological insecticides used in extensive wetland areas, which in turn reduced the need for the use of adulticides including via fogging.⁸⁰ This evidence was confirmed by the CHO, who stated that this evolution in mosquito-control methods occurred across Australia.⁸¹

⁷⁵ Mr Steve Sodomaco, Manager, Health and Local Laws, City of Greater Geelong, *Committee Hansard*, 1 May 2020, p. 34.

⁷⁶ Mr Steve Sodomaco, Manager, Health and Local Laws, City of Greater Geelong, *Committee Hansard*, 1 May 2020, p. 31.

⁷⁷ City of Greater Geelong, answers to questions on notice, 1 May 2020 (received 29 May 2020), Attachment 7 (Historical timeline of products used in mosquito management by the City of Greater Geelong: 1984–2020), p. 7.

⁷⁸ Mr Steve Sodomaco, Manager, Health and Local Laws, City of Greater Geelong, *Committee Hansard*, 1 May 2020, p. 34.

⁷⁹ Professor Brett Sutton, Chief Health Officer, Department of Health Victoria, answers to questions on notice 20 April 2021 (received 31 May 2021), p. 16.

⁸⁰ Mr Lyndon Ray, Coordinator Environmental Health, City of Greater Geelong, *Committee Hansard*, 20 April 2021, pp. 3 and 5.

⁸¹ Professor Brett Sutton, Chief Health Officer, Department of Health Victoria, answers to questions on notice 20 April 2021 (received 31 May 2021), p. 16.

4.54 Chapter 5 discusses the concerns raised during the inquiry about the use of mosquito-control insecticides on the Bellarine Peninsula. The two major issues are the question of possible environmental exposure to chemical mosquito insecticides, and the question of whether such exposures could have caused cancer or autoimmune disease in the local community. Chapter 5 then considers the feasibility and scientific value of any further investigations.

Chapter 5

Concerns about pesticide use

- 5.1 This chapter carefully considers issues raised by inquiry participants: first, the fears that, in the past, individual community members may have been directly exposed to chemical insecticides; and, second, the concerns that local cases of cancer and autoimmune disease might be connected to the use of chemical insecticides.
- 5.2 The chapter concludes with a discussion of evidence to the inquiry regarding the feasibility and value of any further investigations.

Issues raised by inquiry participants

- 5.3 Discovery 3227 and most individual submitters were worried that community members had been repeatedly exposed to unsafe levels of chemical insecticides. Inquiry participants thought that the use of spraying or fogging techniques meant community members had been in direct contact with chemical insecticides. They were especially concerned about the possible use of insecticides containing organophosphates, such as temephos.¹
- 5.4 Submitters explained that they were fearful these alleged chemical exposures had caused many cases of cancer and autoimmune disease among current and former residents of Barwon Heads.
- 5.5 Discovery 3227 suggested that cancer and autoimmune diseases had been caused by aggregate chemical exposures over time.² Discovery 3227 also suggested that the chemical insecticides used for mosquito control may have disrupted endocrine function for some individuals and that this may have triggered the development of cancers and autoimmune diseases.³
- 5.6 The following sections consider these issues raised by submitters alongside relevant evidence from state and local government authorities and evidence from expert witnesses.

¹ See, for example, Name withheld, *Submission 5*, [p. 1]; Name withheld, *Submission 8*, [p. 1]; Gordon Legal, *Submission 27*, pp. 4–7; Mr Ross Harrison, Spokesperson and member, *Discovery 3227, Committee Hansard*, 20 April 2021, pp. 10–11; Ms Kristie Ainsworth, private capacity, *Committee Hansard*, 20 April 2021, p. 18.

² See, for example, Mr Ross Harrison, *Submission 31*, p. 3; Mr Ross Harrison, Spokesperson and member, *Discovery 3227, Committee Hansard*, 20 April 2021, p. 10.

³ Mr Ross Harrison, Spokesperson/Member, *Committee Hansard*, 20 April 2021, p. 10.

Exposures to chemical insecticides

- 5.7 As discussed in chapter 2, a majority of individual submitters expressed the view that the City of Greater Geelong (City) and former council entities had sprayed mosquito insecticides in ways that might have exposed community members to harmful chemicals.⁴
- 5.8 Discovery 3227 expressed its belief that mosquito spraying by the local council used a ‘mosaic of chemicals’ made up of two types of pesticides: organophosphate insecticides and pyrethroid insecticides.⁵ Discovery 3227 alleged that the council’s use of barrier spraying and fogging techniques to control mosquitoes had exposed many in the community to these chemical insecticides, in a number of named locations in Barwon Heads:
- ... within our Village Park , houses adjacent to the wetlands, the kindergarten, the Caravan Parks, the Football oval surrounds, the Barwon Heads Primary School inclusive of sports days ,the schools out of bounds area and the boundaries of the school for the period of 1980 to the early 2000’s.⁶
- 5.9 Another submitter also believed that organophosphorus-based pesticides (OPs) had been sprayed in the township of Barwon Heads:
- From the 1980’s onwards Barwon Heads was sprayed and bombed with Organophosphorus insecticide (OP) to alleviate mosquitos. This practice occurred at a high rate well into the 2000’s.⁷
- 5.10 Ms Ainsworth told the committee that she and others remembered residential streets being regularly fumigated and gutter drains being regularly sprayed and appearing pink when sprayed; and that she remembered ‘foul-smelling, foggy mist’ in the community park.⁸ Ms Ainsworth told the committee she believed that she and her friends had been exposed to chemicals when they rode their bikes in the mist.⁹
- 5.11 Some other submitters also referred to their memories of a fog or mist after mosquito treatments in the town of Barwon Heads.¹⁰

⁴ See, for example, Name withheld, *Submission 5*, [p. 1]; Name withheld, *Submission 8*, [p. 1]; Ms Samantha Judge, *Submission 20*, [pp. 2–3]; Name withheld, *Submission 39*, [p. 1]; Name withheld, *Submission 40*, [p. 1].

⁵ Mr Ross Harrison, Spokesperson/Member, *Committee Hansard*, 20 April 2021, p. 11.

⁶ Mr Ross Harrison, *Submission 31*, p. 3.

⁷ Name withheld, *Submission 5*, [p. 1].

⁸ Ms Kristie Ainsworth, private capacity, *Committee Hansard*, 20 April 2021, p. 18.

⁹ Ms Kristie Ainsworth, private capacity, *Committee Hansard*, 20 April 2021, p. 19.

¹⁰ See, for example, Wayne Lockyer, *Submission 24*, [p. 1]; Name withheld, *Submission 38*, [p. 1]; Name withheld, *Submission 39*, [p. 1].

Organophosphate insecticides

- 5.12 The active ingredients in OPs are organophosphates, which are chemical compounds of phosphoric acid. Since the 1940s OPs have been used for a wide range of applications, including as insecticides for pest control. In recent decades, concerns over health and environmental impacts and toxicity have led to greater restrictions on the use of some OPs, especially in relation to non-target species such as fish and other aquatic life.¹¹
- 5.13 Discovery 3227 alleged that local councils used OPs for mosquito control on the Bellarine Peninsula for several decades, including temephos, malathion, fenthion, dichlorvos, diazinon and chlorpyrifos.¹² Discovery 3227 claimed that the council was using organophosphorus insecticides via fogging and residual barrier spraying from the 1980s into the 2000s.¹³
- 5.14 Other individual inquiry participants also expressed concerns about exposure to organophosphate insecticides.¹⁴ For example, Ms Kristie Ainsworth told the committee:

I strongly believe that the town's cancer and autoimmune cluster is a direct result of the organophosphates used to treat mosquitoes by the City of Greater Geelong.¹⁵

Temephos (larvicide)

- 5.15 Discovery 3227 alleged that the City and former council entities used temephos-based products for mosquito control in and around Barwon Heads over several decades:

Temefos [sic] has been used extensively ... for about 30 years by the City of Greater Geelong in some shape or form. They used it in a pellet form, which they dumped in hundreds and hundreds and hundreds of kilos into our wetlands, but they also used to spray it for mosquitoes in the village park and those areas where adult mosquitoes roost.¹⁶

- 5.16 Evidence from the department and from the City states that Abate (temephos) was a mosquito larvicide normally used in solid formulations (powder or

¹¹ See, for example, Dr Jason Lutze, Executive Director, Australian Pesticides and Veterinary Medicines Authority, *Committee Hansard*, 20 November 2020, pp. 4–5; Jyoti Kaushal, Madhu Khatri & Shailendra Kumar Arya, 'A treatise on Organophosphate pesticide pollution: Current strategies and advancements in their environmental degradation and elimination', *Ecotoxicology and Environmental Safety*, vol. 207, 1 January 2021, doi.org/10.1016/j.ecoenv.2020.111483.

¹² Mr Ross Harrison, Spokesperson/Member, *Committee Hansard*, 20 April 2021, pp. 10 and 13.

¹³ Mr Ross Harrison, Spokesperson/Member, *Committee Hansard*, 20 April 2021, p. 12.

¹⁴ See, for example, Name withheld, *Submission 5*, [p. 1]; Name withheld, *Submission 8*, [p. 1]; Danielle, private capacity, *Committee Hansard*, 20 April 2021, p. 24.

¹⁵ Ms Kristie Ainsworth, private capacity, *Committee Hansard*, 20 April 2021, p. 18.

¹⁶ Mr Ross Harrison, Member, Discovery 3227, *Committee Hansard*, 1 May 2020, p. 20.

pellets).¹⁷ For example, Mr Lyndon Ray informed the committee that the larvicide Abate (temephos) was mostly applied by hand to bodies of water containing mosquito larvae.¹⁸

- 5.17 Mr Ray further explained that Abate was not a product that was fogged, since it was not used for adult mosquito control.¹⁹
- 5.18 The City also gave evidence that in the 1980s and 1990s mosquito larvicide use in Australia began to transition away from OPs towards more use of biological insecticides, like *Bacillus thuringiensis israelensis* (Bti) and s-methoprene.²⁰
- 5.19 At a hearing in 2020, Mr Sodomaco, who had been a council employee since the 1980s, told the committee that Abate was used between 1984 and 1987, and then again in 1998 during a helicopter trial. Stocktake information and other documentation submitted by the City supports these statements.²¹
- 5.20 At the hearing at Barwon Heads in 2021, the City was asked again about its past use of Abate (temephos). Mr Gareth Smith confirmed that Abate was used for a three-year period in the 1980s, and then again on 23 October 1998, when Abate was dropped at five locations during a trial of larvicide application by helicopter.²²

Other organophosphate pesticides (OPs)

- 5.21 Discovery 3227 alleged that the City also used other OPs for mosquito control, including fenthion and malathion. Mr Harrison submitted that these allegations are founded on three things: references to malathion in the 2004 *Framework for mosquito management in Victoria* (framework document) as a registered adulticide;²³ the mention of a number of OPs in archived Victorian

¹⁷ See, for example, Department of Health and Community Services, *Submission 2*, p. 9; City of Greater Geelong, answers to questions on notice, 1 May 2020 (received 29 May 2020), Attachment 7 (Historical timeline of products used in mosquito management by the City of Greater Geelong: 1984–2020). Abate is also available in liquid formulations; see, for example, BASF SE, [Abate: First line of defense against mosquito and insect-borne diseases](#), 2015, p. 3 (accessed 28 June 2021).

¹⁸ Mr Lyndon Ray, Coordinator Environmental Health, City of Greater Geelong, *Committee Hansard*, 20 April 2021, p. 4.

¹⁹ Mr Lyndon Ray, Coordinator Environmental Health, City of Greater Geelong, *Committee Hansard*, 20 April 2021, p. 4.

²⁰ Mr Lyndon Ray, Coordinator Environmental Health, City of Greater Geelong, *Committee Hansard*, 20 April 2021, p. 4.

²¹ See City of Greater Geelong, answers to questions on notice, 1 May 2020 (received 29 May 2020), Attachment 7 (Historical timeline of products used in mosquito management by the City of Greater Geelong: 1984–2020).

²² Mr Gareth Smith, Director City Planning & Economy, City of Greater Geelong, *Committee Hansard*, 20 April 2021, pp. 9–10.

²³ Mr Ross Harrison, Spokesperson/Member, *Committee Hansard*, 20 April 2021, p. 10.

Government website content from 1996, which states that malathion, fenthion and several other OPs were registered for use as mosquito larvicides; and a mention of a fenthion-based product (Baytex 550) in stocktake documents from 1994 provided by the City.²⁴

5.22 Malathion was not identified by the City or the department as one of the products used for mosquito control on the Bellarine Peninsula.²⁵

5.23 The committee asked the City about one mention of five litres of Baytex 550 (fenthion) in its historical timeline of mosquito product use.²⁶ The City stated that, while this product appears in a stocktake list for a chemical shed, it was in fact not used for mosquito control and therefore need not have appeared in the timeline.²⁷

5.24 The City also explained that it had enquired of staff about any possible uses for Baytex 550 at that time:

Existing City mosquito management staff who have worked on the program for over 30 years, recalled this product possibly being used for bull ant control by directly applying it to the ant's nest and did not believe it was ever used for fogging or applying to mosquito larvae.²⁸

5.25 Fenthion was not identified by the City or the department as one of the products used for mosquito control on the Bellarine Peninsula.²⁹

5.26 Discovery 3227 also identified several other chemicals that it believed the City had used for mosquito control in the 1980s and 1990s, including chlorpyrifos,

²⁴ Discovery 3227, *Submission 32*, [p. 27].

²⁵ See, for example, Department of Health and Community Services, *Submission 2*, p. 9; City of Greater Geelong, answers to questions on notice, 1 May 2020 (received 29 May 2020), Attachment 7 (Historical timeline of products used in mosquito management by the City of Greater Geelong: 1984–2020); Mr Gareth Smith, Director City Planning & Economy, City of Greater Geelong, *Committee Hansard*, 1 May 2020, p. 30; Mr Steve Sodomaco, Manager, Health and Local Laws, City of Greater Geelong, *Committee Hansard*, 1 May 2020, p. 31.

²⁶ See City of Greater Geelong, answers to questions on notice, 1 May 2020 (received 29 May 2020), Attachment 7 (Historical timeline of products used in mosquito management by the City of Greater Geelong: 1984–2020), p. 4.

²⁷ Mr Gareth Smith, Director City Planning & Economy, City of Greater Geelong, *Committee Hansard*, 20 April 2021, p. 8.

²⁸ City of Greater Geelong, answers to questions on notice, 1 May 2020 (received 29 May 2020), Attachment 2, [p. 1]. See also Mr Gareth Smith, Director City Planning & Economy, City of Greater Geelong, *Committee Hansard*, 20 April 2021, p. 8.

²⁹ See, for example, Department of Health and Community Services, *Submission 2*, p. 9; City of Greater Geelong, answers to questions on notice, 1 May 2020 (received 29 May 2020), Attachment 7 (Historical timeline of products used in mosquito management by the City of Greater Geelong: 1984–2020); Mr Gareth Smith, Director City Planning & Economy, City of Greater Geelong, *Committee Hansard*, 1 May 2020, p. 30; Mr Steve Sodomaco, Manager, Health and Local Laws, City of Greater Geelong, *Committee Hansard*, 1 May 2020, p. 31.

diazinon and dichlorvos. Evidence submitted by the department and the City does not substantiate this.³⁰

- 5.27 At a hearing, Mr Steve Sodomaco confirmed to the committee that Abate (temephos) was the only organophosphate insecticide used by the City for mosquito control.³¹

Pyrethroid insecticides (adulticides)

- 5.28 As mentioned above, Discovery 3227 alleged that many in the community were regularly exposed to pyrethroid insecticides used by the City for mosquito control.
- 5.29 Pyrethroids are synthetic versions of the active ingredients in natural pyrethrum (known as pyrethrins) and have been used in mosquito insecticides since the 1980s. Pyrethroid-based insecticides are adulticides, targeting adult mosquitoes, and are applied via ultra-low volume (ULV) fogging techniques. This kind of fogging is not visible like the thermal fogging techniques that are used for pyrethrum-based products.
- 5.30 A historical timeline of product use submitted by the City shows occasional use of synthetic pyrethroid insecticides between 1988 and 2005³² and regular use of biological insecticides from 1988 onwards.³³
- 5.31 The department and the City provided details about the historical use of two pyrethroid-based insecticides on the Bellarine Peninsula. Twilight (phenothrin) was applied via ULV fogging in 2007, 2010 and 2012.³⁴ One drum of Reslin (biomesrethrin), a product used in a similar way, is listed in a stocktake list dated 31 March 1999 but with no information available about whether or when

³⁰ See, for example, Department of Health and Community Services, *Submission 2*, p. 9; City of Greater Geelong, answers to questions on notice, 1 May 2020 (received 29 May 2020), Attachment 7 (Historical timeline of products used in mosquito management by the City of Greater Geelong: 1984–2020).

³¹ Mr Steve Sodomaco, Manager, Health and Local Laws, City of Greater Geelong, *Committee Hansard*, 1 May 2020, p. 31.

³² City of Greater Geelong, answers to questions on notice, 1 May 2020 (received 29 May 2020), Attachment 7 (Historical timeline of products used in mosquito management by the City of Greater Geelong: 1984–2020), pp. 1–7.

³³ City of Greater Geelong, answers to questions on notice, 1 May 2020 (received 29 May 2020), Attachment 7 (Historical timeline of products used in mosquito management by the City of Greater Geelong: 1984–2020), pp. 1–7.

³⁴ Department of Health and Community Services, *Submission 2*, p. 9; City of Greater Geelong, *Submission 3*, Attachment 1: Mosquito management products used by the City of Greater Geelong, [p. 4]; City of Greater Geelong, answers to questions on notice, 1 May 2020 (received 29 May 2020), Attachment 7 (Historical timeline of products used in mosquito management by the City of Greater Geelong: 1984–2020), pp. 6 and 8.

it was applied.³⁵ Any community exposures to pyrethroid-based insecticides are most likely to be on the occasions of Twilight use in 2007, 2010 and 2012.

- 5.32 The Victorian Chief Health Officer (CHO) advised the committee that synthetic pyrethroids are safe for use, comparing them with domestic mosquito-control formulations:

The information provided to the Inquiry by CoGG [the City of Greater Geelong] indicates that only synthetic pyrethroids or natural pyrethrins were used for fogging. To improve the effectiveness of synthetic pyrethroids and natural pyrethrins, piperonyl butoxide is often added as a synergist. These fogging agents used by CoGG can be found on supermarket shelves, including flyspray products. An example is Raid Earth Options Botanicals Multi-insect Killer, which contains 3.5g/kg of pyrethrins and 16.1g/kg of piperonyl butoxide. In comparison, the control agent, Pyfog, that was used by CoGG, contains 4g/L of pyrethrins, and 12g/L of piperonyl butoxide.³⁶

- 5.33 The scant use of synthetic pyrethroids on the Bellarine Peninsula is consistent with the national pattern of use reported in a 2017 article, which refers to the infrequent use in Australia of pyrethroid fogging:

Australia does not carry out routine fogging. [If required,] pyrethroids are used in highly regimented and limited fashion.³⁷

Disease causation

- 5.34 As discussed in chapter 2, some submitters believed that these alleged chemical exposures had caused some Barwon Heads residents and regular visitors to develop cancers.³⁸ Other submitters raised concerns about a possible link between chemical insecticides and cases of autoimmune disease in the community.³⁹
- 5.35 Mr Ross Harrison of Discovery 3227 stated that he believes exposure to certain chemicals has occurred and is directly linked to the diseases experienced by

³⁵ City of Greater Geelong, answers to questions on notice, 1 May 2020 (received 29 May 2020), Attachment 7 (Historical timeline of products used in mosquito management by the City of Greater Geelong: 1984–2020), p. 6.

³⁶ Professor Brett Sutton, Chief Health Officer, Department of Health Victoria, answers to questions on notice 20 April 2021 (received 31 May 2021), p. 16. See also Victorian Chief Health Officer, Professor Brett Sutton, answers to questions on notice 20 April 2021 (received 31 May 2021), p. 4.

³⁷ Ary Hoffman, Nancy Margaret Endersby-Harshman & Scott Ritchie, *Mozzies are evolving to beat insecticides – except in Australia*, 17 July 2017 (accessed 27 April 2021).

³⁸ See, for example, Name withheld, *Submission 19*, [pp. 1–2]; Name withheld, *Submission 25*, [p. 1]; Name withheld, *Submission 29*, [p. 1]; Name withheld, *Submission 39*, [p. 1]; Name withheld, *Submission 40*, [p. 1]; Name withheld, *Submission 41*, [p. 1].

³⁹ See, for example, Name withheld, *Submission 4*, [p. 1]; Name withheld, *Submission 6*, [p. 1]; Name withheld, *Submission 8*, [pp. 1–2]; Name withheld, *Submission 18*, [pp. 1–2].

people who have lived or regularly holidayed in Barwon Heads.⁴⁰ Mr Harrison explained that his own investigations had led him to believe that the community had experienced:

... a mosaic disease burden covering specific significant cancers and immune disease—not the result of one pesticide but a group of OP [organophosphate] pesticides and synthetic pyrethroids.⁴¹

5.36 One submitter described their hope that the inquiry might provide answers to the question of what had caused the illnesses of some in the community:

For me this is also about understanding why there are so many ailments suffered around the place that I grew up in. I would like to know if these chemicals are the cause of my own and others' ailments (cancer, autoimmune, and other rare health issues) ...⁴²

Cancer causation

Level of exposure

5.37 The Potential Cancer Cluster Expert Advisory Group (Expert Advisory Group) stated in May 2021:

We acknowledge the difficulty that members of the public often have in understanding that exposure to a carcinogen in and of itself does not lead to cancer. It requires exposure at a sufficiently high level to cause cancer.⁴³

5.38 The Expert Advisory Group restated its opinion that, for community members in the Barwon Heads area, 'any exposures were very likely to have been at insufficient levels to cause cancer'.⁴⁴

5.39 Similarly, Professor Bernard Stewart, a cancer cluster specialist and professor of public health and chemical causation of cancer at the University of New South Wales, and Dr Roger Drew, an accredited consultant toxicologist, both advised that the highest risk of a chemical exposure causing cancer lies with the product manufacturers and applicators, and that members of the general community were unlikely to have been exposed sufficiently to the chemicals in question, even via fogging.⁴⁵

⁴⁰ Mr Ross Harrison, *Submission 31*, p. 3; *Discovery 3227*, *Submission 32*, p. 1.

⁴¹ Mr Ross Harrison, Spokesperson/Member, *Committee Hansard*, 20 April 2021, p. 11.

⁴² Name withheld, *Submission 25*, [p. 1].

⁴³ Professor Brett Sutton, Chief Health Officer, Department of Health Victoria, answers to questions on notice 20 April 2021 (received 31 May 2021), p. 10.

⁴⁴ Professor Brett Sutton, Chief Health Officer, Department of Health Victoria, answers to questions on notice 20 April 2021 (received 31 May 2021), p. 10.

⁴⁵ Professor Bernard Stewart, private capacity, *Committee Hansard*, 20 November 2020, p. 15; Dr Roger Drew, private capacity, *Committee Hansard*, 20 November 2020, pp. 18–20.

5.40 Dr Drew advised that the Australian Pesticides and Veterinary Medicines Authority (APVMA) is the authority with the best information about safe and unsafe exposures to specific chemical formulations, as its risk assessment for each product uses raw data provided by the product manufacturer. Dr Drew said:

... the regulatory authorities have at their hands much more information than does IARC [the International Agency for Research on Cancer]. IARC evaluates the hazards of chemicals. It does not ask the question: what level of exposure is required to cause the cancer?⁴⁶

5.41 At the November 2020 hearing, Dr Drew, a toxicologist with expertise in risk assessment, explained to the committee that, if there had been any community chemical exposures, these may not have been sufficient to cause cancer:

... in relation to chemicals causing cancer ... the majority of that data with humans comes from occupational exposure, where the exposures are really very high. The situation you have here is a potential community exposure, and the question is: are those exposures sufficient to cause cancer?⁴⁷

5.42 Professor Watterson of the Occupational and Environmental Health Research Group, Stirling University, Scotland, commented on the value of exposure data in determining specific risk to individuals.⁴⁸ However, Professor Lin Fritschi, John Curtin Distinguished Professor of Epidemiology, advised the committee of the difficulty of determining details of any historical pesticide exposure for community members:

... you don't know what the dose was. You don't know who was exposed at a high level and who was exposed at a low level, and finding that information is quite difficult.⁴⁹

5.43 Professor Watterson also stated that all individuals are exposed to a wide range of substances and that it is 'extremely difficult' to determine whether a person may have been exposed to specific chemicals. He said:

Usually you are going to get people exposed to a whole range of things by a whole range of routes. People may be exposed because people are using them in the environment, or they may be in their food, or they may be in the water.⁵⁰

5.44 An individual with expertise in pathology, toxicology and epidemiology submitted that it was scientifically unlikely that environmental exposure to chemical pesticides would lead to cancer:

⁴⁶ Dr Roger Drew, private capacity, *Committee Hansard*, 20 November 2020, p. 18.

⁴⁷ Dr Roger Drew, private capacity, *Committee Hansard*, 20 November 2020, p. 18.

⁴⁸ Professor Andrew Watterson, private capacity, *Committee Hansard*, 20 November 2020, p. 24.

⁴⁹ Professor Lin Fritschi, private capacity, *Committee Hansard*, 20 November 2020, p. 8.

⁵⁰ Professor Andrew Watterson, private capacity, *Committee Hansard*, 20 November 2020, p. 23.

Neither epidemiology nor toxicology supports the idea that exposures to environmental levels of synthetic industrial chemicals including pesticides are important as a cause of human cancer.⁵¹

Chemical insecticides used on the Bellarine Peninsula

5.45 The department submitted that the chemical insecticides used historically and currently by the City are not known to cause either cancer or autoimmune disease in humans:

... none of these chemicals is known to cause cancer or autoimmune disease in humans during normal use by or for the public, or by workers when the product is used according to the label ...⁵²

5.46 In May 2021, the CHO again confirmed that the department does not believe that any of the chemical insecticides used by the City (temephos and synthetic pyrethroids) are associated with cancer causation:

The mosquito control agents that the Department of Health understands were used by the City of Greater Geelong (CoGG), are not known to cause leukaemia or other cancers.⁵³

5.47 This statement is supported by evidence from other scientific experts. For example, Professor Fritschi advised the committee there is insufficient evidence of an association between cancer and the insecticides used to control mosquitoes.⁵⁴

5.48 Professor Driscoll, a specialist in cancer clusters, cancer epidemiology and occupational and environmental medicine, also advised the committee that no exposures had been found that might have caused cancer:

... we haven't seen suggestions of significant levels of cancer-causing exposures over this time in this area. I agree that causes should be looked at, but my understanding is that, to the extent they can be, they have been looked at.⁵⁵

5.49 The CHO advised the committee that 'temephos is not known to cause cancer'.⁵⁶ An individual submitter also advised that scientific reviews of temephos have found no evidence that it is carcinogenic.⁵⁷

⁵¹ Name withheld, *Submission 10*, [p. 2].

⁵² Department of Health and Community Services, *Submission 2*, p. 9.

⁵³ Professor Brett Sutton, Chief Health Officer, Department of Health Victoria, answers to questions on notice 20 April 2021 (received 31 May 2021), p. 3.

⁵⁴ Professor Lin Fritschi, private capacity, *Committee Hansard*, 20 November 2020, p. 7.

⁵⁵ Professor Tim Driscoll, Member, Expert Advisory Group on Management of Potential Cancer Cluster Investigations, Victorian Department of Health and Human Services, *Committee Hansard*, 20 April 2021, p. 32.

⁵⁶ Professor Brett Sutton, Chief Health Officer, Department of Health Victoria, answers to questions on notice 20 April 2021 (received 31 May 2021), p. 4.

5.50 The City advised that, although it no longer uses temephos, temephos is still registered by the APVMA for use in mosquito control.⁵⁸

5.51 The CHO advised that synthetic pyrethroids are also not known to be carcinogenic.⁵⁹

5.52 Advice from the World Health Organization in 2014 also suggests that community exposure to fogging with synthetic pyrethroids is considered safe:

The insecticide used in the mosquito fogging is a synthetic pyrethroid that is very similar to the insecticides used in most domestic insect spray cans that are found on supermarket shelves. The 'fog' is created by blasting the mixture of insecticide and water into very fine droplets through the fogging machine. The amount of insecticide in the fog is very small, and is dispersed at quantities that can only kill something as small as a mosquito, so at the concentrations used there will be no adverse health effects on people who are occasionally exposed to the fog. The type of insecticide being used in the fogger is also completely odourless.⁶⁰

5.53 The CHO stated that the products used in the City's mosquito-control programs were unremarkable in the Australian context:

Millions of Australians reside in or visit areas with mosquito-control programs. Many of these programs are of a larger scale and have longer histories involving the use of older mosquito control agents. The department is not aware of any documented cancer clusters resulting from these programs.⁶¹

Other chemical insecticides of concern to the community

5.54 Professor Fritschi told the committee that she was one of the experts who reviewed malathion in 2107, finding that malathion was 'probably carcinogenic'.⁶² Professor Fritschi explained this meant that there was not enough evidence to be sure that malathion could cause cancer. She further advised that 'malathion is not persistent in the environment'⁶³ and that, in any case:

⁵⁷ Name withheld, *Submission 10*, [p. 2].

⁵⁸ City of Greater Geelong, *Submission 3*, Attachment 1 (Mosquito management products used by the City of Greater Geelong), [p. 4].

⁵⁹ Professor Brett Sutton, Chief Health Officer, Department of Health Victoria, answers to questions on notice 20 April 2021 (received 31 May 2021), p. 4.

⁶⁰ World Health Organization, [Mosquito 'fogging' will not harm you, reminds WHO and Solomon Islands Ministry of Health](#), media release, 5 May 2014 (accessed 2 June 2021).

⁶¹ Professor Brett Sutton, Chief Health Officer, Department of Health Victoria, answers to questions on notice 20 April 2021 (received 31 May 2021), p. 7.

⁶² Professor Lin Fritschi, private capacity, *Committee Hansard*, 20 November 2020, p. 7.

⁶³ Professor Lin Fritschi, private capacity, *Committee Hansard*, 20 November 2020, p. 10.

... the levels in people who are in areas where malathion is being sprayed for mosquito control would be reasonably low.⁶⁴

- 5.55 Dr Drew detailed some exposure modelling conducted by the World Health Organization for fogging for mosquitoes using the organophosphate pesticide malathion, which found a 'very low risk of exposure for bystanders'.⁶⁵ Dr Drew also advised that '[m]alathion is regarded as being one of the least potent' organophosphates.⁶⁶
- 5.56 Similarly, Professor Stewart advised that occupational exposure to malathion—by someone either manufacturing or applying the chemical product—would be the only scenario where levels of exposure might be high enough to pose a cancer risk.⁶⁷

Scientific consensus

- 5.57 Professor Stewart told the committee that the number of different types of cancer, along with the absence of any occupational exposure, strongly suggested that the cancers did not share a common cause.⁶⁸
- 5.58 Professor Fritschi also confirmed the general principle that cases of a specific type of cancer were more likely to share a common cause.⁶⁹
- 5.59 Dr Milne of Cancer Council Victoria advised the committee that there was no evidence either of a cancer cluster or of a common cause:

... when you're seeing people exposed to something in the community, you would expect to see a quite substantially elevated incidence of cancer and of specific cancers. ... We didn't see evidence of either here.⁷⁰

- 5.60 Professor Stewart advised the committee that he had been unable to locate any evidence for the causation of cancer in any given population due to the historic use of chemicals in that community:

Has something happened at Bellarine with respect to the use of these agricultural chemicals that is quite distinct?' The answer, so far as I'm aware, is to the contrary—that is, if these chemicals cause cancer in latent populations because they were used historically, that must affect communities all over the world but certainly all over Australia. As far as I can see, there was no evidence that the circumstances in Bellarine are any

⁶⁴ Professor Lin Fritschi, private capacity, *Committee Hansard*, 20 November 2020, p. 10.

⁶⁵ Dr Roger Drew, private capacity, *Committee Hansard*, 20 November 2020, p. 18.

⁶⁶ Dr Roger Drew, private capacity, *Committee Hansard*, 20 November 2020, p. 21.

⁶⁷ Professor Bernard Stewart, private capacity, *Committee Hansard*, 20 November 2020, p. 13.

⁶⁸ Professor Bernard Stewart, private capacity, *Committee Hansard*, 20 November 2020, pp. 15–16; Professor Bernard Stewart, *Submission 35*, p. 22.

⁶⁹ Professor Lin Fritschi, private capacity, *Committee Hansard*, 20 November 2020, p.8.

⁷⁰ Professor Roger Milne, Head of Cancer Epidemiology, Cancer Council Victoria, *Committee Hansard*, 1 May 2020, p. 6.

different to those in most agricultural communities anywhere else—I could find no evidence of the causation of cancer by historic use of chemicals in any context ...⁷¹

5.61 Professor Stewart also stated that no comparable situations involving cancer causation had been documented:

... no closely similar situation of likely cancer causation under circumstances like those characterizing the Bellarine Peninsula cancer cluster has been reported in the medicoscientific literature.⁷²

Aggregate exposures

5.62 As mentioned above, Discovery 3227 believes that cancer and other illnesses in some members of the Barwon Heads community may have been caused by combined exposures to a number of chemical insecticides over time.⁷³ Mr Harrison told the committee:

Over forty years the original Barwon Heads and Bellarine communities have been exposed to a long-term aggregate pesticide exposure ...⁷⁴

5.63 Discovery 3227 submitted that spraying with a number of OPs and other chemical insecticides had, over time, led to illness and premature death for many community members, including a number of young people.⁷⁵

5.64 Dr Drew advised the committee that it was not possible for community members to have been exposed to more than one mosquito-control chemical at a time:

... the manner in which these chemicals are used to control mosquitoes is that they're not all used at the same time and they do not persist in the environment, and, therefore, exposure to multiple chemicals at the same time did not occur.⁷⁶

5.65 Professor Watterson told the committee that the historical use of fogging techniques meant that the exposures in question were likely to have been 'immediate and acute'.⁷⁷

5.66 Dr Drew advised the committee that it was unlikely that aggregate exposure either to a single chemical or multiple chemicals would have increased the risk of cancer:

⁷¹ Professor Bernard Stewart, private capacity, *Committee Hansard*, 20 November 2020, p. 15.

⁷² Professor Bernard Stewart, *Submission 35*, p. 2.

⁷³ See, for example, Mr Ross Harrison, *Submission 31*, p. 3; Mr Ross Harrison, Spokesperson and member, Discovery 3227, *Committee Hansard*, 20 April 2021, p. 10.

⁷⁴ Mr Ross Harrison, Spokesperson and member, Discovery 3227, *Committee Hansard*, 20 April 2021, p. 10.

⁷⁵ Discovery 3227, *Submission 32*, p. 2.

⁷⁶ Dr Roger Drew, private capacity, *Committee Hansard*, 20 November 2020, p. 20.

⁷⁷ Professor Andrew Watterson, private capacity, *Committee Hansard*, 20 November 2020, p. 27.

In terms of aggregate exposure, if you mean combined exposure to a number of chemicals at the same time, no. If you mean aggregate exposure in terms of a number of short-term exposures over a long time, for these particular chemicals, I believe not. These chemicals ... don't interact with the DNA to cause mutagenesis.⁷⁸

Endocrine disruption

- 5.67 Discovery 3227 submitted that its concerns included certain endocrine-disrupting effects of the breakdown products of temephos, which it believes could have caused cases of cancer in the community.⁷⁹
- 5.68 Dr Jason Lutze of the APVMA advised the committee that temephos is considered safe when used according to the label directions.⁸⁰ He also advised that the breakdown products of temephos, if it is used according to the approved label instructions, 'would be at levels that wouldn't be expected to cause harm'.⁸¹
- 5.69 Discovery 3227 also expressed concern about endocrine disruption caused by exposure to chemical insecticides containing pyrethroids.⁸²
- 5.70 Professor Watterson told the committee about UK research which found that synthetic pyrethroids did not appear to carry a risk of endocrine disruption that could lead to cancer.⁸³ Recent research reviewing studies in pyrethroid epidemiology found that '[t]oxicological testing on pyrethroids indicates a weak, if any, effect on the incidence of tumors'.⁸⁴
- 5.71 Similarly, Dr Drew advised the committee that: 'these chemicals ... don't interact with the DNA to cause mutagenesis.'⁸⁵
- 5.72 Professor Stewart, a professor in public health and the chemical causation of cancer, also advised the committee that endocrine disruption is not currently established as a cause of cancer. He stated:

⁷⁸ Dr Roger Drew, private capacity, *Committee Hansard*, 20 November 2020, p. 20.

⁷⁹ See, for example, Mr Ross Harrison, Spokesperson/Member, *Committee Hansard*, 20 April 2021, p. 10.

⁸⁰ Dr Jason Lutze, Executive Director, Australian Pesticides and Veterinary Medicines Authority, *Committee Hansard*, 20 November 2020, p. 3.

⁸¹ Dr Jason Lutze, Executive Director, Australian Pesticides and Veterinary Medicines Authority, *Committee Hansard*, 20 November 2020, p. 4.

⁸² Mr Ross Harrison, Spokesperson and member, Discovery 3227, *Committee Hansard*, 20 April 2021, p. 10.

⁸³ Professor Andrew Watterson, private capacity, *Committee Hansard*, 20 November 2020, p. 26.

⁸⁴ Carol J. Burns & Timothy P. Pastoor, 'Pyrethroid epidemiology: A quality-based review', *Critical Reviews in Toxicology*, 2018, vol. 48, no. 4, pp. 297–311, [doi: 10.1080/10408444.2017.1423463](https://doi.org/10.1080/10408444.2017.1423463).

⁸⁵ Dr Roger Drew, private capacity, *Committee Hansard*, 20 November 2020, p. 20.

I don't believe endocrine disruption is established as a definitive way in which cancer is caused, in the way that mutations through tobacco smoke in the lung is established. ... As a general mechanism, I don't believe that in terms of environmental levels of chemicals, as distinct from chemicals administered as drugs, that endocrine disruption is established as a way of causing cancer.⁸⁶

Autoimmune disease causation

5.73 The department's submission explained that the causes of different autoimmune diseases are not yet well understood:

... autoimmune disease is a broad category of diseases involving essentially any organ or system in the body, with different causes, pathways and treatments. ...

The exact causes of autoimmune disease are not known; however, a range of risk factors have been identified that are likely to play a role in triggering the disease, including genetics, lifestyle and the environment.

Taken together autoimmune diseases are not uncommon and affect about five per cent of the population.⁸⁷

5.74 Research into the causes of autoimmune diseases continues. Some recent research has found that there is a strong genetic component to many kinds of autoimmune diseases,⁸⁸ with a 2019 study finding that the risk of developing an autoimmune disease is 'largely inherited'.⁸⁹ A 2013 study, based on a systematic literature review and a meta-analysis, concluded that 'shared genetic factors' were the most likely cause of multiple autoimmune diseases occurring within the same family.⁹⁰

5.75 At a hearing, the CHO confirmed that autoimmune diseases are very common, telling the committee that:

Autoimmune diseases and inflammatory bowel disease are extremely common. I've got members of my immediate family with both of those illnesses.⁹¹

⁸⁶ Professor Bernard Stewart, private capacity, *Committee Hansard*, 20 November 2020, p. 14.

⁸⁷ Department of Health and Community Services, *Submission 2*, p. 10.

⁸⁸ The Endocrine Society, [Autoimmune diseases are related to each other, some more than others](#), 25 March 2019 (accessed 3 June 2021).

⁸⁹ Ian R. Mackay, 'Clustering and commonalities among autoimmune diseases', *Journal of Autoimmunity*, vol. 33, issues 3–4, 2009, doi.org/10.1016/j.jaut.2009.09.006.

⁹⁰ Jorge Cárdenas-Roldán, Adriana Rojas-Villarraga & Juan-Manuel Anaya, 'How do autoimmune diseases cluster in families? A systematic review and meta-analysis', *BMC Medicine*, vol. 11, article no. 73 (2013), doi.org/10.1186/1741-7015-11-73.

⁹¹ Professor Brett Sutton, Chief Health Officer, Victorian Department of Health, *Committee Hansard*, 20 April 2021, p. 32. See also Department of Health and Community Services, *Submission 2*, pp. 9–10.

5.76 The department advised the inquiry that the insecticides used by the City were not known to cause either cancer or autoimmune conditions, even during occupational use:

... none of these chemicals is known to cause cancer or autoimmune disease in humans during normal use by or for the public, or by workers when the product is used according to the label and with any recommended personal protection equipment for prolonged exposure to concentrated product ...⁹²

5.77 The CHO later confirmed that there are no known links between the chemicals of concern and autoimmune diseases specifically:

None of the agents identified by Mr Harrison and Discovery 3227 have a demonstrated association with human autoimmune disease.⁹³

Further investigations

5.78 This section reviews the issues raised by submitters and other evidence to the committee about whether there are any further investigations that might be appropriate in the circumstances. The committee also sought expert scientific advice as to the feasibility and value of any further investigations into possible chemical exposures or the plausible causation of cancers or other illnesses on the Bellarine Peninsula.⁹⁴

5.79 Discovery 3227 and some other submitters suggested that further investigations would provide answers for the community.⁹⁵ Discovery 3227 made several suggestions for further investigations, for example, a fixed retrospective cohort study⁹⁶ and individual exposure studies.⁹⁷ Discovery 3227 stated its belief that such further investigations would reveal ‘a cancer/immune cluster’.⁹⁸

5.80 The committee heard evidence from experts in the fields of epidemiology, public health, cancer clusters, chemical carcinogenicity (chemical causation of cancer), and toxicology and risk assessment. This evidence canvassed three possibilities:

⁹² Department of Health and Human Services, *Submission 2*, p. 9.

⁹³ Department of Health and Human Services, *Response by the Victorian Chief Health Officer, Professor Brett Sutton, to submissions 31 and 32* (received 25 September 2020), p. 7.

⁹⁴ See *Committee Hansard*, 20 November 2020, pp. 6–29.

⁹⁵ Mr Ross Harrison, Spokesperson and member, Discovery 3227, *Committee Hansard*, 20 April 2021, p. 15.

⁹⁶ Discovery 3227, *Submission 32.1*, pp. 3, 7 and 10.

⁹⁷ Mr Ross Harrison, Spokesperson and member, Discovery 3227, *Committee Hansard*, 20 April 2021, p. 15.

⁹⁸ Discovery 3227, *Submission 32*, [p. 21].

- a fixed retrospective cohort study;
- a retrospective exposure study; and
- no further investigations.

Fixed retrospective cohort study

5.81 Professor Fritschi explained to the committee that a fixed retrospective cohort study (FRCS) would identify a fixed cohort of people who were living in the area at a particular point in time and keep track of them and any cancer diagnoses in that cohort over time. When asked about any alternatives to a FRCS, Professor Fritschi advised:

I don't think there is any other study design you could use that would give you an answer, but even the retrospective cohort study is probably unlikely to give you an answer that is really clear.⁹⁹

5.82 Professor Fritschi further advised the committee that a FRCS would require a larger population, the ability to locate all individuals who were possibly exposed, and information to determine the exposure dose each of them was historically exposed to.

... you would have to somehow go back in time and find all the people who lived there. You can't just do a call for anyone who lived in the Bellarine Peninsula, because that's likely to give you a biased result because people who are particularly interested in the question of cancer or autoimmune disease might be more likely to respond than others. So it is really important that you get everybody, and that's quite difficult to do.¹⁰⁰

5.83 Professor Watterson agreed that a cancer cluster population cohort study is difficult to implement, stating that 'generally the problem is you lose people'.¹⁰¹

5.84 Professor Fritschi's advice to the committee was that, while a FRCS would be theoretically appropriate, it would be very difficult to implement in practice, and that, further, the population size was too small for such a study to deliver statistically significant results.¹⁰²

5.85 Similarly, Dr Drew advised the committee that he believed there was no benefit to a FRCS. However, he believed that a retrospective exposure study could be beneficial.¹⁰³ He told the committee:

I think it's a lot easier to do some retrospective exposure modelling and ask the question, 'Were those exposures likely to cause health effects?'.¹⁰⁴

⁹⁹ Professor Lin Fritschi, private capacity, *Committee Hansard*, 20 November 2020, p. 9.

¹⁰⁰ Professor Lin Fritschi, private capacity, *Committee Hansard*, 20 November 2020, p. 8.

¹⁰¹ Professor Andrew Watterson, private capacity, *Committee Hansard*, 20 November 2020, p. 26.

¹⁰² Professor Lin Fritschi, private capacity, *Committee Hansard*, 20 November 2020, p. 9.

¹⁰³ Dr Roger Drew, private capacity, *Committee Hansard*, 20 November 2020, pp. 19–20.

Retrospective exposure study

5.86 At the hearing on 20 November 2020, Dr Drew advised the committee that, in some cases, a retrospective exposure study could ask:

... what do we think the exposures were and were those exposures safe?¹⁰⁵

5.87 Dr Drew explained that this kind of study is based on:

... the information on how and how often the chemicals were applied, where they were applied, how far away from residences they were, how often people visited the actual places where the chemicals were applied and what the drift of the fog away from that area might have been. It's trying to determine what the exposures were. It's not a cohort study. It doesn't involve actually examining people. It involves examining the method of application.¹⁰⁶

5.88 John Curtin Professor of Epidemiology Lin Fritschi told the committee:

To do a study that would be statistically reliable and epidemiologically rigorous would be theoretically possible, but I don't think it would be possible in real life because it is so hard to find all the people who had been exposed and to find the dose that they had been exposed to, and the numbers would still be low ...¹⁰⁷

5.89 Dr Drew told the committee that this kind of exposure analysis is already used by the APVMA in its product evaluation process. He explained that this methodology also includes an additional safety margin by basing exposure estimates on worst-case scenarios:

... the use of mathematical modelling, which the APVMA use for a whole range of things when they evaluate pesticides, can give a good indication—albeit not necessarily the actual exposures but the worst-case assumptions for a number of different scenarios.¹⁰⁸

5.90 Dr Drew advised the committee that he thought that any exposures to community members such as bystanders 'were likely very low'. When the committee asked whether he could indicate what levels of exposure could cause cancer, Dr Drew said:

... the answer is no, it is not possible to simply say how much an individual would need to be exposed over what period of time in order to be at a high risk of contracting cancer.

¹⁰⁴ Dr Roger Drew, private capacity, *Committee Hansard*, 20 November 2020, p. 19.

¹⁰⁵ Dr Roger Drew, private capacity, *Committee Hansard*, 20 November 2020, p. 19.

¹⁰⁶ Dr Roger Drew, private capacity, *Committee Hansard*, 20 November 2020, p. 19.

¹⁰⁷ Professor Lin Fritschi, Private capacity, *Committee Hansard*, 20 November 2020, p. 7.

¹⁰⁸ Dr Roger Drew, private capacity, *Committee Hansard*, 20 November 2020, p. 19.

No further investigations

5.91 The Cancer Council Victoria report update of March 2021 used all available epidemiological data since records began.¹⁰⁹ When asked by the committee about the value of additional epidemiological studies, the CHO advised that there was no benefit to be gained from any further narrowing of existing epidemiological analyses, and that this could, in fact, lead to greater uncertainty about the findings. He stated:

I do not believe, however, any further epidemiological studies, given their limitations, will be of any benefit to the community particularly because there is no known exposure to a hazard at levels known to cause cancer.¹¹⁰

5.92 The Expert Advisory Group considered that any such analysis was 'unlikely to be useful' and, further, that it was 'very unlikely' to alter the findings of the March 2021 Cancer Council Victoria report update.¹¹¹

5.93 Professor David Hill, the chair of the Expert Advisory Group and an expert in cancer control science and cancer-related behaviours, told the committee:

Whilst it's nearly always possible to conceive of further research that might be undertaken, it's a matter of scientific judgement as to whether such research is feasible, capable of answering an important question and likely to benefit the community when concluded.¹¹²

5.94 More categorically, Professor Stewart advised the committee that he believed there was no merit to any further investigations:

... in this particular case, rather than having a major problem, the fact that multiple cancers have been specified indicates that the matter can almost be resolved in a single sentence.¹¹³

.... I could have simply said, 'Cancer clusters are inherently problematic and sometimes merit comprehensive investigation, but no authority in the world recognises as requiring thorough investigation cancer clusters that involve multiple tumour types, because every specific known carcinogen causes a particular group of cancers.'¹¹⁴

¹⁰⁹ Professor Brett Sutton, Chief Health Officer, Department of Health, Victoria, *Committee Hansard*, 20 April 2021, p. 32.

¹¹⁰ Professor Brett Sutton, Chief Health Officer, Department of Health Victoria, answers to questions on notice 20 April 2021 (received 31 May 2021), p. 4.

¹¹¹ Professor Brett Sutton, Chief Health Officer, Department of Health Victoria, answers to questions on notice 20 April 2021 (received 31 May 2021), p. 13.

¹¹² Professor David Hill, Chair, Potential Cancer Cluster Expert Advisory Group, *Committee Hansard*, 1 May 2020, pp. 24–25.

¹¹³ Professor Bernard Stewart, private capacity, *Committee Hansard*, 20 November 2020, p. 12.

¹¹⁴ Professor Bernard Stewart, private capacity, *Committee Hansard*, 20 November 2020, p. 12.

5.95 Based on extensive experience in Australian cancer cluster investigations, Professor Stewart explained that a further investigation was highly unlikely to reveal a single cause for the cancers in question:

For the relatively few examples of cancer clusters which are subject to scientific investigation, unequivocal resolution of the matter may only be possible after years or decades. ... scientific investigation almost invariably confirms that no recognized carcinogen(s) is responsible.¹¹⁵

5.96 The Expert Advisory Group similarly advised that:

The EAG does not believe that further scientific studies of this perceived issue are justified or desirable.¹¹⁶

Committee view

5.97 The committee acknowledges the difficulty of investigating cancer clusters and recognises that in most, if not all, cases such investigations can only result in a disappointing outcome for the individuals with cancer and their families and friends, who may be looking for answers that a scientific investigation cannot provide.

Information gaps

5.98 Based on the evidence received by the committee, the unfortunate reality is that it is almost impossible to comprehensively determine when, where and how individual chemical products were used in mosquito-control programs on the Bellarine Peninsula. There are many information gaps and some conflicting claims by submitters, and there is no mechanism for discovering all the details of chemical insecticide use by councils on the Bellarine Peninsula throughout the 1980s and 1990s.

Exposure to chemicals and disease causation

5.99 The committee notes that expert evidence to the inquiry suggests that any environmental chemical exposures for community members were likely to have been at very low levels that did not constitute a cancer risk. The committee further notes that, regardless of the actual chemicals used, evidence from experts suggests that the chemicals mentioned by submitters have no direct links to the diseases that have affected people in the Barwon Heads community. Furthermore, it appears that the hypothesis of aggregate exposures causing disease is not supported by the expert scientific evidence presented to the committee.

5.100 The committee notes that for some of the inquiry participants the difference between the carcinogenicity of a substance (cancer hazard) and the cancer risk

¹¹⁵ Professor Bernard Stewart, *Submission 35*, p. 27.

¹¹⁶ Professor Brett Sutton, Chief Health Officer, Department of Health Victoria, answers to questions on notice 20 April 2021 (received 31 May 2021), p. 14.

to individuals, which is based on their personal exposure profile, is not well understood. The committee considers that this needs to be explained and communicated clearly to people who have expressed deep concerns about potential exposures to chemical carcinogens, as this difference is something that most people are not aware of, unless they have a scientific background.

Further investigations

5.101 As discussed in chapter 3, the committee notes that it is very difficult to assess a suspected disease cluster. The Potential Cancer Cluster Expert Advisory Group and the Victorian Department of Health both consider that the epidemiological and exposure concerns have now been addressed. They are of the view that the cases of concern to the community do not represent a cancer cluster, and that there is no scientifically plausible cause of cancer in the affected population.

5.102 The committee acknowledges once again that it does not have scientific expertise in epidemiology, toxicology or cancer causation. However, based on the scientific evidence received during the inquiry, the committee understands that any further epidemiological or chemical exposure studies would be of little value to the community. Importantly, the expert evidence provided to the committee identified concerns that any such further investigations would be methodologically unsound and would therefore lack scientific validity. The committee notes that these assessments are based on the current state of scientific knowledge as presented to the committee.

Recommendations to the Victorian Government

Communication and trust

5.103 The committee is of the view that the Victorian Department of Health did not sufficiently engage with individuals in the community to 'establish the facts' as the first step in its investigations into the fears of a cancer cluster or, more broadly, a disease cluster. Had it facilitated some form of individual input about concerns, rather than relying on the information available in media reports, this may have averted the mistrust and miscommunication that followed the Victorian Department of Health's later responses to community concerns.

5.104 The committee believes it would therefore be highly beneficial if concerned community members could have the opportunity to hear from the Victorian Chief Health Officer in person about the latest epidemiological report findings and about whether any further investigations or other actions could or should be taken. This could be an opportunity to talk about the feasibility, scientific value and community value of any further investigations, and about whether there is any way to provide answers to those in the community who are still concerned about what has caused the development of cancer and autoimmune

diseases in the Barwon Heads region. At the very least, this could give concerned individuals a better understanding of what a cancer cluster is, the data available and its limitations, and the difficulties shared by every investigation of a possible cancer cluster.

- 5.105 Importantly, in addition to meeting with concerned community members, the Victorian Department of Health should produce a detailed report that responds comprehensively, clearly and carefully to the concerns raised by the community. This would address current misunderstandings of scientific information and provide much-needed clarification on the cancer risks of the products used in past and current mosquito management programs throughout Victoria.
- 5.106 The committee agrees with the view of public health experts who believe that the successful outcome of a cluster investigation does not depend on proving or finding the cause of a cluster, but rather on reaching a satisfactory outcome for all groups involved.¹¹⁷ It is paramount to achieve a mutual understanding and the resolution of any conflict between the public's expectation of a cluster investigation and scientific analysis within the limits of available data and knowledge. The Barwon Heads community deserves closure, and this can only be achieved through the active engagement of the Victorian Department of Health and Chief Health Officer in effectively communicating all the findings.

Recommendation 1

5.107 The committee recommends that the Victorian Government urgently undertake to:

- **prepare and release a comprehensive report which explains clearly and carefully the findings of the epidemiological studies and responds to the concerns in relation to chemicals used in mosquito management programs; and**
- **meet with concerned community members at Barwon Heads to present the report and address any remaining concerns.**

2004 Framework for mosquito management in Victoria

5.108 The committee notes that the 2004 *Framework for mosquito management in Victoria* appears not to have been reviewed or updated since 2004, although its update frequency is listed as 'annual'.¹¹⁸ This state-level policy document should be reviewed and updated to reflect the current regulatory environment and current mosquito-control practice across the state.

¹¹⁷ New Zealand Ministry of Health, [Investigating clusters of non-communicable disease: Guidelines for public health units](#), 2005.

¹¹⁸ Victorian Department of Health, [Framework for mosquito management in Victoria: DSE 2004](#), 7 June 2013.

Recommendation 2

5.109 The committee recommends that the Victorian Government review and update the *Framework for mosquito management in Victoria* published by the Victorian Department of Sustainability and Environment in 2004.

Role played by the media

5.110 The committee notes with concern the role played by the media, especially from late 2018 until October 2019 when the Senate inquiry began. The committee is aware that media coverage of cancer cluster investigations is often framed in simple language that obscures the scientific reality that true 'clusters' are extremely rare. More recently, some media reports about the latest epidemiological study released in April 2021 were misleading and did not fully reflect the nuances and caveats that needed to be applied in relation to some of the data. Media organisations and journalists have an important role to play in highlighting community concerns; however, there is a need for scientifically correct content in circumstances where there is concern about the incidence of cancer in a community.

Concluding comments

5.111 The committee thanks once again the private individuals who came to share their experiences. The committee recognises that the inquiry process was long and emotionally draining for many individuals. The committee regrets that the COVID-19 situation delayed the inquiry process.

5.112 It is hoped that this report provides more clarity to all those affected in the Barwon Heads community.

5.113 Finally, the committee recognises the significant impacts that cancer and autoimmune diseases have on the community and acknowledges the concerns raised by residents about the incidence of these diseases in the area.

Senator Rachel Siewert
Chair

Additional comments from Senator the Hon Sarah Henderson

- 1.1 I note the Committee's concern over the role played by the media in its coverage of both this inquiry and cancer clusters more generally. I disagree with the Committee's view regarding media coverage of this and other possible cancer clusters. The media has a legitimate role to play, not only as a voice for those Australians who suffer with cancer, their friends, and their relatives; but also as a defender of the public interest in holding governments and administrators to account. In many cases, the efforts of investigative journalists are the only hope of ordinary citizens who have no other way of making governments and administrators take their concerns seriously.
- 1.2 I was very pleased that the Morrison Government committed to a parliamentary inquiry into a possible cancer cluster on the Bellarine, if re-elected, prior to the 2019 federal election. The media played an important role in giving the Barwon Heads community, in particular, a voice and it is regrettable that the Committee saw fit to criticise the media in this way. This is not to say that the media always get it right, or that journalists are infallible. However, it is to say that any attempt to hinder or otherwise discourage media coverage of issues important to communities must be treated with considerable scepticism.
- 1.3 The Committee notes that the media's 'simple language' often 'obscures ... scientific reality'. Notwithstanding this claim and the comments of several witnesses including the Victorian Department of Health which was the focus of some of these criticisms, I am not persuaded and nor did the evidence support the proposition that the media coverage of the concerns of the Bellarine Peninsula community was inaccurate, misleading or simple.
- 1.4 In fact, the report notes on many occasions that media reports were the main, if not the only, source of information for the Victorian Department of Health and other government organisations about cancer rates on the Bellarine peninsula. It is passing strange for the Committee to note the obvious importance of media coverage to government departments seeking scientific data about possible cancer clusters, only to then voice its concern about media coverage obscuring scientific 'reality'.
- 1.5 The fact is that scientific 'reality' continues to change, depending on the quality and quantity of evidence available to scientists. This phenomenon is to be welcomed, as it is the key to our trust that scientific results continue to be impartial and apolitical. It is certainly the basis of the practical success of scientific endeavours in the modern world. There is every chance that the future may provide us with more and higher quality evidence about the causes

and prevalence of cancer clusters. There is every chance that some of our contemporary scientific conclusions about them will be proven wrong including in relation to causation of cancers and other illnesses. It is almost a certainty that government departments will continue to be affected by human error, incompetence or more serious failings. We should be thankful that our media, a fundamental tenet of Australia's democracy, will be there to remind us of these things.

- 1.6 Finally, I wish to thank the residents of the Bellarine Peninsula and Barwon Heads, in particular, who participated in this inquiry. As I declared at the public hearing held in Barwon Heads, I am a member of this community. I reiterate the Committee's condolences to the families and friends of those who have tragically lost loved ones. For many, this inquiry has been an extremely difficult and painful journey. For some, I recognise that this inquiry will not provide closure or all of the answers.

Senator the Hon Sarah Henderson
Participating Member

Appendix 1

Mosquito-control products used on the Bellarine Peninsula

Table 1.1 Overview of evidence from the Victorian Department of Health and City of Greater Geelong about mosquito-control products used on the Bellarine Peninsula since 1984

Active ingredient (product name)	Use (formulation)	Location type	Method of application	Approximate period of use
<i>Chemical insecticides</i>				
Organophosphates				
temephos (Abate)	Larvicide (powder, granules)	Wetlands, stagnant water, drains, town perimeter	By hand Trial of helicopter	1984–1987 1998 ¹
Synthetic pyrethroids				
biomesrethrin (Reslin)	Adulticide (liquid)	[no information]	Thermal fogging or ULV fogging	1999 ²
phenothrin (Twilight)	Adulticide (liquid)	Dense vegetation	ULV fogging	2007, 2010, 2012
<i>Biological insecticides</i>				
Microbial insecticides				

¹ Not used for mosquito control after 1998 helicopter trial at five locations on one date. Present in stocktake lists until 2009.

² Present in stocktake list at end of 1999.

Bti ³ (Skeetal VectoBac, Mozkil, Teknar)	Larvicide (liquid, granules)	Wetlands, lagoons, mosquito breeding sites, stagnant water (liquid) Thick vegetation (granules)	Ground-based (by foot, truck or amphibious vehicle; mist blower, portable pump) Helicopter	From 1987 or earlier By helicopter from 2005 ⁴
Insect growth regulators (IGRs) ⁵				
s-methoprene (Altosid, Altosand, Prosand, Biopren, Prolink)	Larvicide (liquid, sand, briquets, pellets)	Wetlands, lagoons, stagnant water (liquid) Breeding sites prior to flooding (briquets, pellets) Thick vegetation (sand)	Ground-based (pellets, briquets, liquid) Helicopter (sand)	From 1997 or earlier By helicopter 2006–2019
<i>Biological insecticides</i>				
Plant-based insecticides				
Pyrethrum (Py Fog Pyrocide)	Adulticide (liquid)	Barwon Heads caravan parks, dense vegetation, town reserve	Misting Thermal fogging	1989–2010

Source: Department of Health and Community Services, Submission 2, p. 9; City of Greater Geelong, Submission 3, Attachment 1 (Mosquito management products used by the City of Greater Geelong), p. [4]; City of Greater Geelong, answers to questions on notice, 1 May 2020 (received 29 May 2020), Attachment 7 (Historical timeline of products used in mosquito management by the City of Greater Geelong: 1984–2020); City of Greater Geelong, answers to questions on notice 20 April 2021 (received 3 June 2021), pp. 2–4.

³ *Bacillus thuringiensis israelensis.*

⁴ Approval from the Commonwealth government permits aerial treatment for mosquito larvae in wetlands on the Bellarine Peninsula between 15 August and 15 March each year by way of solid product dropped by a helicopter flying at low height.

⁵ S-methoprene is considered a biological insecticide due to its mode of action.

Appendix 2

Submissions and additional information

Submissions

- 1 Department of Health
- 2 Victorian Department of Health and Human Services
 - Attachment
- 3 City of Greater Geelong
- 4 *Name Withheld*
- 5 *Name Withheld*
- 6 *Name Withheld*
- 7 *Confidential*
- 8 *Name Withheld*
- 9 *Confidential*
- 10 *Name Withheld*
- 11 *Confidential*
- 12 *Confidential*
- 13 *Confidential*
- 14 *Confidential*
- 15 *Confidential*
- 16 Mr Nicholas Guyett
- 17 *Confidential*
- 18 *Name Withheld*
- 19 *Name Withheld*
- 20 Ms Samantha Judge
- 21 *Confidential*
- 22 *Confidential*
- 23 *Confidential*
- 24 Mr Wayne Lockyer
- 25 *Name Withheld*
- 26 *Confidential*
- 27 Gordon Legal
 - 5 Attachments
- 28 *Confidential*
- 29 *Name Withheld*
- 30 *Confidential*
- 31 Mr Ross Harrison
 - Response
- 32 Discovery 3227
 - 4 Supplementary submissions

- Attachment
- 3 Responses

- 33 St Leonards Progress Association Inc
- 34 Australian Pesticides and Veterinary Medicines Authority
- 35 Professor Bernard Stewart
- 36 *Name Withheld*
- 37 Professor Andrew Watterson
- 38 *Name Withheld*
- 39 *Name Withheld*
- 40 *Name Withheld*
- 41 *Name Withheld*
- 42 *Confidential*
- 43 *Confidential*

Additional Information

- 1 Information on malathion, and Potential Exposure to Pesticides in Nordic Greenhouses, from Professor Lin Fritschi, received 20 November 2020
- 2 Use of Malathion for Vector Control, Report of a World Health Organization Meeting Geneva, 16-17 May 2016, from Dr Roger Drew, received 20 November 2020
- 3 Cancer Council Victoria Bellarine Peninsula Cancer Incidence Report: Update, 15 March 2021, from Victorian Chief Health Officer, received 15 April 2021
- 4 Report of Expert Advisory Group on Management of potential cancer cluster investigations, Department of Health and Human Services, Victoria, 9 April 2021, from Victorian Chief Health Officer, received 15 April 2021

Answer to Question on Notice

- 1 Answers to Questions taken on Notice during 1 May public hearing, received from Potential Cancer Cluster Expert Advisory Group, 26 May 2020
- 2 Answers to Questions taken on Notice during 1 May public hearing, received from Gordon Legal, 28 May 2020
- 3 Answers to Questions taken on Notice during 1 May public hearing, received from Cancer Council Victoria, 29 May 2020
- 4 Answers to Questions taken on Notice during 1 May public hearing, received from City of Greater Geelong, 29 May 2020
- 5 Answers to Questions taken on Notice during 1 May public hearing, received from Victorian Department of Health and Human Services and the Chief Health Officer, 25 September 2020
- 6 Answers to written Questions on Notice, received from Department of Education and Training, Victoria, 15 June 2020
- 7 Answers to Questions taken on Notice during 20 November public hearing, received from Australian Pesticides and Veterinary Medicines Authority, 11 December 2020

- 8 Answers to Questions taken on Notice during 20 April public hearing, received from Expert Advisory Group on Management of Potential Cancer Cluster Investigations, 20 April 2021
- 9 Answers to Questions taken on Notice during 20 April public hearing, received from Victorian Department of Health, 31 May 2021
- 10 Answers to Questions taken on Notice during 20 April public hearing, received from City of Greater Geelong, 4 June 2021

Correspondence

- 1 Correspondence clarifying evidence given at Canberra public hearing on 20 November 2020, received from Professor Lin Fritschi, 2 December 2020

Appendix 3

Public hearings

Friday, 1 May 2020

Committee Room 2S1
Parliament House
Canberra

Cancer Council Victoria

- Professor Roger Milne, Head of Cancer Epidemiology

Gordon Legal

- Mr Peter Gordon, Senior Partner
- Ms Madison Wall, Paralegal

Discovery 3227

- Mr Ross Harrison, Member

Potential Cancer Cluster Expert Advisory Group, Department of Health and Human Services, Victoria

- Professor David Hill, Chair
- Professor Kelly-Anne Phillips, Member
- Professor Tim Driscoll, Member

City of Greater Geelong

- Mr Gareth Smith, Director Planning, Design and Development
- Mr Steve Sodomaco, Manager Health and Local Laws

Victorian Government - Department of Health and Human Services

- Professor Brett Sutton, Chief Health Officer

Friday, 20 November 2020

Committee Room 2S1
Parliament House
Canberra

Australian Pesticides and Veterinary Medicines Authority

- Dr Jason Lutze, Executive Director
- Dr Sheila Logan, Deputy Executive Director

Professor Lin Fritschi, Private capacity

Professor Bernard Stewart, Private capacity

Dr Roger Drew, Private capacity

Professor Andrew Watterson, Private capacity

Tuesday, 20 April 2021

Barwon Heads Community Hall

Barwon Heads

City of Greater Geelong

- Mr Gareth Smith, Director City Planning and Economy
- Mr Lyndon Ray, Coordinator Environmental Health
- Mr Peter Smith, Coordinator Strategic Implementation

Discovery 3227

- Mr Ross Harrison, Member/Spokesperson
- Mr Justin McEncroe, Member

Ms Kristie Ainsworth, Private capacity

Ms Samantha Wigmore, Private capacity

Danielle, Private capacity

Victorian Department of Health

- Adjunct Clinical Professor Brett Sutton, Chief Health Officer

Expert Advisory Group on Management of Potential Cancer Cluster Investigations

- Professor David Hill, Chair
- Professor Tim Driscoll, Member

Ms Kate Bailey, Private capacity

Michele, Private capacity

Mr Campbell Stephenson, Private capacity