

# APPENDIX C5 – NORTHERN CARDINIA SHIRE FLOOD EMERGENCY PLAN

## Overview of Flooding Consequences

The area around Emerald, Menzies Creek, Clematis, Cockatoo, Avonsleigh, Gembrook and Nangana is semi-rural with many creeks and tributaries that flow predominantly in a northerly direction toward the Shire of Yarra Ranges and join Woori Yallock Creek. The terrain is hilly and in parts forested and lends to flash flooding given significant rainfall in a short amount of time (generally up to 6 hours).

Consequences of flash flooding may include impacts to the Puffing Billy Tourist Railway to parts of the track between Emerald and Cockatoo stations. Belgrave-Gembrook Road and Woori Yallock Road may also be impacted at low points in Cockatoo and Nangana. See table 5.1 for other potential infrastructure and property consequences during a 1% AEP (100yr ARI) flash flood for the area.

*This Summary table is generated from Victorian Government data. The State of Victoria does not guarantee that the publication is without flaw of any kind or is wholly appropriate for your particular purposes and therefore disclaims all liability for error, loss or damage which may arise from reliance upon it. All persons access this information should make appropriate enquiries to assess the currency of the data.*

### Summary of Consequences in a 1% AEP (100yr ARI) flood within the Northern Cardinia Shire region

Property					
<b>Properties</b>	<b>95</b>				
Residential	17				
Commercial	1				
Industrial	0				
Public Land	4				
Rural	73				
Community Infrastructure					
Care Facilities	1	Lifeview Emerald Glades Aged Care Facility			
Child Care / Kindergartens	1	Cockatoo Kinder			
Essential Infrastructure					
Major Roads	2	Belgrave-Gembrook Road, Cockatoo; and Woori Yallock Road, Nangana and Cockatoo			
Emergency Services	1	Emerald Ambulance Station			
Sewerage Facilities	16	2 Emergency Relief Points; and 14 Groups of Unsewered Properties or individual Pumping Stations			
Tourism / Recreation					
Sports Facilities	1	Cockatoo Little Athletics Centre			
Recreational Facilities	1	Emerald Lake Park's driveway off Emerald Lake Road			
Camping Grounds	1	Helio's Camp			
Tourist Attractions	1	Puffing Billy Tourist Railway Track between Emerald and Cockatoo Stations			
Government Boundaries					
Local Gov't Areas	1	Cardinia Shire	CMA	1	Port Phillip and Westernport
Adjacent LGAs	1	Shire of Yarra Ranges	CFA District	1	District 08
SES Unit Area	1	Emerald	FRV District	0	

Table C5.1 – Consequence Summary of 1% AEP flood around the northern Cardinia Shire region

## Gauges and Warnings

Neither the Bureau of Meteorology nor Melbourne Water currently provides flood forecasts for the Woori Yallock, Cockatoo or Shepherd Creeks catchments. All flood response actions must therefore be driven by rainfall and / or water level observations. Telemetered water level / flood gauges are located at Monbulk, Nangana, Beenak and Emerald.

Gauge	Station No.	Location	Stream Level & Flow Gauge	Rain Gauge	Map Reference
Beenak	586195	Tims Corner, Beenak		✓	VicMap Book 6618 G15
Cockatoo Creek	229248B	Tschampions Rd, Nangana	✓		Melway 310 E1
Emerald	586033	Cardinia Reservoir		✓	Melway 126 G9
Sheperd Creek	229677A	Woori Yallock – Koo Wee Rup Road, Nangana	✓		Melway 308 F11
Woori Yallock Creek	229694B	Old Emerald Rd, Monbulk	✓		Melway 125 E6

Table C5.2 – Gauges monitoring conditions for the Northern Cardinia Shire catchments

These Gauges may provide some warning of expected flooding. See the Melbourne Water website for more information on these gauges: <http://www.melbournewater.com.au/waterdata/rainfallandriverveldata/Pages/Rainfall-and-river-level-new.aspx>. The Bureau of Meteorology's website also links a number of these gauges at: [http://www.bom.gov.au/cgi-bin/wrap\\_fwo.pl?IDV60201.html](http://www.bom.gov.au/cgi-bin/wrap_fwo.pl?IDV60201.html). It is advised that residents monitor the Bureau of Meteorology's website <http://www.bom.gov.au/vic/warnings/index.shtml?ref=hdr> and the VicEmergency website <https://emergency.vic.gov.au/> for any thunderstorm, flood or severe weather warnings present for their area.



## Properties at Flood Risk

Properties listed in the table below are at risk from flooding within the Northern Cardinia Shire catchments around Emerald, Cockatoo and Gembrook. As more intelligence becomes available, this list may change. This table has been populated based on modelling work as part of the Northern Cardinia Shire (Cardno, September 2020) flood mapping and risk assessment program. Note that any multi-lot properties situated above ground floor likely impacted by isolation only with flooding on ground floor impacting access to common areas and/or carpark and storage facilities. Information on above ground-floor properties is not available in this list.

*This Property Flood Risk Table is presented by the Victoria State Emergency Service for the purpose of disseminating emergency management information. The contents of the information have not been independently verified by the Victoria State Emergency Service. No liability is accepted for any damage, loss or injury caused by errors or omissions in this information or for any action taken by any person in reliance upon it.*

Properties at risk from Flooding (where building footprint intersects a flood extent)						
Residential			Commercial	Industrial	Rural	Public Use
Street No. at Risk in AEP Event			Address	Suburb	Along Melbourne Water Watercourse	Flood Risk Type
20% AEP	5% AEP	1% AEP				
	✓	✓	22-24 Alexander Road	Cockatoo	Cockatoo Creek	Flash
✓	✓	✓	30 Alexander Road	Cockatoo	Cockatoo Creek	Flash
✓	✓	✓	32 Alexander Road	Cockatoo	Cockatoo Creek	Flash
		✓	4 Bailey Road	Cockatoo	Cockatoo Creek	Flash
✓	✓	✓	5-7 Bailey Road	Cockatoo	Cockatoo Creek	Flash
	✓	✓	11 Bailey Road	Cockatoo	Cockatoo Creek	Flash
✓	✓	✓	19 Bailey Road	Cockatoo	Cockatoo Creek	Flash
		✓	23 Bailey Road	Cockatoo	Cockatoo Creek	Flash
		✓	65 Bedford Road	Cockatoo	Cockatoo Creek	Flash
		✓	28 Belgrave-Gembrook Road	Cockatoo	Cockatoo Creek	Flash
		✓	32 Belgrave-Gembrook Road	Cockatoo	Cockatoo Creek	Flash
		✓	311 Belgrave-Gembrook Road	Gembrook	Cockatoo Creek	Flash
	✓	✓	12 Bellbird Crescent	Emerald	Wattle Creek	Flash
✓	✓	✓	17 Bluebird Avenue	Cockatoo	Cockatoo Creek	Flash
✓	✓	✓	5 Boronia Crescent	Cockatoo	Cockatoo Creek	Flash
✓	✓	✓	7 Boronia Crescent	Cockatoo	Cockatoo Creek	Flash
✓	✓	✓	2 Caroline Avenue	Cockatoo	Cockatoo Creek	Flash
✓	✓	✓	4 Caroline Avenue	Cockatoo	Cockatoo Creek	Flash
✓	✓	✓	6 Caroline Avenue	Cockatoo	Cockatoo Creek	Flash
		✓	2 Colin Avenue	Emerald	Menzies Creek	Flash
		✓	4 Colin Avenue	Emerald	Menzies Creek	Flash
✓	✓	✓	136 Collie Road	Gembrook	Shepherd Creek East Branch	Flash
		✓	46 Devon Avenue	Cockatoo	Cockatoo Creek	Flash
	✓	✓	50 Emerald Lake Road	Emerald	Wattle Creek	Flash
	✓	✓	1/50 Emerald Lake Road	Emerald	Wattle Creek	Flash
		✓	15 Emerald-Monbulk Road	Emerald	Menzies Creek	Flash
		✓	78 Emerald-Monbulk Road	Emerald	Menzies Creek	Flash
		✓	1 Fell Road	Cockatoo	Cockatoo Creek	Flash
		✓	2/1 Fell Road	Cockatoo	Cockatoo Creek	Flash

Properties at risk from Flooding (where building footprint intersects a flood extent)

Properties at risk from Flooding (where building footprint intersects a flood extent)						
Residential			Commercial	Industrial	Rural	Public Use
Street No. at Risk in AEP Event			Address	Suburb	Along Melbourne Water Watercourse	Flood Risk Type
20% AEP	5% AEP	1% AEP				
✓	✓	✓	25 First Avenue	Cockatoo	Cockatoo Creek	Flash
✓	✓	✓	27 First Avenue	Cockatoo	Cockatoo Creek	Flash
✓	✓	✓	29 First Avenue	Cockatoo	Cockatoo Creek	Flash
		✓	31 First Avenue	Cockatoo	Cockatoo Creek	Flash
✓	✓	✓	36 First Avenue	Cockatoo	Cockatoo Creek	Flash
	✓	✓	38 First Avenue	Cockatoo	Cockatoo Creek	Flash
✓	✓	✓	40 First Avenue	Cockatoo	Cockatoo Creek	Flash
	✓	✓	44 First Avenue	Cockatoo	Cockatoo Creek	Flash
		✓	53 First Avenue	Cockatoo	Cockatoo Creek	Flash
✓	✓	✓	55 First Avenue	Cockatoo	Cockatoo Creek	Flash
✓	✓	✓	57 First Avenue	Cockatoo	Cockatoo Creek	Flash
✓	✓	✓	59 First Avenue	Cockatoo	Cockatoo Creek	Flash
	✓	✓	63 First Avenue	Cockatoo	Cockatoo Creek	Flash
✓	✓	✓	65 First Avenue	Cockatoo	Cockatoo Creek	Flash
✓	✓	✓	67 First Avenue	Cockatoo	Cockatoo Creek	Flash
	✓	✓	3 Hazel Street	Cockatoo	Cockatoo Creek	Flash
✓	✓	✓	5 Hazel Street	Cockatoo	Cockatoo Creek	Flash
	✓	✓	7 Hazel Street	Cockatoo	Cockatoo Creek	Flash
✓	✓	✓	8 Hazel Street	Cockatoo	Cockatoo Creek	Flash
		✓	25 Lawsons Road	Emerald	Menzies Creek	Flash
✓	✓	✓	82 Magpie Road	Menzies Creek	Muddy Creek	Flash
		✓	5 Maillard Street	Cockatoo	Cockatoo Creek	Flash
✓	✓	✓	9 Mary Street	Emerald	Woori Yallock Creek Tributary	Flash
	✓	✓	4 Maurice Street	Cockatoo	Cockatoo Creek	Flash
✓	✓	✓	6A Maurice Street	Cockatoo	Cockatoo Creek	Flash
	✓	✓	6 Maurice Street	Cockatoo	Cockatoo Creek	Flash
✓	✓	✓	2 McBride Street	Cockatoo	Cockatoo Creek	Flash
		✓	12 Memorial Avenue	Emerald	Drainage to Cardinia Reservoir	Flash
	✓	✓	16 Memorial Avenue	Emerald	Drainage to Cardinia Reservoir	Flash
		✓	18 Memorial Avenue	Emerald	Drainage to Cardinia Reservoir	Flash
		✓	1 Neville Street	Cockatoo	Cockatoo Creek	Flash
✓	✓	✓	23A Nobelius Street	Emerald	Woori Yallock Creek Tributary	Flash
		✓	110 Old Soldier Road	Cockatoo	Pancake Creek	Flash
✓	✓	✓	65 Pakenham Road	Cockatoo	Cockatoo Creek	Flash
✓	✓	✓	89 Pakenham Road	Cockatoo	Cockatoo Creek	Flash
✓	✓	✓	523 Paternoster Road	Mount Burnett	Dudman Creek	Flash
✓	✓	✓	18 Ronald Road	Emerald	Woori Yallock Creek Tributary	Flash
		✓	13 Russell Street	Emerald	Drainage to Cardinia Reservoir	Flash
	✓	✓	15 Russell Street	Emerald	Drainage to Cardinia Reservoir	Flash
✓	✓	✓	3 Seaview Road	Cockatoo	Cockatoo Creek	Flash
✓	✓	✓	5 Seaview Road	Cockatoo	Cockatoo Creek	Flash
	✓	✓	7 Seaview Road	Cockatoo	Cockatoo Creek	Flash
✓	✓	✓	21 Second Avenue	Cockatoo	Cockatoo Creek	Flash

Properties at risk from Flooding (where building footprint intersects a flood extent)						
Residential			Commercial	Industrial	Rural	Public Use
Street No. at Risk in AEP Event			Address	Suburb	Along Melbourne Water Watercourse	Flood Risk Type
20% AEP	5% AEP	1% AEP				
	✓	✓	23 Second Avenue	Cockatoo	Cockatoo Creek	Flash
		✓	24 Second Avenue	Cockatoo	Cockatoo Creek	Flash
✓	✓	✓	29 Second Avenue	Cockatoo	Cockatoo Creek	Flash
	✓	✓	28 Springs Street	Cockatoo	Cockatoo Creek	Flash
✓	✓	✓	30 Springs Street	Cockatoo	Cockatoo Creek	Flash
		✓	32 Springs Street	Cockatoo	Cockatoo Creek	Flash
	✓	✓	36 Springs Street	Cockatoo	Cockatoo Creek	Flash
✓	✓	✓	2-4 Steane Street	Cockatoo	Cockatoo Creek	Flash
		✓	6 Steane Street	Cockatoo	Cockatoo Creek	Flash
✓	✓	✓	13 View Hill Road	Cockatoo	Cockatoo Creek	Flash
	✓	✓	17A View Hill Road	Cockatoo	Cockatoo Creek	Flash
		✓	17 View Hill Road	Cockatoo	Cockatoo Creek	Flash
✓	✓	✓	19 View Hill Road	Cockatoo	Cockatoo Creek	Flash
	✓	✓	21 View Hill Road	Cockatoo	Cockatoo Creek	Flash
		✓	23 View Hill Road	Cockatoo	Cockatoo Creek	Flash
✓	✓	✓	1 Woodrow Court	Cockatoo	Cockatoo Creek	Flash
✓	✓	✓	4 Woodrow Court	Cockatoo	Cockatoo Creek	Flash
		✓	230 Woori Yallock Road	Cockatoo	Cockatoo Creek	Flash
	✓	✓	234 Woori Yallock Road	Cockatoo	Cockatoo Creek	Flash
		✓	266 Woori Yallock Road	Cockatoo	Cockatoo Creek	Flash
✓	✓	✓	345 Woori Yallock Road	Avonsleigh	Cockatoo Creek	Flash
		✓	574 Woori Yallock Road	Cockatoo	Cockatoo Creek	Flash
		✓	6 Wright Road	Emerald	Wattle Creek	Flash
	✓	✓	22-24 Alexander Road	Cockatoo	Cockatoo Creek	Flash
✓	✓	✓	30 Alexander Road	Cockatoo	Cockatoo Creek	Flash
✓	✓	✓	32 Alexander Road	Cockatoo	Cockatoo Creek	Flash
		✓	4 Bailey Road	Cockatoo	Cockatoo Creek	Flash
✓	✓	✓	5-7 Bailey Road	Cockatoo	Cockatoo Creek	Flash
	✓	✓	11 Bailey Road	Cockatoo	Cockatoo Creek	Flash
✓	✓	✓	19 Bailey Road	Cockatoo	Cockatoo Creek	Flash
<b>Totals</b>						
<b>43</b>	<b>64</b>	<b>95</b>				

Table C5.3 – Properties at risk of flooding within the Northern Cardinia Shire catchments around Emerald, Cockatoo and Gembrook

## Isolation

No major isolation risks exist for areas around Emerald, Cockatoo and Gembrook during a 1% AEP (100yr ARI) event. Some localised short-duration isolation may occur due to flash flooding.

## Essential Infrastructure

- The **Ambulance Station** at 12 Memorial Avenue, Emerald may experience some flash flooding in the external parts of the property during a 1% AEP (100yr ARI) event. Access and Egress to the facility is not expected to be impacted by Ambulance Vehicles should this occur.
- The **Puffing Billy Tourist Railway** may see parts of the track impacted by flooding during a 5% AEP (20yr ARI) between Emerald and Cockatoo stations

During an event, see the Public Transport Victoria's Website for details on delays or alterations to services. <http://ptv.vic.gov.au/live-travel-updates/>. A map of Public Transport routes within the Cardinia Shire is available via the website at: [https://www.ptv.vic.gov.au/assets/PTV-default-site/more/maps/Local-area-maps/Metropolitan/8\\_Cardinia\\_LAM.pdf](https://www.ptv.vic.gov.au/assets/PTV-default-site/more/maps/Local-area-maps/Metropolitan/8_Cardinia_LAM.pdf)

Apart from the roads outlined below, all other essential infrastructure and services areas around Emerald, Cockatoo and Gembrook are expected to remain unaffected by flooding during a 1% AEP (100yr ARI) event. This includes the Cardinia Reservoir Pumping Station.

## Road Closures

The following roads are subject to closure during flooding around Emerald, Cockatoo and Gembrook. Check the VicTraffic website for more details: <http://alerts.vicroads.vic.gov.au/>

Department of Transport (VicRoads) Roads likely flooded in a 1% AEP (100yr ARI) event
<ul style="list-style-type: none"> <li>• Belgrave-Gembrook Road at Cockatoo Creek, Cockatoo</li> </ul>
<ul style="list-style-type: none"> <li>• Woori Yallock Road at multiple locations between Tschampions Road, Nangana and Mountain Road, Cockatoo</li> </ul>

Table C5.4 – Department of Transport (VicRoads) Possible Road Closures during a flooding event

Cardinia Shire Council Roads likely flooded in a 1% AEP (100yr ARI) event			
COCKATOO		EMERALD	GEMBROOK
<ul style="list-style-type: none"> <li>• Alexander Road</li> </ul>	<ul style="list-style-type: none"> <li>• Mountain Road</li> </ul>	<ul style="list-style-type: none"> <li>• Lakeside Drive</li> </ul>	<ul style="list-style-type: none"> <li>• Watkins Lane</li> </ul>
<ul style="list-style-type: none"> <li>• Bedford Road</li> </ul>	<ul style="list-style-type: none"> <li>• Nangana Street</li> </ul>	<ul style="list-style-type: none"> <li>• Old Beaconsfield Road</li> </ul>	<b>NANGANA</b>
<ul style="list-style-type: none"> <li>• Bluebird Avenue</li> </ul>			<ul style="list-style-type: none"> <li>• Calder Road</li> </ul>

Table C5.5 – Cardinia Shire Council Possible flooded roads due to flash flooding

## Flood Mitigation

No formal Retarding Basins, Pumping Stations, Levees or Weirs exist within the Northern Cardinia Shire catchments around Emerald, Cockatoo and Gembrook.

## Sewerage Infrastructure

Sewerage Infrastructure of note during a severe flood event located around Emerald, Cockatoo and Gembrook is contained within the following two tables.

### Sewer Pumping Stations

Sewerage Pumping Station	On Drain / Waterway	Bank / Side of Waterway	Operator	Location	Melway Reference
Chestnut Gardens	Local Drainage	-	Yarra Valley Water	Russell Court, Emerald	127 D5
Cockatoo Properties	Cockatoo Creek	Northern	Yarra Valley Water	A number of unsewered properties along Lisheen Road, Cockatoo	311 K10
Cockatoo Properties	Cockatoo Creek	Eastern	Yarra Valley Water	A number of unsewered properties along Arthur Road and Suffolk Avenue, Cockatoo	311 H6
Cockatoo Properties	Cockatoo Creek	Eastern	Yarra Valley Water	A number of unsewered properties on Allenby Avenue, Cockatoo	311 H5
Cockatoo Properties	Cockatoo Creek	Eastern	Yarra Valley Water	A number of unsewered properties between Joffre Pde and Colin Ave, Cockatoo	311 J4
Cockatoo Properties	Cockatoo Creek	Eastern	Yarra Valley Water	A number of unsewered properties around Nangana St, Bilocla Ave and Francis St, Cockatoo	311 K2
Emerald Close	Local Drainage	-	Yarra Valley Water	Emerald Close, Emerald	127 F3
Emerald Properties	Wattle Creek	Southern	Yarra Valley Water	A number of unsewered properties between Fern Glade Drive and Bellbird Crescent, Emerald	311 A5
Emerald Lake	Wattle Creek	Northern	Yarra Valley Water	Rear of Emerald Backpackers Hostel, Lakeview Ct, Emerald	127 K3
Emerald Properties	Local Drainage	-	Yarra Valley Water	A number of unsewered properties between Ronald Road and Margaret Road, Emerald	311 A1
Ferres Road	Menzies Creek Tributary	-	Yarra Valley Water	Ferres Road, Emerald	127 E4
Gembrook Properties	Cockatoo Creek	Northern	Yarra Valley Water	A number of unsewered properties in around Gembrook township	312 K10
Symons Road	Wattle Creek	Northern	Yarra Valley Water	End of Symons Road, Emerald	311 C3
Sherriff Road	Local Drainage	-	Yarra Valley Water	Worrell Reserve, Sherriff Road, Emerald	127 G3

Table C5.6 – Sewer Pumping Stations within the Northern Cardinia Shire Catchments around Emerald, Cockatoo and Gembrook



## Sewer Emergency Relief Points

There are Sewer Emergency Relief Points along the Cockatoo and Wattle Creeks that will likely affect floodwater conditions should they be activated. Contact the Infrastructure Operator EMLO/Duty Officer for information on any recent or planned releases at a Sewer Emergency Relief Point as part of a Dynamic Risk Assessment (DRA) if work is to be conducted at or downstream of the outlet.

On Drain / Waterway	Bank / Side of Waterway	Operator	Location	Melway Reference
Cockatoo Creek	Southern	Yarra Valley Water	Corner Woori Yallock Road and Mountain Road, Cockatoo	311 J2
Wattle Creek	Northern	Yarra Valley Water	Rear of Emerald Backpackers Hostel, Lakeview Ct, Emerald	127 K3

Table C5.7 – Sewer Emergency Relief Points in the Northern Cardinia Shire Catchments around Emerald, Cockatoo and Gembrook

## Flood Impacts and Operational Considerations (Intelligence Cards)

The tables on the following pages provide a breakdown of the possible consequences of flooding around Emerald, Cockatoo and Gembrook at various creek heights or rain totals within Cardinia Shire. These tables are to be used only as a guide as no two floods at a location will have identical impacts.

Intelligence Cards have been included for the following locations:

- Cockatoo Creek, Nangana
- Northern Cardinia Shire Stormwater Drainage

# FLOOD INTELLIGENCE CARD – NANGANA GAUGE, COCKATOO CREEK

Version 1 – January 2022



Note: flood intelligence records are approximations. This is because no two floods at a location, even if they peak at the same height, will have identical impacts. Flood intelligence cards detail the relationship between flood magnitude and flood consequences. More details about flood intelligence and its use can be found in the Australian Emergency Management Manuals flood series.

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LOCATION:	Tschampions Road, Nangana
WEBSITE:	<a href="https://www.melbournewater.com.au/water-data-and-education/rainfall-and-river-levels#/reader/229248B">https://www.melbournewater.com.au/water-data-and-education/rainfall-and-river-levels#/reader/229248B</a>
STREAM:	Cockatoo Creek
GAUGE NUMBER:	229248B
GAUGE ZERO:	125.12m AHD
GAUGE TYPE:	Stream Level & Flow

MELWAY REFERENCE:	310 E1
MINOR:	Not Established
MODERATE:	Not Established
MAJOR:	Not Established
LEVEE HEIGHT:	N/A
HIGHEST RECORDED FLOOD:	2.51m (5 <sup>th</sup> February 2011)

Creek Height	Annual Exceedance Probability (% AEP)	Consequence / Impact	Operational Considerations
Unavailable	20% AEP (5yr ARI) Flood Level	<p><b>Properties at Flood Risk (where building footprint on property intersects the flood extent)</b></p> <p><b>37 Properties in Total</b></p> <ul style="list-style-type: none"> <li>• 30 &amp; 32 Alexander Road, Cockatoo</li> <li>• 5-7 &amp; 19 Bailey Road, Cockatoo</li> <li>• 17 Bluebird Avenue, Cockatoo</li> <li>• 5 &amp; 7 Boronia Crescent, Cockatoo</li> <li>• 2, 4 &amp; 6 Caroline Avenue, Cockatoo</li> <li>• 25, 27, 29, 36, 40, 55, 57, 59, 65 &amp; 67 First Avenue, Cockatoo</li> <li>• 5 &amp; 8 Hazel Street, Cockatoo</li> <li>• 6A Maurice Street, Cockatoo</li> <li>• 2 McBride Street, Cockatoo</li> <li>• 65 &amp; 89 Pakenham Road, Cockatoo</li> <li>• 3 &amp; 5 Seaview Road, Cockatoo</li> <li>• 21 &amp; 29 Second Avenue, Cockatoo</li> <li>• 30 Springs Street, Cockatoo</li> <li>• 2-4 Steane Street, Cockatoo</li> <li>• 13 &amp; 19 View Hill Road, Cockatoo</li> <li>• 1 &amp; 4 Woodrow Court, Cockatoo</li> <li>• 345 Woori Yallock Road, Avonsleigh</li> </ul>	

Creek Height	Annual Exceedance Probability (% AEP)	Consequence / Impact	Operational Considerations
		<p><b>Tourism / Recreation Likely Flooded</b></p> <ul style="list-style-type: none"> <li>The Cockatoo Little Athletics Centre at 3 Mountain Road, Cockatoo</li> </ul> <p><b>Water Over Road (Roads in Red are Department of Transport Roads)</b></p> <ul style="list-style-type: none"> <li>Bluebird Avenue, Cockatoo</li> <li>Mountain Road, Cockatoo</li> <li>Nangana Street, Cockatoo</li> <li>Woori Yallock Road at multiple locations between Tschampions Road, Nangana and Mountain Road, Cockatoo</li> </ul>	
Unavailable	5% AEP (20yr ARI) Flood Level	<p><b>Properties at Flood Risk (where building footprint on property intersects the flood extent)</b></p> <p><b>53 Properties in Total</b></p> <ul style="list-style-type: none"> <li>22-24, 30 &amp; 32 Alexander Road, Cockatoo</li> <li>5-7, 11 &amp; 19 Bailey Road, Cockatoo</li> <li>17 Bluebird Avenue, Cockatoo</li> <li>5 &amp; 7 Boronia Crescent, Cockatoo</li> <li>2, 4 &amp; 6 Caroline Avenue, Cockatoo</li> <li>25, 27, 29, 36, 38, 40, 44, 55, 57, 59, 63, 65 &amp; 67 First Avenue, Cockatoo</li> <li>3, 5, 7 &amp; 8 Hazel Street, Cockatoo</li> <li>4, 6A &amp; 6 Maurice Street, Cockatoo</li> <li>2 Mcbride Street, Cockatoo</li> <li>65 &amp; 89 Pakenham Road, Cockatoo</li> <li>3, 5 &amp; 7 Seaview Road, Cockatoo</li> <li>21, 23 &amp; 29 Second Avenue, Cockatoo</li> <li>28, 30 &amp; 36 Springs Street, Cockatoo</li> <li>2-4 Steane Street, Cockatoo</li> <li>13, 17A, 19 &amp; 21 View Hill Road, Cockatoo</li> <li>1 &amp; 4 Woodrow Court, Cockatoo</li> <li>234 &amp; 345 Woori Yallock Road, Cockatoo</li> </ul> <p><b>Tourism / Recreation Likely Flooded</b></p> <ul style="list-style-type: none"> <li>The Cockatoo Little Athletics Centre at 3 Mountain Road, Cockatoo</li> </ul> <p><b>Water Over Road (Roads in Red are Department of Transport Roads)</b></p> <ul style="list-style-type: none"> <li>Bluebird Avenue, Cockatoo</li> <li>Mountain Road, Cockatoo</li> <li>Nangana Street, Cockatoo</li> <li>Woori Yallock Road at multiple locations between Tschampions Road, Nangana and Mountain Road, Cockatoo</li> </ul>	
2.51m	5 <sup>th</sup> February 2011 Flood Level Peak (~ 1.25% AEP (80yr ARI) event)		
Unavailable	1% AEP (100yr ARI) Flood Level	<p><b>Properties at Flood Risk (where building footprint on property intersects the flood extent)</b></p> <p><b>74 Properties in Total</b></p>	

Creek Height	Annual Exceedance Probability (% AEP)	Consequence / Impact	Operational Considerations
		<ul style="list-style-type: none"> <li>• 22-24, 30 &amp; 32 Alexander Road, Cockatoo</li> <li>• 4, 5-7, 11, 19 &amp; 23 Bailey Road, Cockatoo</li> <li>• 65 Bedford Road, Cockatoo</li> <li>• 28, 32 &amp; 311 Belgrave-Gembrook Road, Cockatoo</li> <li>• 17 Bluebird Avenue, Cockatoo</li> <li>• 5 &amp; 7 Boronia Crescent, Cockatoo</li> <li>• 2, 4 &amp; 6 Caroline Avenue, Cockatoo</li> <li>• 46 Devon Avenue, Cockatoo</li> <li>• 1 &amp; 2/1 Fell Road, Cockatoo</li> <li>• 25, 27, 29, 31, 36, 38, 40, 44, 53, 55, 57, 59, 63, 65 &amp; 67 First Avenue, Cockatoo</li> <li>• 3, 5, 7 &amp; 8 Hazel Street, Cockatoo</li> <li>• 5 Maillard Street, Cockatoo</li> <li>• 4, 6A &amp; 6 Maurice Street, Cockatoo</li> <li>• 2 McBride Street, Cockatoo</li> <li>• 1 Neville Street, Cockatoo</li> <li>• 65 &amp; 89 Pakenham Road, Cockatoo</li> <li>• 3, 5 &amp; 7 Seaview Road, Cockatoo</li> <li>• 21, 23, 24 &amp; 29 Second Avenue, Cockatoo</li> <li>• 28, 30, 32 &amp; 36 Springs Street, Cockatoo</li> <li>• 2-4 &amp; 6 Steane Street, Cockatoo</li> <li>• 13, 17A, 17, 19, 21 &amp; 23 View Hill Road, Cockatoo</li> <li>• 1 &amp; 4 Woodrow Court, Cockatoo</li> <li>• 230, 234, 266, 345 &amp; 574 Woori Yallock Road, Cockatoo</li> </ul> <p><b>Community Infrastructure Likely Flooded</b></p> <ul style="list-style-type: none"> <li>• Cockatoo Kinder at 23 Bailey Road, Cockatoo</li> </ul> <p><b>Tourism / Recreation Likely Flooded</b></p> <ul style="list-style-type: none"> <li>• The Cockatoo Little Athletics Centre at 3 Mountain Road, Cockatoo</li> </ul> <p><b>Water Over Road (Roads in Red are Department of Transport Roads)</b></p> <ul style="list-style-type: none"> <li>• Alexander Road, Cockatoo</li> <li>• Bedford Road, Cockatoo</li> <li>• Belgrave-Gembrook Road at Cockatoo Creek, Cockatoo</li> <li>• Bluebird Avenue, Cockatoo</li> <li>• Mountain Road, Cockatoo</li> <li>• Nangana Street, Cockatoo</li> <li>• Watkins Lane, Gembrook</li> <li>• Woori Yallock Road at multiple locations between Tschampions Road, Nangana and Mountain Road, Cockatoo</li> </ul>	

Table C5.8 – Breakdown of likely consequences at various Nangana gauge level heights along Cockatoo Creek with operational considerations

# FLOOD INTELLIGENCE CARD – NORTHERN CARDINIA SHIRE’S STORMWATER DRAINAGE (UNGAUGED)

Version 1 – February 2022



Note: flood intelligence records are approximations. This is because no two floods at a location, even if they peak at the same height, will have identical impacts. Flood intelligence cards detail the relationship between flood magnitude and flood consequences. More details about flood intelligence and its use can be found in the Australian Emergency Management Manuals flood series.

This Flood Intelligence Card publication is presented by the Victoria State Emergency Service for the purpose of disseminating emergency management information. The contents of the information have not been independently verified by the Victoria State Emergency Service. No liability is accepted for any damage, loss or injury caused by errors or omissions in this information or for any action taken by any person in reliance upon it. **Scan the QR code for the current rain totals for this gauge.**

CLOSEST RAIN GAUGE:	<b>Emerald</b>
LOCATION:	<b>Cardinia Reservoir</b>
WEBSITE:	<a href="https://www.melbournewater.com.au/water-data-and-education/rainfall-and-river-levels#/reader/586033">https://www.melbournewater.com.au/water-data-and-education/rainfall-and-river-levels#/reader/586033</a>

MELWAY REF:	<b>126 G9</b>
GAUGE NUMBER:	<b>586033</b>
GAUGE TYPE:	<b>Rain</b>

Design Rainfall Depths (mm) – Indication of Possible Flooding	Annual Exceedance Probability (% AEP)	Consequence / Impact	Operational Considerations
11mm in 10 mins; 18mm in 30 mins; 23mm in 1 hour; 29mm in 2 hours; 34mm in 3 hours; or 46mm in 6 hours  Note: rainfall depths are a very rough method of estimating flood events and have been used due to the ungagged nature of the catchment. This should be used as a guide only.	20% AEP (5-year ARI)	<p><b>Properties at Flood Risk (where building footprint on property intersects the flood extent)</b></p> <p><b>6 Properties in Total</b></p> <ul style="list-style-type: none"> <li>• <b>Dudman Creek</b></li> <li>• 523 Paternoster Road, Mount Burnett</li> <li>• <b>Muddy Creek</b></li> <li>• 82 Magpie Road, Menzies Creek</li> <li>• <b>Shepherd Creek East Branch</b></li> <li>• 136 Collie Road, Gembrook</li> <li>• <b>Woori Yallock Creek Tributary</b></li> <li>• 9 Mary Street, Emerald</li> <li>• 23A Nobelius Street, Emerald</li> <li>• 18 Ronald Road, Emerald</li> </ul> <p><b>Community Infrastructure Likely Flooded</b></p> <ul style="list-style-type: none"> <li>• Parts of Helio’s Camp at 110 Old Soldier Road, Cockatoo adjacent to Pancake Creek</li> </ul> <p><b>Water Over Road</b></p> <p><b>Drainage to Cardinia Reservoir</b></p> <ul style="list-style-type: none"> <li>• Old Beaconsfield Road at Jarmina Way, Emerald</li> </ul>	

Design Rainfall Depths (mm) – Indication of Possible Flooding	Annual Exceedance Probability (% AEP)	Consequence / Impact	Operational Considerations
		<p><b>Pancake Creek</b></p> <ul style="list-style-type: none"> <li>Calder Road, Nangana</li> </ul> <p><b>Woori Yallock Creek Tributary</b></p> <ul style="list-style-type: none"> <li>Lakeside Drive, Emerald</li> </ul>	
<p>15mm in 10 mins; 24mm in 30 mins; 30mm in 1 hour; 38mm in 2 hours; 45mm in 3 hours; or 62mm in 6 hours</p> <p>Note: rainfall depths are a very rough method of estimating flood events and have been used due to the ungagged nature of the catchment. This should be used as a guide only.</p>	<p>5% AEP (20-year ARI)</p>	<p><b>Properties at Flood Risk (where building footprint on property intersects the flood extent)</b></p> <p><b>11 Properties in Total</b></p> <p><b>Drainage to Cardinia Reservoir</b></p> <ul style="list-style-type: none"> <li>16 Memorial Avenue, Emerald</li> <li>15 Russell Street, Emerald</li> </ul> <p><b>Dudman Creek</b></p> <ul style="list-style-type: none"> <li>523 Paternoster Road, Mount Burnett</li> </ul> <p><b>Muddy Creek</b></p> <ul style="list-style-type: none"> <li>82 Magpie Road, Menzies Creek</li> </ul> <p><b>Shepherd Creek East Branch</b></p> <ul style="list-style-type: none"> <li>136 Collie Road, Gembrook</li> </ul> <p><b>Wattle Creek</b></p> <ul style="list-style-type: none"> <li>12 Bellbird Crescent, Emerald</li> <li>50 &amp; 1/50 Emerald Lake Road, Emerald</li> </ul> <p><b>Woori Yallock Creek Tributary</b></p> <ul style="list-style-type: none"> <li>9 Mary Street, Emerald</li> <li>23A Nobelius Street, Emerald</li> <li>18 Ronald Road, Emerald</li> </ul> <p><b>Community Infrastructure Likely Flooded</b></p> <ul style="list-style-type: none"> <li>Parts of Helio's Camp at 110 Old Soldier Road, Cockatoo adjacent to Pancake Creek</li> </ul> <p><b>Tourism / Recreation Likely Impacted</b></p> <ul style="list-style-type: none"> <li>The <b>Puffing Billy Tourist Railway</b> may see parts of the track impacted by flooding during a 5% AEP (20yr ARI) between Emerald and Cockatoo stations</li> <li>Emerald Lake Park's driveway off Emerald Lake Road may be flooded</li> </ul> <p><b>Water Over Road</b></p> <p><b>Drainage to Cardinia Reservoir</b></p> <ul style="list-style-type: none"> <li>Old Beaconsfield Road at Jarmina Way, Emerald</li> </ul> <p><b>Pancake Creek</b></p> <ul style="list-style-type: none"> <li>Calder Road, Nangana</li> </ul> <p><b>Woori Yallock Creek Tributary</b></p> <ul style="list-style-type: none"> <li>Lakeside Drive, Emerald</li> </ul>	

Design Rainfall Depths (mm) – Indication of Possible Flooding	Annual Exceedance Probability (% AEP)	Consequence / Impact	Operational Considerations
<p>20mm in 10 mins; 32mm in 30 mins; 39mm in 1 hour; 49mm in 2 hours; 57mm in 3 hours; or 80mm in 6 hours</p> <p>Note: rainfall depths are a very rough method of estimating flood events and have been used due to the ungagged nature of the catchment. This should be used as a guide only.</p>	<p>1% AEP (100-year ARI)</p>	<p><b>Properties at Flood Risk (where building footprint on property intersects the flood extent)</b></p> <p><b>21 Properties in Total</b></p> <p><b>Drainage to Cardinia Reservoir</b></p> <ul style="list-style-type: none"> <li>• 12, 16 &amp; 18 Memorial Avenue, Emerald</li> <li>• 13 &amp; 15 Russell Street, Emerald</li> </ul> <p><b>Dudman Creek</b></p> <ul style="list-style-type: none"> <li>• 523 Paternoster Road, Mount Burnett</li> </ul> <p><b>Menzies Creek</b></p> <ul style="list-style-type: none"> <li>• 2 &amp; 4 Colin Avenue, Emerald</li> <li>• 15 &amp; 78 Emerald-Monbulk Road, Emerald</li> <li>• 25 Lawsons Road, Emerald</li> </ul> <p><b>Muddy Creek</b></p> <ul style="list-style-type: none"> <li>• 82 Magpie Road, Menzies Creek</li> </ul> <p><b>Pancake Creek</b></p> <ul style="list-style-type: none"> <li>• 110 Old Soldier Road, Cockatoo</li> </ul> <p><b>Shepherd Creek East Branch</b></p> <ul style="list-style-type: none"> <li>• 136 Collie Road, Gembrook</li> </ul> <p><b>Wattle Creek</b></p> <ul style="list-style-type: none"> <li>• 12 Bellbird Crescent, Emerald</li> <li>• 50 &amp; 1/50 Emerald Lake Road, Emerald</li> <li>• 6 Wright Road, Emerald</li> </ul> <p><b>Woori Yallock Creek Tributary</b></p> <ul style="list-style-type: none"> <li>• 9 Mary Street, Emerald</li> <li>• 23A Nobelius Street, Emerald</li> <li>• 18 Ronald Road, Emerald</li> </ul> <p><b>Community Infrastructure Likely Flooded</b></p> <ul style="list-style-type: none"> <li>• Parts of Helio's Camp at 110 Old Soldier Road, Cockatoo adjacent to Pancake Creek</li> <li>• Lifeview Emerald Glades Aged Care Facility at 15 Emerald-Monbulk Road, Emerald</li> </ul> <p><b>Essential Infrastructure Likely Impacted</b></p> <ul style="list-style-type: none"> <li>• The <b>Ambulance Station</b> at 12 Memorial Avenue, Emerald may experience some flash flooding in the external parts of the property during a 1% AEP (100yr ARI) event. Access and Egress to the facility is not expected to be impacted by Ambulance Vehicles should this occur.</li> </ul> <p><b>Tourism / Recreation Likely Impacted</b></p> <ul style="list-style-type: none"> <li>• The <b>Puffing Billy Tourist Railway</b> may see parts of the track impacted by flooding during a 5% AEP (20yr ARI) between Emerald and Cockatoo stations</li> </ul>	

Design Rainfall Depths (mm) – Indication of Possible Flooding	Annual Exceedance Probability (% AEP)	Consequence / Impact	Operational Considerations
		<ul style="list-style-type: none"> <li>• Emerald Lake Park's driveway off Emerald Lake Road may be flooded</li> </ul> <p><b>Water Over Road</b></p> <p><b>Drainage to Cardinia Reservoir</b></p> <ul style="list-style-type: none"> <li>• Old Beaconsfield Road at Jarmina Way, Emerald</li> </ul> <p><b>Pancake Creek</b></p> <ul style="list-style-type: none"> <li>• Calder Road, Nangana</li> </ul> <p><b>Woori Yallock Creek Tributary</b></p> <ul style="list-style-type: none"> <li>• Lakeside Drive, Emerald</li> </ul>	

Table C5.9 – Breakdown of possible consequences at various rainfall intensities around Emerald, Cockatoo and Gembrook with operational considerations