Translation of Port Fairy Coastal Hazard Assessment

Port Fairy Coastal and Structure Planning Project

V161030

Prepared for
Moyne Shire

27 September 2017

Cardno
Shaping the Future

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0	10 Feb 17	Initial Draft	Rob Swan	Rob Swan
1	24 March 2017	Draft	Rob Swan	Rob Swan
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1 Introduction

Cardno, in conjunction with Moyne Shire, has undertaken Stage 1 of the Coastal Planning Analysis for Port Fairy. This project aims to extend and further develop the modelling and datasets created as part of the Port Fairy Coastal Hazard Vulnerability assessment. The key outcome of this stage of the project is to develop useful datasets that can be combined to best understand and identify the coastal risks for planning purposes

The project has comprised the following tasks

- Extract and provide additional hydrodynamic modelling of the township of Port Fairy to provide comprehensive data for depths, velocities, flow paths and estimated length of time for inundation for the Port Fairy township.
- In addition to, and including Port Fairy West, map present day 1% AEP (Annual Exceedance Probability) and the 0.2m sea level rise scenario storm tide flood levels.
- Present the findings using a single set of GIS (geographic information system) layers for a range of scenarios including various sea level rise and catchment flooding scenarios.

A number of scenarios have been assessed, including:

- Present Day (50 year ARI)
- Present Day (100-year ARI*)
- 2030 (100 year ARI with 0.2m SLR*)
- 2050 (100 year ARI with 0.4m SLR rel. 1990)
- 2080 (100 year ARI with 0.8m SLR rel. 1990)
- 2100 (100 year ARI with 1.2m SLR rel. 1990*)

To facilitate good planning outcomes, the project has developed a range of outputs datasets that consider more than just the depth of inundation. By extending the hydrodynamic modelling to a fully dynamic regime incorporating both tidal and estuarine flows, the project has determined the following outputs for each scenario:

- Water Depth (m)
- Water Surface Elevation (m AHD)
- Time of Inundation above threshold (hours)
- Maximum flow velocity
- Direction of maximum velocity
- Flood Hazard Class, based on safety criteria as described in Australian Rainfall and Runoff. This is a classification based on a number of physical factors, including flood depth, flood velocity and the depth by velocity product. The classes are related to risk to human wellbeing in an inundation scenario.

2 Hydraulic Modelling

A number of models were used in the Port Fairy Coastal Hazard Assessment (PFCHA) to determine the expected coastal inundation at and around Port Fairy. The key model for inundation was a MIKE-Flood model that had been run dynamically for the following scenarios:

> Present Day (50 year ARI)
> 2050 (100 year ARI with 0.4m SLR rel. 1990)
> 2080 (100 year ARI with 0.8m SLR rel. 1990)

The additional scenarios described in section 1 were not hydraulically modelled as part of the PFCHA. However, the model input files with respect to boundary conditions and wave overtopping were prepared as part of that project for all scenarios described in section 1. These t files generated in the PFCHA were used in the hydraulic modelling undertaken as part of this project. The PFCHA report contains a full description of the methodology used to develop the expected tidal and wave overtopping model input files.

2.1 MIKE-Flood model

Cardno received the MIKE-Flood model from Water Research Laboratory (WRL) at the University of New South Wales. MIKE-Flood is a 2-dimensional hydraulic model that solves the Saint Venant shallow equations to determine the flow and level of water in an ocean, estuary or floodplain. For unknown reasons, the model was unable to be successfully run for this project, despite using the input files provided by WRL in an unchanged form.

In order to be able to undertake the project, it was decided to recreate the MIKE-Flood model in an alternate modelling software. As the project area was required to be extended for the area considered in the PFCHA this additional work to transfer the model was considered minimal.

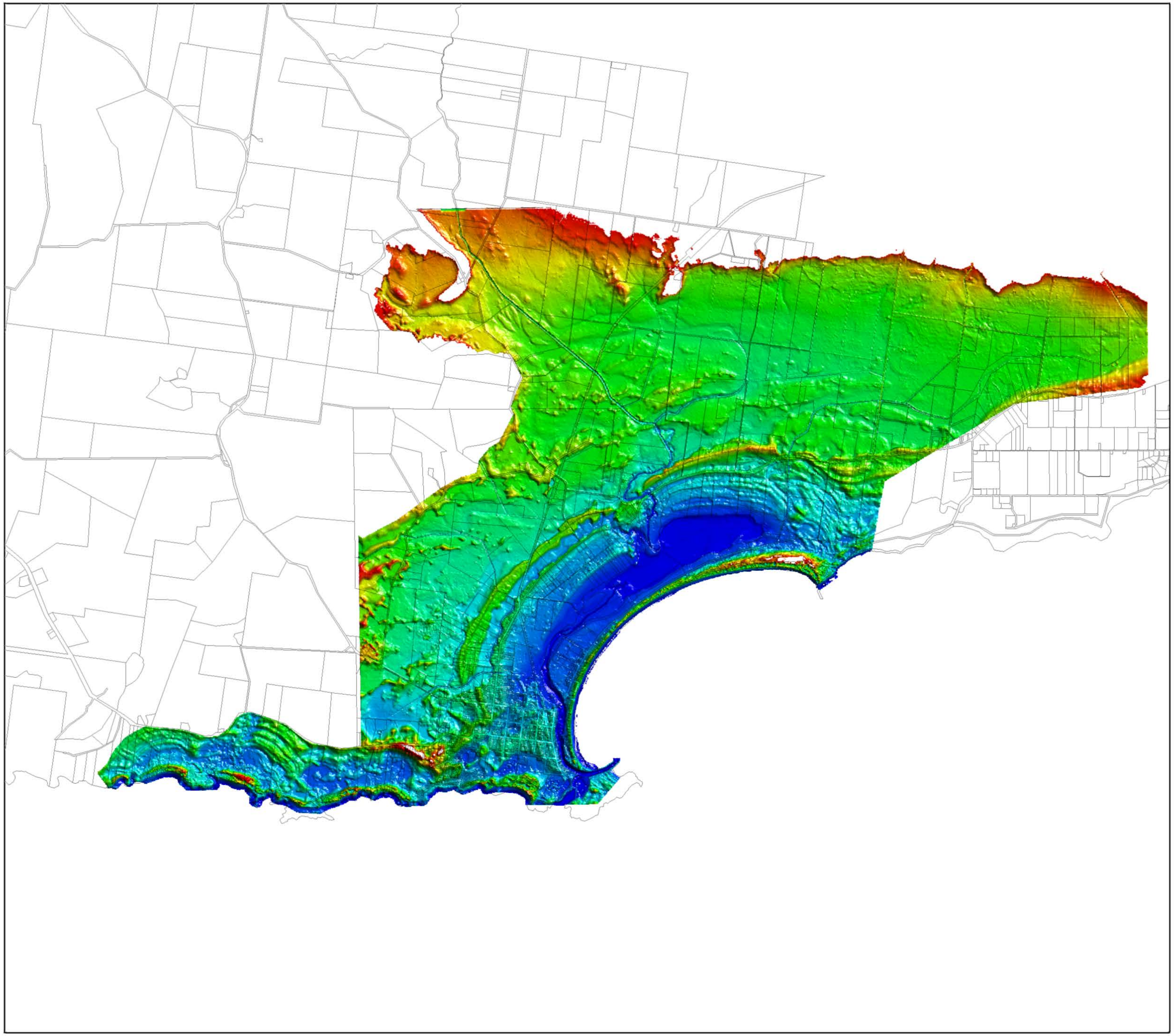
2.2 Development of the SOBEK Flood Model

The model chosen to undertake the analysis for this project was SOBEK, a 1d2d hydrodynamic model that is functionally identical to MIKE-Flood. A simple process of translating the model input files from the MIKE format to the SOBEK format was undertaken. As part of this process, some areas were added to the model domain, specifically in the west of the project area including the coastline and floodplain to 300 m west of the Southern Ocean Mariculture site.

As part of the update process, it was also noted that some culverts on tributaries of the Moyne River had not been properly included in the MIKE-Flood model and these minor errors were rectified. It was considered that these issues would not have had an impact on the overall results of the PFCHA.

The SOBEK Model was run and the results compared against the outputs from the MIKE-Flood model. In general, differences between the models were less than 3 cm and the SOBEK model results were considered appropriate for use in the project. The SOBEK model extent is found in Figure 1.

For mapping, the SOBEK model was run for all scenarios described in Section 2. Inputs for the model were adopted from results provided to Cardno by WRL and Moyne Shire and have been developed using the methods described in the PFCHA.



Port Fairy Coastal Hazard Project

Model Topography

Legend

Property Boundary

Topography (mAHD)

14.94

0

Cardno

Map Produced by <Division> (<BU>)
Date: <Current Date>
Coordinate System: <Current Coordinate System>
Project:<Job Number>_<Phase>
Map:<map name>.wor 01

3 Mapping of Swash Zones

As part of the consultation process for the development of the flood maps, the Glenelg Hopkins catchment Management Authority requested that the mapping show areas that may be affected by wave overtopping. Flood models such as Mike21 and SOBEK do not have the computational ability to model the momentum transfer of a breaking wave and instead utilise the concept of a still water level for the mapping of inundation. A still water level is effectively the average height of the water over a wave period.

As waves break, their momentum is transferred into a shallow flow that surges up a beach. The steeper the beach, the higher this surge. Surge heights were calculated by WRL and have been adopted in our analysis. For the purpose of modelling inundation, the flux across the dune is estimated and that volume is introduced into the flood storage area on the landward side of the dune. Whilst this provides an accurate assessment of the expected inundation in ponded areas, it does not identify the potential swash areas (swash being the broken waves).

We have estimated the area in which water will travel when waves overtop the dunes. There are two swash zones, one at the western end of Ocean Drive and the other at Peasoup. The shape of two of the swash zones were drawn by using the adopted dune height from the wave overtopping calculations undertaken by WRL (3.3 and 3.5 m AHD respectively) and identifying that level from the topographic data. This provides the width of the swash zone at the 'top' of the dune. The shape was then tapered to meet the flood inundation extents, based on the topographic information. The extents shown on the map are indicative only and are intended to provide an estimate of areas that may be subject to wave overtopping.

To provide context, Cardno undertook simple hydraulic calculations using Mannings Equation for open channel flow to estimate the average depth at the dune crest and the expected flow velocity on the downslope of the dune. These were calculated using a Manning's n value of 0.04 and 0.08, to give a range of values. Table 3-1 and Table 3-2 show the range of average depths at Ocean Drive and Peasoup.

Table 3-1 Ocean Drive Overtopping –Manning's 'n' ranging between 0.04 and 0.08

Scenario	Max Flow (m^3/s)	Depth (m)	Velocity (m/s)
Present Day (50 year ARI)	1.369	0.019 – 0.029	0.160 – 0.243
Present Day (100-year ARI*)	1.408	0.019 – 0.029	0.162 – 0.245
2030 (100 year ARI with 0.2m SLR*)	2.143	0.025 – 0.037	0.192 – 0.290
2050 (100 year ARI with 0.4m SLR rel. 1990)	3.158	0.031 – 0.047	0.224 – 0.339
2080 (100 year ARI with 0.8m SLR rel. 1990)	5.627	0.044 – 0.067	0.282 – 0.427
2100 (100 year ARI with 1.2m SLR rel. 1990*)	9.467	0.060 – 0.091	0.347 – 0.526

Table 3-2 Peasoup Overtopping – Manning's 'n' ranging between 0.04 and 0.08

Scenario	Max Flow (m^3/s)	Depth (m)	Velocity (m/s)
Present Day (50 year ARI)	0.380	0.015 – 0.023	0.144 – 0.218
Present Day (100-year ARI*)	0.398	0.016 – 0.024	0.146 – 0.222
2030 (100 year ARI with 0.2m SLR*)	0.560	0.019 – 0.029	0.168 – 0.254
2050 (100 year ARI with 0.4m SLR rel. 1990)	0.878	0.025 – 0.038	0.201 – 0.304
2080 (100 year ARI with 0.8m SLR rel. 1990)	1.573	0.036 – 0.054	0.253 – 0.384
2100 (100 year ARI with 1.2m SLR rel. 1990*)	2.663	0.049 – 0.074	0.313 – 0.474

From the calculations, the average depth of the wave overtopping is less than 10 cm in all scenarios on the landward side of the dune. Water depths on the seaward side of the dune may be much higher, especially in areas where waves are breaking. The depths shown in the tables above assume that the wave has broken prior to reaching the top of the dune. An example of the expected swash zone at Ocean Drive is shown below using magenta shading.

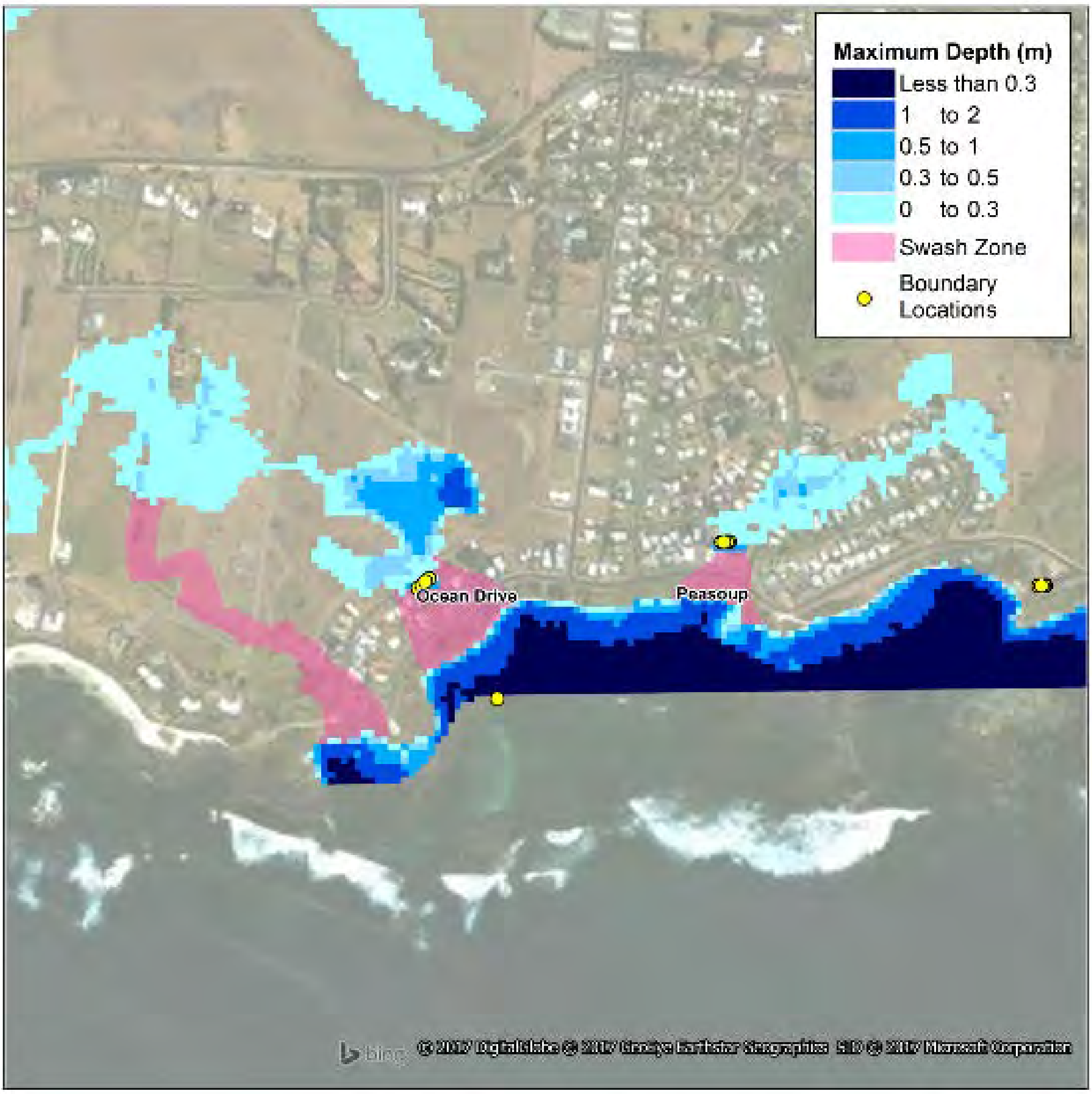


Figure 3-1 Swash Zones, Ocean Drive and Peasoup

It should be noted that these swash extents are not exclusive and other areas along the foreshore may be impacted by wave runup.

4 GIS Outputs

Maps and GIS layers have been produced for each scenario. The maps include the data as described in the following sections and can be found in Appendix A.

4.1 Flood Depth

These maps show maximum flood depth experienced during the inundation event. This is a depth above the modelled ground level, with a reference level at the centre of the model grid cell.

4.2 Water Surface Elevation (m AHD)

These maps show the water surface elevation in metres above Australian Height Datum, which is approximately equivalent to mean sea level at 1990.

4.3 Time of Inundation above 0.3 metres

These maps show the time of inundation above a flood depth of 0.3 metres. As the tide level rises and falls areas may be inundated but the flooding may not last very long. A preliminary threshold value of 0.3 metres has been set as this is often the approximate level that houses are built above ground level. It is also approximately equivalent to the safe wading depth for small children in a flood event.

4.4 Maximum flow velocity

Flow velocity is a measure of the speed at which water flows across land. High velocities generally indicate areas of greater flood risk and can identify the main flood flowpaths.

4.5 Flow Vectors

A flow vector provides an indication of the speed and direction of flow at the time of maximum water velocity. These maps provide an understanding of how inundation progresses through the coastal floodplain.

4.6 Flood Hazard Class

Flood Hazard is measure of risk associated with the combination of both flood depth and flood velocity. As a rule, the faster the water flows, the less depth is required to create a potential hazards to people or objects in the floodplain. For this approach, we have adopted the flood hazard classes as per the generalised description from Australian Rainfall and Runoff (2016) Book 6 Chapter 7 – Safety Design Criteria. The classification is shown in Table 4-1.

Table 4-1 Flood Hazard Classification (ARR, 2016)

Hazard Vulnerability Classification	Description
H1	Generally safe for vehicles, people and buildings.
H2	Unsafe for small vehicles.
H3	Unsafe for vehicles, children and the elderly.
H4	Unsafe for vehicles and people.
H5	Unsafe for vehicles and people. All buildings vulnerable to structural damage. Some less robust buildings subject to failure.
H6	Unsafe for vehicles and people. All building types considered vulnerable to failure.

5 Planning Considerations

The maps provided provide a comprehensive analysis of the risk of coastal inundation at Port Fairy for sea level rises of up to 1.2 m. These maps can provide guidance for decision makers in developing appropriate planning controls for coastal inundation and coastal erosion.

Stage 2 of the project provides for the synthesis of the outputs provide by this report into planning scheme changes at both a policy and overlay level. There are differences between coastal inundation and riverine flooding that can be important when adopting a risk based approach to planning controls. This means that it is likely that schedules will be required to the Land Subject to Inundation Overlay and Floodway Overlay that appropriately consider the special conditions associated with coastal inundation, especially where that inundation is transient. Key aspects to consider are:

> The time of inundation is important in coastal flooding, especially for areas where the depth of water is low. This is because storm tides are predictable and warnings can be provided, meaning that there are design response that can limit floodplain risk to people and property.

> The appropriateness of freeboard limits for different areas, such as those fronting the open coast along Ocean Drive, and those along the tidal estuary.

> How to manage swash zones with regard to property protection.

The analysis undertaken as part of this report does not include consideration of very large flood events and elevated sea levels. The 1% AEP flood on the Moyne River is the dominant flood mechanism for many areas surrounding the Port Fairy township, particularly inland of the coastal fringe. Planning for the town's future expansion should include consideration of both the ocean and riverine flood mechanisms.

5.1 Warning Times

Along the south coast of Australia sea-level variations over longer time-scales are related to meteorological systems which move from west to east. The corresponding sea-level variations also migrate from west to east as demonstrated by Provis and Radok (1979) and illustrated in the monthly reports from the National Tidal Centre for the Australian Baseline Sea-level Monitoring Project. It would be useful in terms of emergency services if the water levels associated with such storm events could be predicted in advance.

Cardno have undertaken work to develop an algorithm to predict the sea level at Lorne and Geelong based on the measured tidal residual at Portland. This approach has enabled an accurate prediction of the sea level at Lorne 7 hours in advance and 18 hours in advance for Geelong. Details of the approach are found in the Bellarine Corio Coastal Hazard Vulnerability Assessment Inundation Report.

This approach could be adopted for Port Fairy, using the predicted tide level at Portland Gauge and a residual measured at a tide gauge in South Australia (for example at Victor Harbor or Thevenard). Once an appropriate lag is determined from the available data, the storm tide level at Port Fairy can be predicted. Wave heights can be appropriately predicted by the Bureau of Meteorology.

The advantage of this approach is that it does not require any additional gauges to be put in place to enable the prediction. It would be useful to have a wave buoy offshore to validate and refine the wave prediction models for the Victorian south coast.

6 Conclusions

This report provides important analysis of the expected hazards and risks associated with coastal inundation at Port Fairy. The report should be read in conjunction with the Port Fairy Coastal Hazard Assessment, as the data used to generate the mapped outputs in this document are primarily derived from that project.

The maps and information provided in this report will enable stage 2 of the project to be commenced utilising a risk based approach to develop appropriate planning controls.

The digital data attached to this report contains all maps and GIS data tables for each modelled sea level scenario.

Port Fairy Coastal and Structure Planning Project

APPENDIX

A

MAPS

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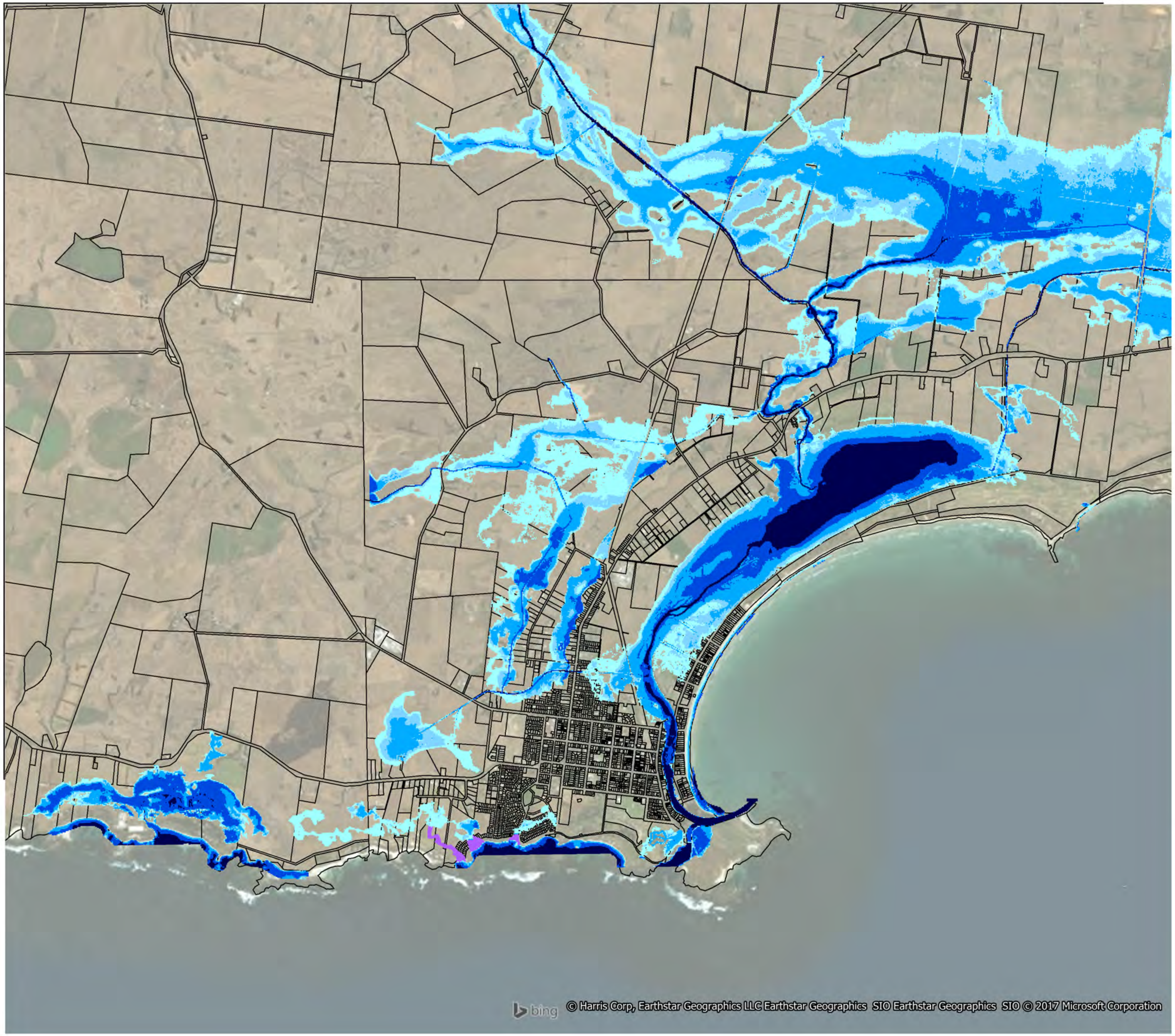

Port Fairy Maximum Depth

Present day
10 year river ARI
50 year ocean ARI

Maximum Depth (m)

- Greater than 2
- 1 to 2
- 0.5 to 1
- 0.3 to 0.5
- Less than 0.3
- Swash Zone

N
W E
S

0 2
kilometers
Scale 1:37,660

Cardno

Map Produced by Cardno Victoria
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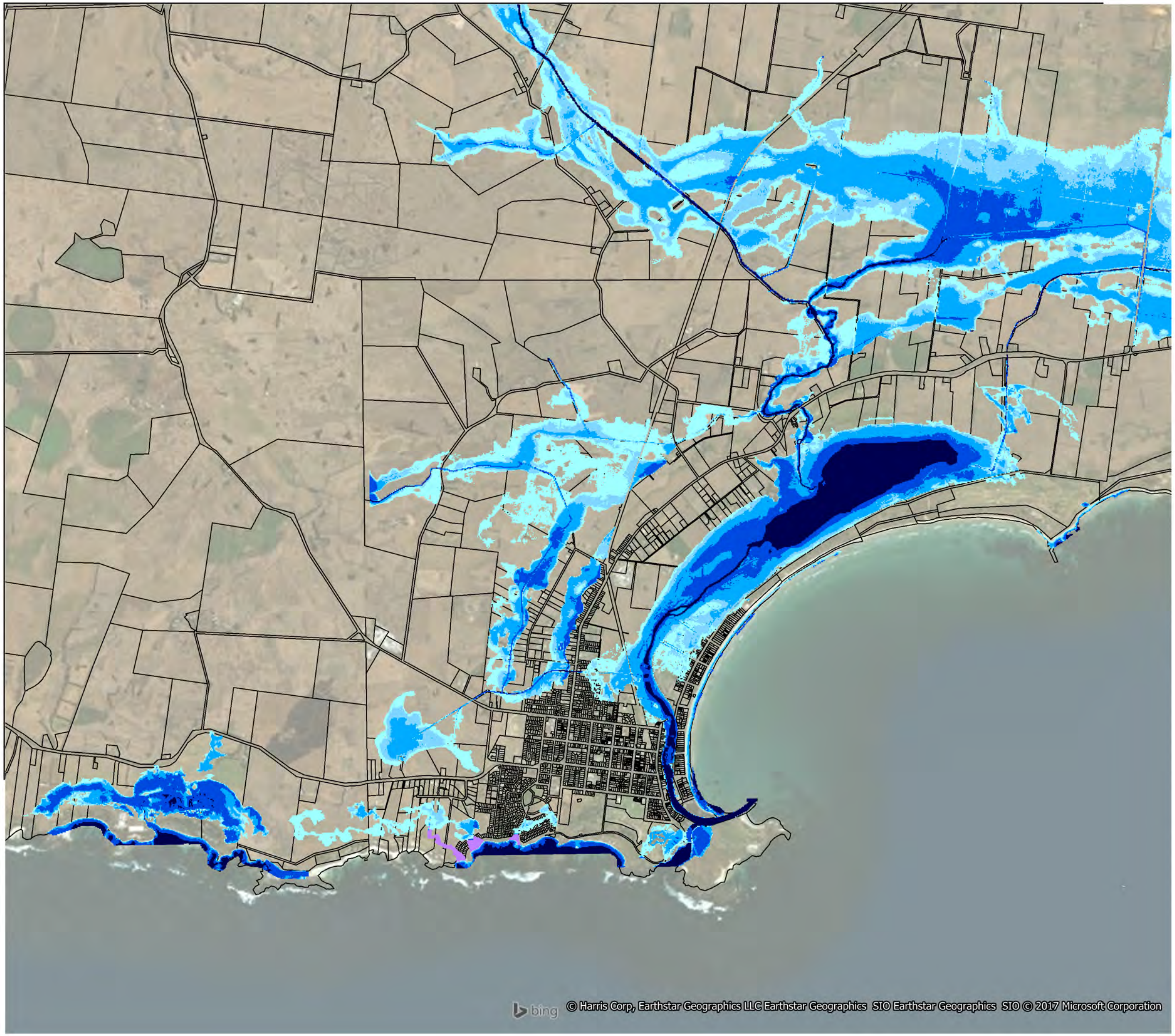
Project: V161030W



Port Fairy Maximum Depth

Present day
10 year river ARI
100 year ocean ARI

Maximum Depth (m)

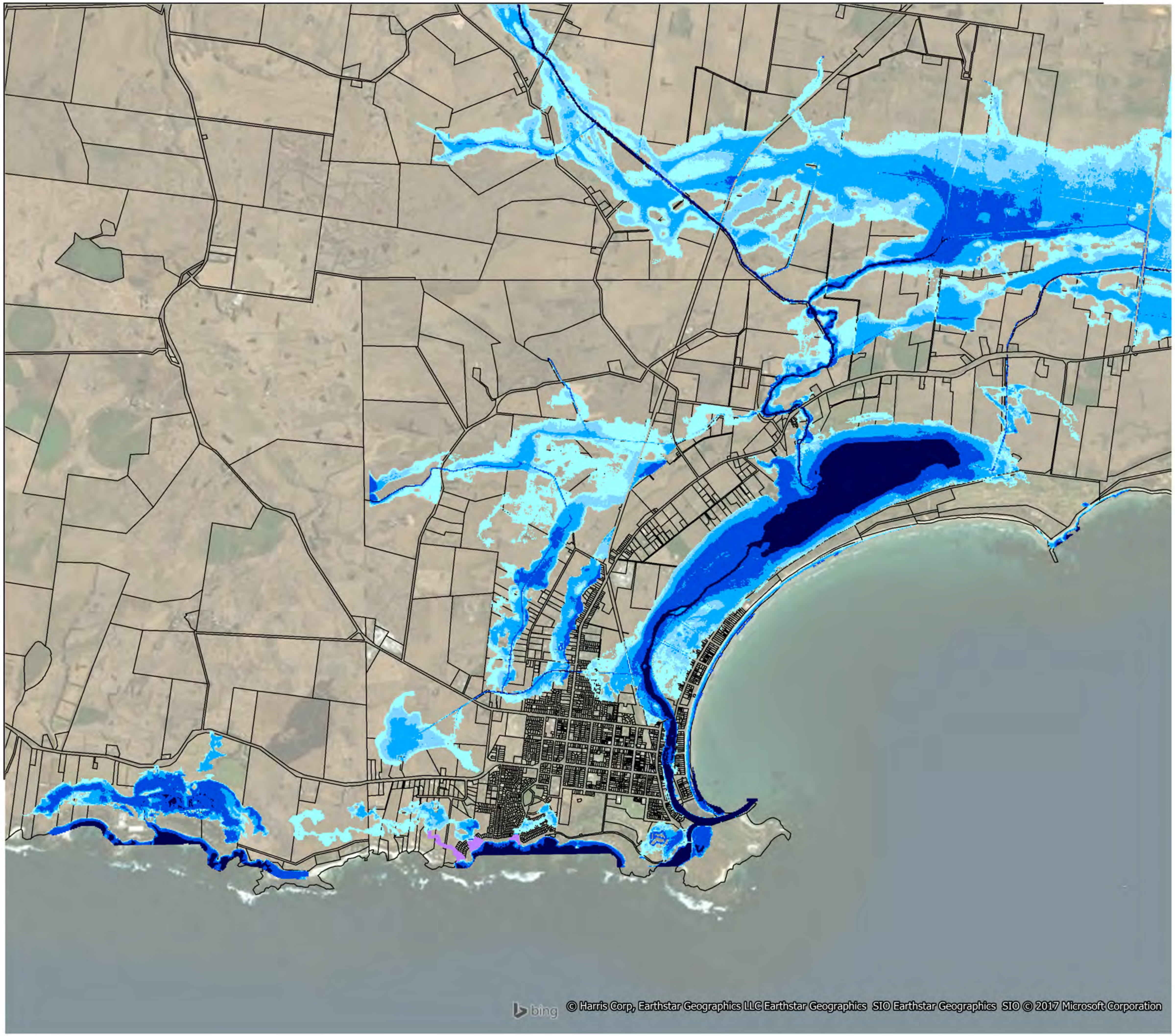
- Greater than 2
- 1 to 2
- 0.5 to 1
- 0.3 to 0.5
- Less than 0.3
- Swash Zone

N
W E
S

0 2
kilometers
Scale 1:37,660

Cardno

Map Produced by Cardno Victoria
Date: 26/09/2017
Coordinate System: MGA 94 - Zone 54
Project: V161030W



Port Fairy Maximum Depth

2030
10 year river ARI
100 year ocean ARI + 0.2m SLR

Maximum Depth (m)

- Greater than 2
- 1 to 2
- 0.5 to 1
- 0.3 to 0.5
- Less than 0.3
- Swash Zone

0 — 2 kilometers

Scale 1:37,660

Cardno

Map Produced by Cardno Victoria
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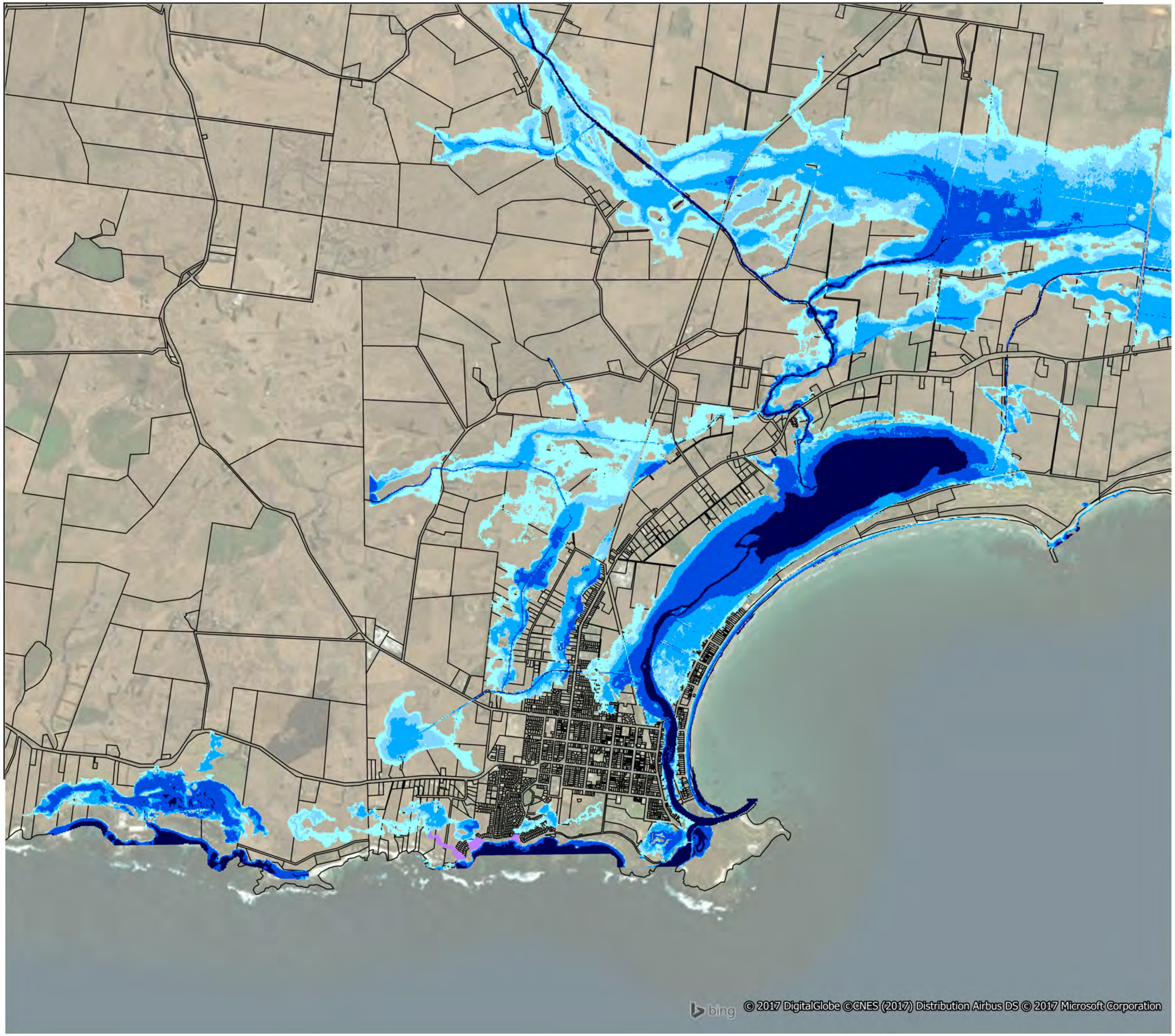

Port Fairy Maximum Depth

2050
10 year river ARI
100 year ocean ARI + 0.4m SLR

Maximum Depth (m)

- Greater than 2
- 1 to 2
- 0.5 to 1
- 0.3 to 0.5
- Less than 0.3
- Swash Zone

N S E W

0 2
kilometres
Scale 1:37,660

Cardno

Map Produced by Cardno Victoria
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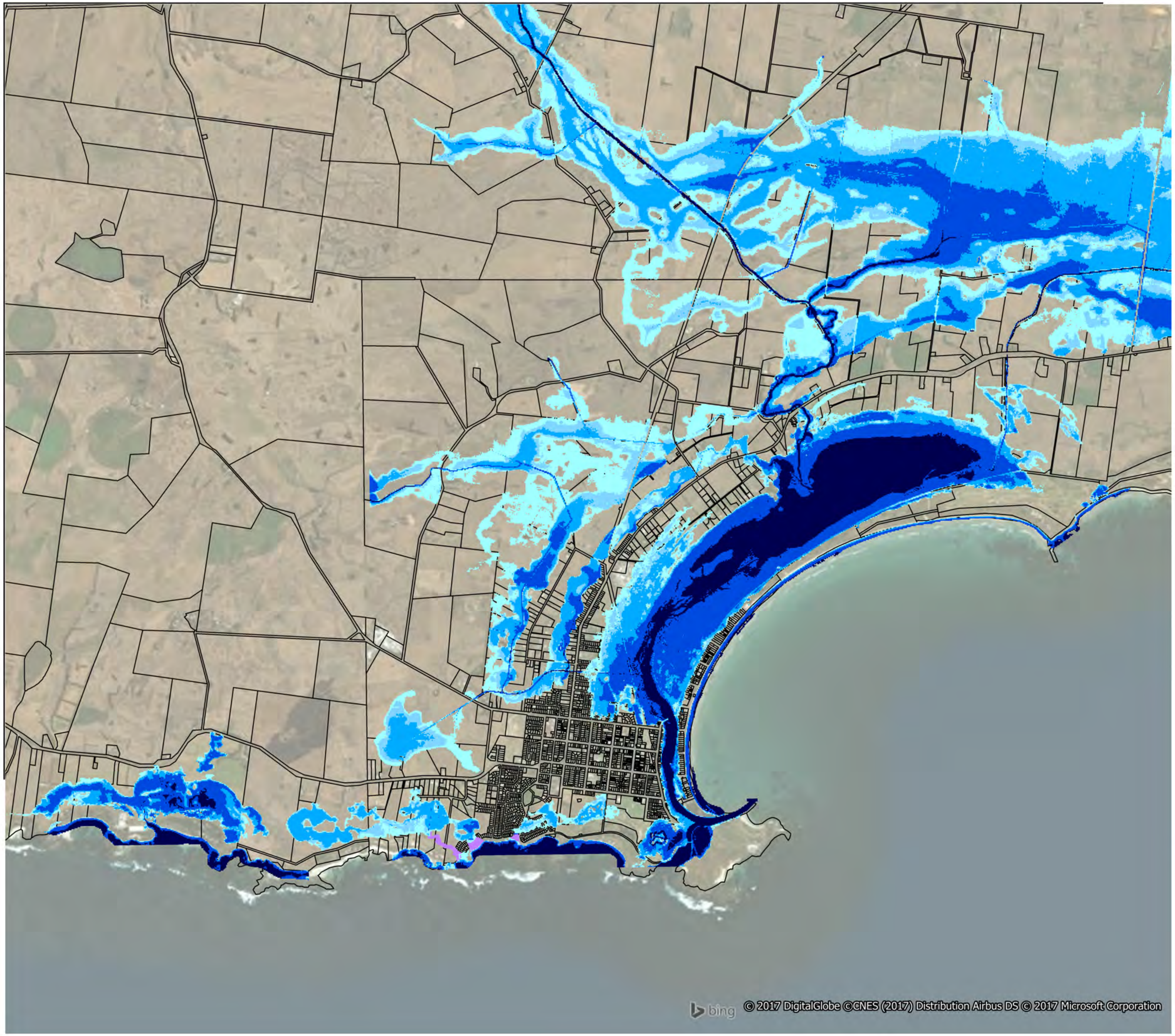
Project: V161030W



Port Fairy Maximum Depth

2080
20 year river ARI
100 year ocean ARI + 0.8m SLR

Maximum Depth (m)

- Greater than 2
- 1 to 2
- 0.5 to 1
- 0.3 to 0.5
- Less than 0.3
- Swash Zone

N
W E
S

0 2
kilometres
Scale 1:37,660

Cardno

Map Produced by Cardno Victoria
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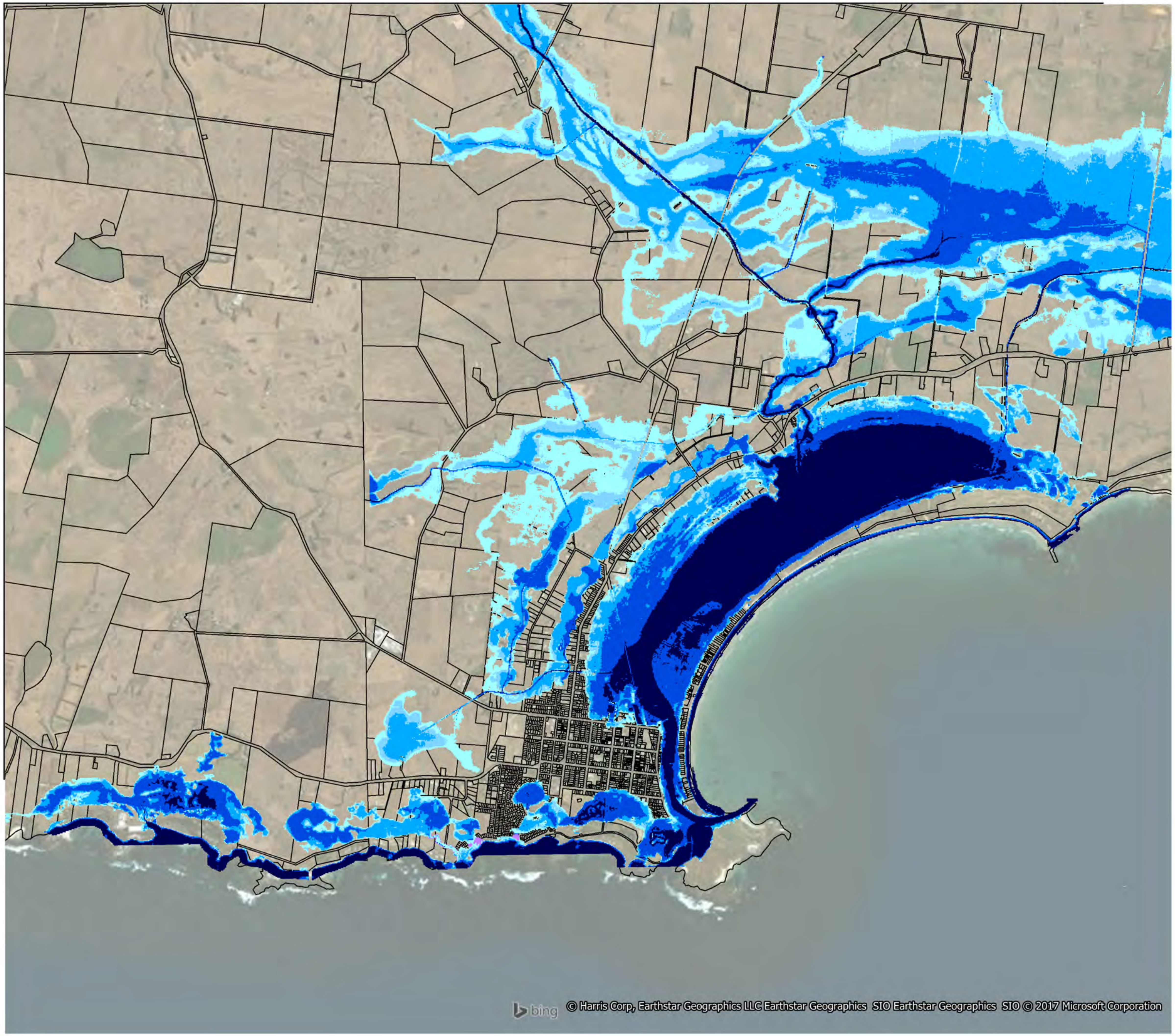
Project: V161030W



Port Fairy Maximum Depth

2100
20 year river ARI
100 year ocean ARI + 1.2m SLR

Maximum Depth (m)

- Greater than 2
- 1 to 2
- 0.5 to 1
- 0.3 to 0.5
- Less than 0.3
- Swash Zone

N S E W

0 2
kilometers
Scale 1:37,660

Cardno

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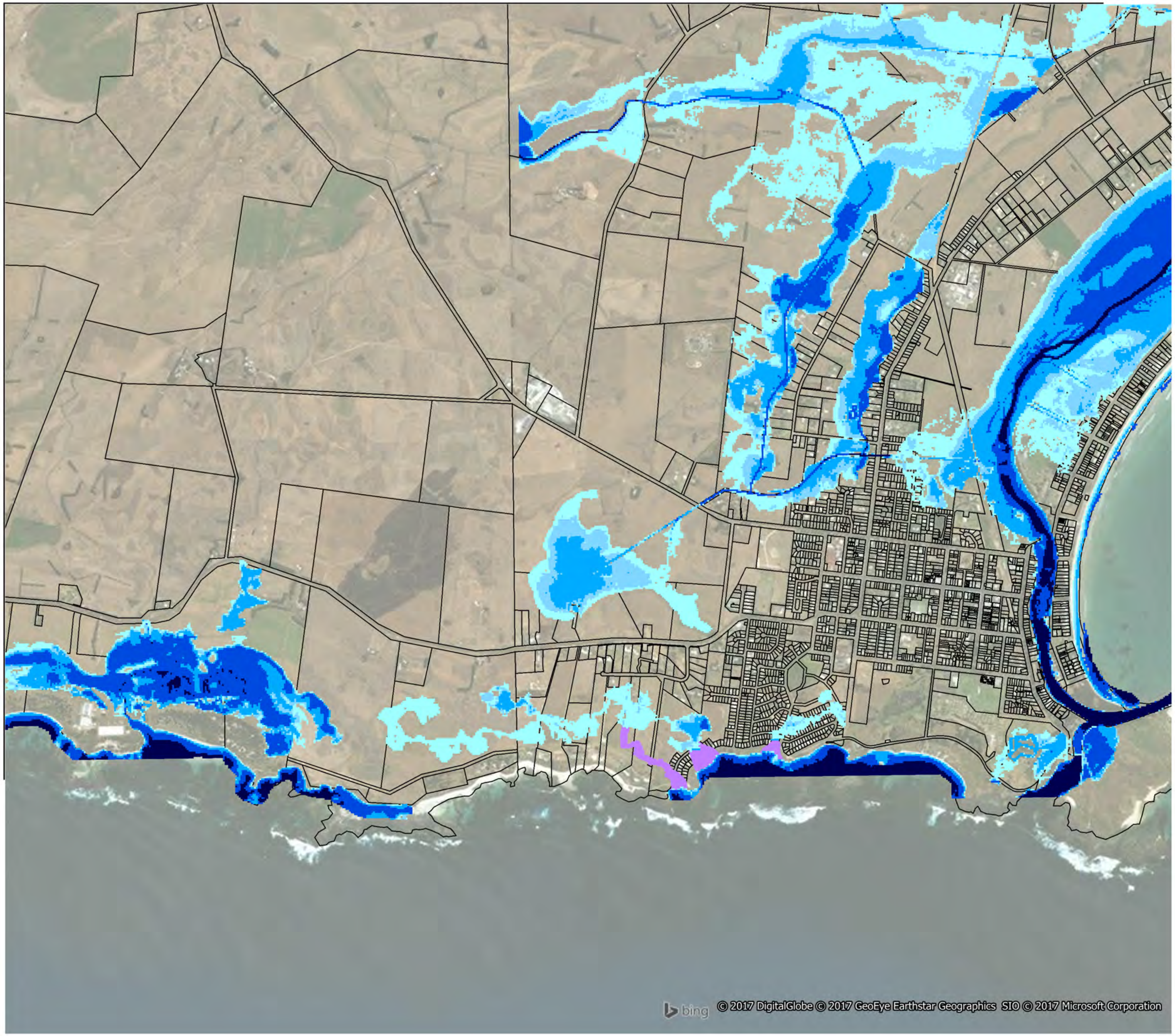
Project: V161030W



Port Fairy Township Maximum Depth

Present day
10 year river ARI
50 year ocean ARI

Maximum Depth (m)

- Greater than 2
- 1 to 2
- 0.5 to 1
- 0.3 to 0.5
- Less than 0.3
- Swash Zone

Scale 1:21,530

Map Produced by Cardno Victoria
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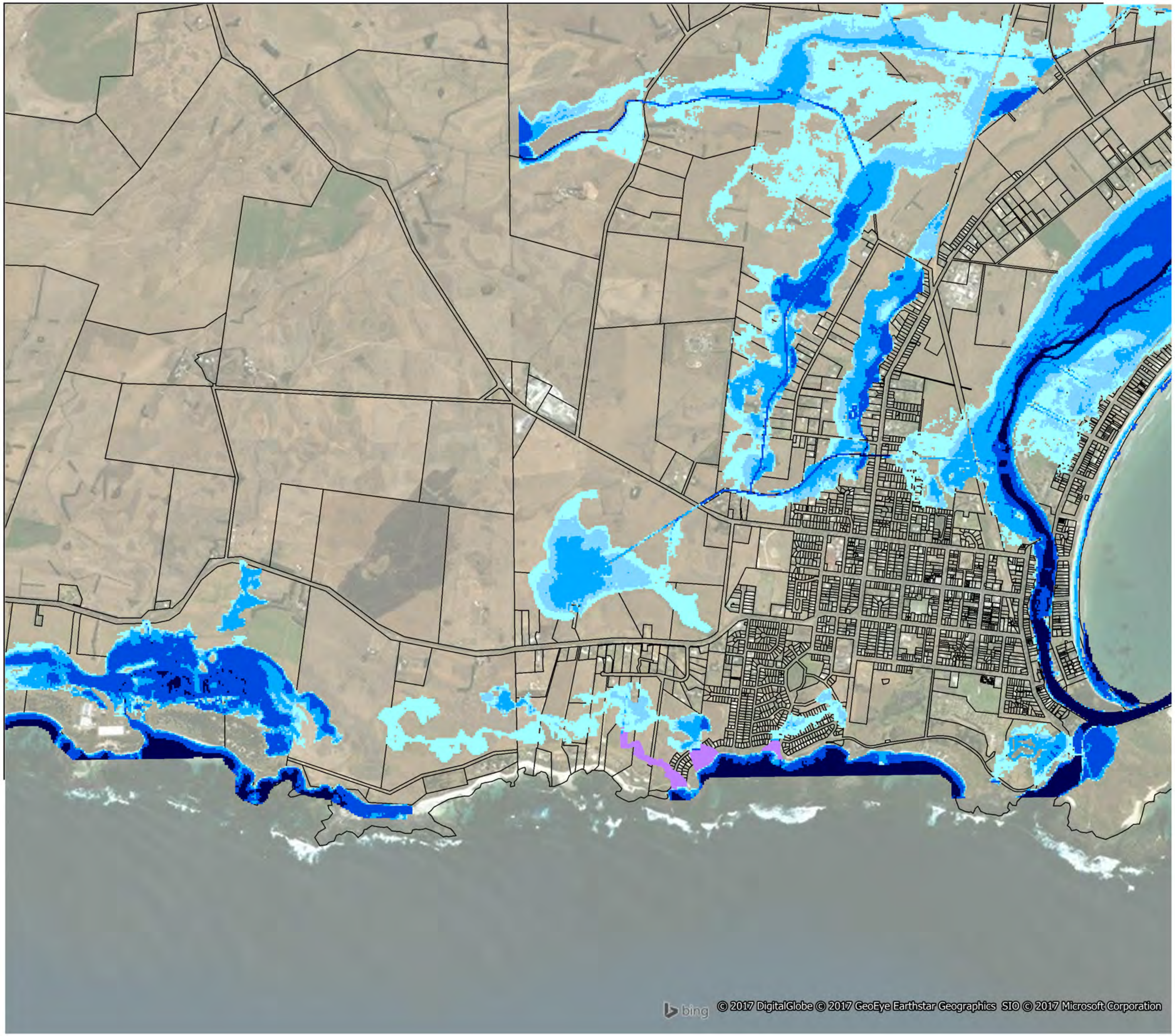
Project: V161030W



Port Fairy Township Maximum Depth

Present day
10 year river ARI
100 year ocean ARI

Maximum Depth (m)

- Greater than 2
- 1 to 2
- 0.5 to 1
- 0.3 to 0.5
- Less than 0.3
- Swash Zone

N
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kilometers
Scale 1:21,530

Cardno

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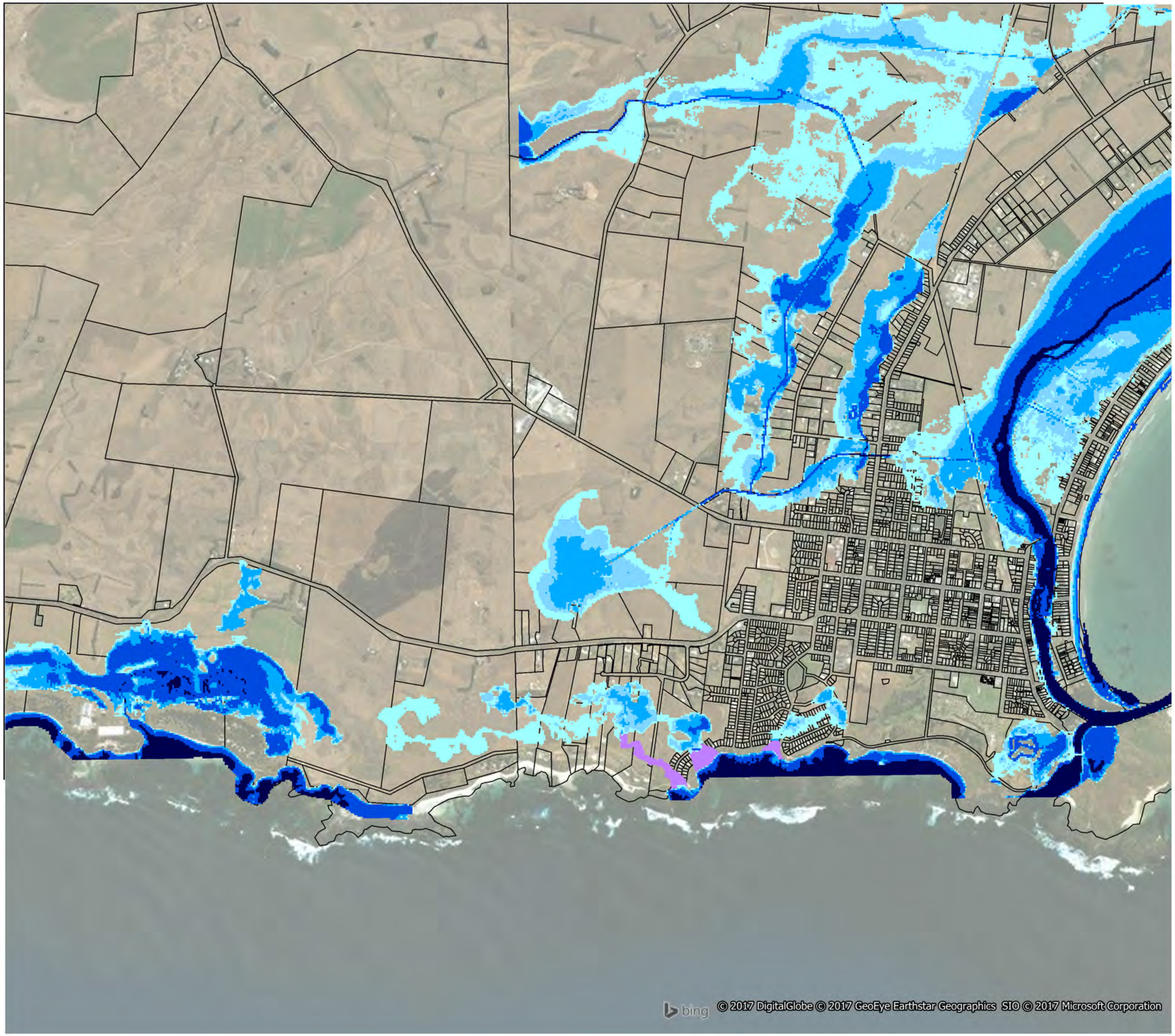

Port Fairy Township Maximum Depth

2030
10 year river ARI
100 year ocean ARI + 0.2m SLR

Maximum Depth (m)

- Greater than 2
- 1 to 2
- 0.5 to 1
- 0.3 to 0.5
- Less than 0.3
- Swash Zone

0 — 1 kilometers

Scale 1:21,530

Cardno

Map Produced by Cardno Victoria
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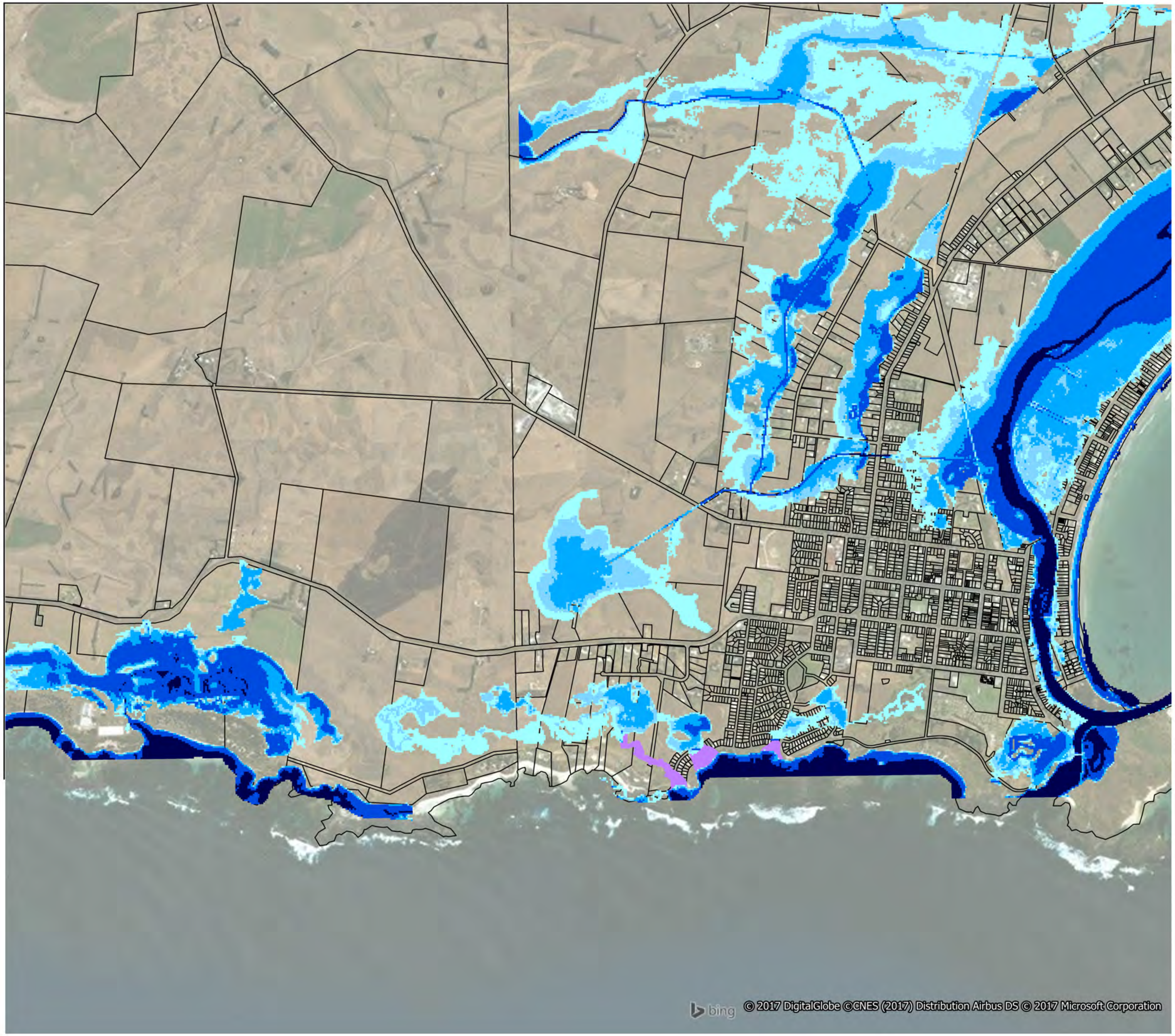

Port Fairy Township Maximum Depth

2050
10 year river ARI
100 year ocean ARI + 0.4m SLR

Maximum Depth (m)

- Greater than 2
- 1 to 2
- 0.5 to 1
- 0.3 to 0.5
- Less than 0.3
- Swash Zone

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kilometres
Scale 1:21,530

Cardno

Map Produced by Cardno Victoria
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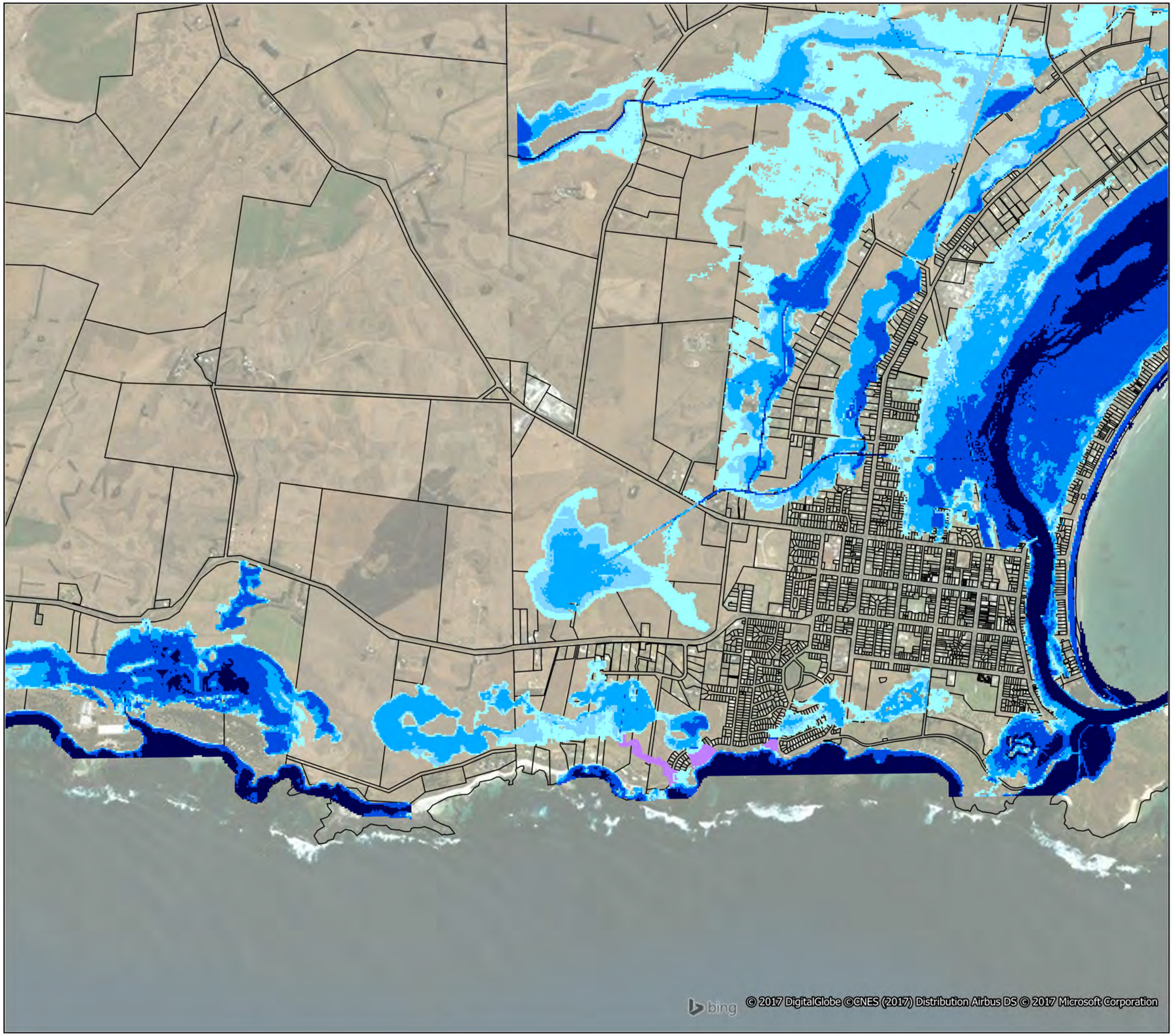

Port Fairy Township Maximum Depth

2080
20 year river ARI
100 year ocean ARI + 0.8m SLR

Maximum Depth (m)

- Greater than 2
- 1 to 2
- 0.5 to 1
- 0.3 to 0.5
- Less than 0.3
- Swash Zone

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Scale 1:21,530

Cardno

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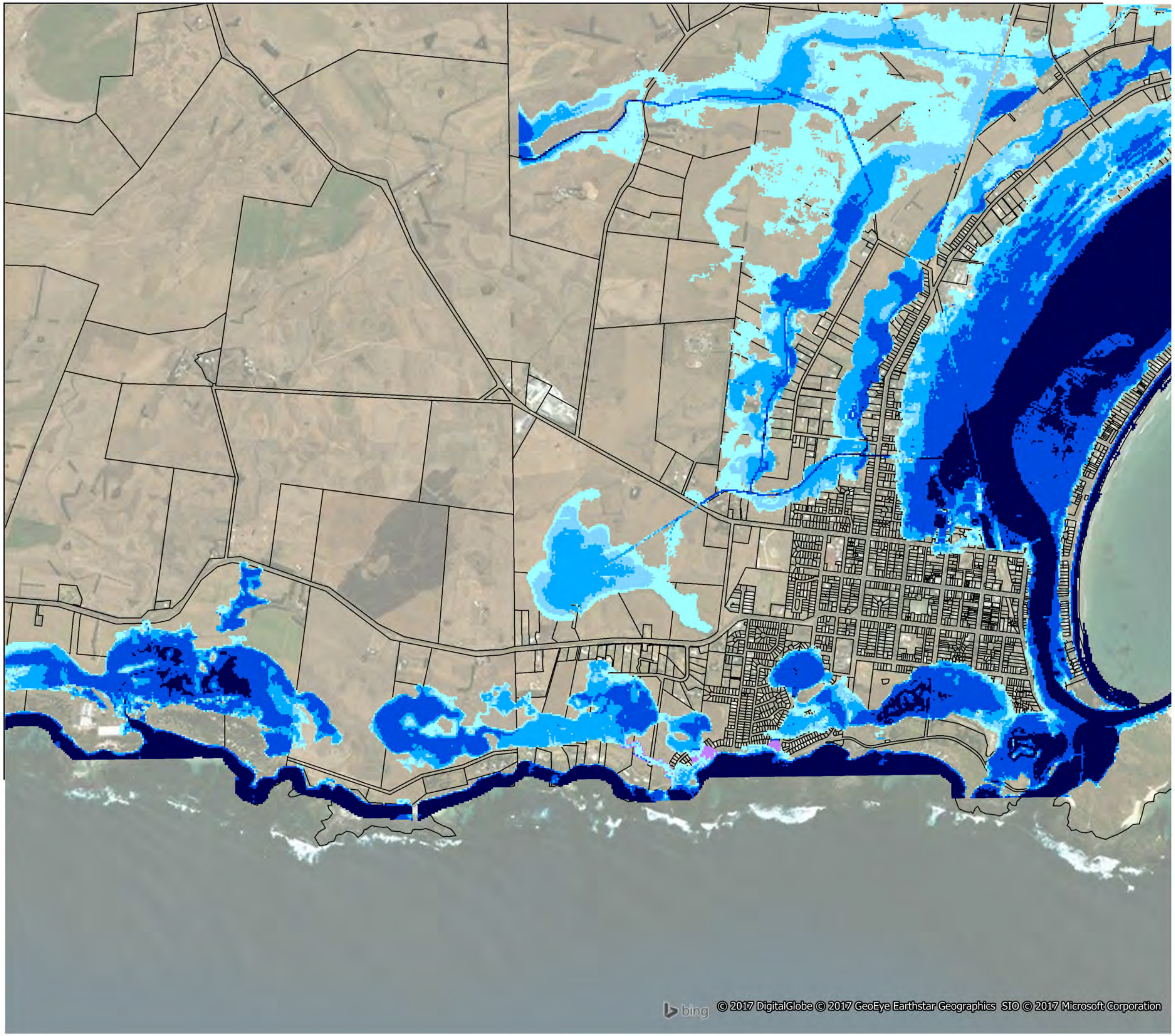

Port Fairy Township Maximum Depth

2100
20 year river ARI
100 year ocean ARI + 1.2m SLR

Maximum Depth (m)

- Greater than 2
- 1 to 2
- 0.5 to 1
- 0.3 to 0.5
- Less than 0.3
- Swash Zone

0 — 1 kilometers

Scale 1:21,530

Cardno

Map Produced by Cardno Victoria
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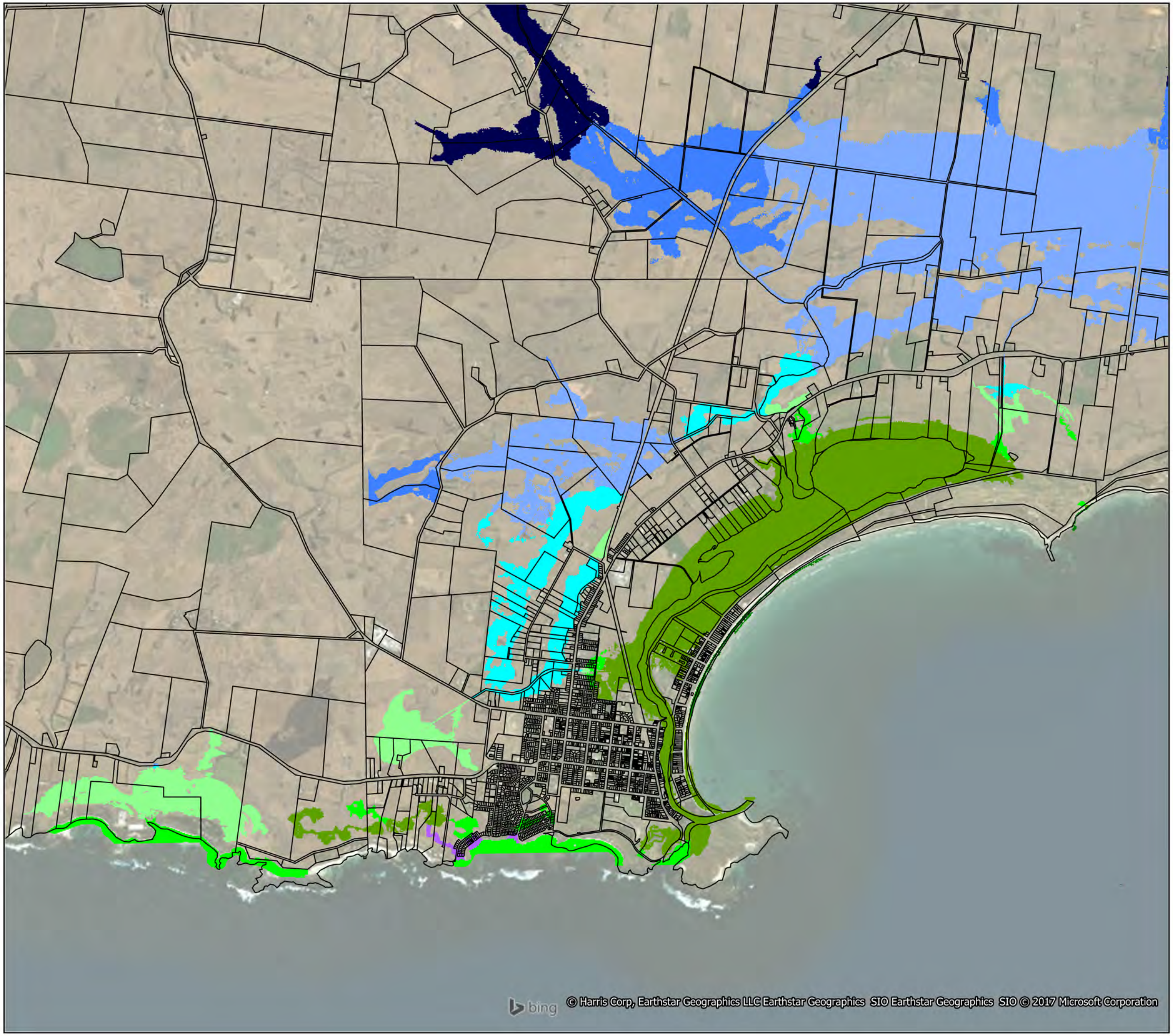
Project: V161030W



Port Fairy Maximum Water Surface Elevation

Present day
10 year river ARI
50 year ocean ARI

Maximum Water Surface Elevation (mAHD)

- 0 to 1
- 1 to 2
- 2 to 3
- 3 to 4
- 4 to 5
- 5 to 7.5
- 7.5 to 10
- 10 to 13.5
- Swash Zone

0 2
kilometers
Scale 1:37,660

Cardno

Map Produced by Cardno Victoria
Date: 26/09/2017
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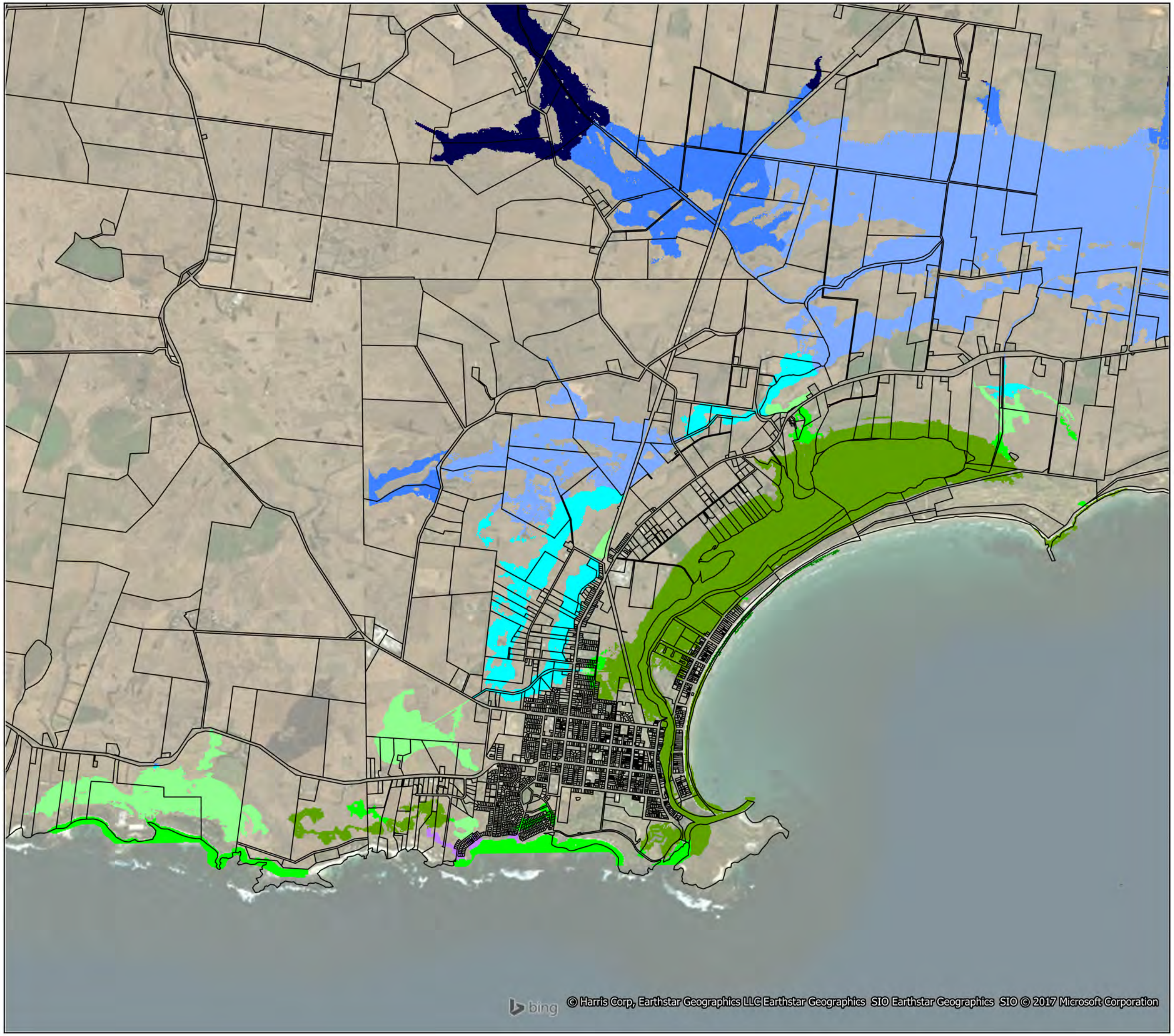
Project: V161030W



Port Fairy Maximum Water Surface Elevation

Present day
10 year river ARI
100 year ocean ARI

Maximum Water Surface Elevation (mAHD)

- 0 to 1
- 1 to 2
- 2 to 3
- 3 to 4
- 4 to 5
- 5 to 7.5
- 7.5 to 10
- 10 to 13.5
- Swash Zone

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kilometers
Scale 1:37,660

Cardno

Map Produced by Cardno Victoria
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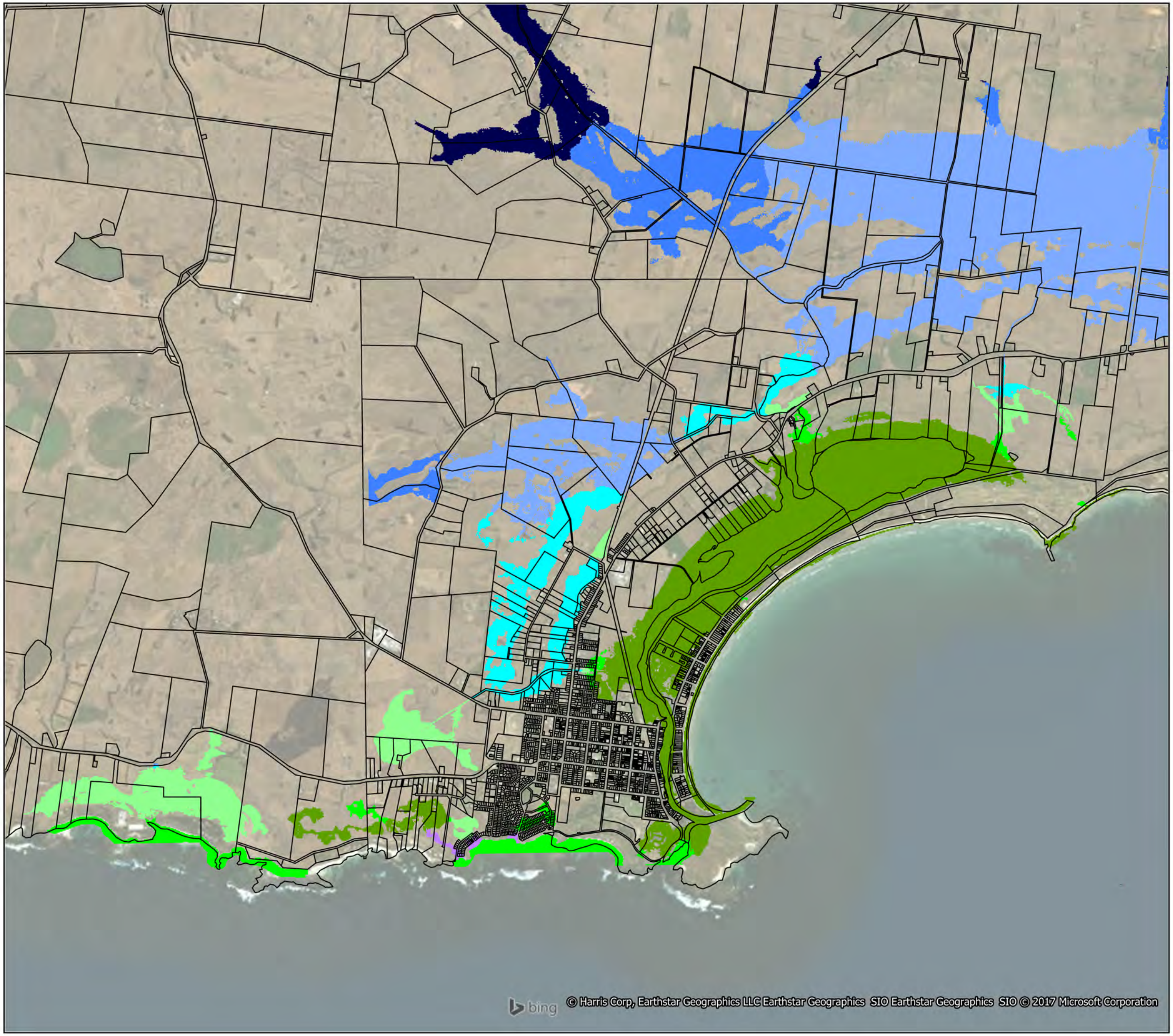

Port Fairy Maximum Water Surface Elevation

2030
10 year river ARI
100 year ocean ARI + 0.2m SLR

Maximum Water Surface Elevation (mAHD)

0 to 1	
1 to 2	
2 to 3	
3 to 4	
4 to 5	
5 to 7.5	
7.5 to 10	
10 to 13.5	
Swash Zone	

N
W E
S

0 2
kilometers
Scale 1:37,660

Cardno

Map Produced by Cardno Victoria
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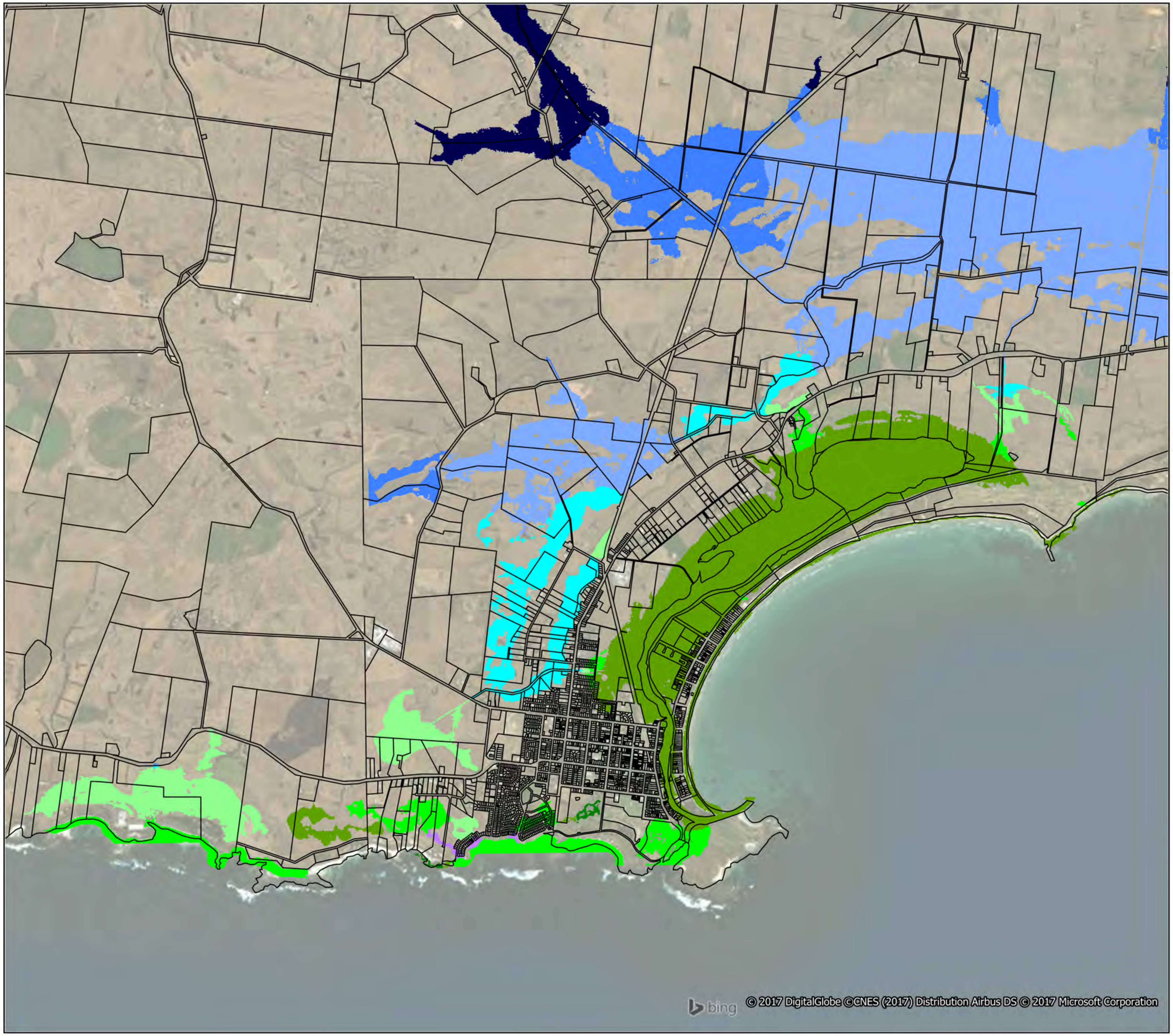
Coordinate System: MGA 94 - Zone 54
Project: V161030W



Port Fairy Maximum Water Surface Elevation

2050
10 year river ARI
100 year ocean ARI + 0.4m SLR

Maximum Water Surface Elevation (mAHD)

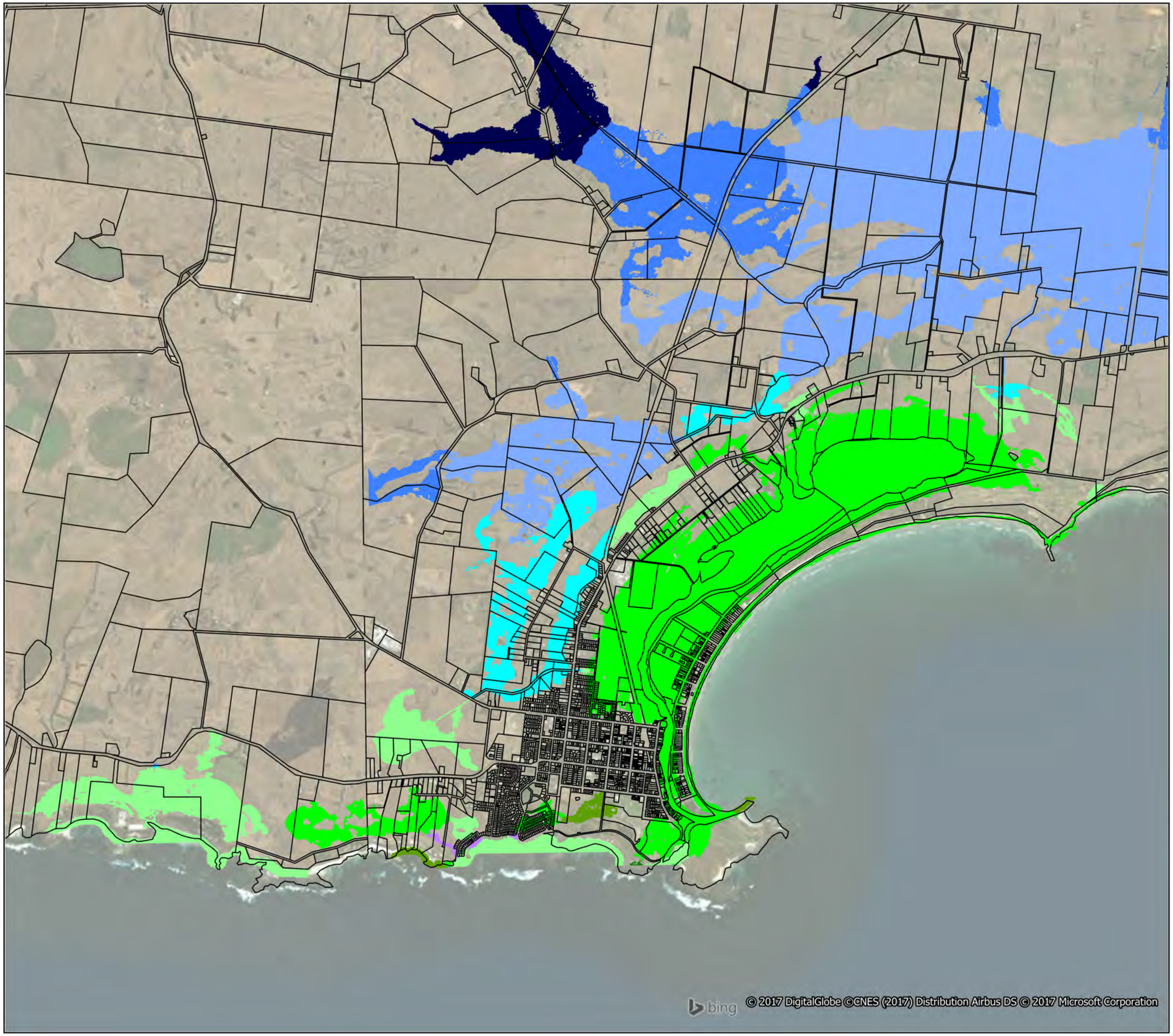
- 0 to 1
- 1 to 2
- 2 to 3
- 3 to 4
- 4 to 5
- 5 to 7.5
- 7.5 to 10
- 10 to 13.5
- Swash Zone

N
W E
S

0 2
kilometres
Scale 1:37,660

Cardno

Map Produced by Cardno Victoria
Date: 26/09/2017
Coordinate System: MGA 94 - Zone 54
Project: V161030W



Port Fairy Maximum Water Surface Elevation

2080
20 year river ARI
100 year ocean ARI + 0.8m SLR

Maximum Water Surface Elevation (mAHD)

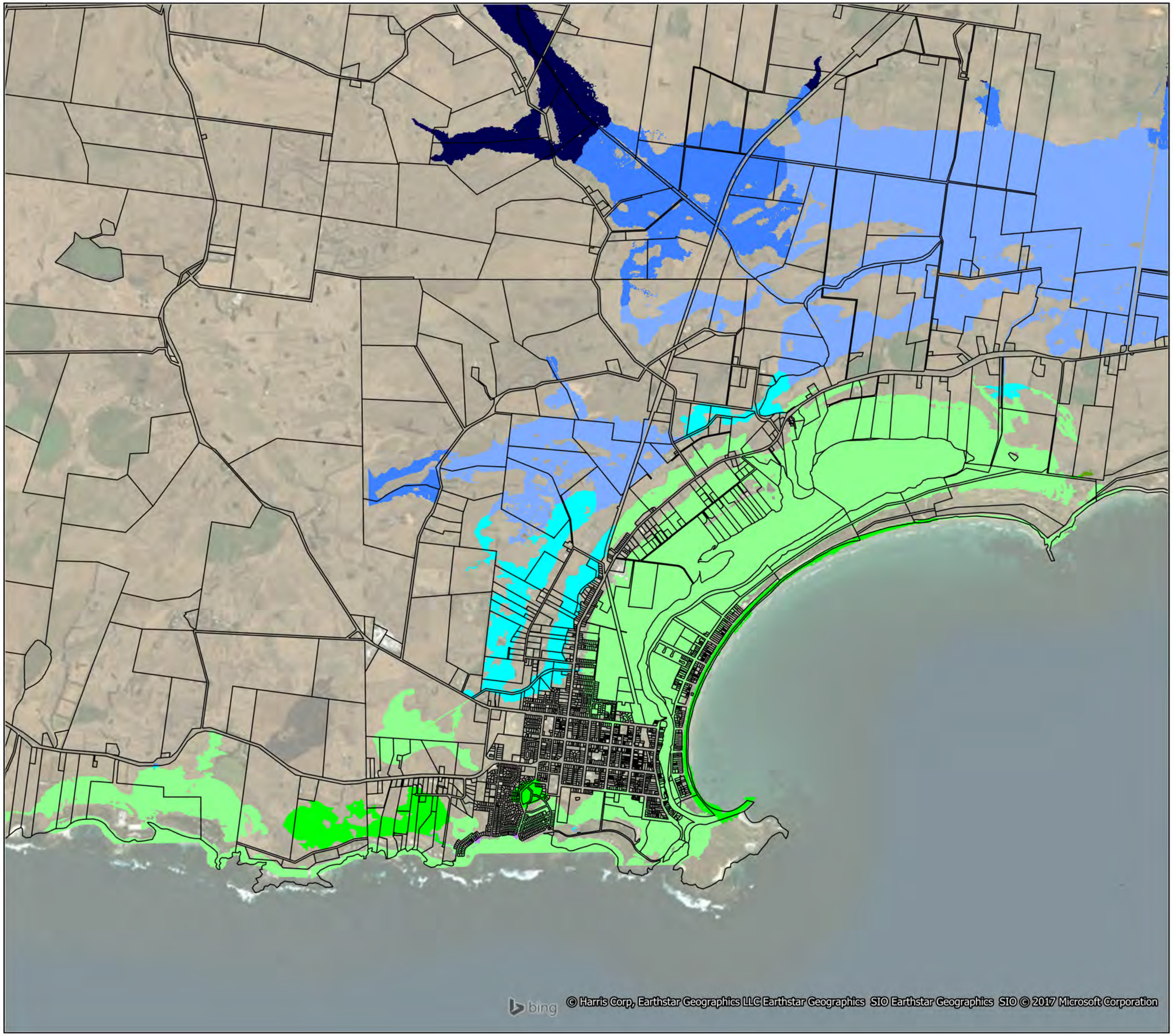
- 0 to 1
- 1 to 2
- 2 to 3
- 3 to 4
- 4 to 5
- 5 to 7.5
- 7.5 to 10
- 10 to 13.5
- Swash Zone

N
W E
S

0 2
kilometres
Scale 1:37,660

Cardno

Map Produced by Cardno Victoria
Date: 26/09/2017
Coordinate System: MGA 94 - Zone 54
Project: V161030W



Port Fairy Maximum Water Surface Elevation

2100
20 year river ARI
100 year ocean ARI + 1.2m SLR

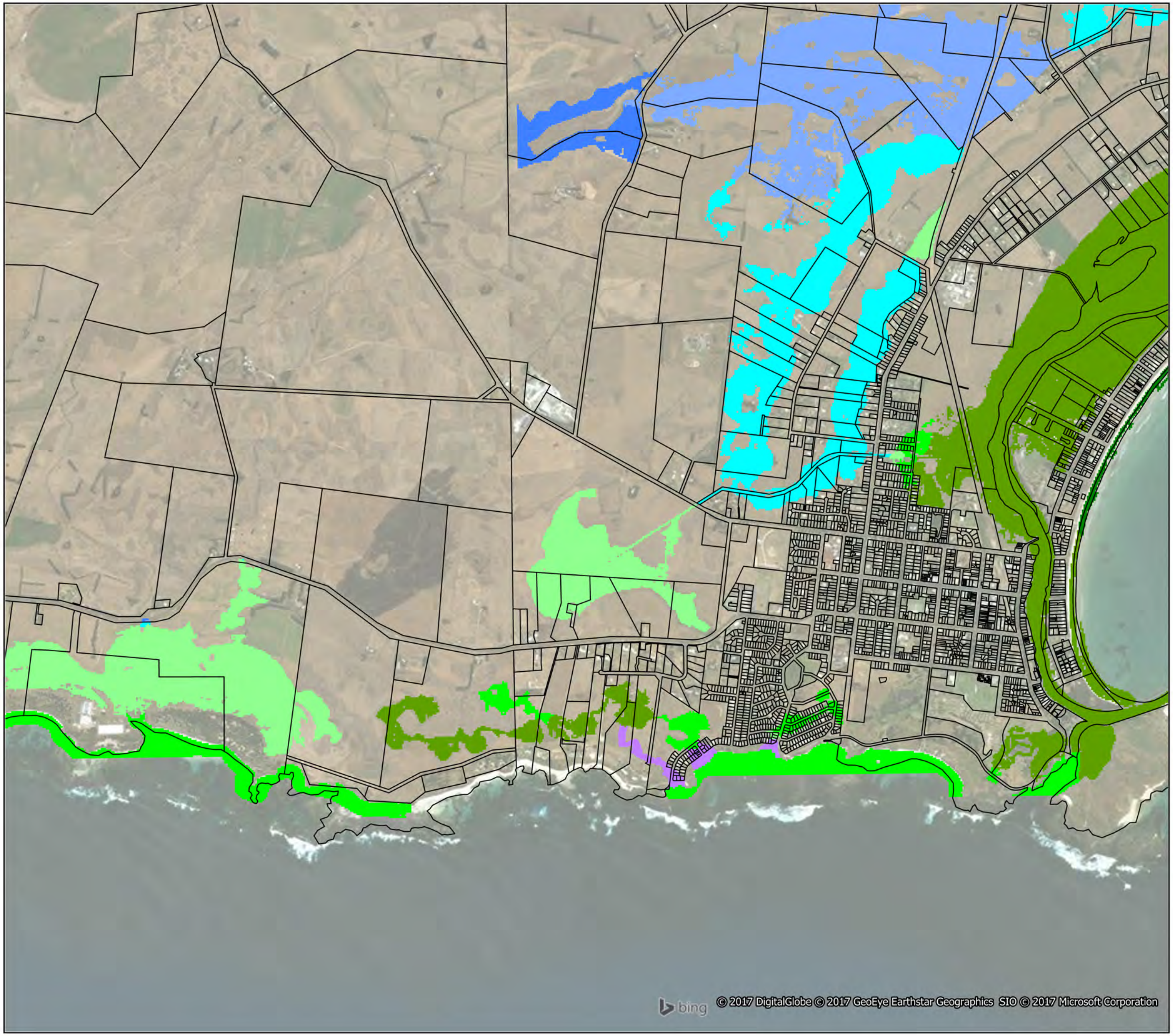
Maximum Water Surface Elevation (mAHD)

0	to 1
1	to 2
2	to 3
3	to 4
4	to 5
5	to 7.5
7.5	to 10
10	to 13.5
Swash Zone	

0 2
kilometers
Scale 1:37,660

Cardno

Map Produced by Cardno Victoria
Date: 26/09/2017
Coordinate System: MGA 94 - Zone 54
Project: V161030W



Port Fairy Township Maximum Water Surface Elevation

Present day
10 year river ARI
50 year ocean ARI

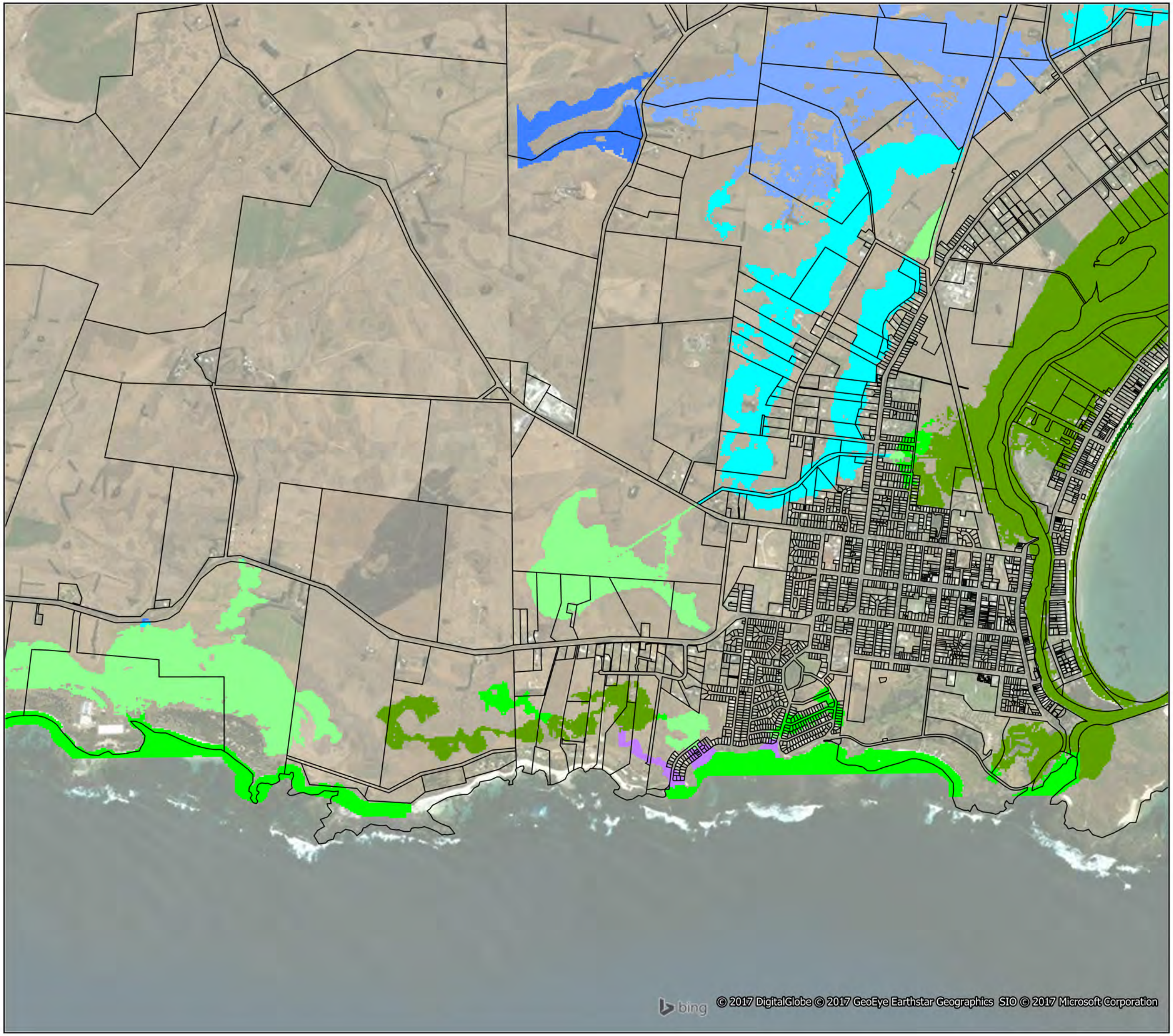
Maximum Water Surface Elevation (mAHD)

- 0 to 1
- 1 to 2
- 2 to 3
- 3 to 4
- 4 to 5
- 5 to 7.5
- 7.5 to 10
- 10 to 13.5
- Swash Zone

0 1
kilometers
Scale 1:21,530

Cardno

Map Produced by Cardno Victoria
Date: 26/09/2017
Coordinate System: MGA 94 - Zone 54
Project: V161030W



Port Fairy Township Maximum Water Surface Elevation

Present day
10 year river ARI
100 year ocean ARI

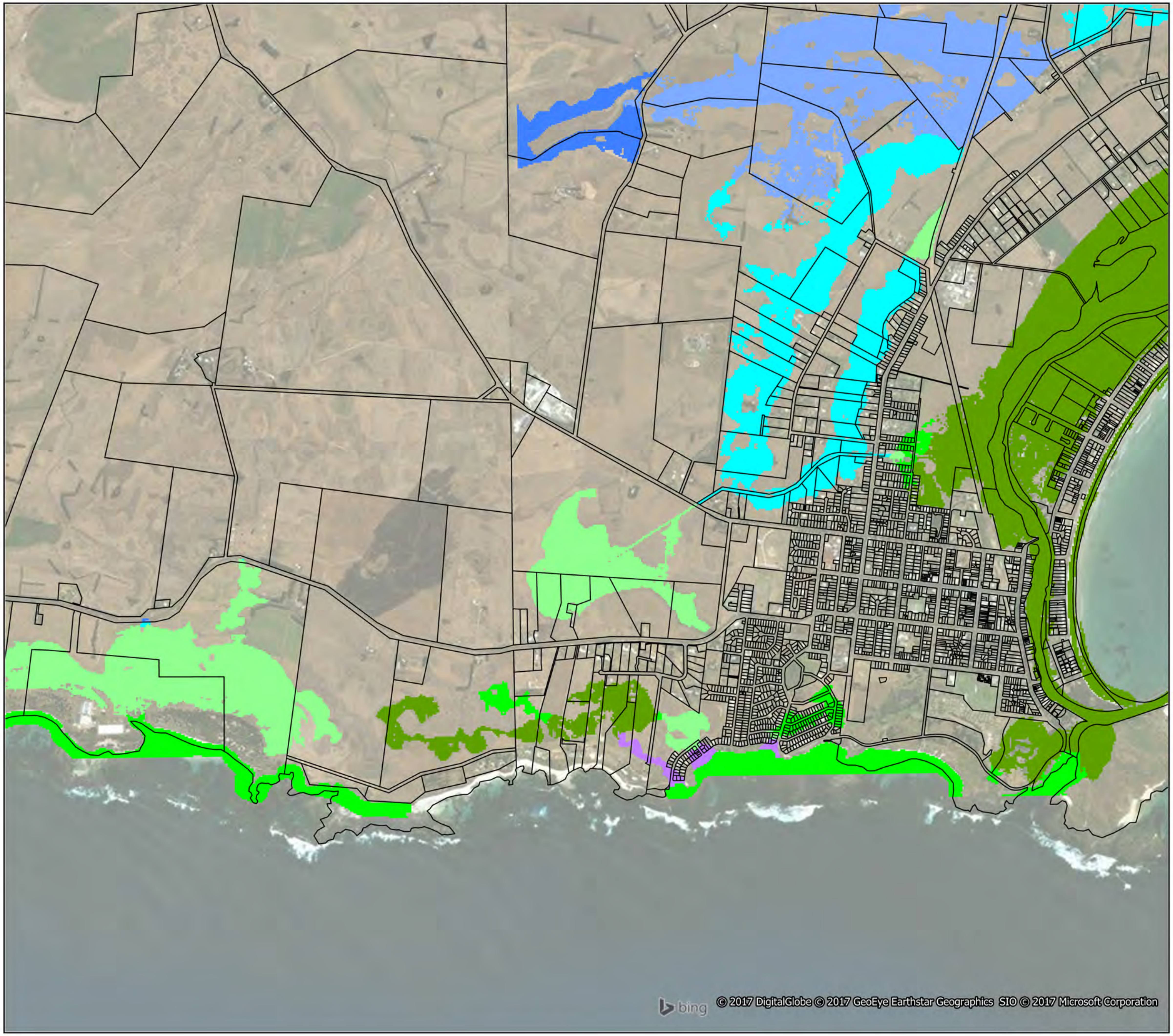
Maximum Water Surface Elevation (mAHD)

0 to 1	
1 to 2	
2 to 3	
3 to 4	
4 to 5	
5 to 7.5	
7.5 to 10	
10 to 13.5	
Swash Zone	

0 1
kilometers
Scale 1:21,530

Cardno

Map Produced by Cardno Victoria
Date: 26/09/2017
Coordinate System: MGA 94 - Zone 54
Project: V161030W



Port Fairy Township Maximum Water Surface Elevation

2030
10 year river ARI
100 year ocean ARI + 0.2m SLR

Maximum Water Surface Elevation (mAHD)

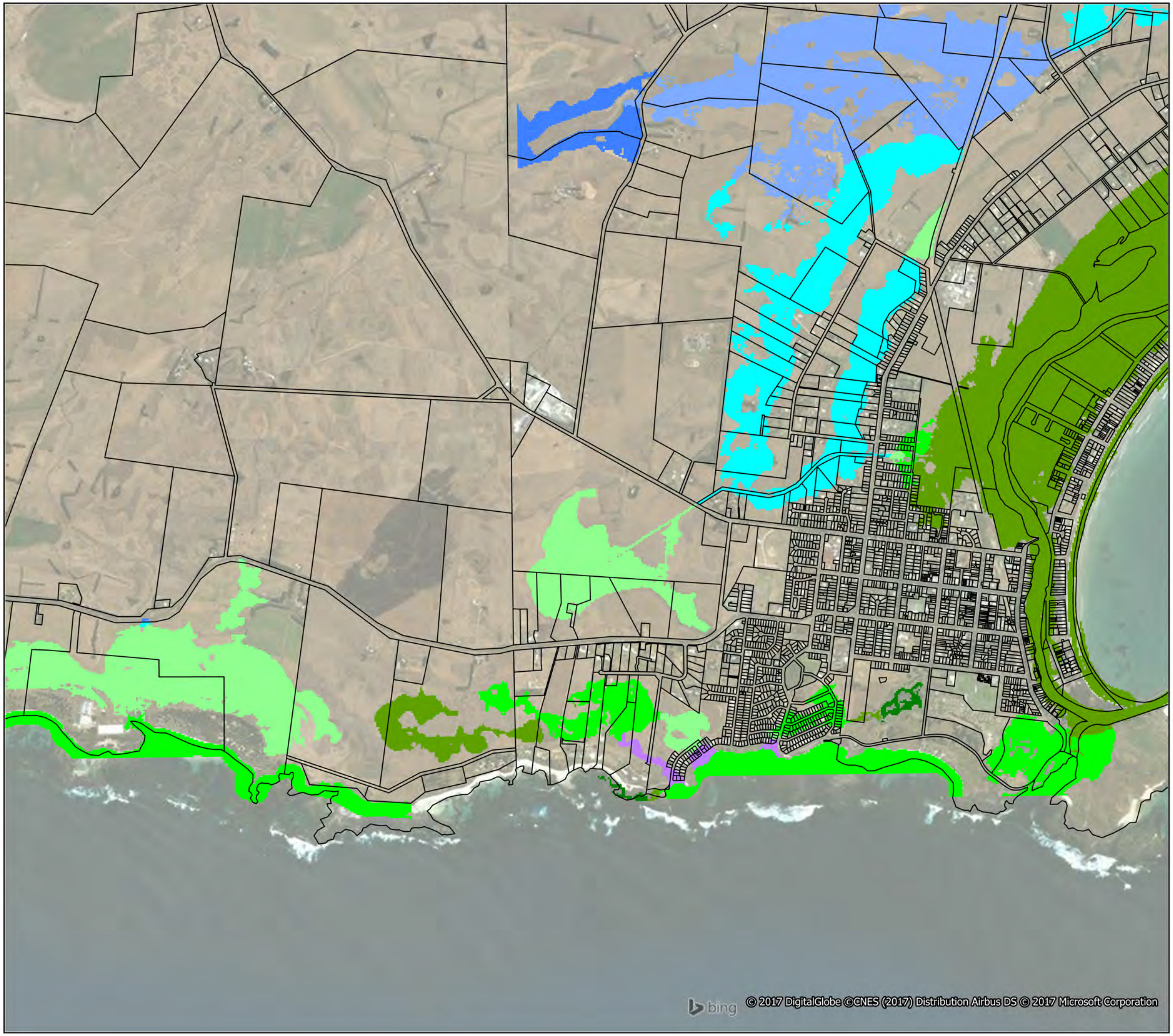
- 0 to 1
- 1 to 2
- 2 to 3
- 3 to 4
- 4 to 5
- 5 to 7.5
- 7.5 to 10
- 10 to 13.5
- Swash Zone

N
W E
S

0 1
kilometers
Scale 1:21,530

Cardno

Map Produced by Cardno Victoria
Date: 26/09/2017
Coordinate System: MGA 94 - Zone 54
Project: V161030W



Port Fairy Township Maximum Water Surface Elevation

2050
10 year river ARI
100 year ocean ARI + 0.4m SLR

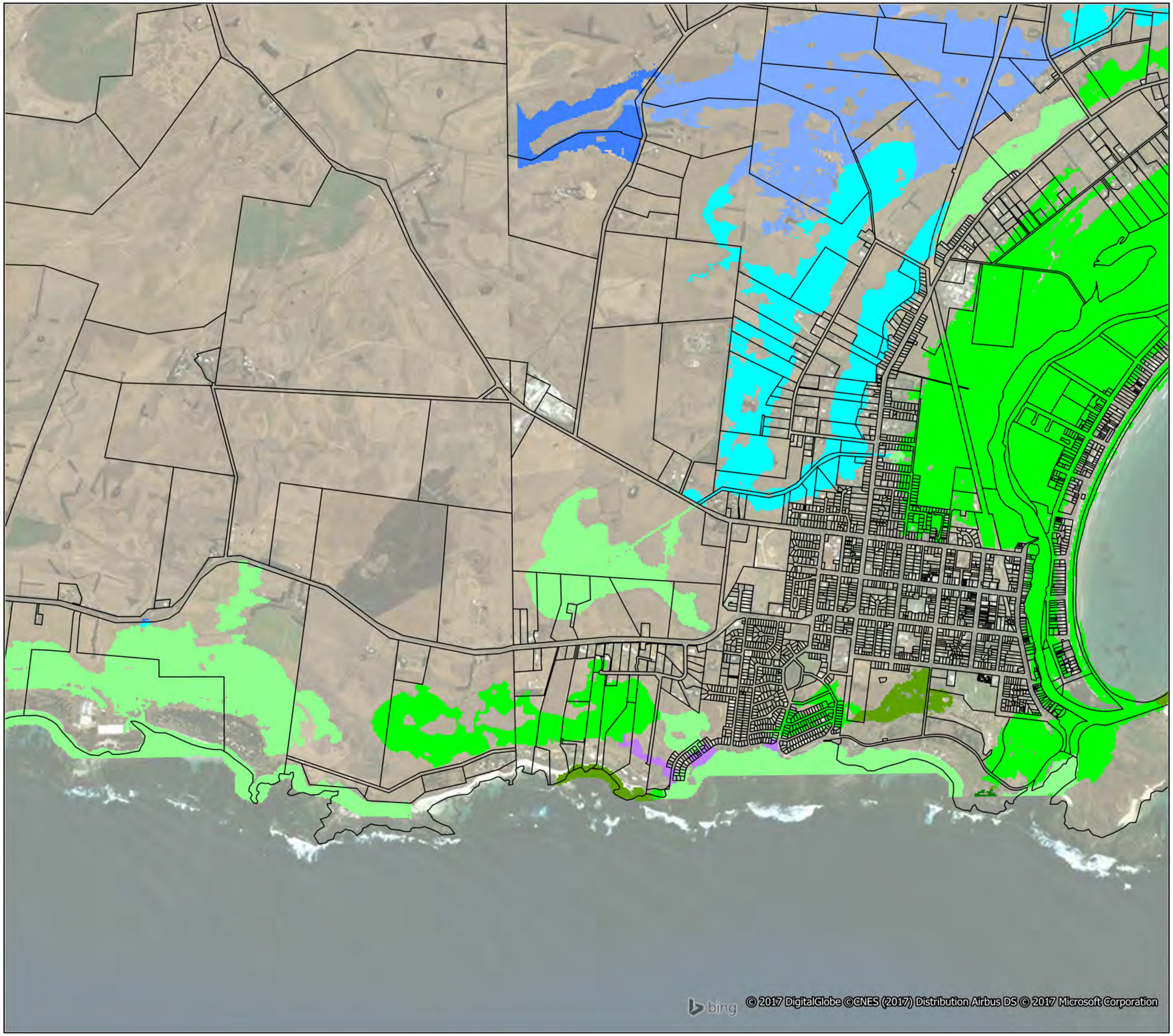
Maximum Water Surface Elevation (mAHD)

- 0 to 1
- 1 to 2
- 2 to 3
- 3 to 4
- 4 to 5
- 5 to 7.5
- 7.5 to 10
- 10 to 13.5
- Swash Zone

0 — 1 kilometres
Scale 1:21,530

Cardno

Map Produced by Cardno Victoria
Date: 26/09/2017
Coordinate System: MGA 94 - Zone 54
Project: V161030W



Port Fairy Township Maximum Water Surface Elevation

2080
20 year river ARI
100 year ocean ARI + 0.8m SLR

Maximum Water Surface Elevation (mAHD)

- 0 to 1
- 1 to 2
- 2 to 3
- 3 to 4
- 4 to 5
- 5 to 7.5
- 7.5 to 10
- 10 to 13.5
- Swash Zone

0 — 1 kilometres
Scale 1:21,530

Cardno

Map Produced by Cardno Victoria
Date: 26/09/2017
Coordinate System: MGA 94 - Zone 54
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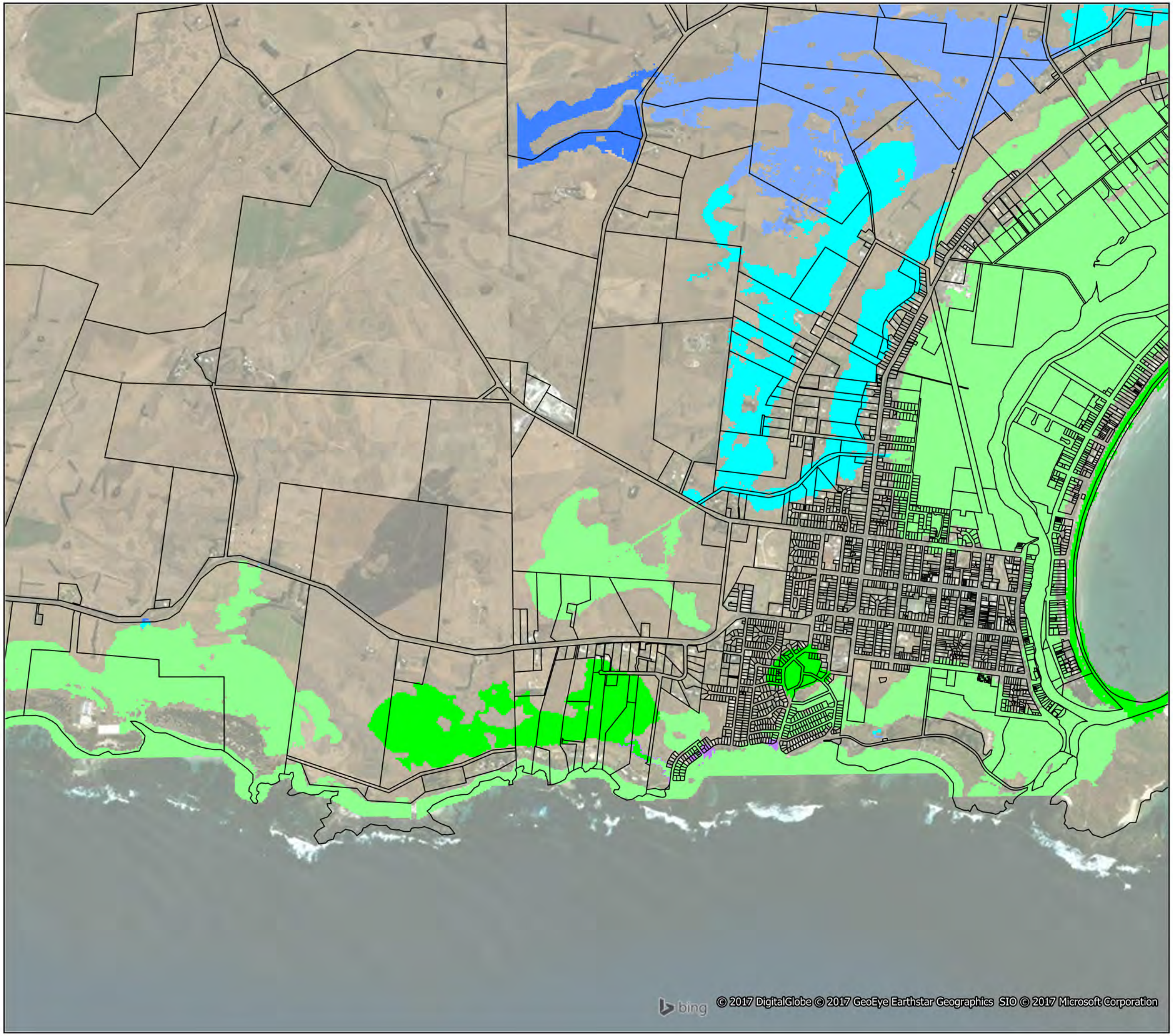


Port Fairy Township Maximum Water Surface Elevation

2100
20 year river ARI
100 year ocean ARI + 1.2m SLR

Maximum Water Surface Elevation (mAHD)

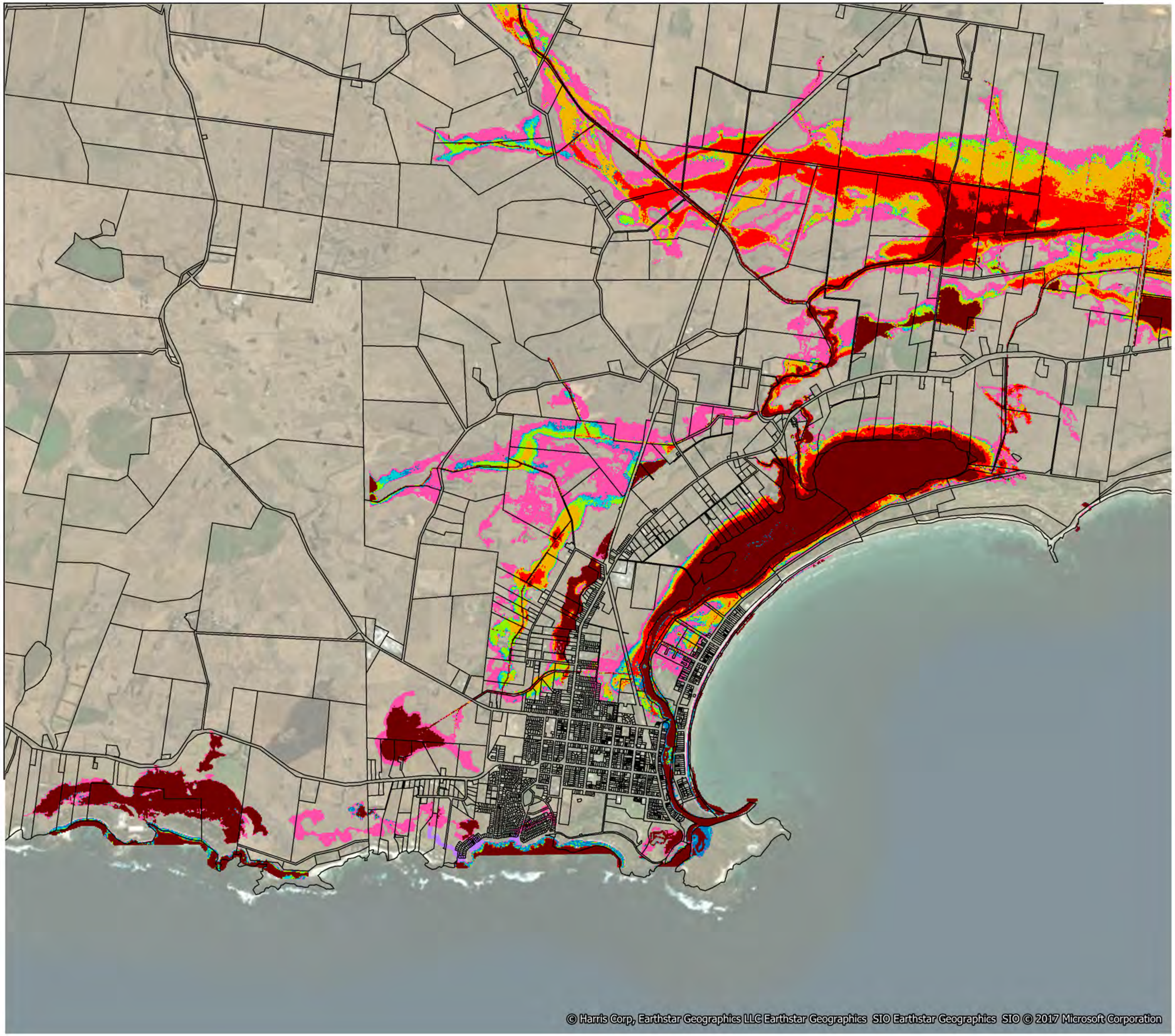
0 to 1	
1 to 2	
2 to 3	
3 to 4	
4 to 5	
5 to 7.5	
7.5 to 10	
10 to 13.5	
Swash Zone	

0 — 1 kilometers

Scale 1:21,530

Cardno

Map Produced by Cardno Victoria
Date: 26/09/2017
Coordinate System: MGA 94 - Zone 54
Project: V161030W



Port Fairy Time of Inundation Above 0.3m

Present day
10 year river ARI
50 year ocean ARI

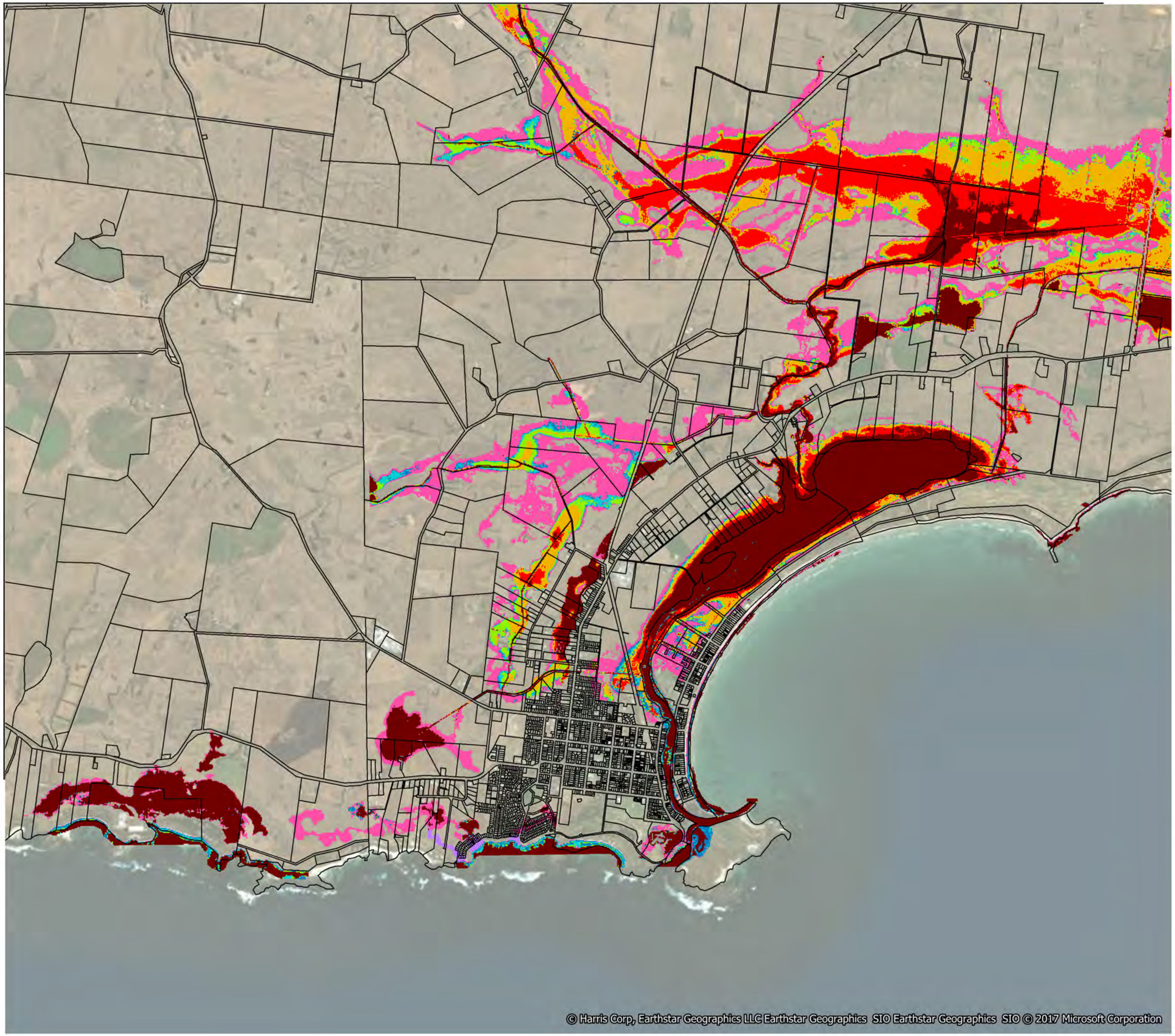
Time of inundation (hours)

- Less than 6
- 6 to 12
- 12 to 24
- 24 to 48
- Greater than 48
- Remains Inundated
- Total Flood Extent
- Swash Zone

0 — 2
kilometers
Scale 1:37,660

Cardno

Map Produced by Cardno Victoria
Date: 26/09/2017
Coordinate System: MGA 94 - Zone 54
Project: V161030W



Port Fairy Time of Inundation Above 0.3m

Present Day
10 year river ARI
100 year ocean ARI

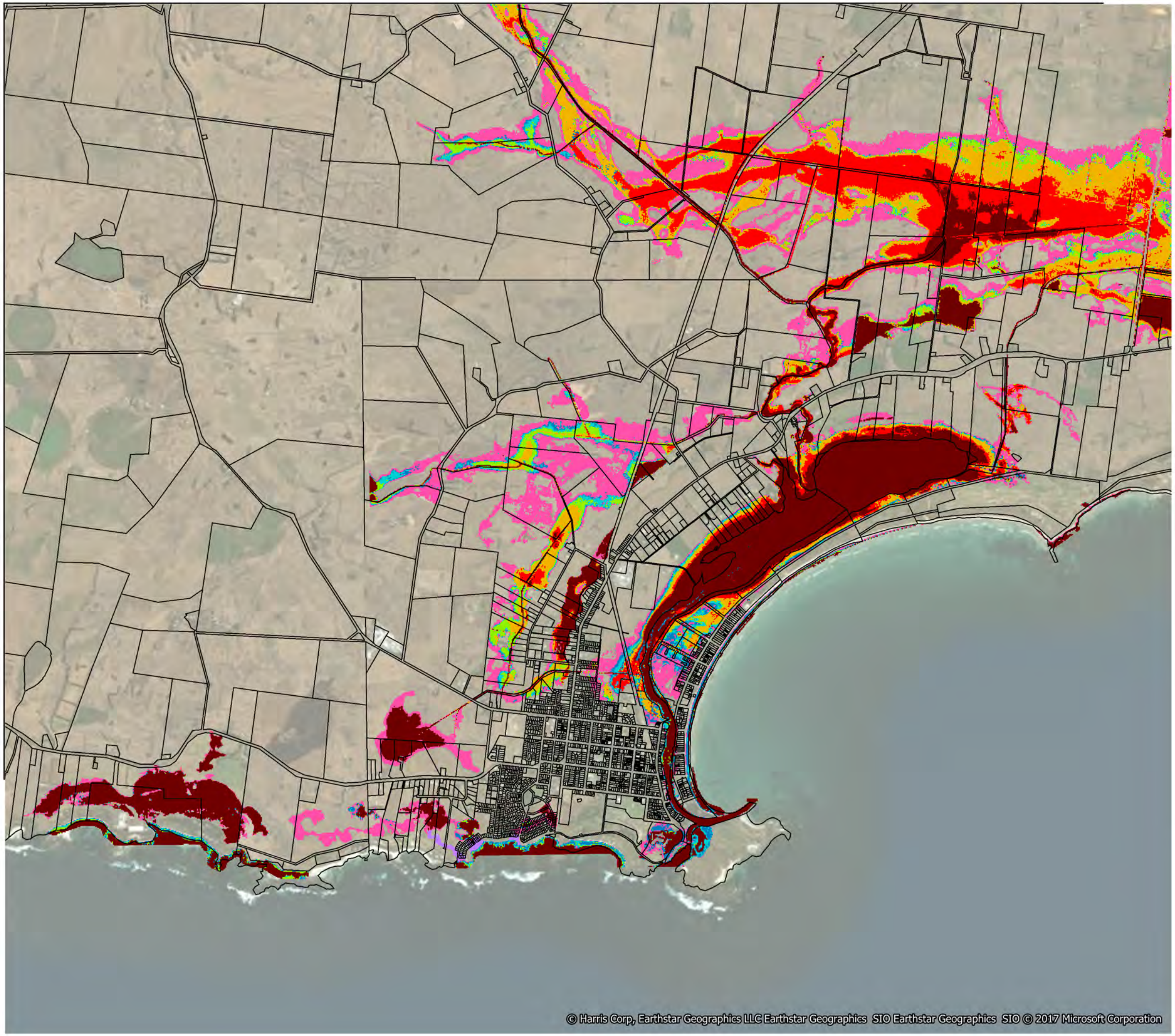
Time of Inundation (hours)

- Less than 6
- 6 to 12
- 12 to 24
- 24 to 48
- Greater than 48
- Remains Inundated
- Total Flood Extent
- Swash Zone

0 2
kilometers
Scale 1:37,660

Cardno

Map Produced by Cardno Victoria
Date: 26/09/2017
Coordinate System: MGA 94 - Zone 54
Project: V161030W



Port Fairy Time of Inundation Above 0.3m

2030
10 year river ARI
100 year ocean ARI + 0.2m SLR

Time of Inundation (hours)

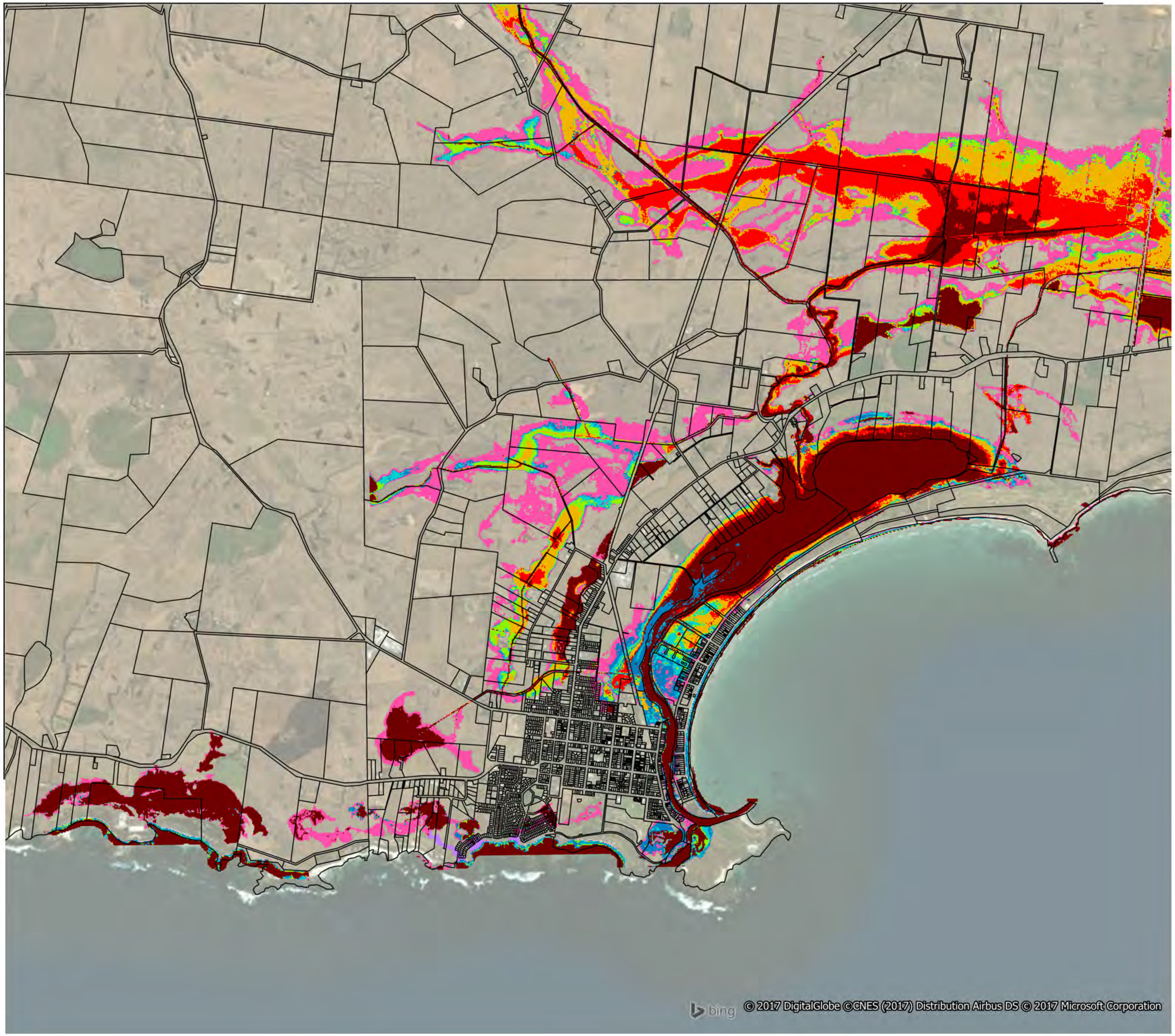
- Less than 6
- 6 to 12
- 12 to 24
- 24 to 48
- Greater the 48
- Remains Inundated
- Total Flood Extent
- Swash Zone

N
W E
S

0 2
kilometers
Scale 1:37,660

Cardno

Map Produced by Cardno Victoria
Date: 26/09/2017
Coordinate System: MGA 94 - Zone 54
Project: V161030W



Port Fairy Time of Inundation Above 0.3m

2050
10 year river ARI
100 year ocean ARI + 0.4m SLR

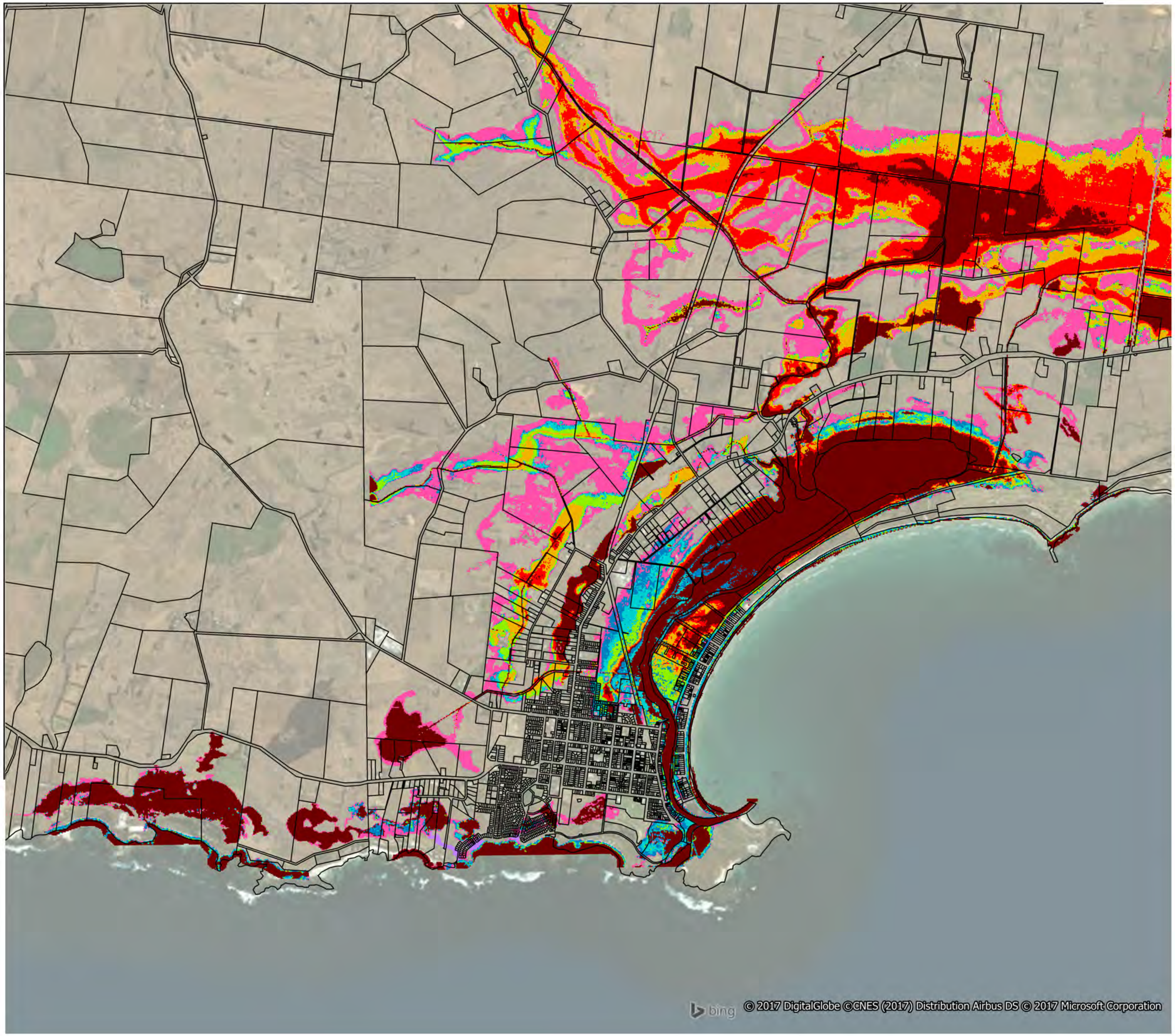
Time of Inundation (hours)

- Less than 6
- 6 to 12
- 12 to 24
- 24 to 48
- Greater than 48
- Remains Inundated
- Total Flood Extent
- Swash Zone

0 2
kilometres
Scale 1:37,660

Cardno

Map Produced by Cardno Victoria
Date: 26/09/2017
Coordinate System: MGA 94 - Zone 54
Project: V161030W



Port Fairy Time of Inundation Above 0.3m

2080
20 year river ARI
100 year ocean ARI + 0.8m SLR

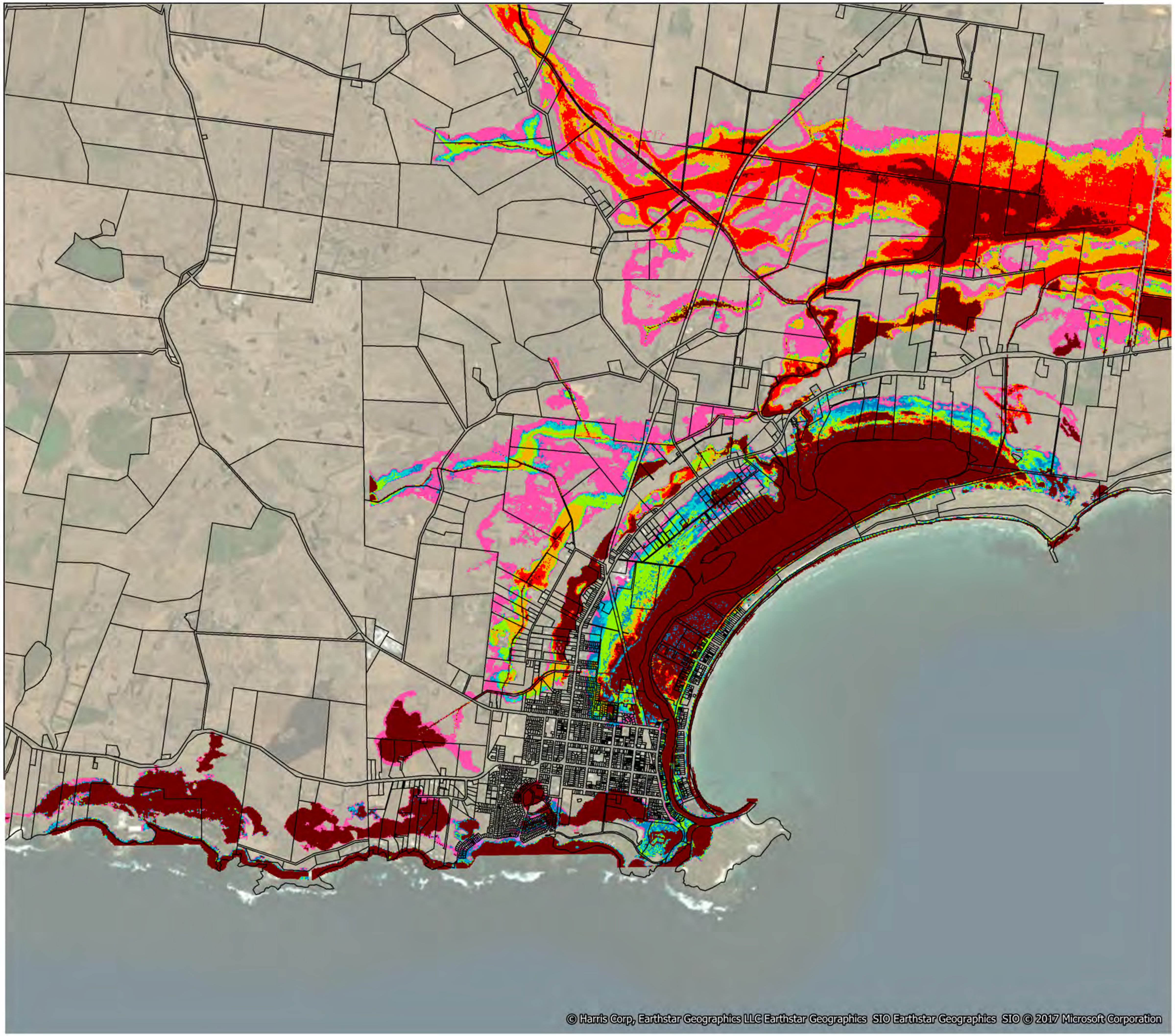
Time of Inundation (hours)

- Less than 6
- 6 to 12
- 12 to 24
- 24 to 48
- Greater than 48
- Remains Inundated
- Total Flood Extent
- Swash Zone

0 2
kilometres
Scale 1:37,660

Cardno

Map Produced by Cardno Victoria
Date: 26/09/2017
Coordinate System: MGA 94 - Zone 54
Project: V161030W



Port Fairy Time of Inundation Above 0.3m

2100
20 year river ARI
100 year ocean ARI + 1.2m SLR

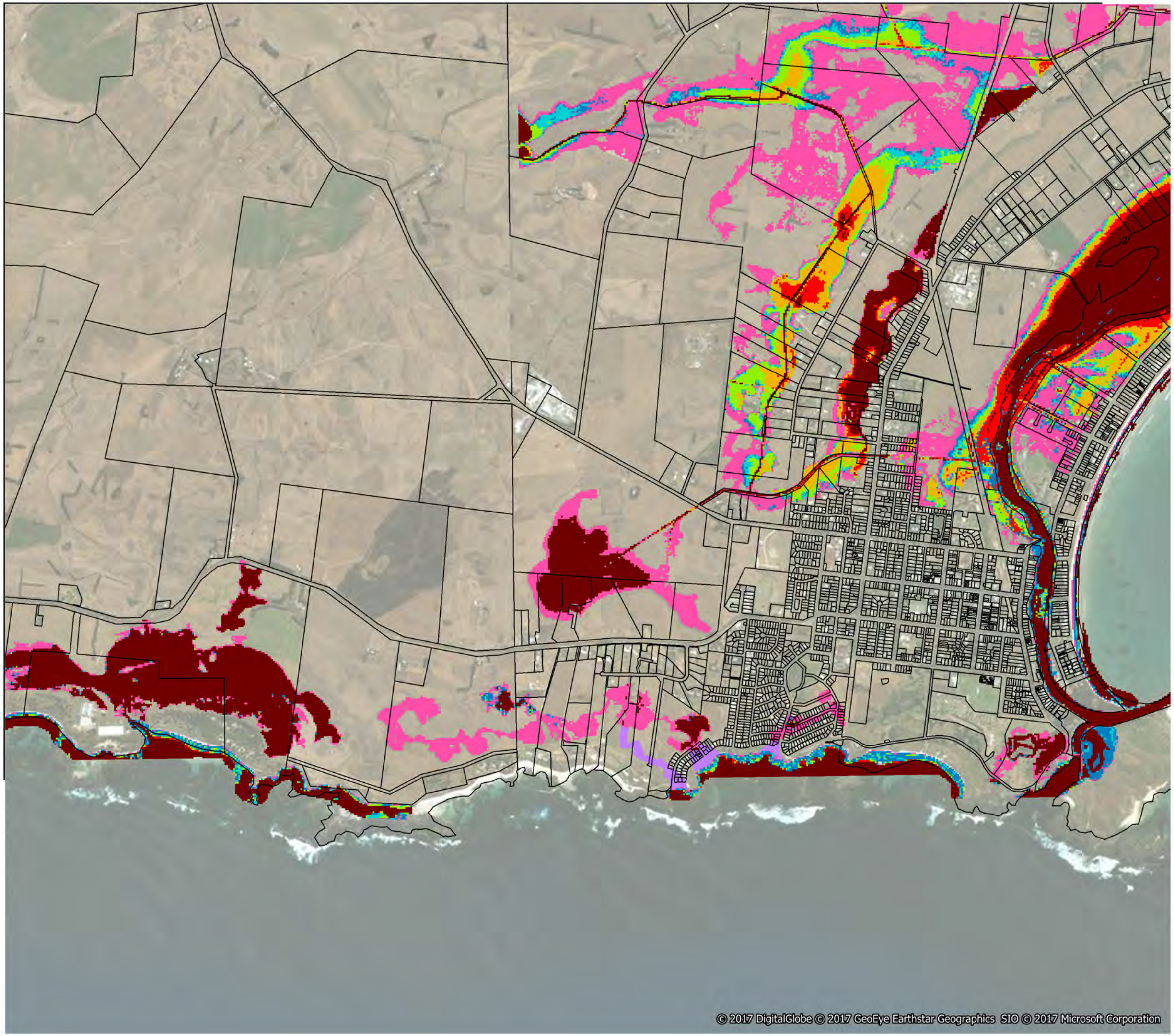
Time of Inundation (hours)

- Less than 6
- 6 to 12
- 12 to 24
- 24 to 48
- Greater than 48
- Remains Inundated
- Total Flood Extent
- Swash Zone

0 2
kilometers
Scale 1:37,660

Cardno

Map Produced by Cardno Victoria
Date: 26/09/2017
Coordinate System: MGA 94 - Zone 54
Project: V161030W



Port Fairy Township Time of Inundation Above 0.3m

Present day
10 year river ARI
50 year ocean ARI

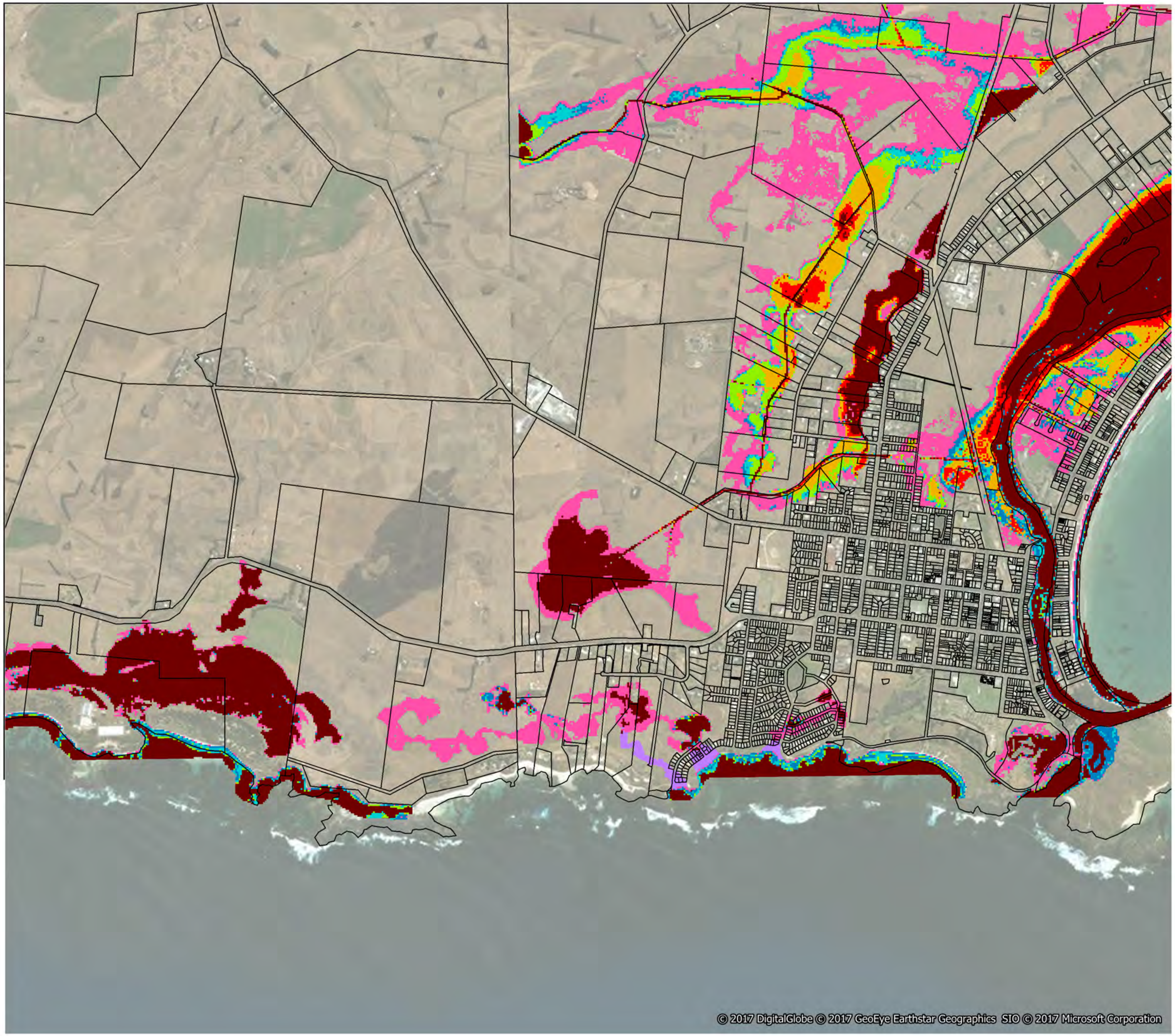
Time of Inundation (hours)

- Less than 6
- 6 to 12
- 12 to 24
- 24 to 48
- Greater than 48
- Remains Inundated
- Total Flood Extent
- Swash Zone

0 1
kilometers
Scale 1:21,530

Cardno

Map Produced by Cardno Victoria
Date: 26/09/2017
Coordinate System: MGA 94 - Zone 54
Project: V161030W



Port Fairy Township Time of Inundation Above 0.3m

Present Day
10 year river ARI
100 year ocean ARI

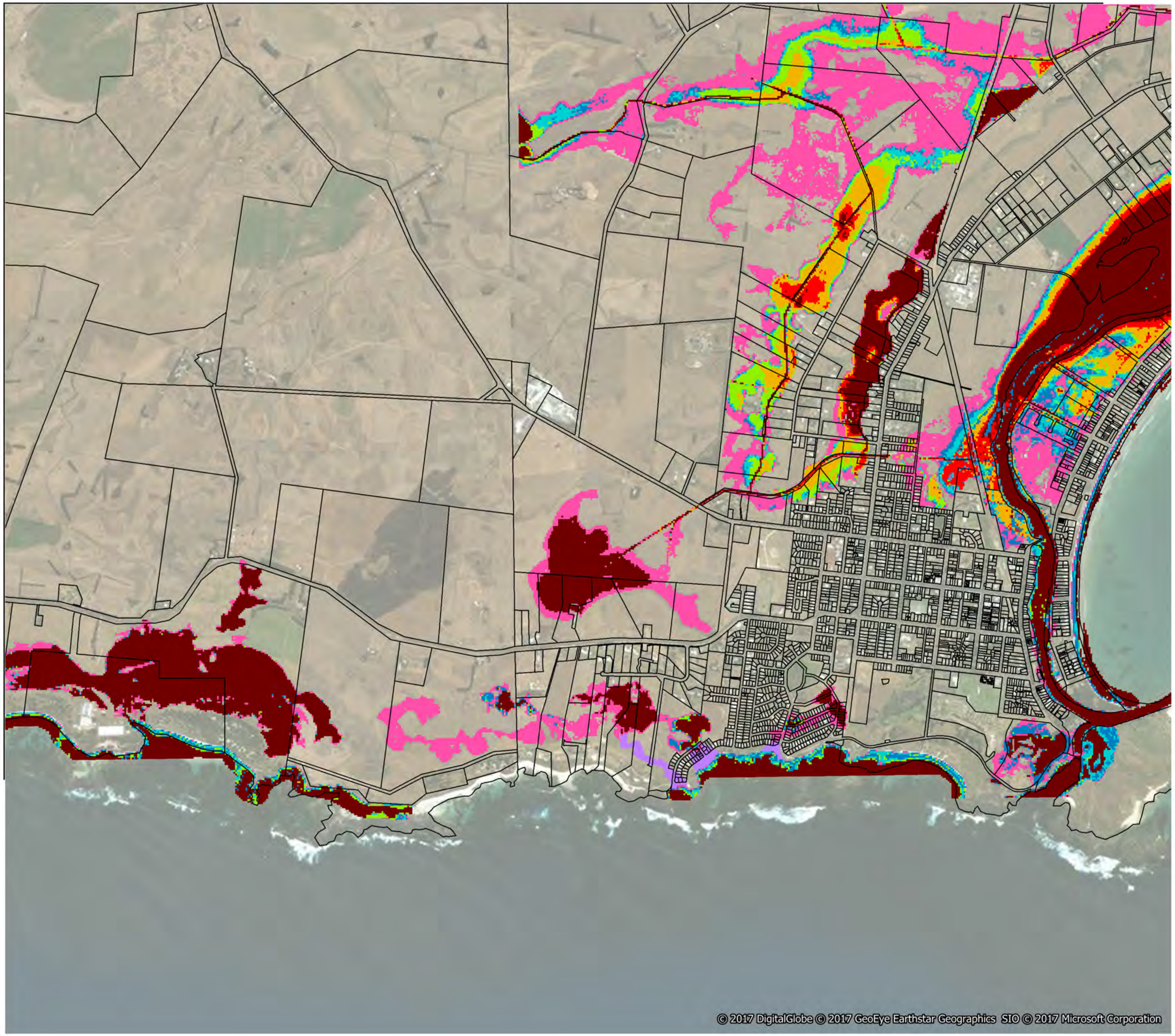
Time of Inundation (hours)

- Less than 6
- 6 to 12
- 12 to 24
- 24 to 48
- Greater than 48
- Remains Inundated
- Total Flood Extent
- Swash Zone

0 1
kilometers
Scale 1:21,530

Cardno

Map Produced by Cardno Victoria
Date: 26/09/2017
Coordinate System: MGA 94 - Zone 54
Project: V161030W



Port Fairy Township Time of Inundation Above 0.3m

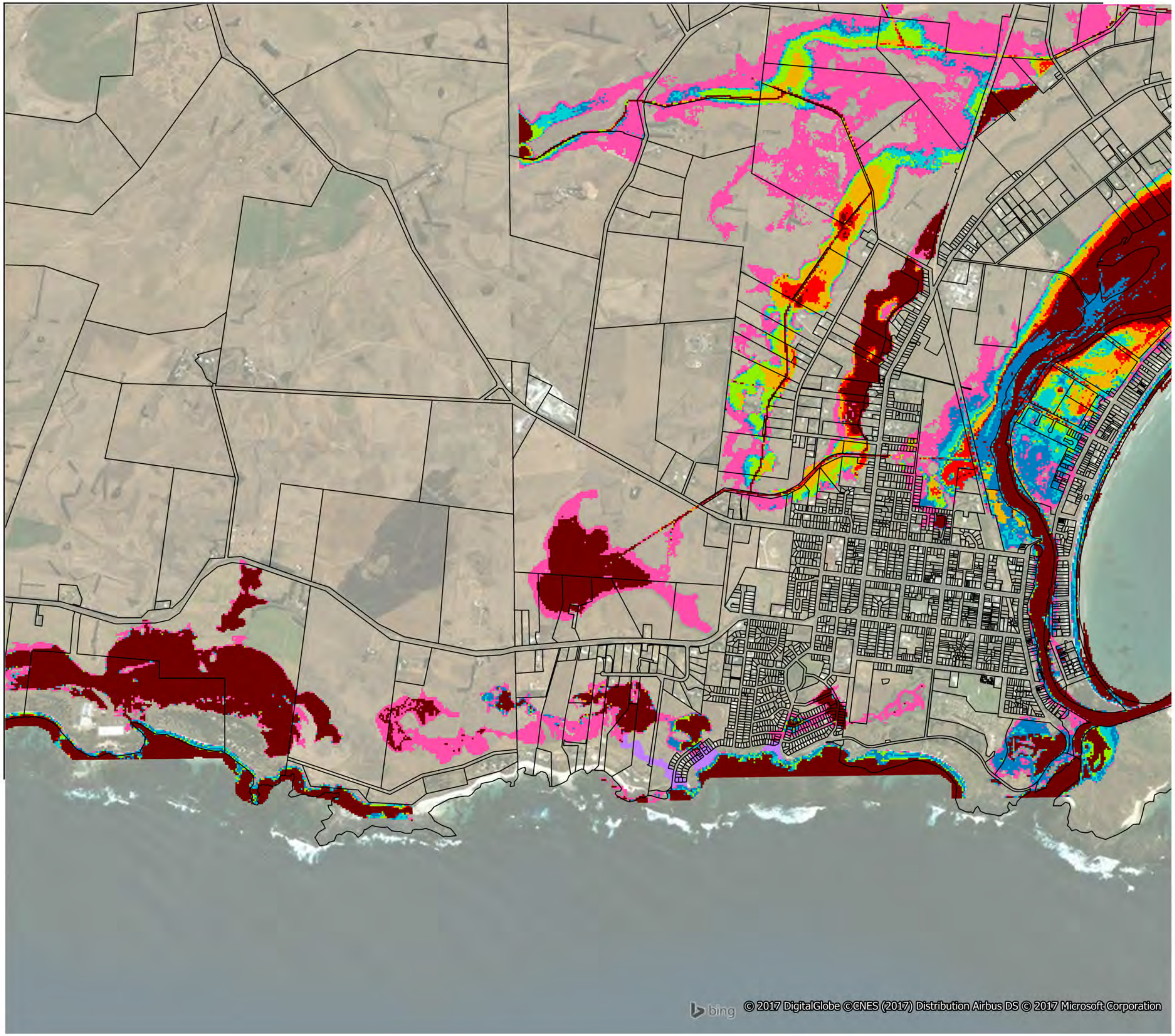
2030
10 year river ARI
100 year ocean ARI + 0.2m SLR

Time of Inundation (hours)
- Less than 6
- 6 to 12
- 12 to 24
- 24 to 48
- Greater than 48
- Remains Inundated
- Total Flood Extent
- Swash Zone

0 1
kilometers

Cardno

Map Produced by Cardno Victoria
Date: 26/09/2017
Coordinate System: MGA 94 - Zone 54
Project: V161030W



Port Fairy Township Time of Inundation Above 0.3m

2050
10 year river ARI
100 year ocean ARI + 0.4m SLR

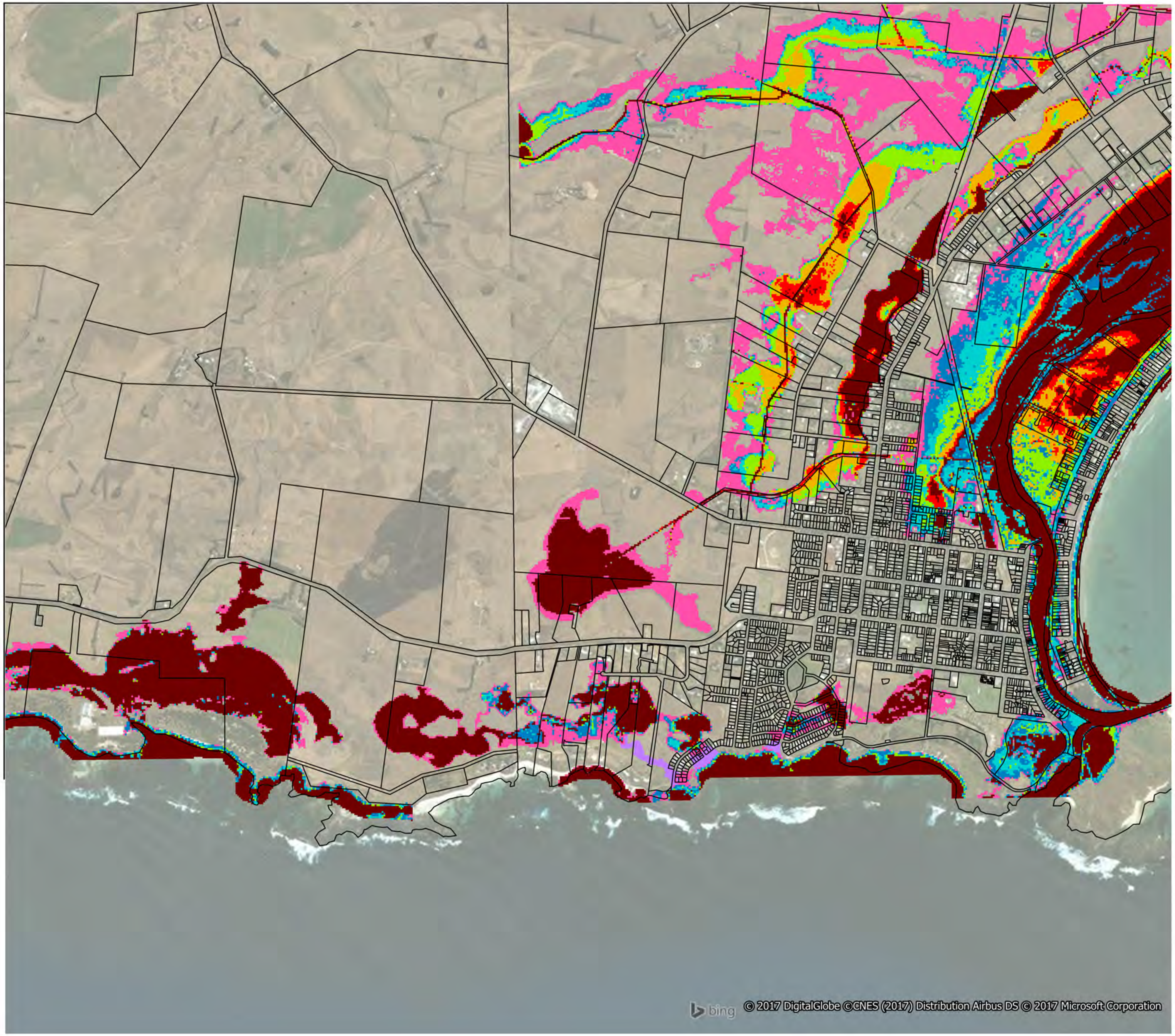
Time of Inundation (hours)

- Less than 6
- 6 to 12
- 12 to 24
- 24 to 48
- Greater than 48
- Remains Inundated
- Total Flood Extent
- Swash Zone

0 1
kilometres
Scale 1:21,530

Cardno

Map Produced by Cardno Victoria
Date: 26/09/2017
Coordinate System: MGA 94 - Zone 54
Project: V161030W



Port Fairy Township Time of Inundation Above 0.3m

2080
20 year river ARI
100 year ocean ARI + 0.8m SLR

Time of Inundation (hours)

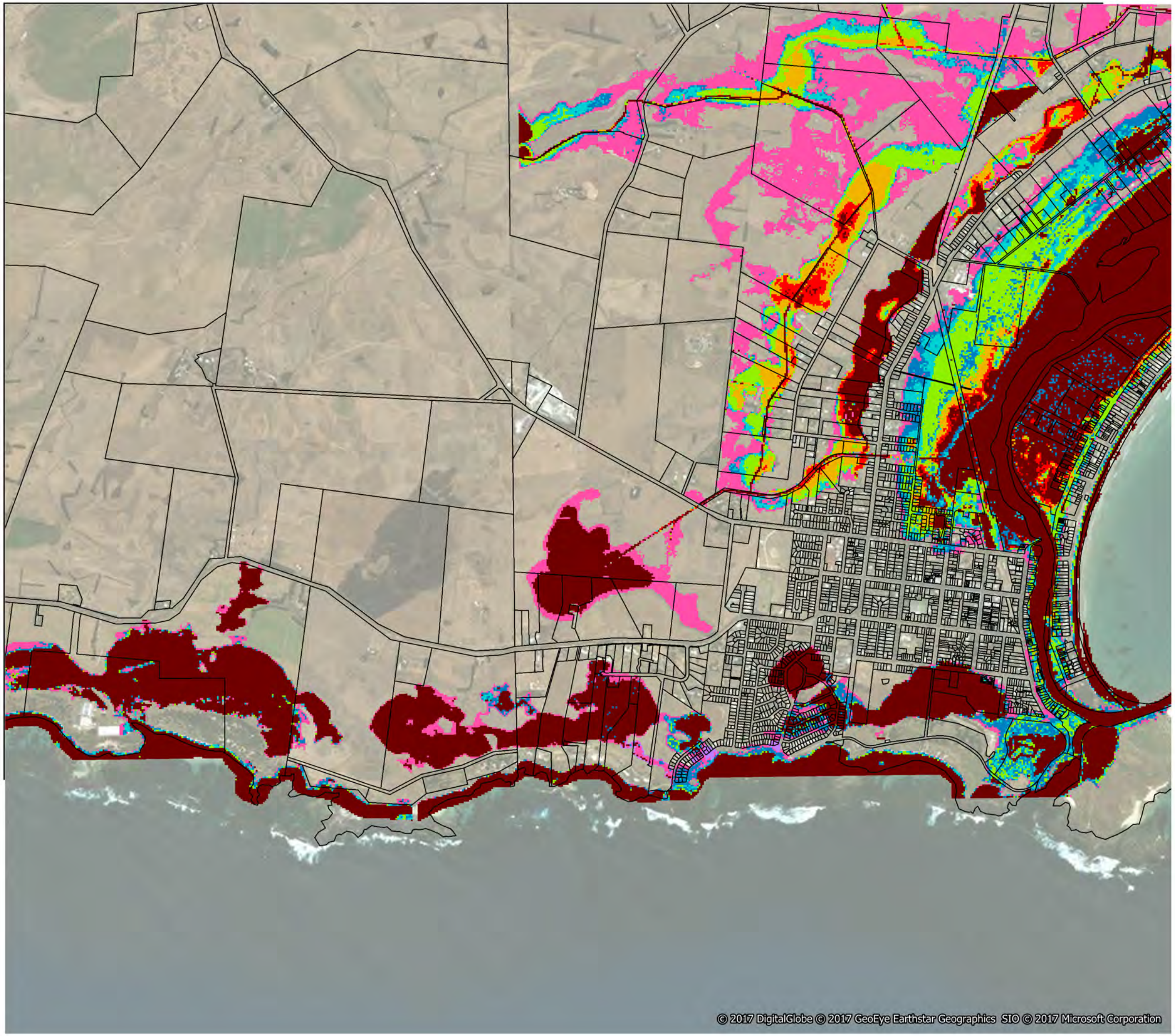
- Less than 6
- 6 to 12
- 12 to 24
- 24 to 48
- Greater than 48
- Remains Inundated
- Total Flood Extent
- Swash Zone

N
W E
S

0 1
kilometres
Scale 1:21,530

Cardno

Map Produced by Cardno Victoria
Date: 26/09/2017
Coordinate System: MGA 94 - Zone 54
Project: V161030W



Port Fairy Township Time of Inundation Above 0.3m

2100
20 year river ARI
100 year ocean ARI + 1.2m SLR

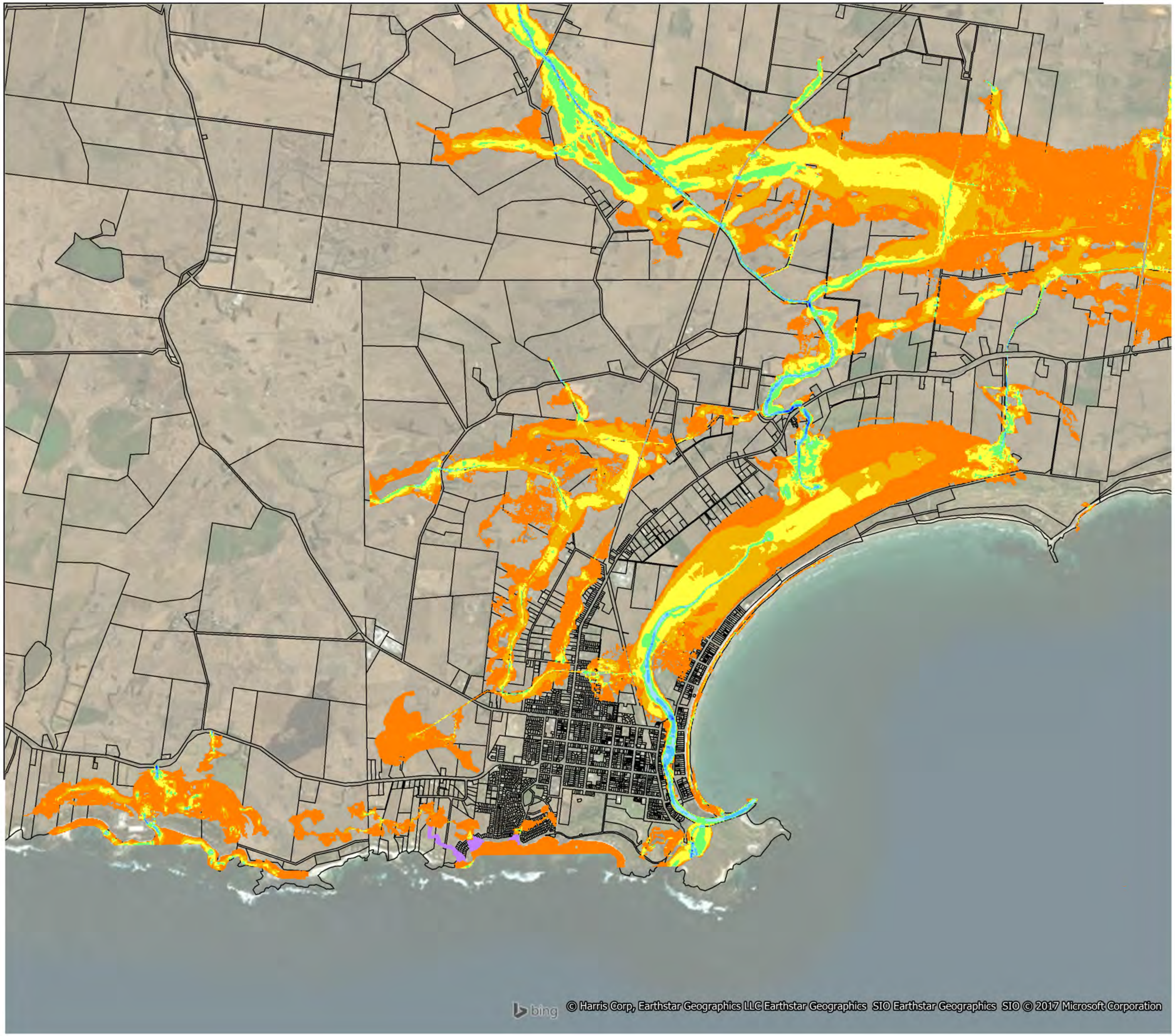
Time of Inundation (hours)

- Less than 6
- 6 to 12
- 12 to 24
- 24 to 48
- Greater than 48
- Remains Inundated
- Total Flood Extent
- Swash Zone

0 1
kilometers
Scale 1:21,530

Cardno

Map Produced by Cardno Victoria
Date: 26/09/2017
Coordinate System: MGA 94 - Zone 54
Project: V161030W



Port Fairy Maximum Velocity

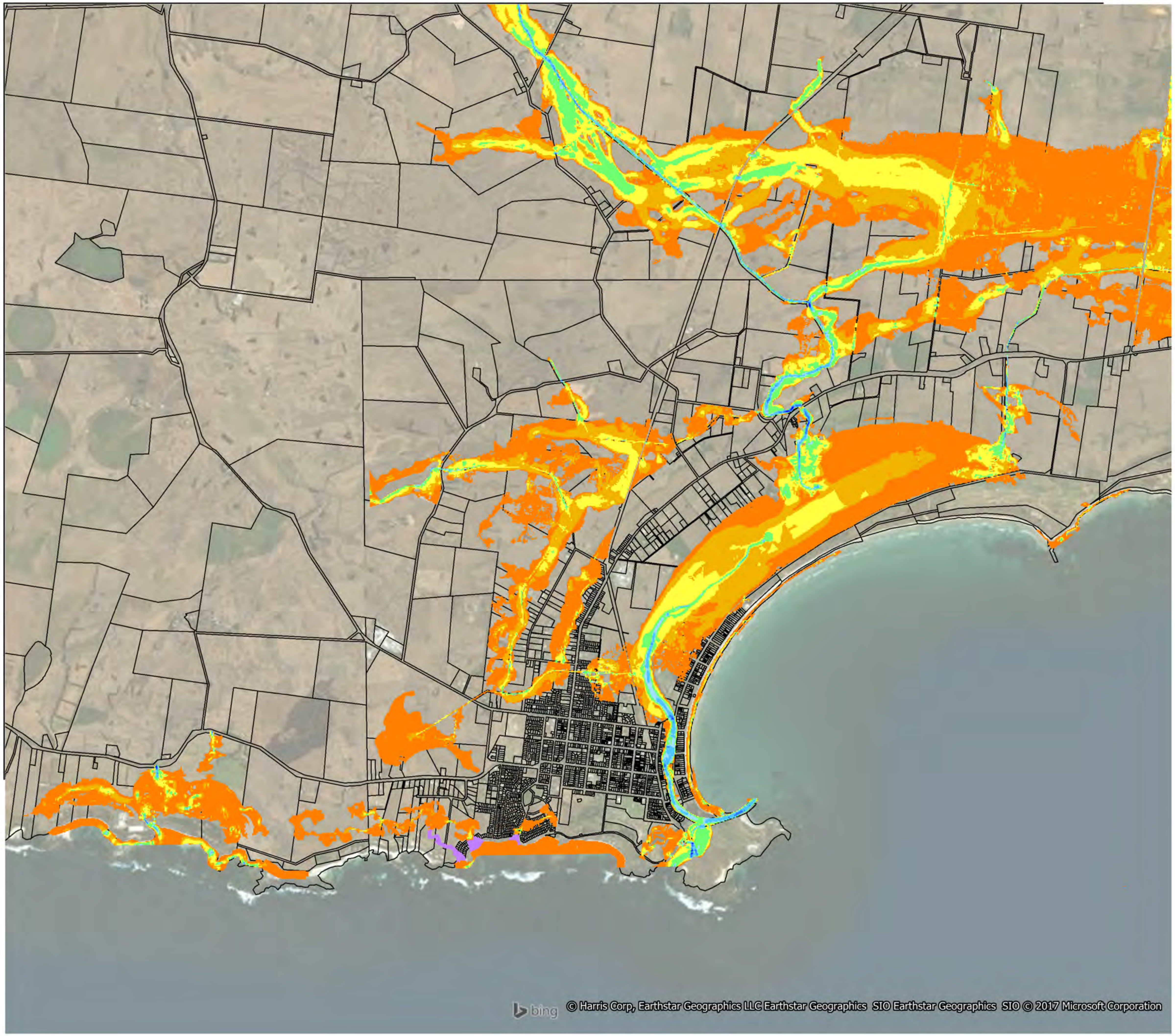
Present day
10 year river ARI
50 year ocean ARI

Velocity (m/s)

- Greater than 2
- 1.5 to 2
- 1 to 1.5
- 0.8 to 1
- 0.4 to 0.8
- 0.2 to 0.4
- 0.1 to 0.2
- Less than 0.1
- Swash Zone

0 2
kilometers
Scale 1:37,660

Map Produced by Cardno Victoria
Date: 26/09/2017
Coordinate System: MGA 94 - Zone 54
Project: V161030W



Port Fairy Maximum Velocity

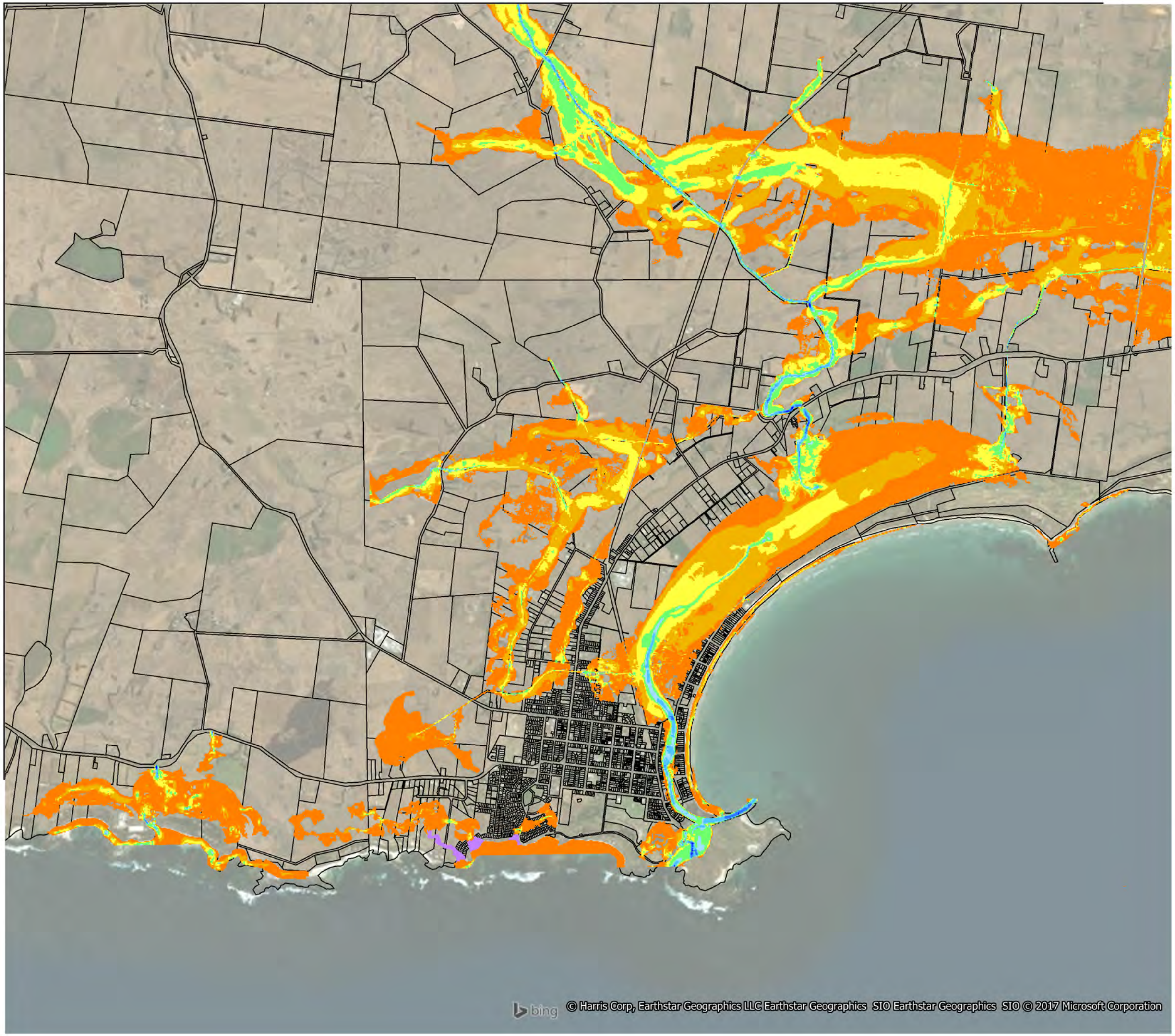
Present day
10 year river ARI
100 year ocean ARI

Velocity (m/s)

- Greater than 2
- 1.5 to 2
- 1 to 1.5
- 0.8 to 1
- 0.4 to 0.8
- 0.2 to 0.4
- 0.1 to 0.2
- Less than 0.1
- Swash Zone

0 2
kilometers
Scale 1:37,660

Map Produced by Cardno Victoria
Date: 26/09/2017
Coordinate System: MGA 94 - Zone 54
Project: V161030W



Port Fairy Maximum Velocity

2030
10 year river ARI
100 year ocean ARI + 0.2m SLR

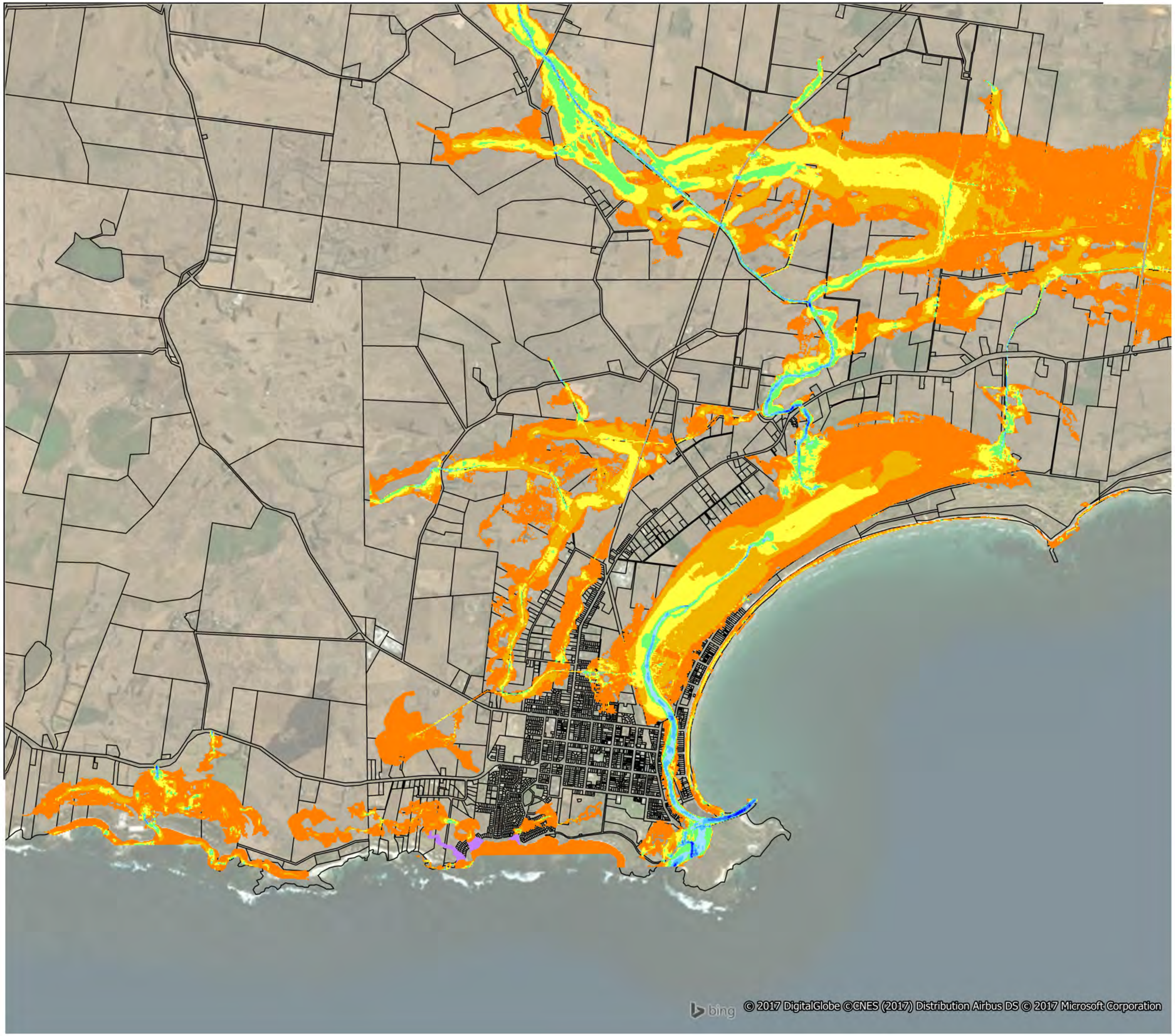
Velocity (m/s)

- Greater than 2
- 1.5 to 2
- 1 to 1.5
- 0.8 to 1
- Swash Zone
- 0.4 to 0.8
- 0.2 to 0.4
- 0.1 to 0.2
- Less than 0.1

0 2
kilometers

Cardno

Map Produced by Cardno Victoria
Date: 26/09/2017
Coordinate System: MGA 94 - Zone 54
Project: V161030W



Port Fairy Maximum Velocity

2050
10 year river ARI
100 year ocean ARI + 0.4m SLR

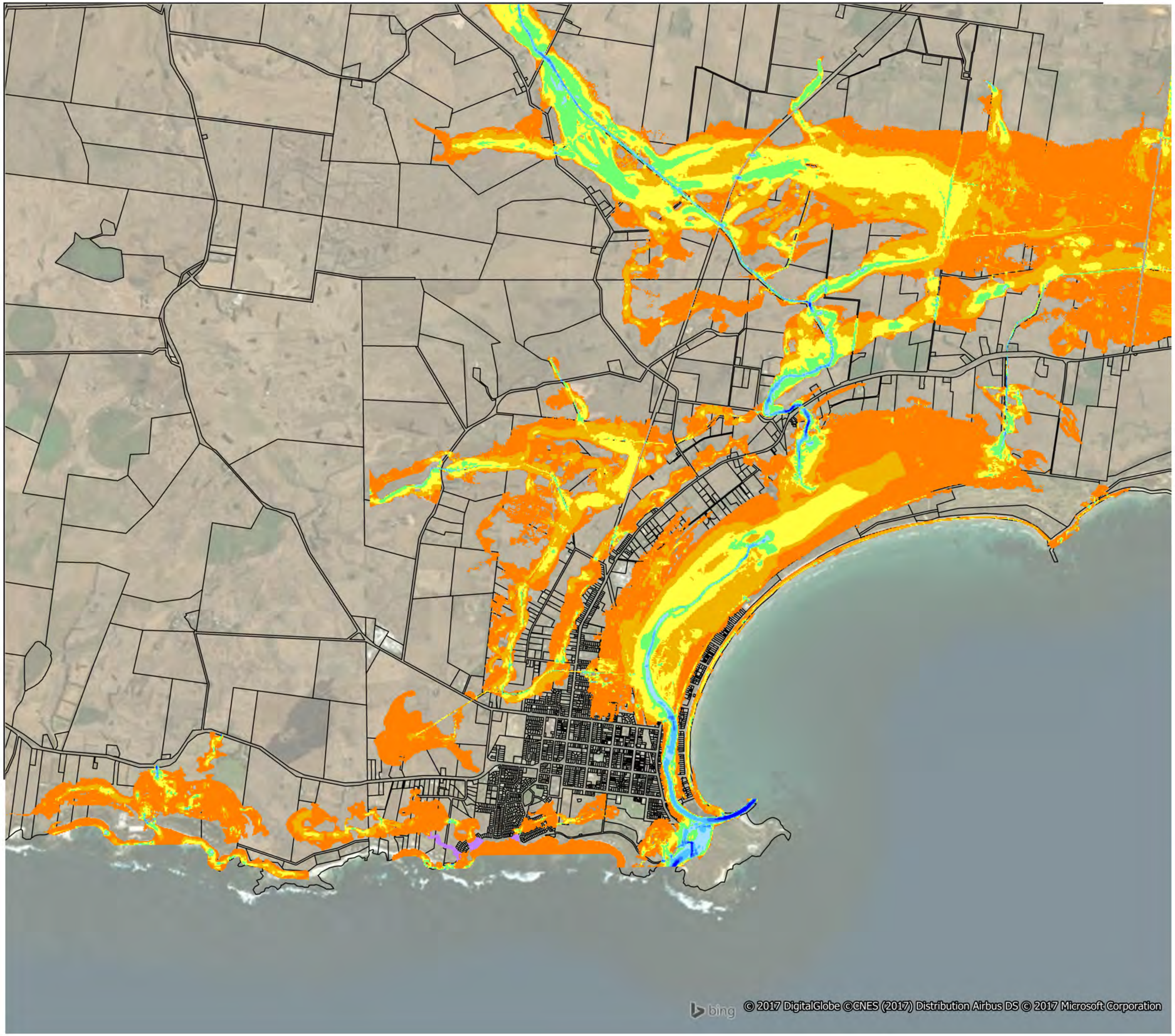
Velocity (m/s)

- Greater than 2
- 1.5 to 2
- 1 to 1.5
- 0.8 to 1
- Swash Zone
- 0.4 to 0.8
- 0.2 to 0.4
- 0.1 to 0.2
- Less than 0.1

0 2
kilometres
Scale 1:37,660

Cardno

Map Produced by Cardno Victoria
Date: 26/09/2017
Coordinate System: MGA 94 - Zone 54
Project: V161030W



Port Fairy Maximum Velocity

2080
20 year river ARI
100 year ocean ARI + 0.8m SLR

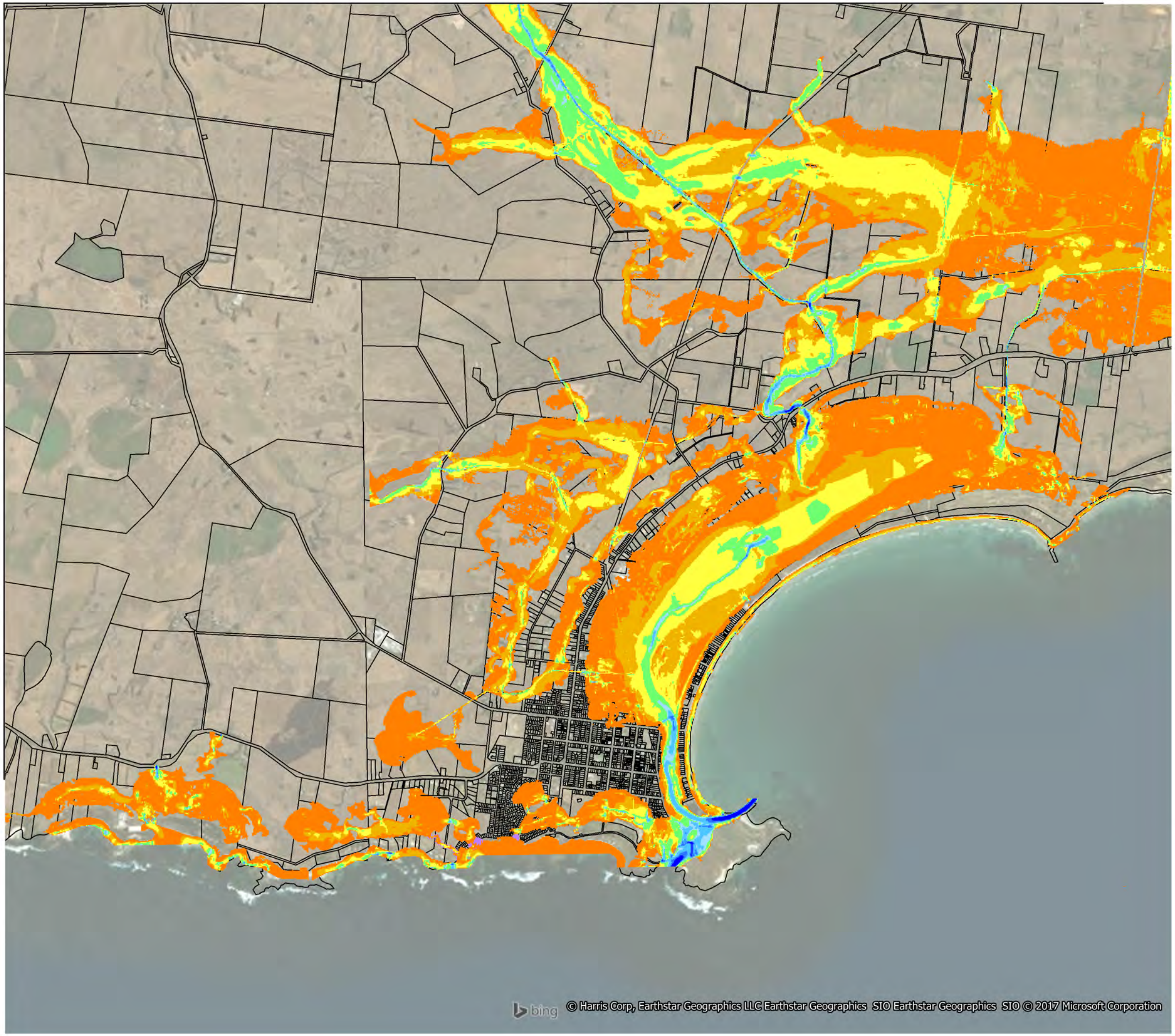
Velocity (m/s)

- Greater than 2
- 1.5 to 2
- 1 to 1.5
- 0.8 to 1
- Swash Zone
- 0.4 to 0.8
- 0.2 to 0.4
- 0.1 to 0.2
- Less than 0.1

0 — 2 kilometres
Scale 1:37,660

Cardno

Map Produced by Cardno Victoria
Date: 26/09/2017
Coordinate System: MGA 94 - Zone 54
Project: V161030W



Port Fairy Maximum Velocity

2100
20 year river ARI
100 year ocean ARI + 1.2m SLR

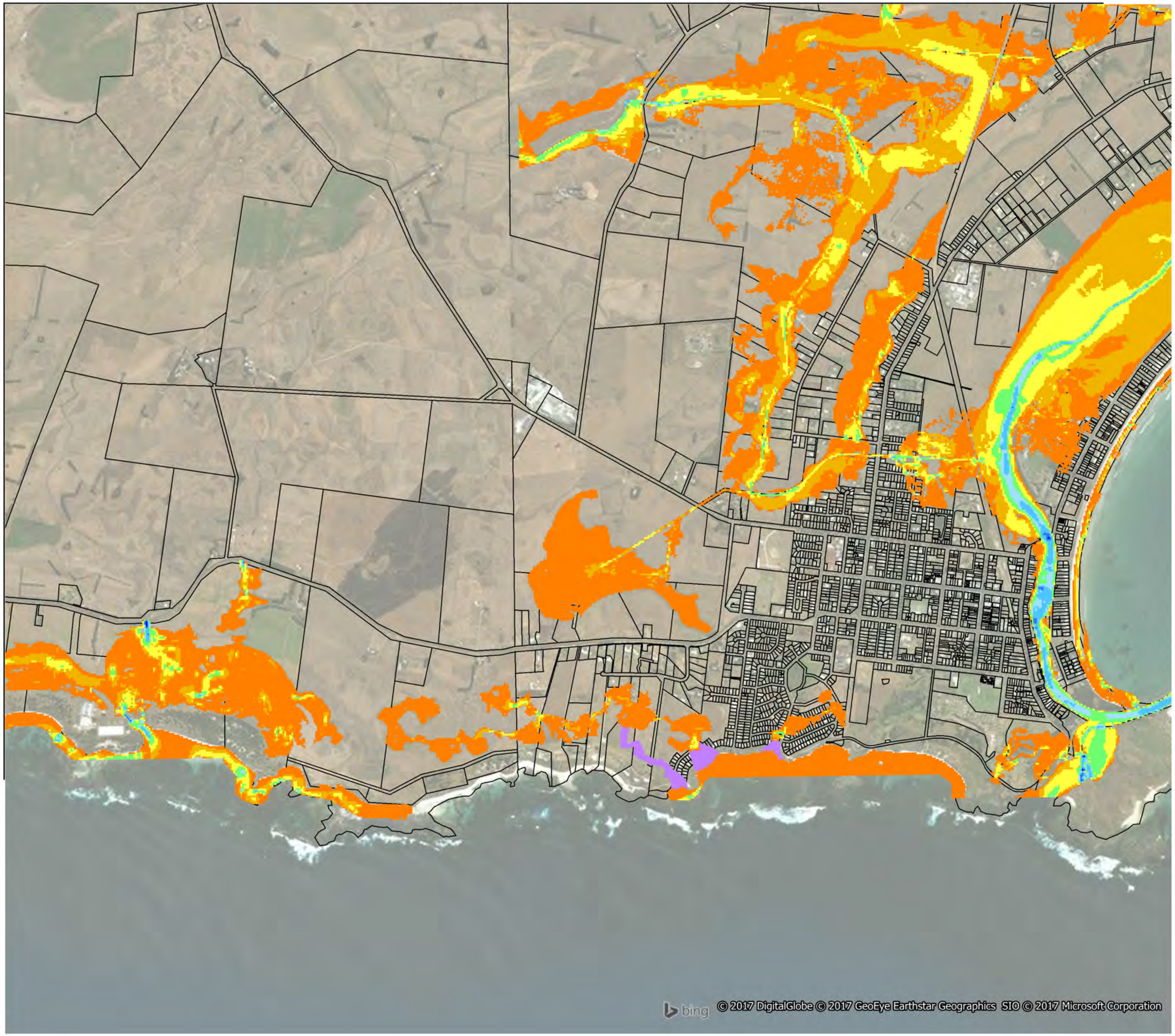
Velocity (m/s)

- Greater than 2
- 1.5 to 2
- 1 to 1.5
- 0.8 to 1
- Swash Zone
- 0.4 to 0.8
- 0.2 to 0.4
- 0.1 to 0.2
- Less than 0.1

0 2
kilometers
Scale 1:37,660

Cardno

Map Produced by Cardno Victoria
Date: 26/09/2017
Coordinate System: MGA 94 - Zone 54
Project: V161030W



Port Fairy Township Maximum Velocity

Present day
10 year river ARI
50 year ocean ARI

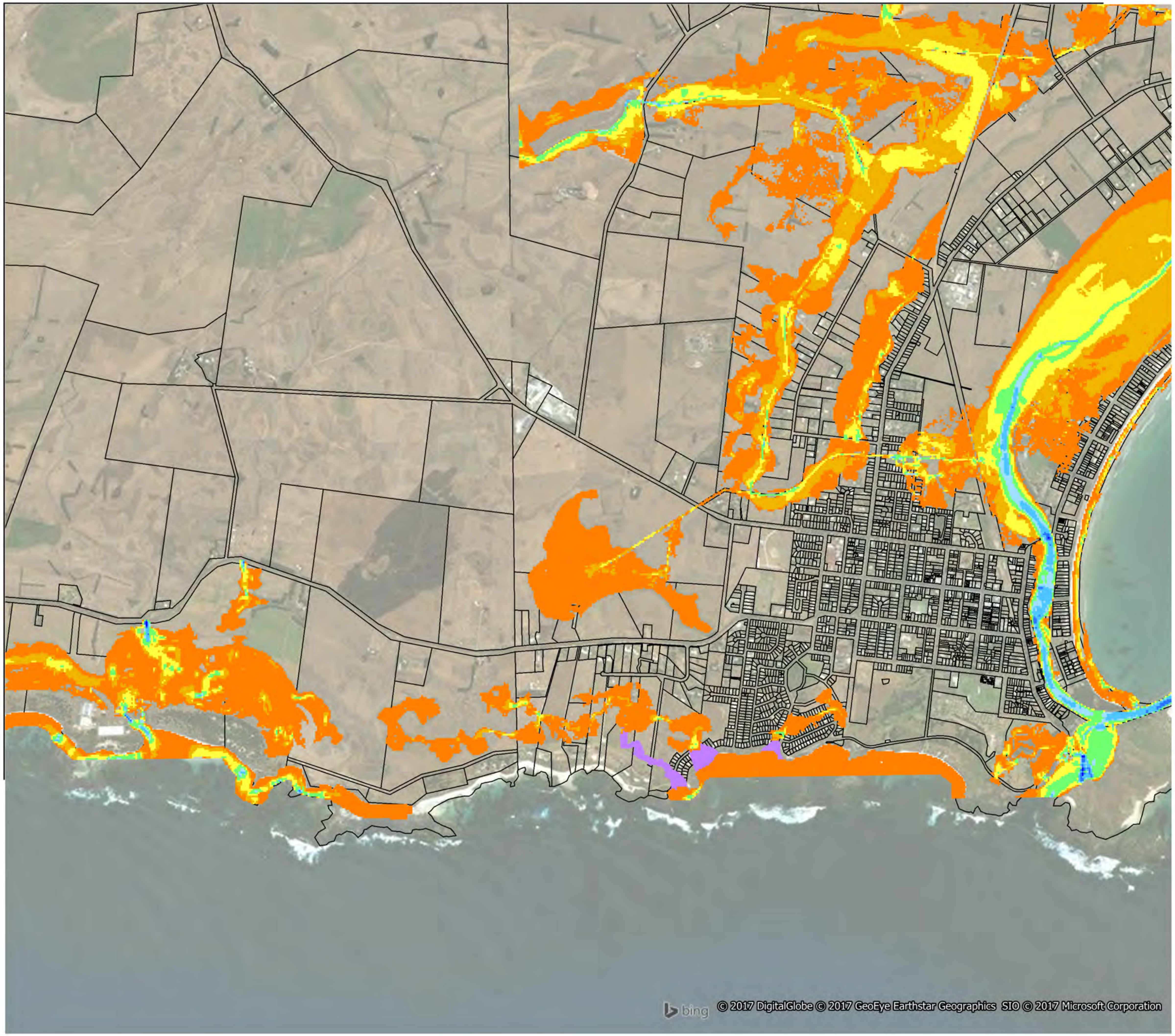
Velocity (m/s)

Greater than 2	0.4 to 0.8
1.5 to 2	0.2 to 0.4
1 to 1.5	0.1 to 0.2
0.8 to 1	Less than 0.1
Swash Zone	

0 — 1
kilometers
Scale 1:21,530

Cardno

Map Produced by Cardno Victoria
Date: 26/09/2017
Coordinate System: MGA 94 - Zone 54
Project: V161030W



Port Fairy Township Maximum Velocity

Present day
10 year river ARI
100 year ocean ARI

Velocity (m/s)

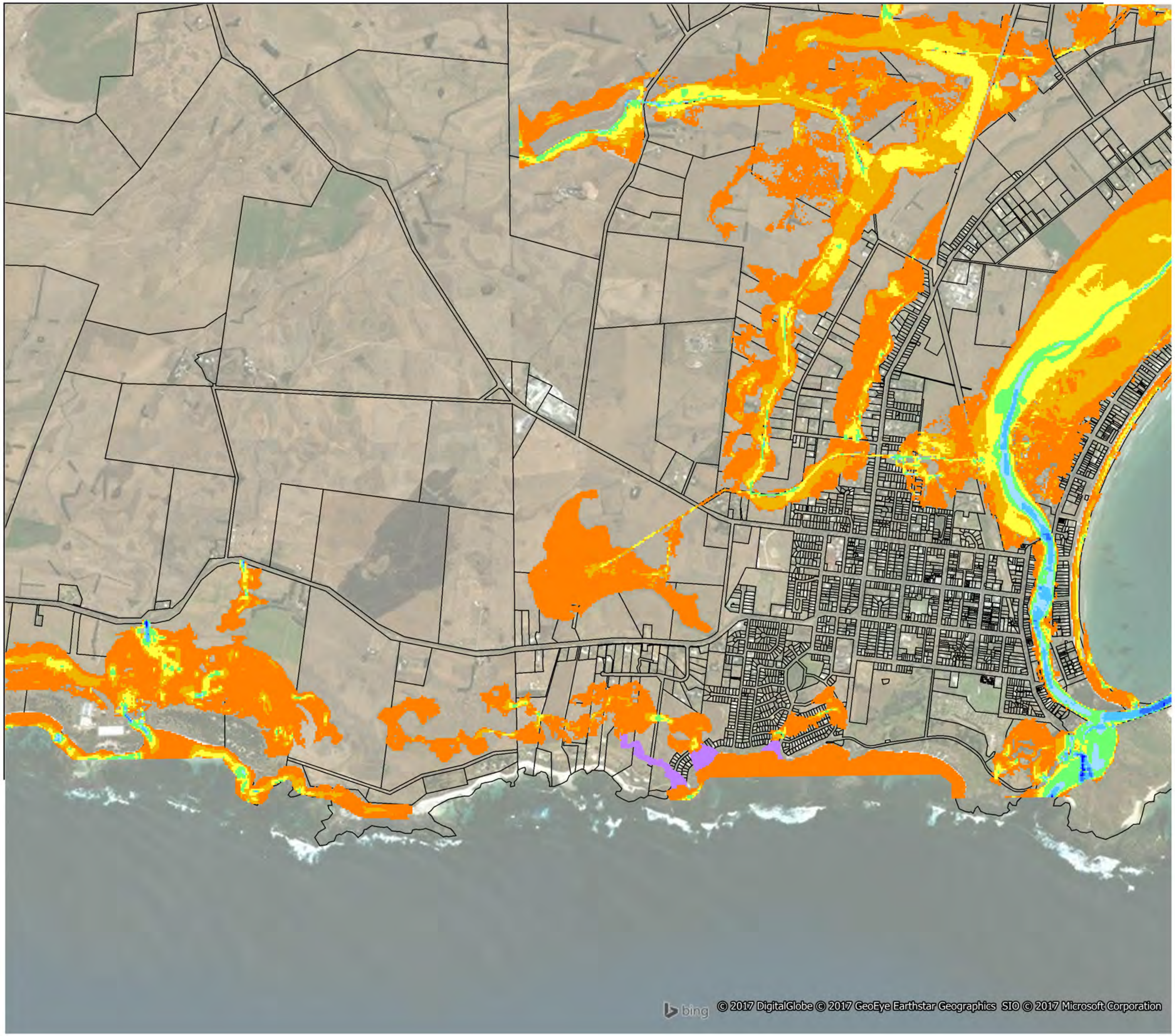
- Greater than 2
- 1.5 to 2
- 1 to 1.5
- 0.8 to 1
- Swash Zone
- 0.4 to 0.8
- 0.2 to 0.4
- 0.1 to 0.2
- Less than 0.1

0 — 1 kilometers

Scale 1:21,530

Cardno

Map Produced by Cardno Victoria
Date: 26/09/2017
Coordinate System: MGA 94 - Zone 54
Project: V161030W



Port Fairy Township Maximum Velocity

2030
10 year river ARI
100 year ocean ARI + 0.2m SLR

Velocity (m/s)

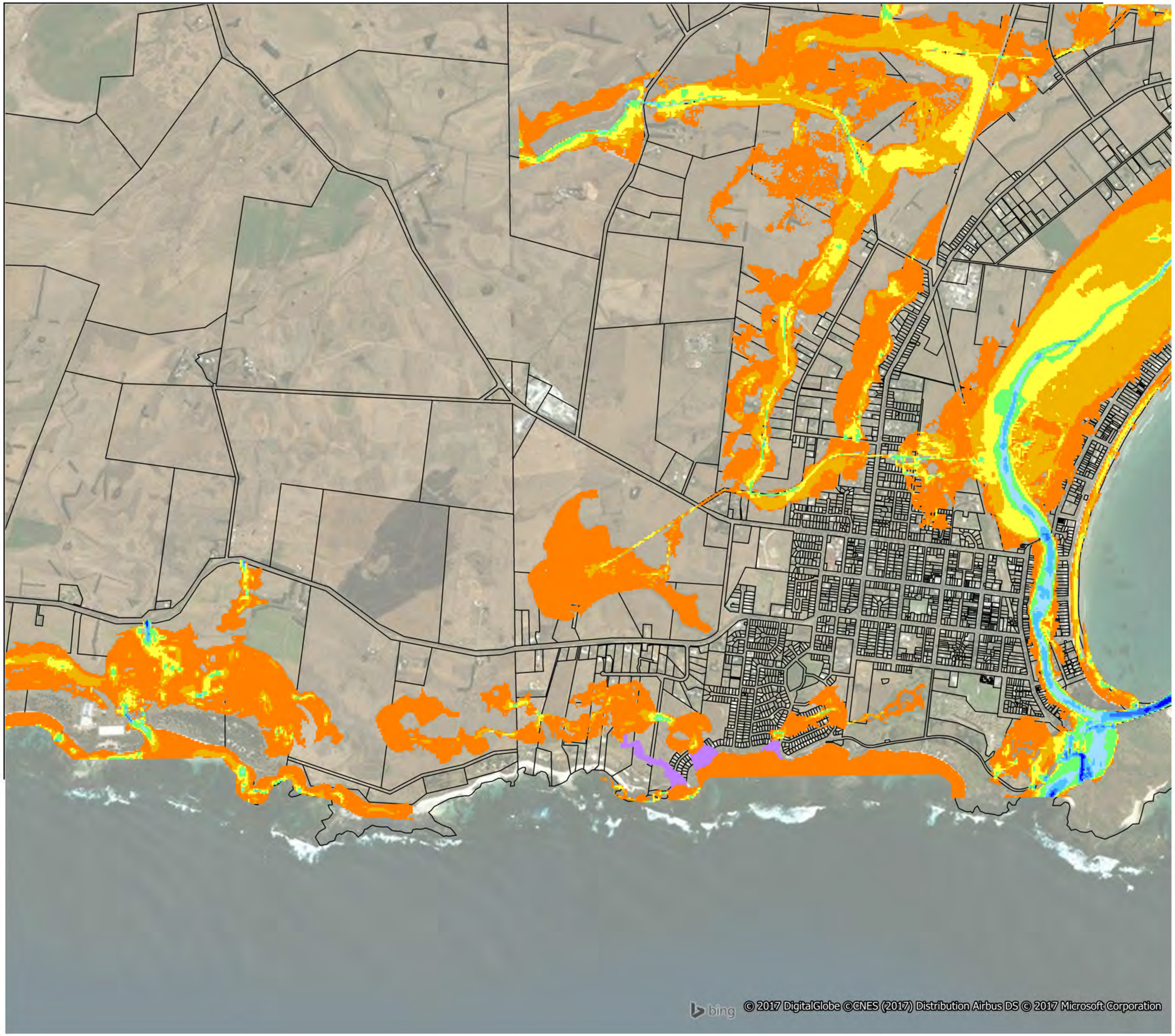
- Greater than 2
- 1.5 to 2
- 1 to 1.5
- 0.8 to 1
- Swash Zone
- 0.4 to 0.8
- 0.2 to 0.4
- 0.1 to 0.2
- Less than 0.1

N
W E
S

0 1
kilometers

Cardno

Map Produced by Cardno Victoria
Date: 26/09/2017
Coordinate System: MGA 94 - Zone 54
Project: V161030W



Port Fairy Township Maximum Velocity

2050
10 year river ARI
100 year ocean ARI + 0.4m SLR

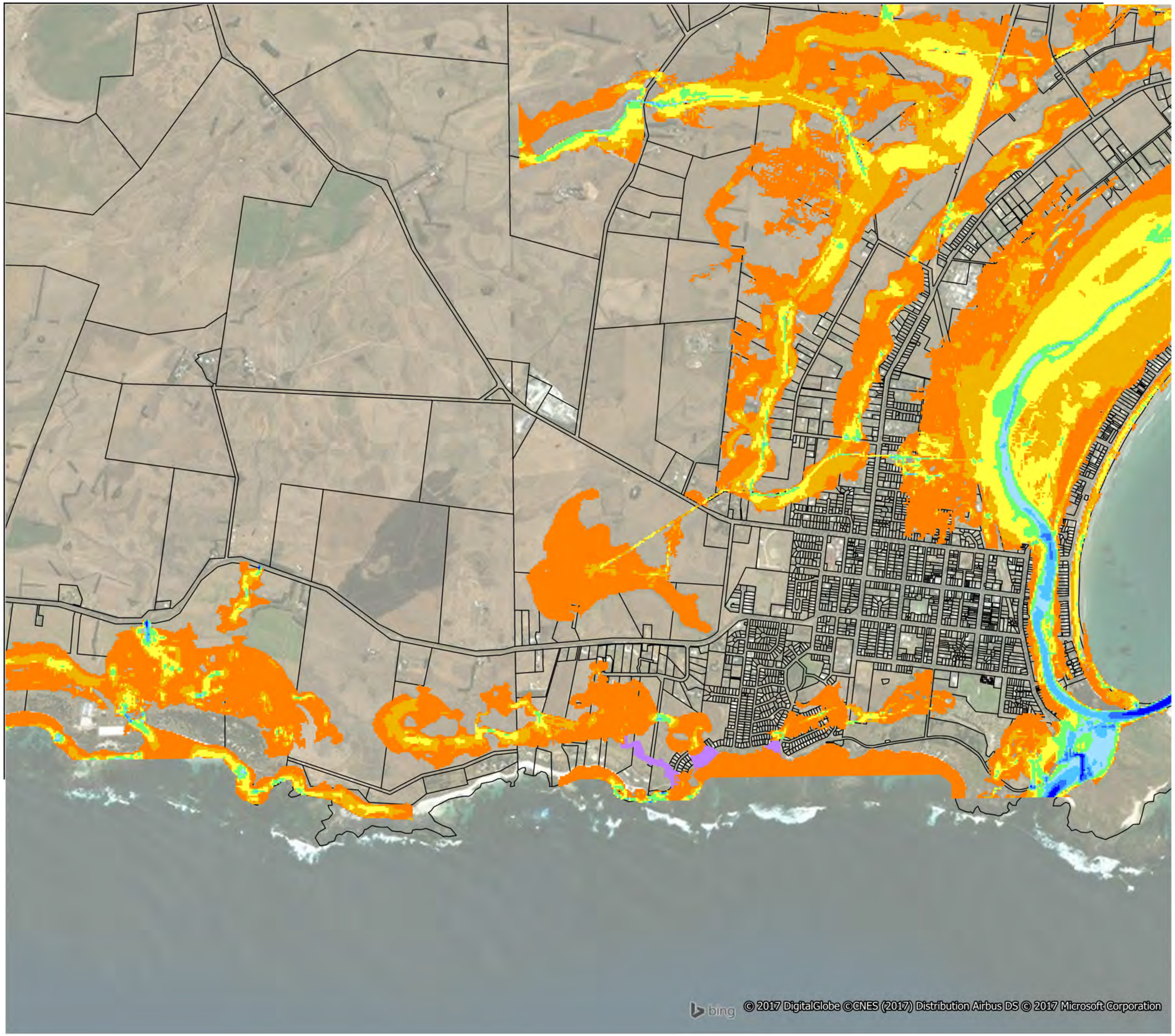
Velocity (m/s)

- Greater than 2
- 1.5 to 2
- 1 to 1.5
- 0.8 to 1
- Swash Zone
- 0.4 to 0.8
- 0.2 to 0.4
- 0.1 to 0.2
- Less than 0.1

0 — 1 kilometres
Scale 1:21,530

Cardno

Map Produced by Cardno Victoria
Date: 26/09/2017
Coordinate System: MGA 94 - Zone 54
Project: V161030W



Port Fairy Township Maximum Velocity

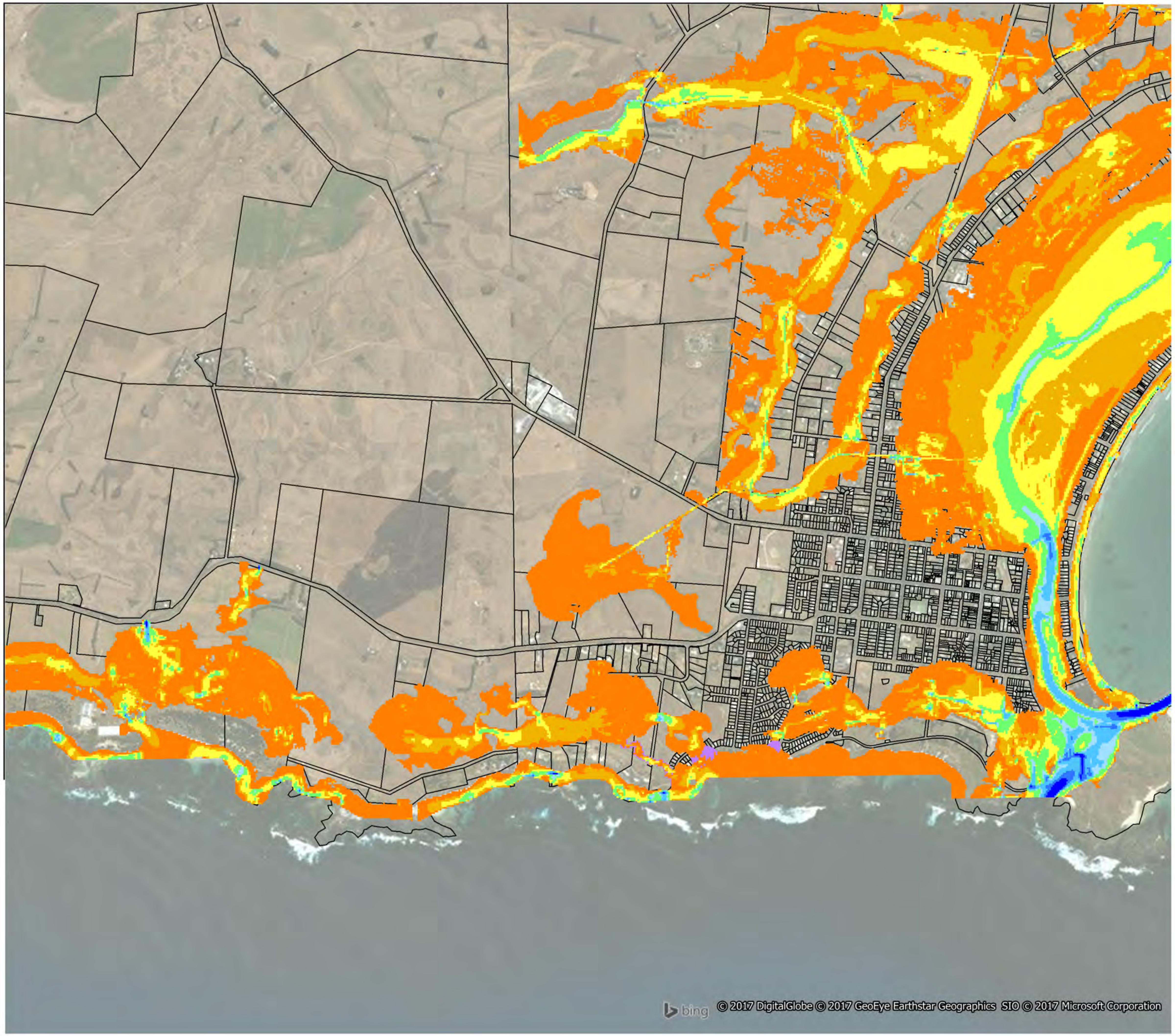
2080
20 year river ARI
100 year ocean ARI + 0.8m SLR

Velocity (m/s)

- Greater than 2
- 1.5 to 2
- 1 to 1.5
- 0.8 to 1
- Swash Zone
- 0.4 to 0.8
- 0.2 to 0.4
- 0.1 to 0.2
- Less than 0.1

Cardno

Map Produced by Cardno Victoria
Date: 26/09/2017
Coordinate System: MGA 94 - Zone 54
Project: V161030W



Port Fairy Township Maximum Velocity

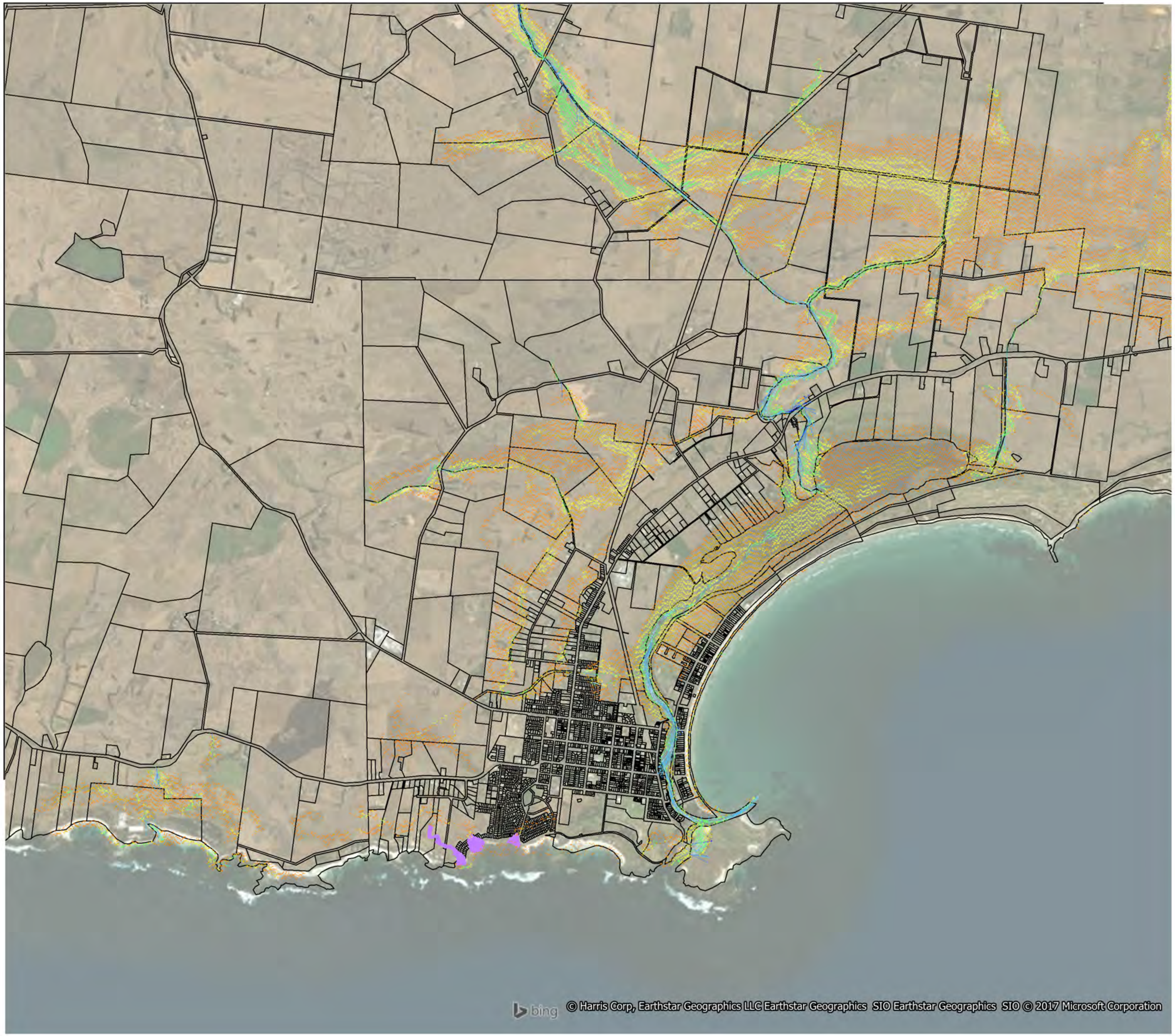
2100
20 year river ARI
100 year ocean ARI + 1.2m SLR

Velocity (m/s)	
Greater than 2	0.4 to 0.8
1.5 to 2	0.2 to 0.4
1 to 1.5	0.1 to 0.2
0.8 to 1	Less than 0.1
Swash Zone	

0 1
kilometers
Scale 1:21,530

Cardno

Map Produced by Cardno Victoria
Date: 26/09/2017
Coordinate System: MGA 94 - Zone 54
Project: V161030W



Port Fairy Flow Vectors

Present day
10 year river ARI
50 year ocean ARI

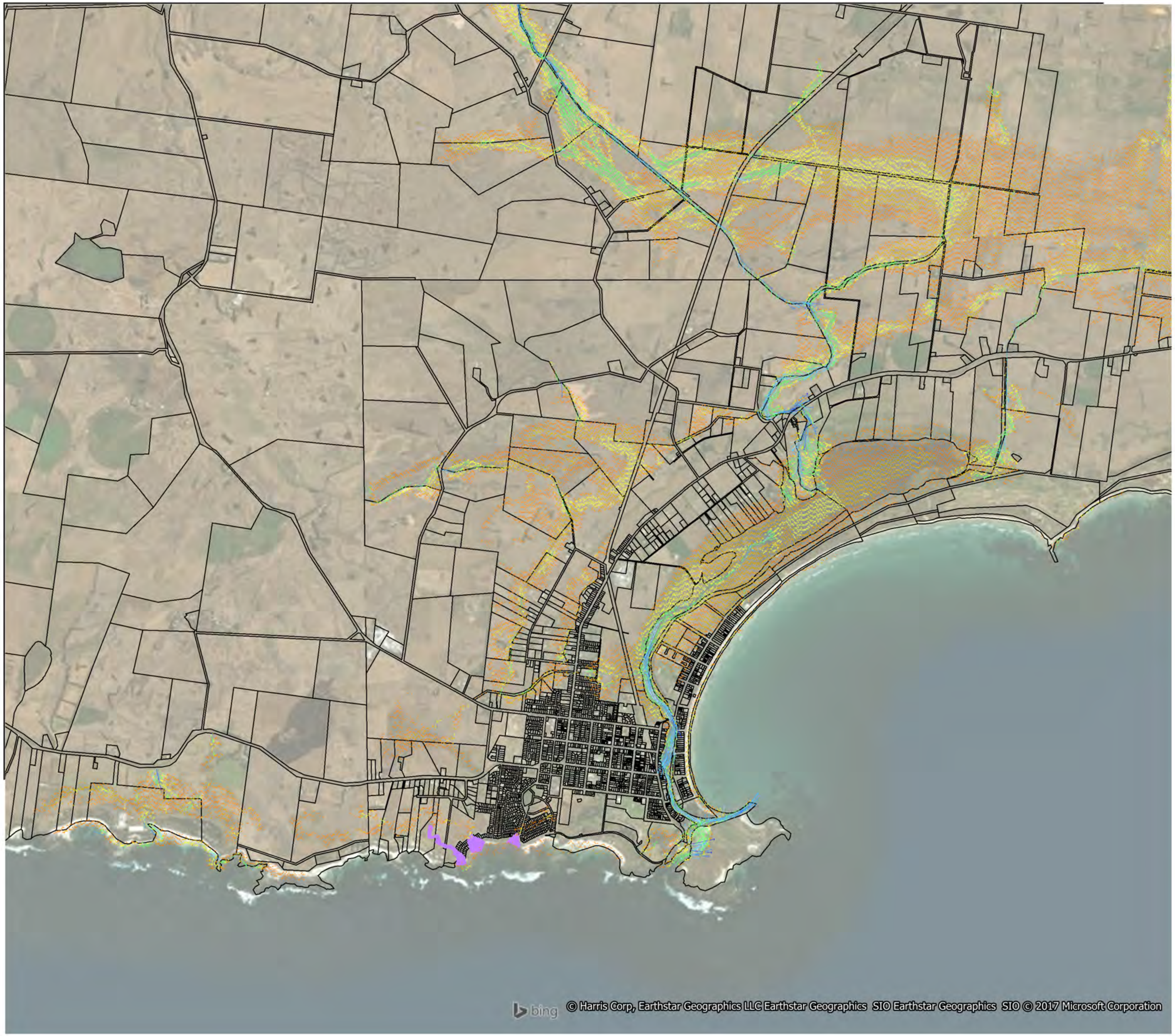
Maximum Velocity (m/s)

- Greater than 2
- 1.5 to 2
- 1 to 1.5
- 0.8 to 1
- 0.4 to 0.8
- 0.2 to 0.4
- 0.1 to 0.2
- Less than 0.1
- Swash Zone

0 — 2 kilometers
Scale 1:37,660

Cardno

Map Produced by Cardno Victoria
Date: 26/09/2017
Coordinate System: MGA 94 - Zone 54
Project: V161030W



Port Fairy Flow Vectors

Present day
10 year river ARI
100 year ocean ARI

Maximum Velocity (m/s)

Greater than 2	0.4 to 0.8
1.5 to 2	0.2 to 0.4
1 to 1.5	0.1 to 0.2
0.8 to 1	Less than 0.1
Swash Zone	

0 2
kilometers
Scale 1:37,660

Cardno

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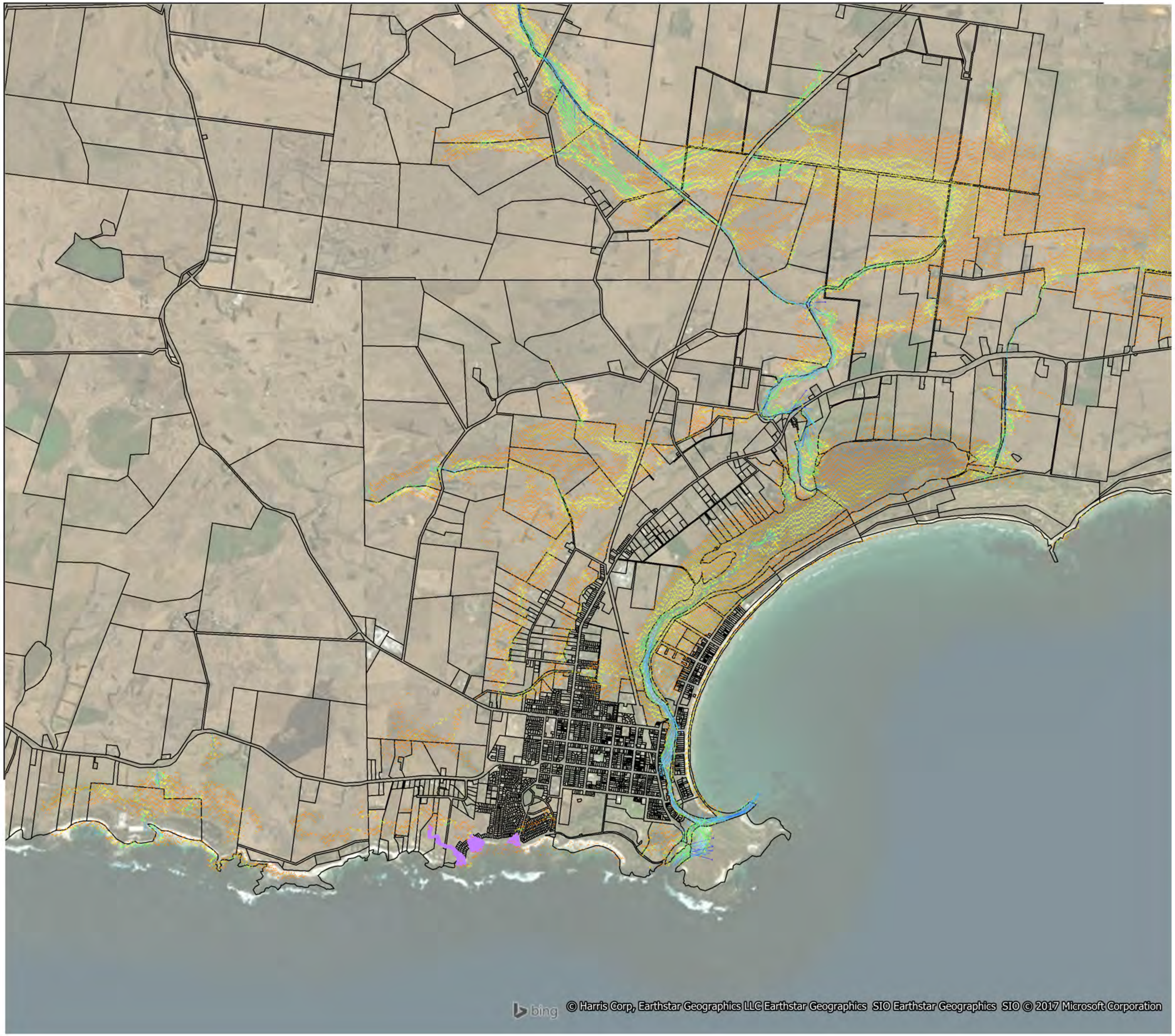
Date: 26/09/2017
Coordinate System: MGA 94 - Zone 54
Project: V161030W



Port Fairy Flow Vectors

2030
10 year river ARI
100 year ocean ARI + 0.2m SLR

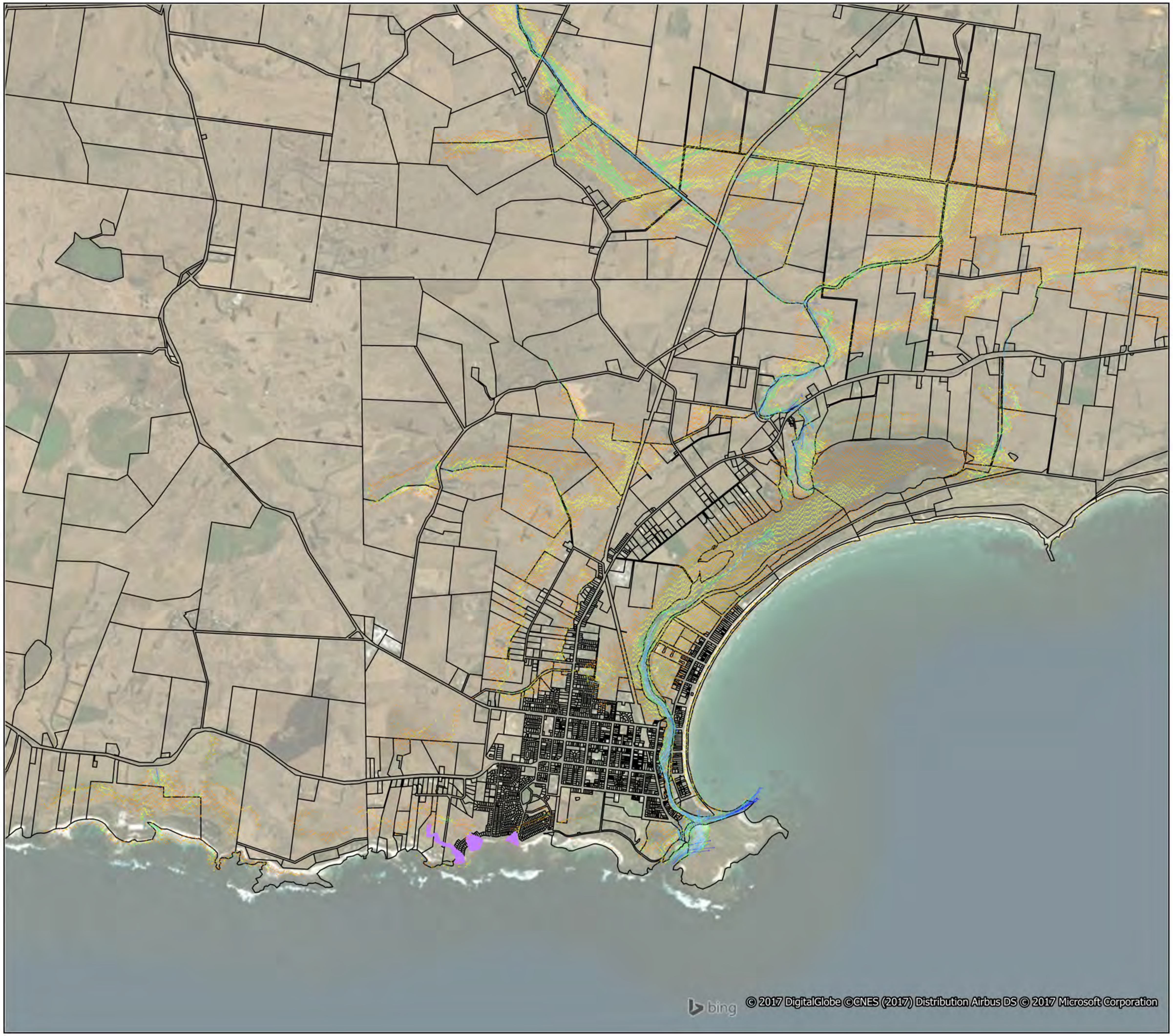
Maximum Velocity (m/s)

- Greater than 2
- 1.5 to 2
- 1 to 1.5
- 0.8 to 1
- 0.4 to 0.8
- 0.2 to 0.4
- 0.1 to 0.2
- Less than 0.1
- Swash Zone

0 2
kilometers

Cardno

Map Produced by Cardno Victoria
Date: 26/09/2017
Coordinate System: MGA 94 - Zone 54
Project: V161030W



Port Fairy Flow Vectors

2050
10 year river ARI
100 year ocean ARI + 0.4m SLR

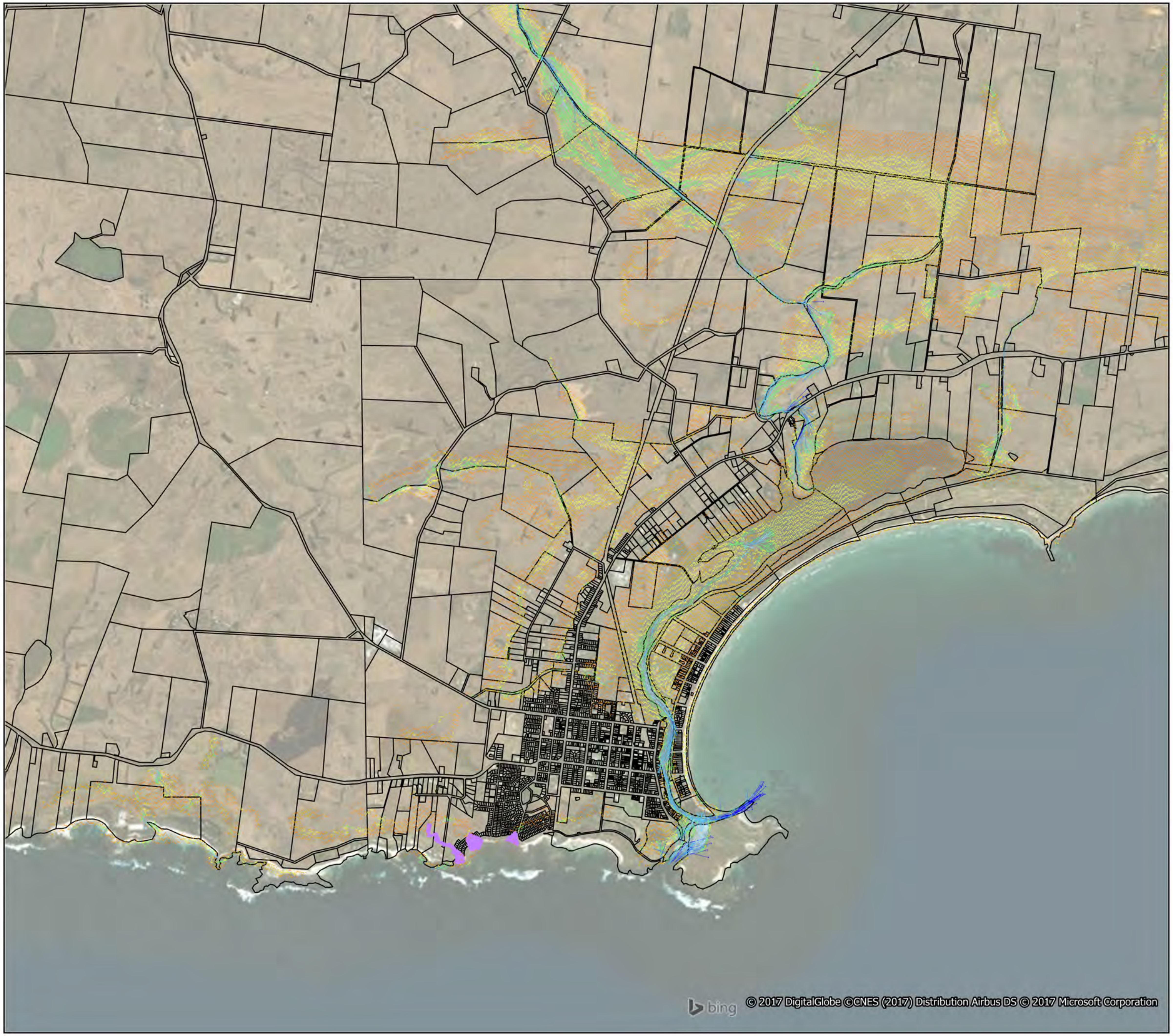
Maximum Velocity (m/s)

- Greater than 2
- 1.5 to 2
- 1 to 1.5
- 0.8 to 1
- 0.4 to 0.8
- 0.2 to 0.4
- 0.1 to 0.2
- Less than 0.1
- Swash Zone

0 2
kilometres
Scale 1:37,660

Cardno

Map Produced by Cardno Victoria
Date: 26/09/2017
Coordinate System: MGA 94 - Zone 54
Project: V161030W



Port Fairy Flow Vectors

2080
20 year river ARI
100 year ocean ARI + 0.8m SLR

Maximum Velocity (m/s)

- Greater than 2
- 1.5 to 2
- 1 to 1.5
- 0.8 to 1
- Swash Zone
- 0.4 to 0.8
- 0.2 to 0.4
- 0.1 to 0.2
- Less than 0.1

0 – 2 kilometres
Scale 1:37,660

Cardno

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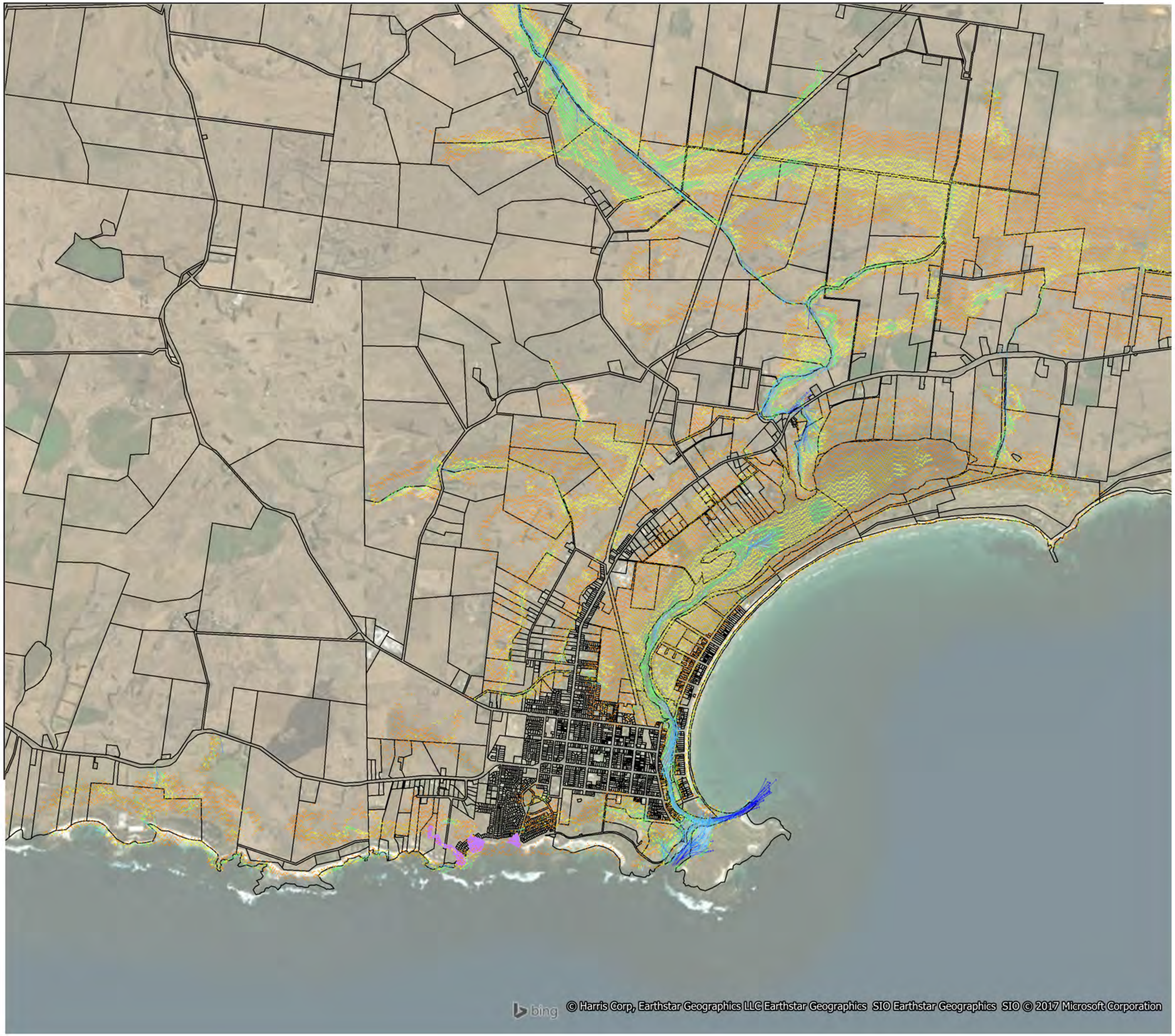
Project: V161030W



Port Fairy Flow Vectors

2100
20 year river ARI
100 year ocean ARI + 1.2m SLR

Maximum Velocity (m/s)

- Greater than 2
- 1.5 to 2
- 1 to 1.5
- 0.8 to 1
- 0.4 to 0.8
- 0.2 to 0.4
- 0.1 to 0.2
- Less than 0.1
- Swash Zone

0 — 2 kilometers
Scale 1:37,660

Cardno

Map Produced by Cardno Victoria
Date: 26/09/2017
Coordinate System: MGA 94 - Zone 54
Project: V161030W

Port Fairy Township Flow Vectors

Present day
10 year river ARI
50 year ocean ARI

Maximum Velocity (m/s)

- Greater than 2
- 1.5 to 2
- 1 to 1.5
- 0.8 to 1
- Swash Zone
- 0.4 to 0.8
- 0.2 to 0.4
- 0.1 to 0.2
- Less than 0.1

0 — 1 kilometers

Scale 1:21,530

Cardno

Map Produced by Cardno Victoria
Date: 26/09/2017
Coordinate System: MGA 94 - Zone 54
Project: V161030W

Port Fairy Township Flow Vectors

Present day
10 year river ARI
100 year ocean ARI

Maximum Velocity (m/s)

- Greater than 2
- 1.5 to 2
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- 0.4 to 0.8
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0 — 1 kilometers
Scale 1:21,530

Cardno

Map Produced by Cardno Victoria
Date: 26/09/2017
Coordinate System: MGA 94 - Zone 54
Project: V161030W

Port Fairy Township Flow Vectors

2030
10 year river ARI
100 year ocean ARI + 0.2m SLR

Maximum Velocity (m/s)

- Greater than 2
- 1.5 to 2
- 1 to 1.5
- 0.8 to 1
- Swash Zone
- 0.4 to 0.8
- 0.2 to 0.4
- 0.1 to 0.2
- Less that 0.1

0 1
kilometers

Cardno

Map Produced by Cardno Victoria
Date: 26/09/2017
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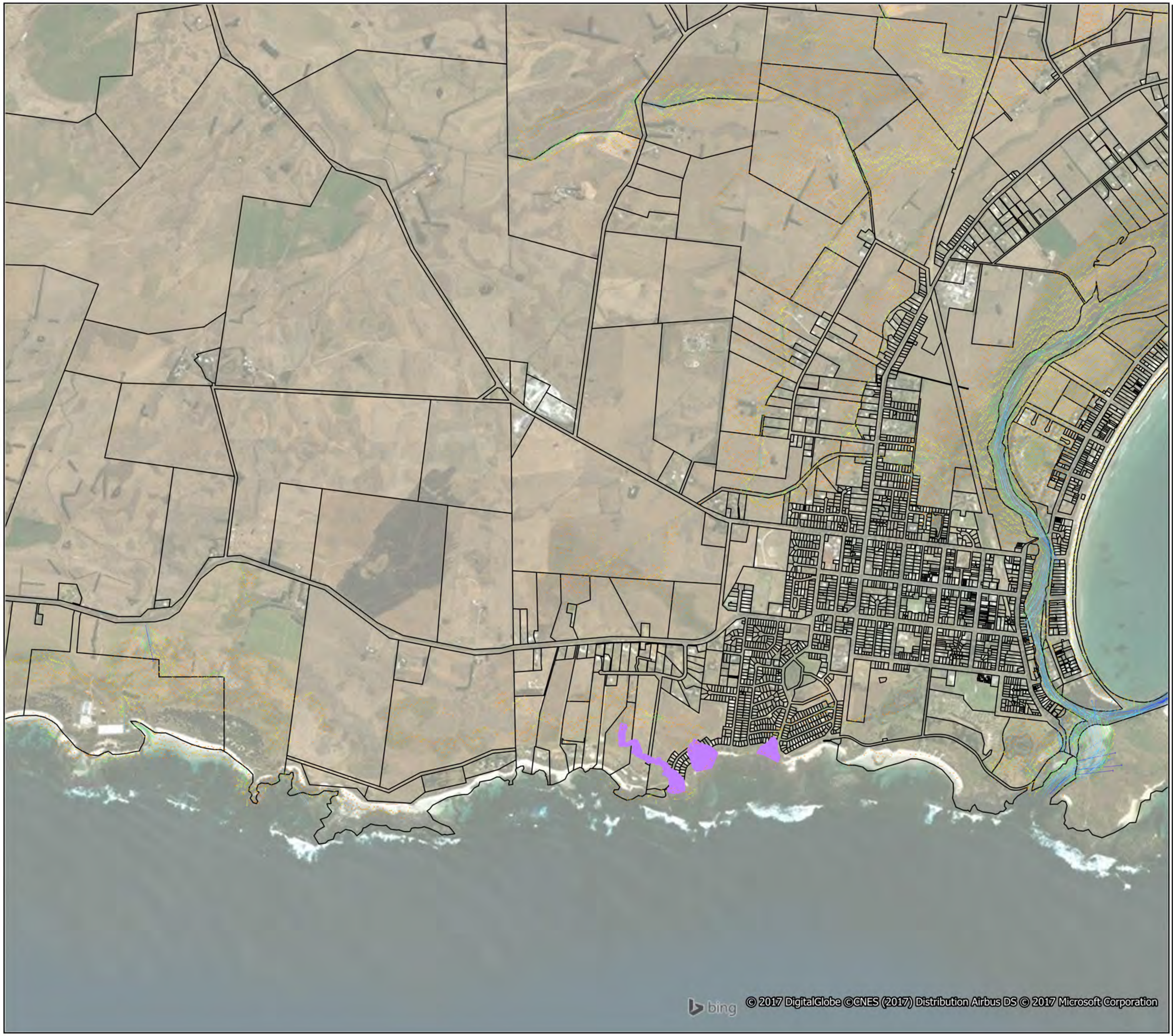
Project: V161030W



Port Fairy Township Flow Vectors

2050
10 year river ARI
100 year ocean ARI + 0.4m SLR

Maximum Velocity (m/s)

- Greater than 2
- 1.5 to 2
- 1 to 1.5
- 0.8 to 1
- Swash Zone
- 0.4 to 0.8
- 0.2 to 0.4
- 0.1 to 0.2
- Less than 0.1

0 — 1 kilometres

Scale 1:21,530

Cardno

Map Produced by Cardno Victoria
Date: 26/09/2017
Coordinate System: MGA 94 - Zone 54
Project: V161030W

Port Fairy Township Flow Vectors

2080
20 year river ARI
100 year ocean ARI + 0.8m SLR

Maximum Velocity (m/s)

- Greater than 2
- 1.5 to 2
- 1 to 1.5
- 0.8 to 1
- 0.4 to 0.8
- 0.2 to 0.4
- 0.1 to 0.2
- Less than 0.1
- Swash Zone

0 — 1 kilometres
Scale 1:21,530

Cardno

Map Produced by Cardno Victoria
Date: 26/09/2017
Coordinate System: MGA 94 - Zone 54
Project: V161030W

Port Fairy Township Flow Vectors

2100
20 year river ARI
100 year ocean ARI + 1.2m SLR

Maximum Velocity (m/s)

- Greater than 2
- 1.5 to 2
- 1 to 1.5
- 0.8 to 1
- 0.4 to 0.8
- 0.2 to 0.4
- 0.1 to 0.2
- Less than 0.1
- Swash Zone

N
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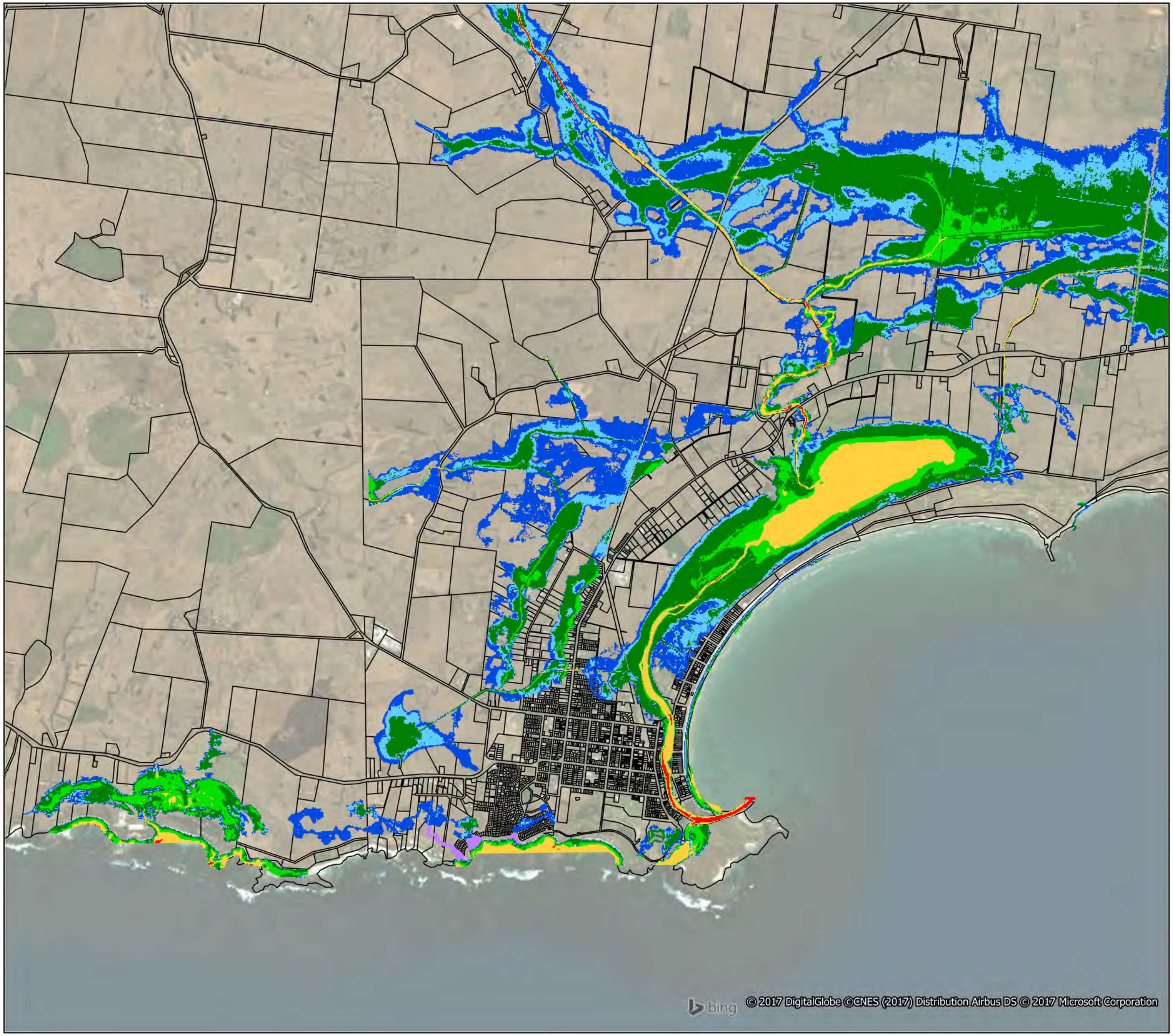
kilometers
Scale 1:21,530

Cardno

Map Produced by Cardno Victoria
Date: 26/09/2017
Coordinate System: MGA 94 - Zone 54
Project: V161030W



Port Fairy Hazard Classes

Present day
10 year river ARI
50 year ocean ARI

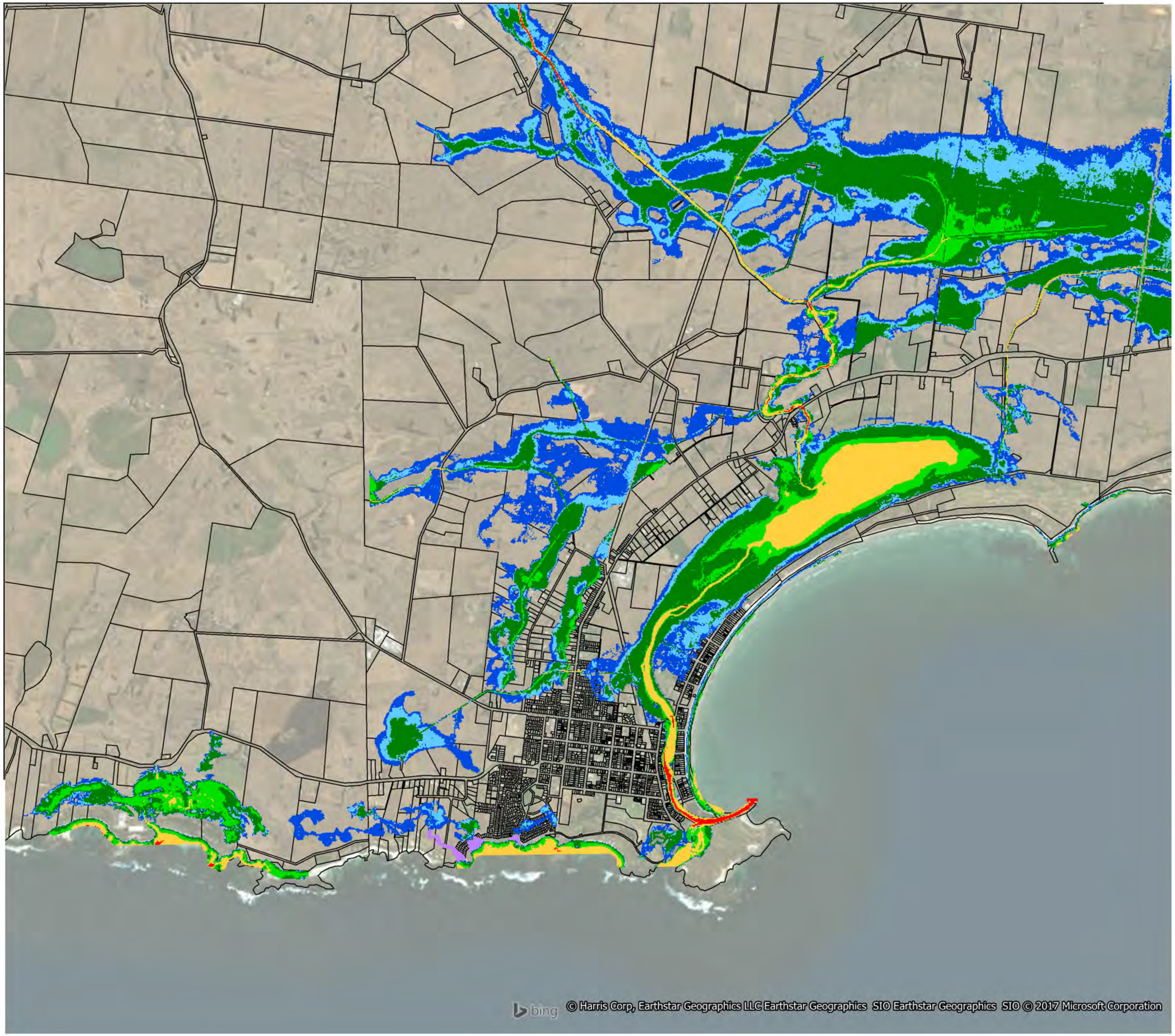
Melbourne Water Hazard Class

- H1
- H2
- H3
- H4
- H5
- H6
- Swash Zone

0 2
kilometres
Scale 1:37,660

Cardno

Map Produced by Cardno Victoria
Date: 26/09/2017
Coordinate System: MGA 94 - Zone 54
Project: V161030W



Port Fairy Hazard Classes

Present Day
10 year river ARI
100 year ocean ARI

Melbourne Water Hazard Class

- H1
- H2
- H3
- H4
- H5
- H6
- Swash Zone

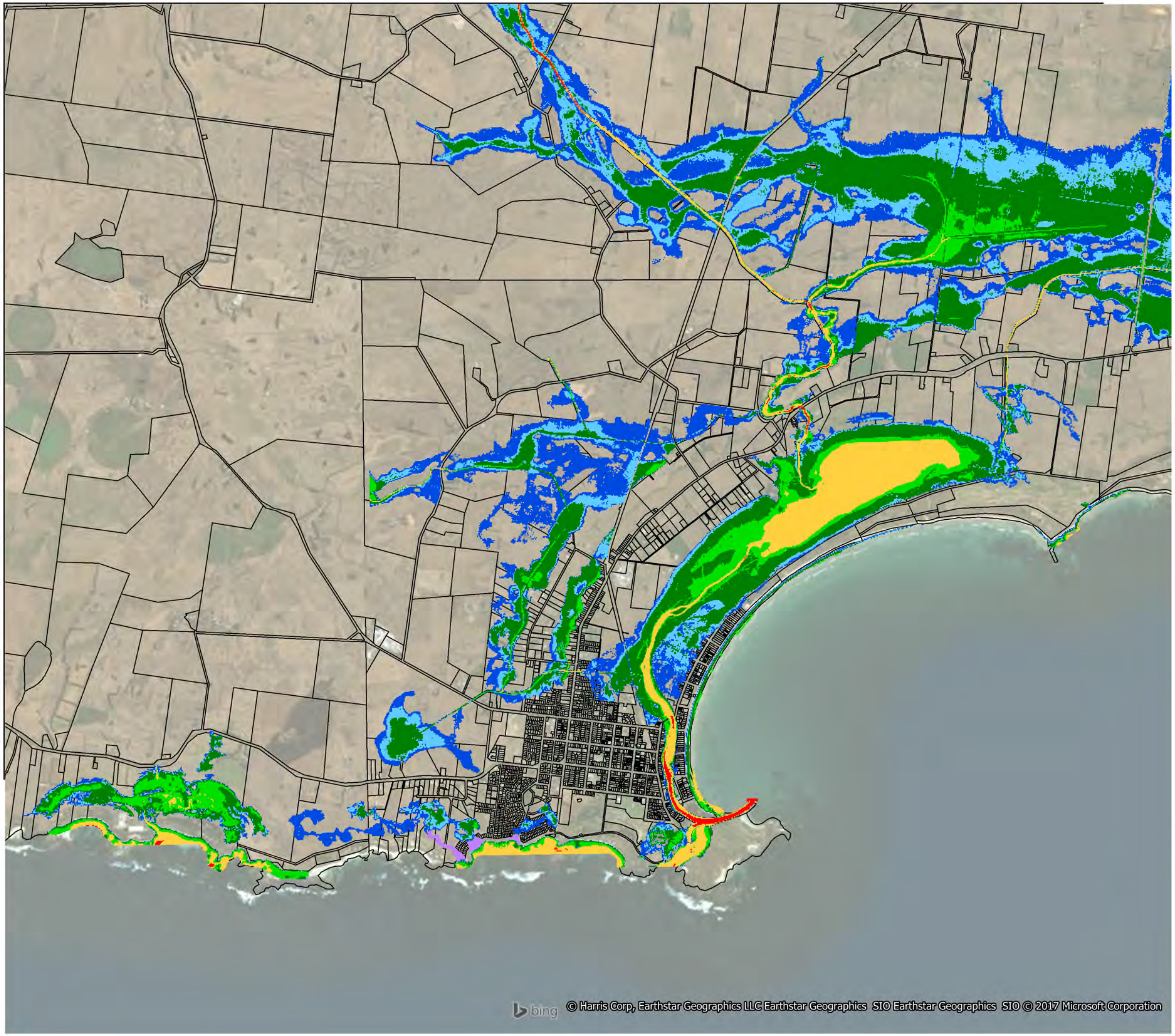
0 2

kilometers

Scale 1:37,660

Cardno

Map Produced by <Division> (<BU>)
Date: <Current Date>
Coordinate System: <Current Coordinate System>
Project:<Job Number>_<Phase>
Map:<map name>.wor 01



Port Fairy Hazard Classes

2030
10 year river ARI
100 year ocean ARI + 0.2m SLR

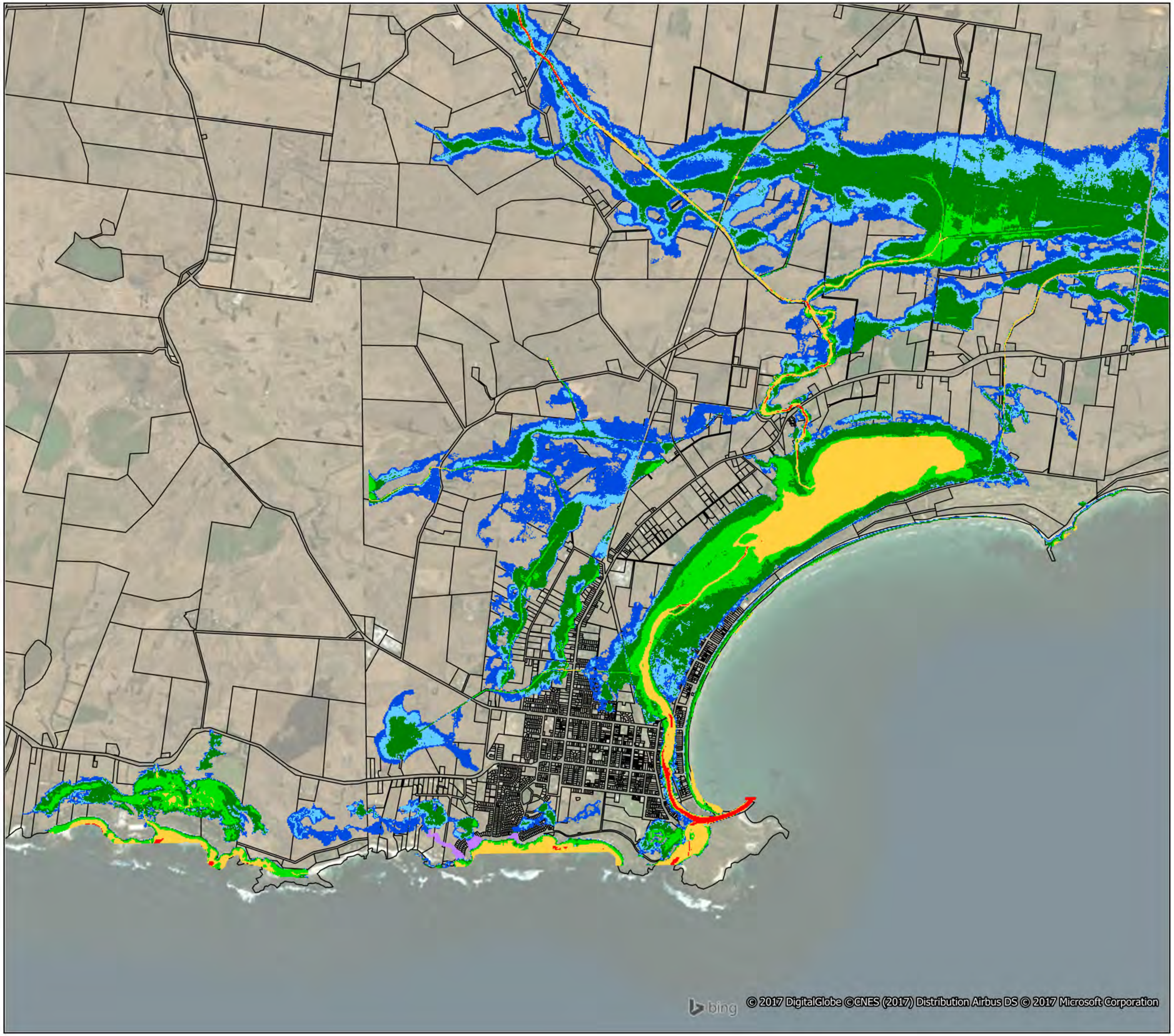
Melbourne Water Hazard Class

- H1
- H2
- H3
- H4
- H5
- H6
- Swash Zone

0 2
kilometers
Scale 1:37,660

Cardno

Map Produced by Cardno Victoria
Date: 26/09/2017
Coordinate System: MGA 94 - Zone 54
Project: V161030W



Port Fairy Hazard Classes

2050
10 year river ARI
100 year ocean ARI + 0.4m SLR

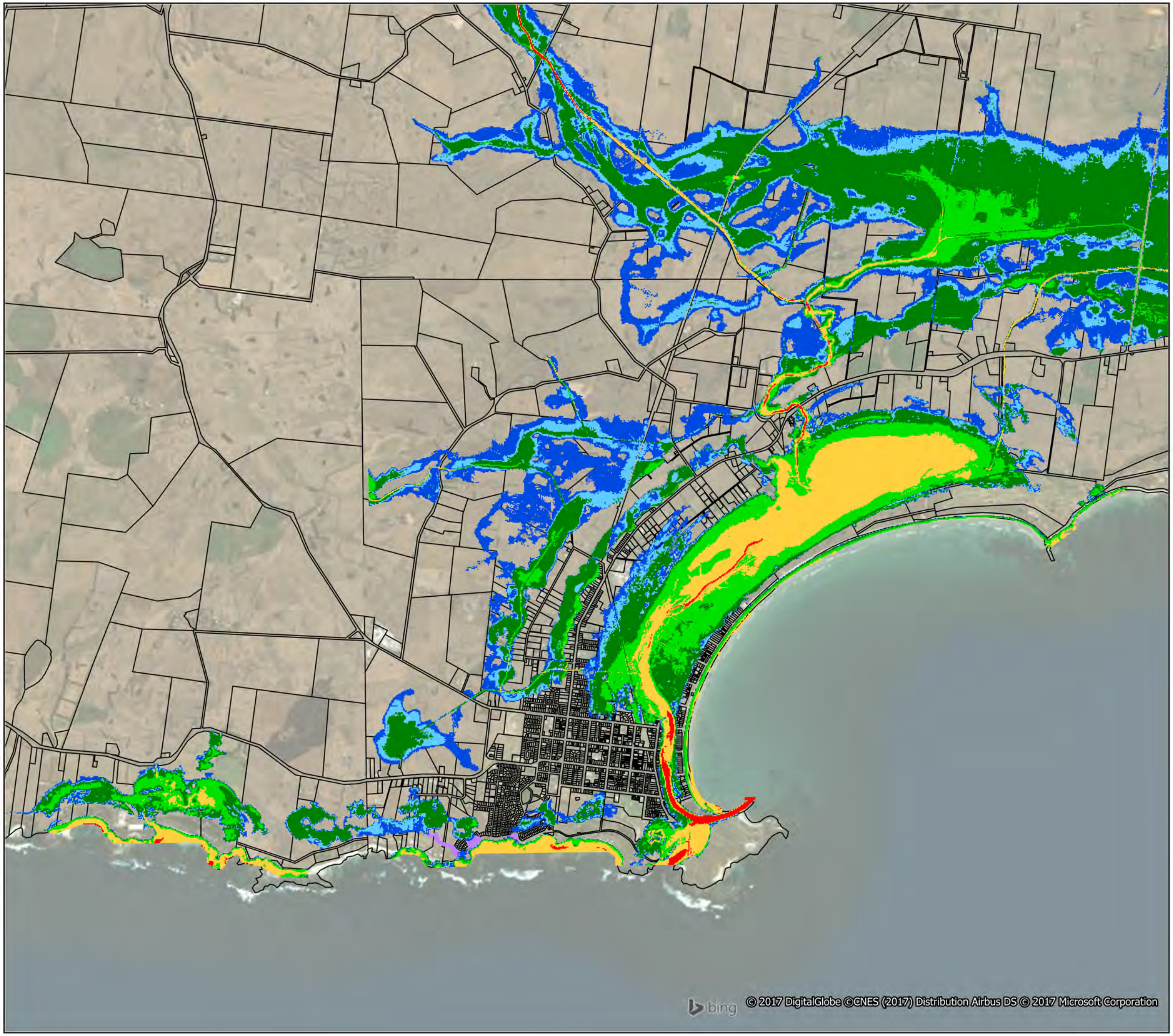
Melbourne Water Hazard Class

- H1
- H2
- H3
- H4
- H5
- H6
- Swash Zone

0 — 2 kilometres
Scale 1:37,660

Cardno

Map Produced by Cardno Victoria
Date: 26/09/2017
Coordinate System: MGA 94 - Zone 54
Project: V161030W



Port Fairy Hazard Classes

2080
20 year river ARI
100 year ocean ARI + 0.8m SLR

Melbourne Water Hazard Class

- H1
- H2
- H3
- H4
- H5
- H6
- Swash Zone

N
W E
S

0 2
kilometres
Scale 1:37,660

Cardno

Map Produced by Cardno Victoria
Date: 26/09/2017
Coordinate System: MGA 94 - Zone 54
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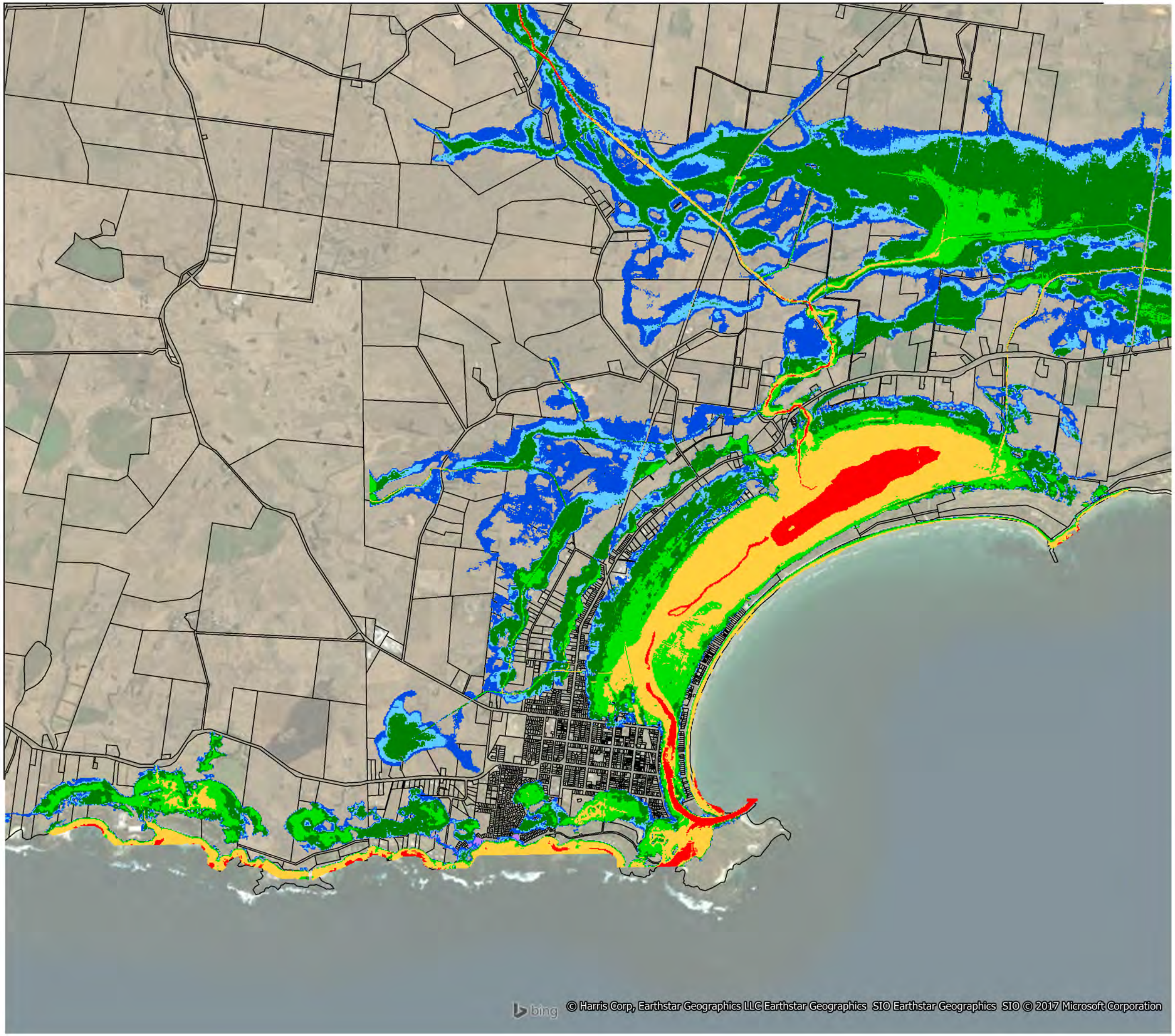


Port Fairy Hazard Classes

2100
20 year river ARI
100 year ocean ARI + 1.2m SLR

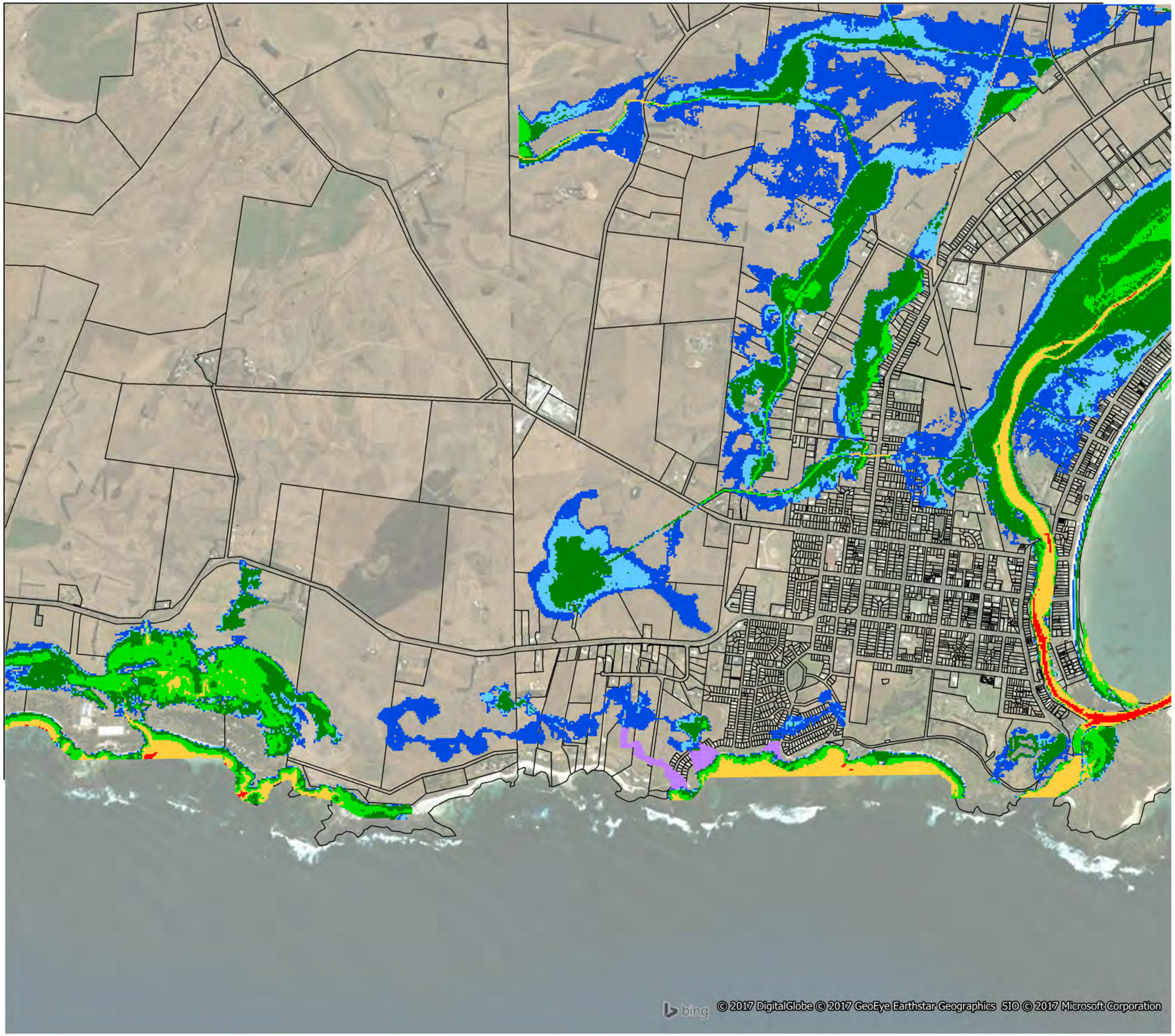
Melbourne Water Hazard Class

- H1
- H2
- H3
- H4
- H5
- H6
- Swash Zone

0 2
kilometers
Scale 1:37,660

Cardno

Map Produced by Cardno Victoria
Date: 26/09/2017
Coordinate System: MGA 94 - Zone 54
Project: V161030W



Port Fairy Township Hazard Classes

Present day
10 year river ARI
50 year ocean ARI

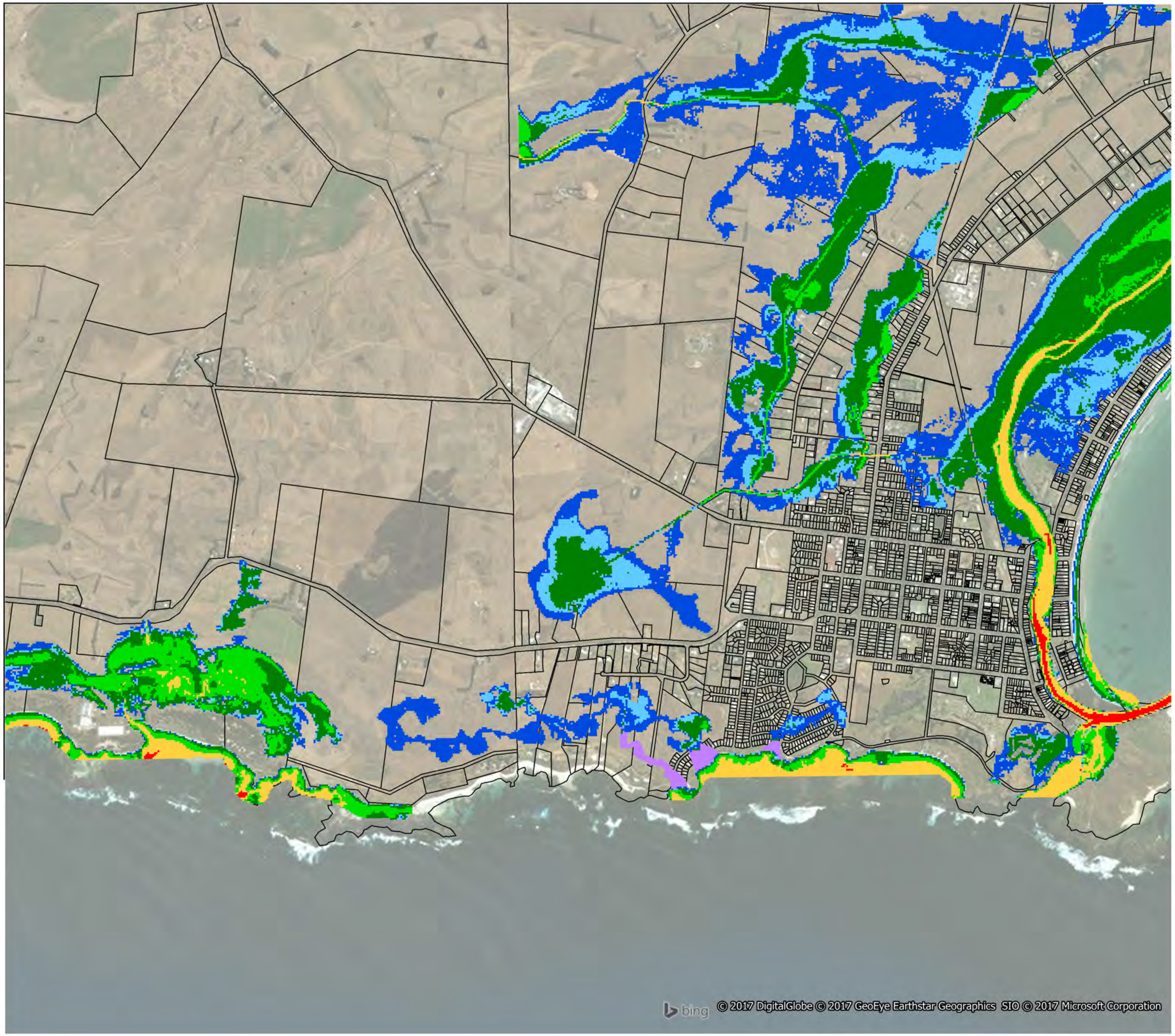
Melbourne Water Hazard Class

- H1
- H2
- H3
- H4
- H5
- H6
- Swash Zone

0 – 1 kilometers
Scale 1:21,530

Cardno

Map Produced by Cardno Victoria
Date: 26/09/2017
Coordinate System: MGA 94 - Zone 54
Project: V161030W



Port Fairy Township Hazard Classes

Present Day
10 year river ARI
100 year ocean ARI

Melbourne Water Hazard Class

- H1
- H2
- H3
- H4
- H5
- H6
- Swash Zone

0 1
kilometers
Scale 1:21,530

Map Produced by Cardno Victoria
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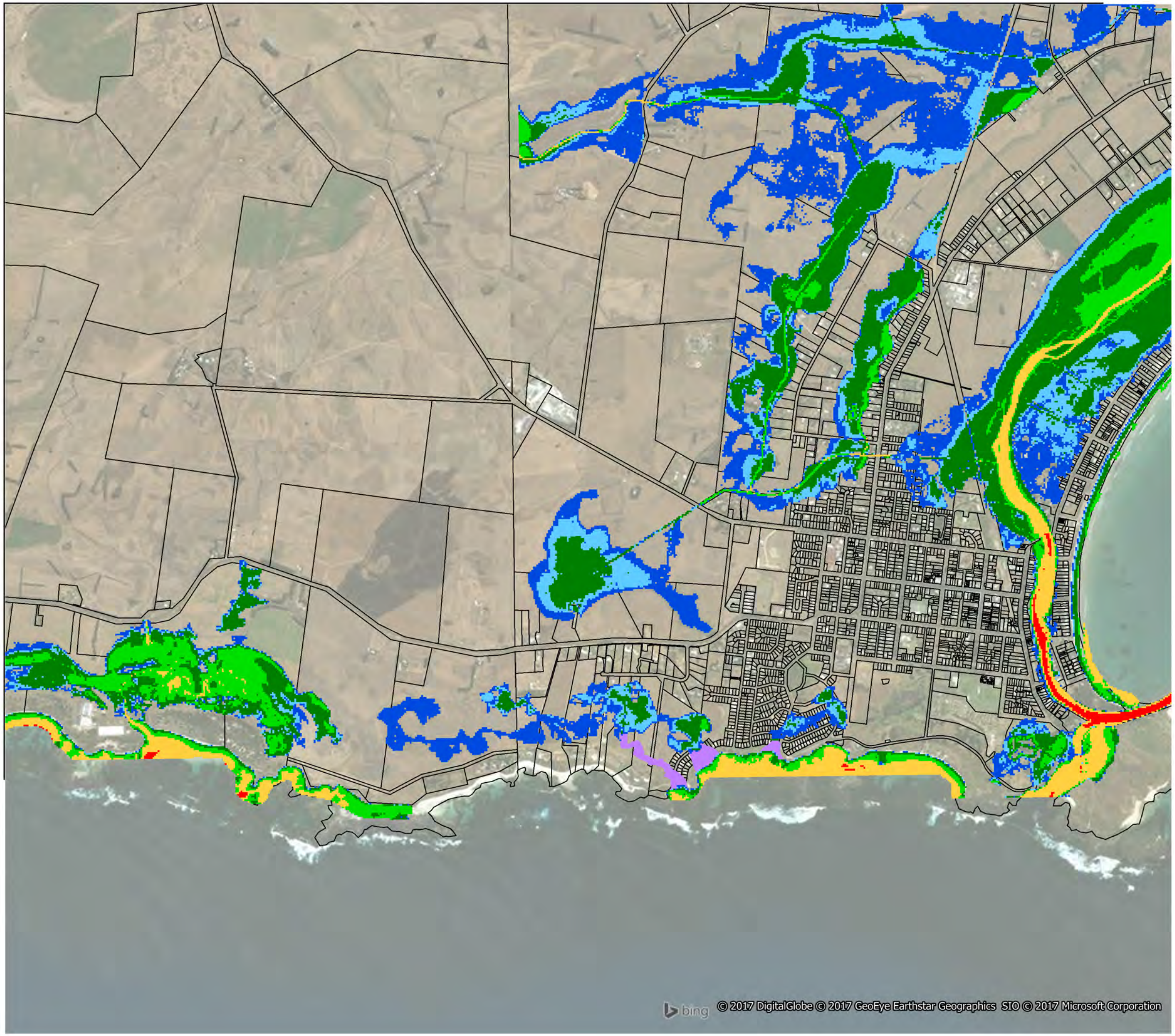

Port Fairy Township Hazard Classes

2030
10 year river ARI
100 year ocean ARI + 0.2m SLR

Melbourne Water Hazard Class

- H1
- H2
- H3
- H4
- H5
- H6
- Swash Zone

0 — 1 kilometers
Scale 1:21,530

Cardno

Map Produced by Cardno Victoria
Date: 26/09/2017
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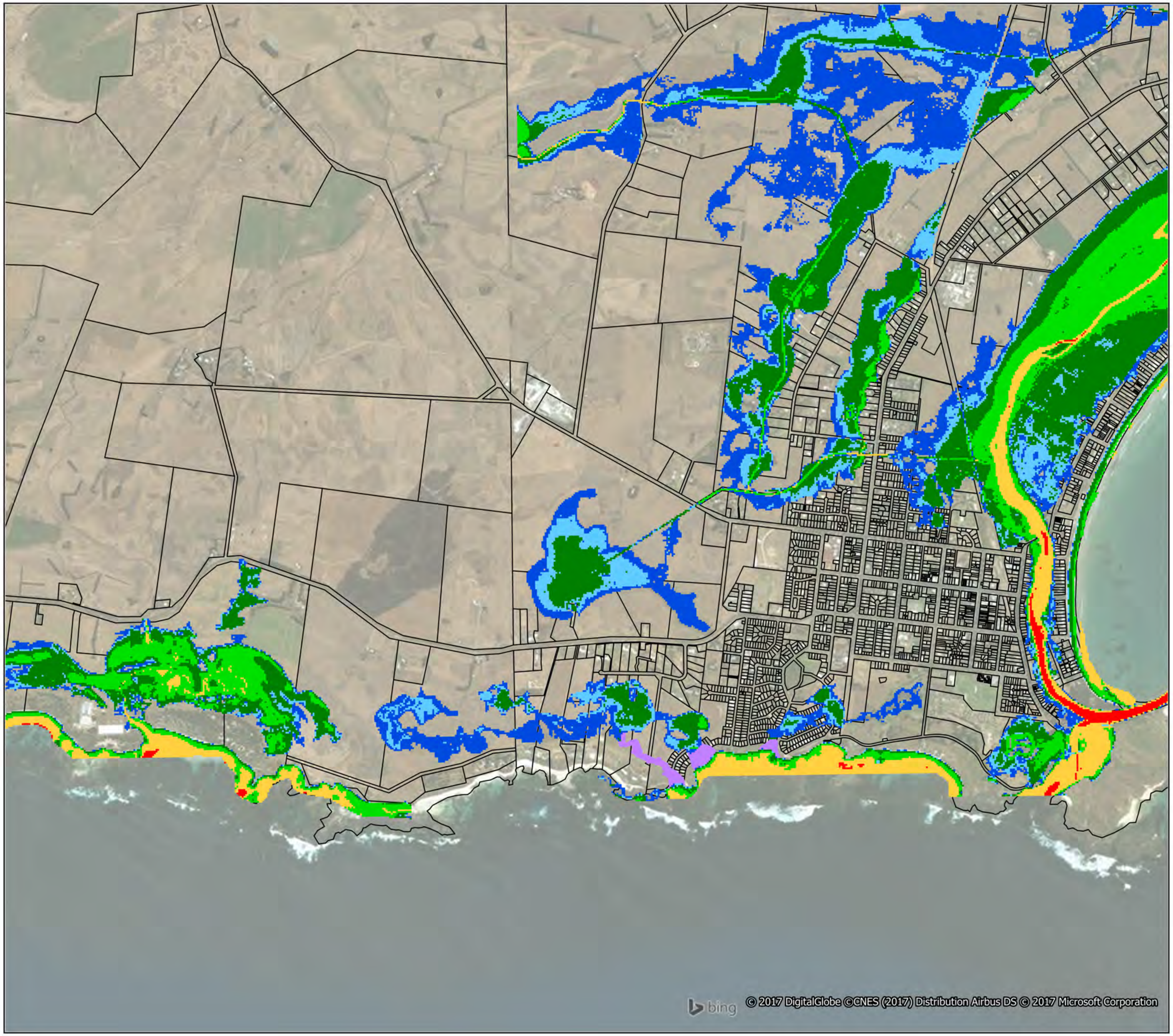

Port Fairy Township Hazard Classes

2050
10 year river ARI
100 year ocean ARI + 0.4m SLR

Melbourne Water Hazard Class

- H1
- H2
- H3
- H4
- H5
- H6
- Swash Zone

0 1
kilometres
Scale 1:21,530

Cardno

Map Produced by Cardno Victoria
Date: 26/09/2017
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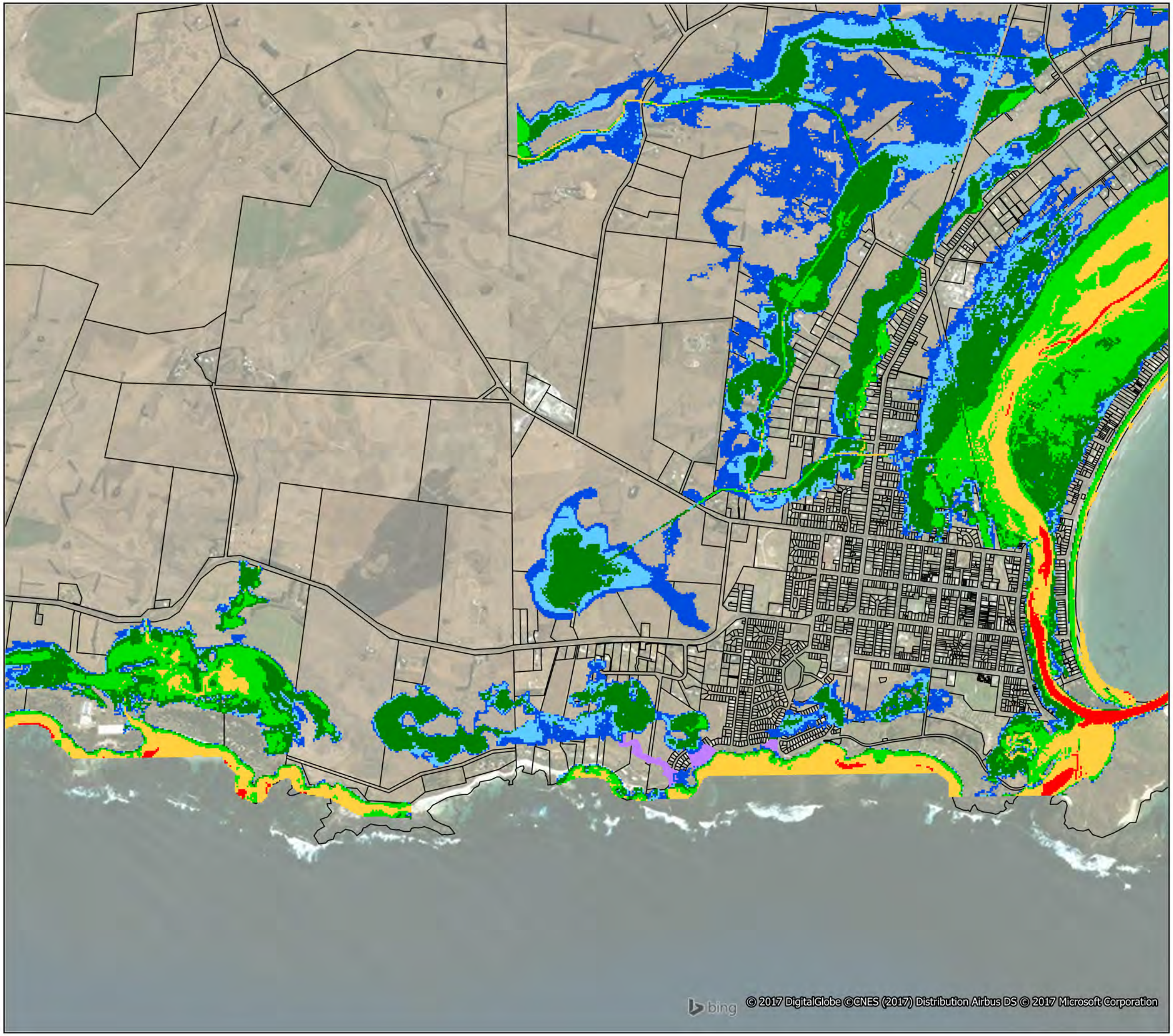

Port Fairy Township Hazard Classes

2080
20 year river ARI
100 year ocean ARI + 0.8m SLR

Melbourne Water Hazard Class

- H1
- H2
- H3
- H4
- H5
- H6
- Swash Zone

0 1
kilometres
Scale 1:21,530

Cardno

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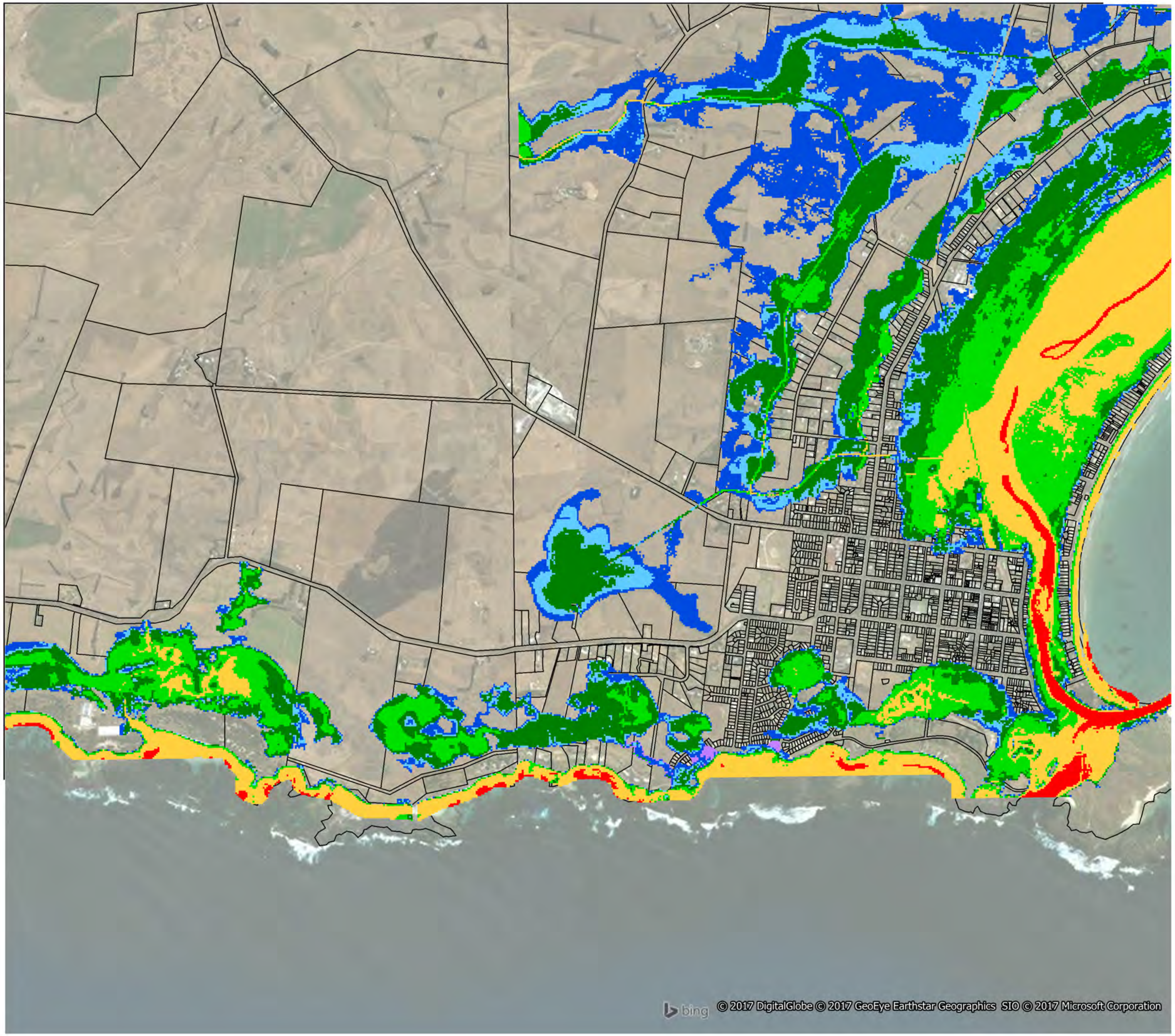

Port Fairy Township Hazard Classes

2100
20 year river ARI
100 year ocean ARI + 1.2m SLR

Melbourne Water Hazard Class

- H1
- H2
- H3
- H4
- H5
- H6
- Swash Zone

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kilometers
Scale 1:21,530

Cardno

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Date: 26/09/2017
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