

**BEFORE THE HEARING PANEL IN TIMARU**

**IN THE MATTER** of the Resource Management Act 1991

**AND**

**IN THE MATTER** of the hearing of submissions in relation to the Proposed  
Timaru District Plan

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**STATEMENT OF PRIMARY EVIDENCE OF SAMUEL CASEY MORGAN ON  
BEHALF OF PRIMEPORT TIMARU LIMITED AND TIMARU DISTRICT  
HOLDINGS LIMITED**

**HEARING STREAM F - COASTAL ENVIRONMENT**

Dated: 9 April 2025

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## **EXECUTIVE SUMMARY**

1. My full name is Samuel Casey Morgan. I am employed as Technical Principal- Coastal Adaptation at WSP NZ Ltd.
2. I have prepared this statement of evidence on behalf PrimePort Limited (**PrimePort**) and Timaru District Holdings Ltd (**TDHL**) in respect of matters arising from PrimePort and TDHL's submissions and further submissions on the Proposed Timaru District Plan (**Proposed Plan**).
3. This evidence is in relation to coastal hazard and management that are address in the CE-Coastal Environment chapter of the Proposed Plan.
4. Due to their coastal nature, Ports in general and their associated activities are inherently susceptible to coastal hazards. PrimePort and Port Zone is most susceptible to coastal inundation which will occur more frequently with sea-level rise (**SLR**).
5. At present I consider the risk from coastal hazard to be reasonably low. However, as the effects of future SLR are realised the risk begins to escalate.
6. However, due to the nature of work undertaken at PrimePort, it is my opinion that they are well placed to manage the potential impacts from coastal hazards across the Port Zone.
7. Due to the need for port infrastructure to be located in these locations the range of adaptation management responses available for use is limited.
8. A regulatory framework that enables adaptation management and measures in the right situations will assist in the success of such approaches.

## **INTRODUCTION**

9. My full name is Samuel Casey Morgan. I am a Technical Principal - Coastal Adaptation at WSP New Zealand based in Gisborne.

### **Qualifications and experience**

10. I hold a Master of Science Degree (Hons) in Marine Science, specialising in the Geosciences, from the University of Auckland.
11. I am a Co- Chair of the New Zealand Coastal Society and hold a General Environmental Practitioner Certification in the fields of coastal processes and

coastal management under the Environment Institute of Australia and New Zealand scheme.

12. In 2008, I started at the Rodney District Council in an operational role undertaking the maintenance and development of coastal assets within the district. Prior to this, I was involved in research and teaching at the University of Auckland (UoA) and University of Wollongong, as well as research at the Elkhorn Slough Estuarine Research Centre in California.
13. Between 2009 and 2011, I worked for Davis Coastal Consultants on a range of coastal management and engineering projects. Following this, I was employed by Auckland Council as a Senior Coastal Specialist from August 2011 to January 2016, and then with AR & Associates, as an Associate - Coastal Scientist between 2016 and early 2018.
14. While at 4Sight Consulting Limited from 2018 as Principal Coastal Consultant, I managed a range of coastal management projects and provided coastal science inputs. Part of this role involved the review of coastal processes aspects for resource consent applications, including technical reviews of the America's Cup basin and wharf extensions at Ports of Auckland.
15. I joined WSP NZ as a Technical Principal - Coastal Adaptation in October 2022. In this role I am primarily involved in the development of coastal management responses to coastal hazard risk. This involves an understanding of the science, public engagement, Iwi engagement, planning and engineering aspects of coastal management.
16. This evidence is in relation to coastal hazards and management that are addressed in the CE-Coastal Environment chapter of the Proposed Plan.
17. In preparing this evidence I have considered the following documents:
  - (a) Proposed Timaru District Plan- Coastal Environment Chapter.
  - (b) NIWA, 2020. Timaru District Coastal Hazard Assessment Coastal Inundation, Prepared for Environment Canterbury. June 2020.
  - (c) MacDonald, Kate (2020). Timaru Coastal Erosion Assessment. Prepared by Jacobs, July 2020 on behalf of Environment Canterbury and Timaru District Council.

- (d) Evidence of Derek Todd on the Coastal Environment Chapter of the Proposed Timaru District Plan in relation to coastal natural hazards. Dated 20 March 2025
- (e) Evidence of Cyprien Bosserelle on the Coastal Environment Chapter of the Proposed Timaru District Plan in relation to coastal natural hazards. Dated 28 February 2025.
- (f) Memo from Nick Griffiths on the Flood Assessment Overlay. Dated 28 February 2025.

18. I am authorised to provide this evidence on behalf of PrimePort and TDHL.

### **Code of conduct**

19. While this is a Council hearing, I have read the Code of Conduct for Expert Witnesses (contained in the 2023 Practice Note) and agree to comply with it. Except where I state I rely on the evidence of another person, I confirm that the issues addressed in this statement of evidence are within my area of expertise, and I have not omitted to consider material facts known to me that might alter or detract from my expressed opinions.

### **Scope of evidence**

20. My statement of evidence addresses the following matters:

- (a) Coastal Hazard Exposure;
- (b) Port Activity Risk Profiles;
- (c) Adaptive Management Principles; and
- (d) Proposed Plan Context

21. I address each of these points in my evidence below.

### **PRIMEPORT COASTAL HAZARD EXPOSURE**

22. Ports by nature are inherently exposed to coastal inundation and coastal processes hazard risks. Under the notified version of the Proposed Plan the Port Zone is subject to multiple hazard overlays. The notified version of the Proposed Plan did not extend the High Hazard Area overlay over the Port Zone, however the Section 42A Report<sup>1</sup> has recommended an amendment

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<sup>1</sup> Paragraph 7.5.7 of Mr Willis's Section 42A Report.

to the definition of High Hazard Area that would capture parts of the Port Zone.

23. A *High Hazard Area* as notified was defined as “flood hazard areas subject to inundation events where the water depth (metres) x velocity (metres per second) is greater than or equal to 1 or where depths are greater than 1 metre, in a 0.2% annual exceedance probability flood event”. The Section 42A Report now proposes to define a High Hazard Area as:

‘a. land likely to be subject to coastal erosion; or

b. land where there is inundation by floodwater and where the water depth (metres) x velocity (metres per second) is greater than or equal to 1, or where depths are greater than 1 metre, in a 0.2% Annual Exceedance Probability flood event.

When determining a. and b. above, the cumulative effects of climate change over the next 100 years (based on latest national guidance) and all sources of flooding (including fluvial, pluvial, and coastal) must be accounted for.’

24. The section of coast extending from the Port entrance toward Patiti Point, known as South Beach, has been shown to be growing seaward at between 0.5-2.4m/yr based on research published from the University of Auckland<sup>2</sup>. The area of greatest accumulation occurs within the central portion of the beach, but the method of measurement does not account for active management of the northern part of the system. Overall, this type of behaviour is expected to provide a degree of resilience to erosion associated with future SLR.
25. The Port Zone is susceptible to coastal inundation and the degree of risk is expected to increase with future SLR. Under present day conditions there is a minor amount of inundation of the Port area under a 0.2% AEP event with greatest water depths situated near the wharf interfaces. Under current projections inundation during storm events is not considered to be a significant issue until beyond 2060.
26. It is noted that even under future SLR conditions the Port Zone will only be impacted by coastal inundation during storm conditions and without any modifications to ground levels or other infrastructure.
27. I agree with Dr. Bosserelle that modelling by NIWA is likely conservative in the Port area as it underestimates the damping role of existing rock revetment on inundation as well as specific stormwater management in the

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<sup>2</sup> <https://felt.com/map/Coastal-change-rates-BLpLUAXDQVOXGMbUIVLSbA?loc=-44.396868,171.266233,15.93z>  
Recovered 31 March 2023.

Port area. However, I also recognise that there is an obvious risk to the Port Zone from coastal inundation.

## **PORT ACTIVITY RISK PROFILES**

28. Under the New Zealand Coastal Policy Statement 2010 (NZCPS), risk is defined as the consequences of an event and the likelihood of occurrence.
29. In order to better understand the impact of coastal inundation across PrimePort WSP have undertaken a high-level risk assessment. This involved classifying and mapping the various activities across the area and then investigating water depths under different flooding scenarios. Maps of flood extents and infrastructure exposure can be found in Appendix A.
30. The maps have been produced using updated survey information provided by PrimePort and respective tide and storm surge levels obtained from the NIWA modelling. The different SLR scenarios were obtained from the NZ SeaRise website.
31. The different activity types were first identified via aerial imagery and then confirmed by PrimePort.
32. The different activity types have been assigned a relative risk profile as can be seen in the table below. This risk profile and respective waters depths under different scenarios provide an understanding of the risk of different activities at PrimePort. The basis for the risk profile assessment summaries provided below was the definition of a High Hazard Area, noted above including the proposed definition change. This analysis has only focused on infrastructure located within the PORTZ zone identified in the Proposed Plan.

<b>Risk Profile</b>	<b>Activity</b>
<b>Extreme/Highest</b>	1. Hazardous Substances - Chemical/Fuel
<b>High</b>	2. Agricultural/ Engineering
<b>Medium</b>	3. Transportation (Kiwirail, Prime Port, Container Terminal)
<b>Medium/low</b>	4. Food processing and storage
<b>Low</b>	5. Recreational/art/cultural
<b>Low</b>	6. General Storage
<b>Lowest</b>	7. Carparks and public toilets

33. Under current day 500-year ARI coastal event, flooding is shown to extend across the southern port area (with flood depths up to 0.5m), and to a lesser degree throughout the central Port area (with flood depths of 0.1m in most areas and up to 0.3m flood depths). Under this scenario flood depths greater than 1.0m are predicted along the northern Port area.

Under a current day 500-year ARI coastal storm, no high-risk activities (Hazardous Substances and Agricultural/ Engineering) are exposed to flood depths over 1.0m.

34. The current day 500-year ARI event with 0.2m of SLR (indicative timeframe out to 2040), shows a small increase to the flood depths and extent in the southern and central port areas. Flood depths of 0.5m are shown in the central port area, with flood depths to up to 1.5m in the southern port area. Small, localised areas within the central port area show flood depths between 0.5m and 1.0m. Under this scenario, flood depths greater than 1.5m are shown in northern port area.

Under a current day 500-year ARI coastal storm with 0.2m of SLR a total of 15 assets, within high-risk activities (12 Hazardous substances and 3 Agricultural/ Engineering assets), are at risk from flood depths between 0m and 0.5m, 18 assets (4 hazardous substances and 14 agricultural/ engineering assets) are at risk from flood depths between 0.5m and 1.0m, and 1 asset (agricultural/ engineering asset) is at risk from flood depths between 1.0m and 1.5m.

35. The current day 500-year ARI event with 0.5m of SLR (indicative timeframe out to 2060) shows an increase to the flood depths and extent in the southern

and central port areas. Flood depths of up to 1.0m are shown in the central port area, with flood depths to up to 1.5m in the southern port area. Small, localised areas within the central port area show flood depths between 1.0m and 1.5m. Under this scenario, flood depths greater than 1.5m are shown in the northern port area.

Under a current day 500-year ARI coastal storm with 0.5m of SLR a total of 23 assets, within high-risk activities (21 Hazardous substances and 2 Agricultural/ Engineering assets), are at risk from flood depths between 0m and 0.5m, 7 assets (3 hazardous substances and 4 agricultural/ engineering assets) are at risk from flood depths between 0.5m and 1.0m, and 17 assets (4 hazardous substances and 13 agricultural/ engineering assets) are at risk from flood depths between 1.0m and 1.5m.

36. The current day 500-year ARI event with 1.0m of SLR (indicative timeframe out to 2120), shows an increase to the flood depths and extent in the southern and central port areas. Flood depths of 1.0m are shown in the central port area, with flood depths up to 1.5m in the southern port area. Small, localised areas within the central port area show flood depths between 1.0m and 1.5m. Under this scenario, flood depths greater than 1.5m are shown in northern port area.

Under a current day 500-year ARI coastal storm with 1.0m of SLR a total of 2 assets, within high-risk activities (1 Hazardous substances and 1 Agricultural/ Engineering assets), are at risk from flood depths between 0m and 0.5m, 23 assets (21 hazardous substances and 2 agricultural/ engineering assets) are at risk from flood depths between 0.5m and 1.0m, 7 assets (3 hazardous substances and 4 agricultural/ engineering assets) are at risk from flood depths between 1.0m and 1.5m, and 18 assets (4 hazardous substances and 14 agricultural/engineering assets) are at risk from flood depths greater than 1.5m.

37. The current day 500-year ARI event with 1.2m of SLR (indicative timeframe out to 2130) shows similar areas susceptible to flooding however flood depths and extents increase with depths to up to 1.9m in the southern port area and up to 1.5m in the central port area. Flood depths over 1.5m are shown along the inner port area and northern port area.

Under a current day 500-year ARI coastal storm with 1.2m of SLR a total of 5 assets, within high-risk activities (3 Hazardous substances and 2 Agricultural/ Engineering assets), are at risk from flood depths between 0m and 0.5m, 14 assets (13 hazardous substances and 1 agricultural/ engineering assets) are at risk from flood depths between 0.5m and 1.0m, 15 assets (12 hazardous substances and 3 agricultural/ engineering assets) are at risk from flood depths between 1.0m and 1.5m, and 19 assets (4 hazardous substances and 15 agricultural/engineering assets) are at risk from flood depths greater than 1.5m..

38. The current day 500-year ARI event with 1.5m of SLR (indicative timeframe out to 2150), shows an increase in flood depths and extents, particularly to the central and southern port area where flood depths over between 1.0m and 1.5 and over 1.5m are shown to encroach further inland.

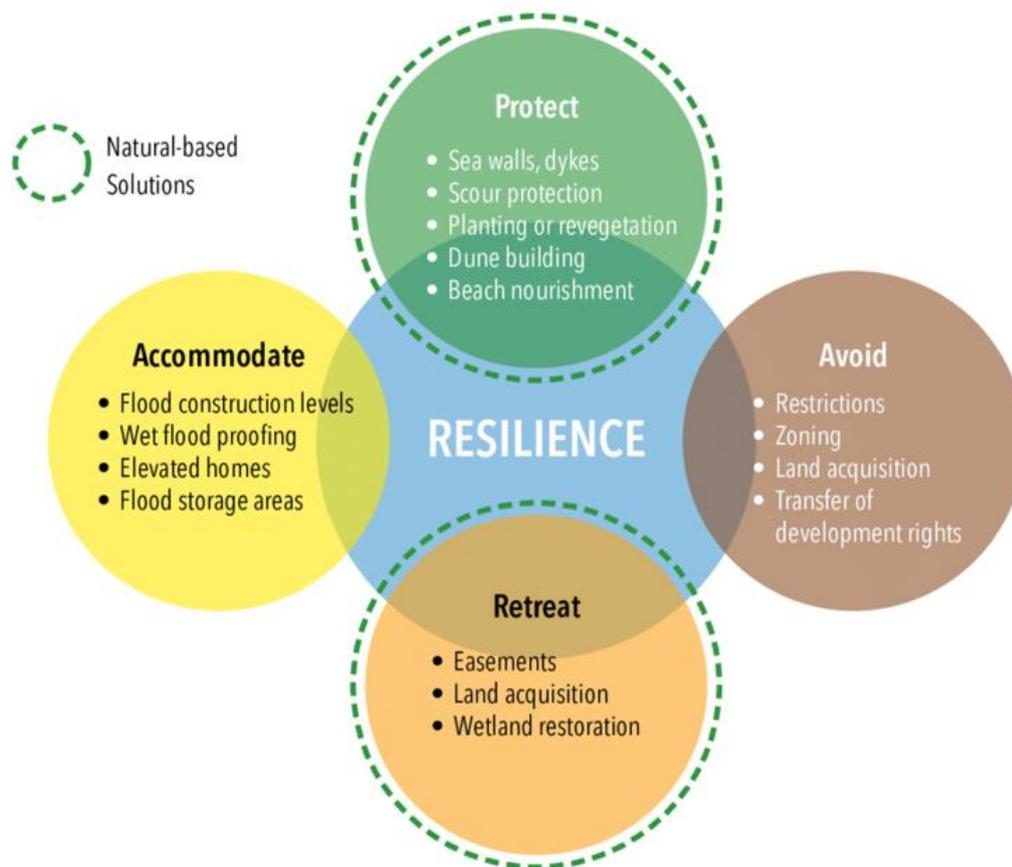
39. Under a current day 500-year ARI coastal storm with 1.2m of SLR a total of 9 assets, within high-risk activities (8 Hazardous substances and 1 Agricultural/ Engineering assets) are at risk from flood depths between 0m and 0.5m, 2 assets (1 hazardous substances and 1 agricultural/ engineering asset) are at risk from flood depths between 0.5m and 1.0m, 23 assets (21 hazardous substances and 2 agricultural/ engineering assets) are at risk from flood depths between 1.0m and 1.5m, and 26 assets (7 hazardous substances and 17 agricultural/engineering assets) are at risk from flood depths greater than 1.5m.

LIDAR elevations show that along the southern port area, the gravel berm/dune along this section of the coast is lower than the northern section of south beach up to the split. As a result of the gravel berm being lower along this section of coastline, there are greater flood depths in the southern area which could be suggested to be due to overtopping along this section of the coast. Using the risk profile of activities, the activities located within this area have a medium risk profile, where the activities within this area are used for transportation purposes (Kiwirail, container storage etc.).

40. It is noted that no infrastructure is thought to be at risk outside of storm conditions under any SLR scenarios investigated.

#### **ADAPTIVE MANAGEMENT PRINCIPLES**

41. The PARA framework sets the general principles of Protect, Accommodate, Retreat and Avoid in the development of adaptation management strategies. These principles are essentially a broad reference to the intent of different approaches to provide resilience. The framework is explained in the figure below.



42. As there is a functional need for ports and associated activities to be located within an area subject to coastal hazard, I do not consider the adaptation management responses of Retreat and Avoid are applicable or appropriate across the full range of port activities.
43. As a part of its regular activities, PrimePort is monitoring tide levels and weather conditions, as stated in Mr Cooper's evidence. Therefore, I consider them well placed to implement adaptation measures in response to future changes in coastal hazard dynamics.
44. This includes maintenance of gravels being deposited on South Beach as a means of tracking future erosion potential.
45. This type of work will allow for sufficient lead in, with appropriate triggers, to allow for the employment of adaptation measures and these will be able to be better refined as the science evolves and in response to analysis of monitoring data.
46. Further, this type of work will easily tie into existing asset management and renewal programmes across the site.

47. Development and use of the risk framework discussed above will ultimately dictate the application of adaptation measures from within the PARA framework.
48. For example, those lower risk type activities subject to a lesser degree of hazard exposure (<1m water depths) may be suitable to accommodate types of measures such as raising high risk elements like electrical supply points.
49. Medium risk activity types may require a mix of protect and accommodation measures, depending on the specific elements of the activity. These types of measures include inundation & flood proofing (membranes and sealants), and raising service equipment (heating, ventilation, air conditioning, plumbing appliances, raising duct systems and electrical equipment). Protection measures such as flood gates may also be appropriate.
50. High risk activity types may need to rely more on protection measures such as bunding to prevent coastal water inundation.
51. As asset renewals and redevelopment of the Port Zone is undertaken, there may be opportunities to relocate high hazard activities to areas within the zone that present a lower hazard exposure risk. These opportunities may also be further enhanced by the employment of engineering measures such as improved drainage and stormwater management to lessen the hazards exposure.
52. Further, adaptation management is typically dynamic in nature, responding to observed changes in hazard behaviour over time. Because of this dynamic nature, the regulatory environment needs a flexible and enabling regime for the application of adaptation plans and mechanisms.

## **PROPOSED PLAN CONTEXT**

53. I have reviewed the relevant PORTZ specific provisions drafted by the planners and support these provisions as being appropriate and reasonable within the Port Zone.
54. This is because there is an allowance for the inclusion of adaptive measures to be developed to manage risk across the Port Zone
55. With the exception of one point which I discuss below, I agree with Dr. Bosserelle's and Mr. Todd's comments with respect to specific coastal hazard provisions within the Proposed Plan for the Port Zone.

56. I do not agree with Dr. Bosserelle's commentary that a restricted discretionary rule be developed to avoid development that increases the risk to people in the medium to long term, unless Dr Bosserelle's commentary means to simply support restricted discretionary status for natural hazard sensitive buildings that do not mitigate potential flood hazard, which new rule CE-RXX Natural Hazard Sensitive Buildings within the PORTZ achieves. In my opinion, the rule framework now suggested, addresses the risk adequately.
57. I note in rule CE-R9 as proposed in the Section 42A Report there is an allowance for the Crown, Canterbury Regional Council or the Timaru District Council to undertake natural hazard mitigation works where they are for the operation, maintenance, replacement or upgrading of these works. In my opinion, I consider it is both reasonable and appropriate that PrimePort as an infrastructure operator be afforded the same measures.
58. This will allow PrimePort to respond to damage occurring from hazardous events such as severe storms. In some cases this may be critical to continued Port operations. Furthermore, PrimePort are best placed to understand the work required to alleviate or remedy the risk.
59. I note the Coastal Erosion Overlay now includes the South Beach. I do think it is reasonable to include the Coastal Erosion Overlay, as there is a degree of hazard risk associated with this and the overlay seeks to minimise the risk.
60. I understand that the Coastal Erosion Overlay along South Beach is intended to allow for short term storm erosion demand. This is the amount of beach retreat that might be possible under extreme storm conditions. For South Beach it is my understanding that long term erosion has not been allowed for as the beach is accretionary in nature. But it is unclear how this has been mapped along South Beach.
61. Prior investigations estimated worst case short-term erosion along South Beach to be in the order of 17.7m. Typically this would be mapped from the MHWS line and the MHWS line + SLR and an example is provided in the image below. This has been produced using the most recent survey of the area and creating offsets from respective MHWS marks.



62. Further, I am unclear how the landward boundary might change with an accreting system such as South Beach. For example, if the storm erosion demand is 17.7m measured landward from MHWS and beach (and MHWS) is accreting by 2m/yr then the hazard risk is also shifting seaward with the growing beach.

**CONCLUSION**

63. PrimePort, due to the nature of its function, needs to be located within areas subject to potential coastal hazard risk.

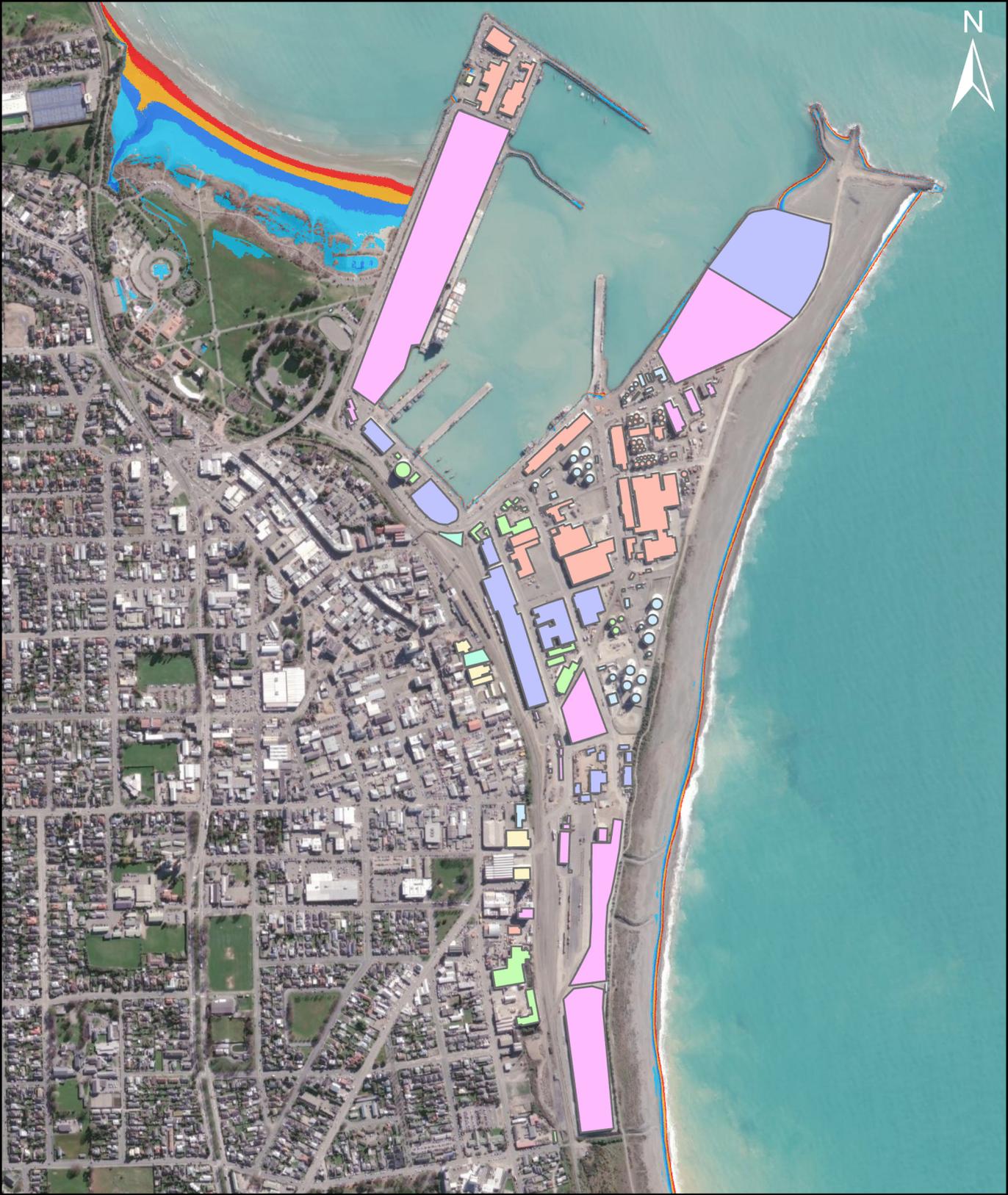
64. Coastal inundation during storm events presents the biggest coastal hazard risk to PrimePort. This risk is expected to increase with future SLR.
65. PrimePort is well placed through existing monitoring and asset management programmes to manage this risk through adaptive management mechanisms.
66. The proposed new policy and rule framework will enable the Port and associated businesses to continue to operate and develop in the PORTZ while providing sufficient flexibility to implement flexible and dynamic adaptation measures as necessary.
67. The basis for mapping the new proposed Coastal Erosion Overlay on South Beach is not sufficiently clear to enable me to confirm whether it is appropriate or not. Further evidence on this matter from Environment Canterbury will be helpful.

Date: 9 April 2025

A handwritten signature in blue ink, appearing to read 'S. Morgan', written in a cursive style.

Samuel Casey Morgan

## APPENDIX A- COASTAL INUNDATION RISK MAPS



**LEGEND** PROJECT

**Categorised Port Activities**

- Hazardous Substances - Chemical/Fuel
- Agricultural/Engineering
- Transportation
- Food Processing and Storage
- Recreational/Art/Cultural
- General Storage
- Carparks and public toilets

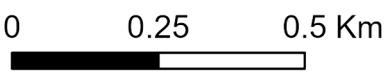
**MHWS +1m SLR Flood Depths (m)**

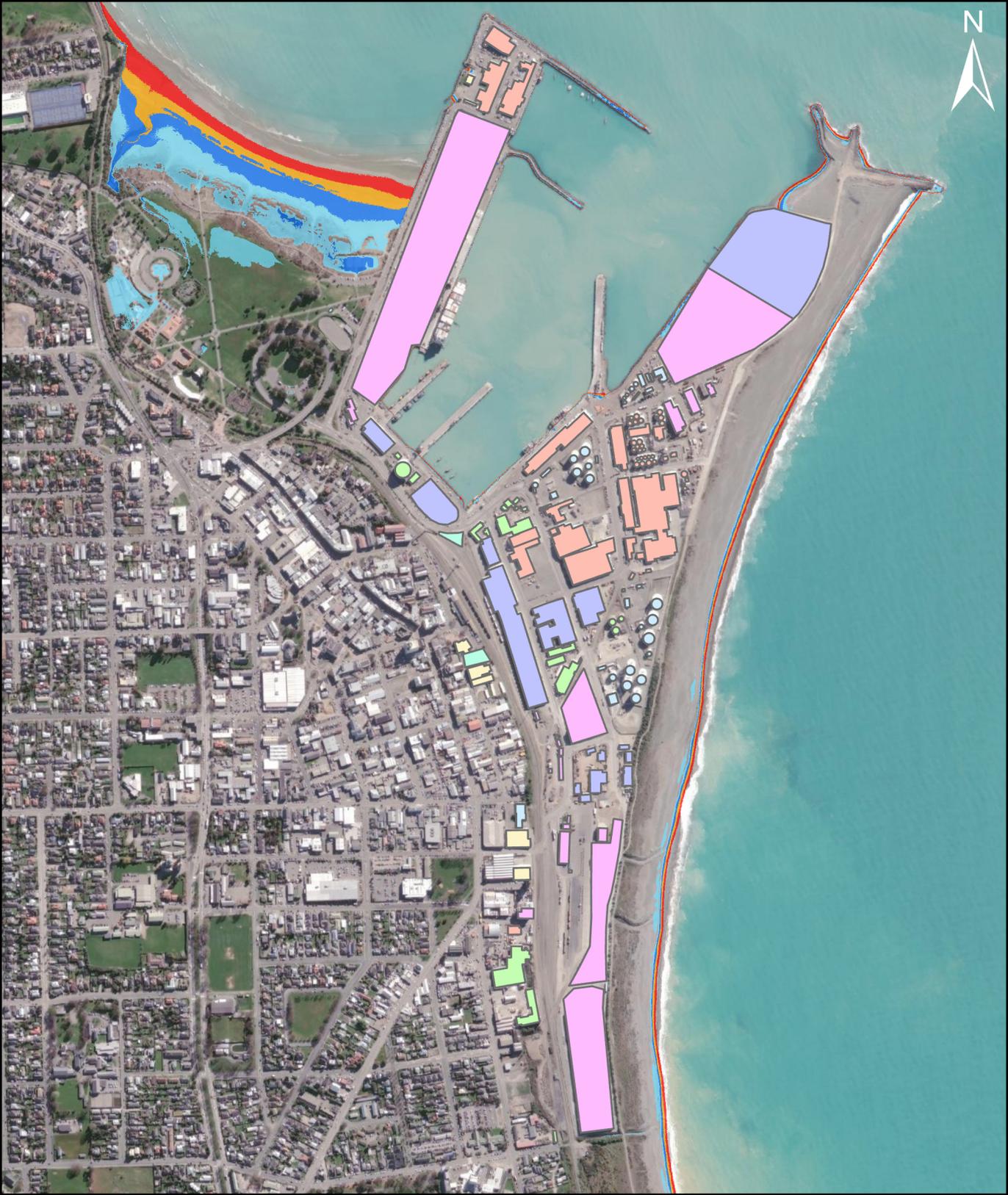
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Timaru District Council  
Timaru, Canterbury



**SCALE**





LEGEND PROJECT

Categorised Port Activities

-  Hazardous Substances - Chemical/Fuel
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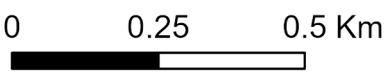
MHWS +1.2m SLR Flood Depths (m)

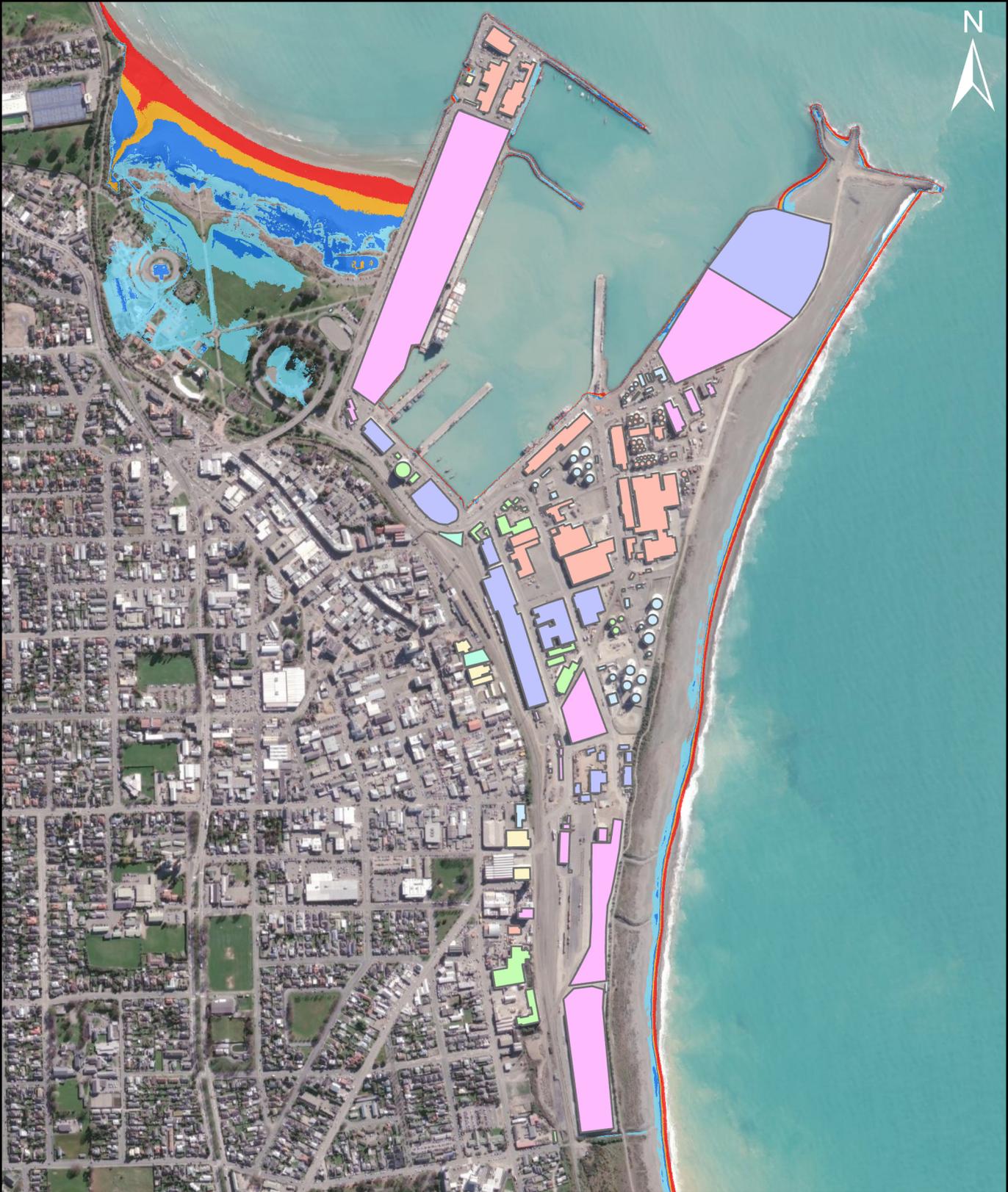
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Timaru District Council  
Timaru, Canterbury



SCALE





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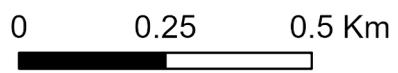
**MHWS +1.5m SLR Flood Depths (m)**

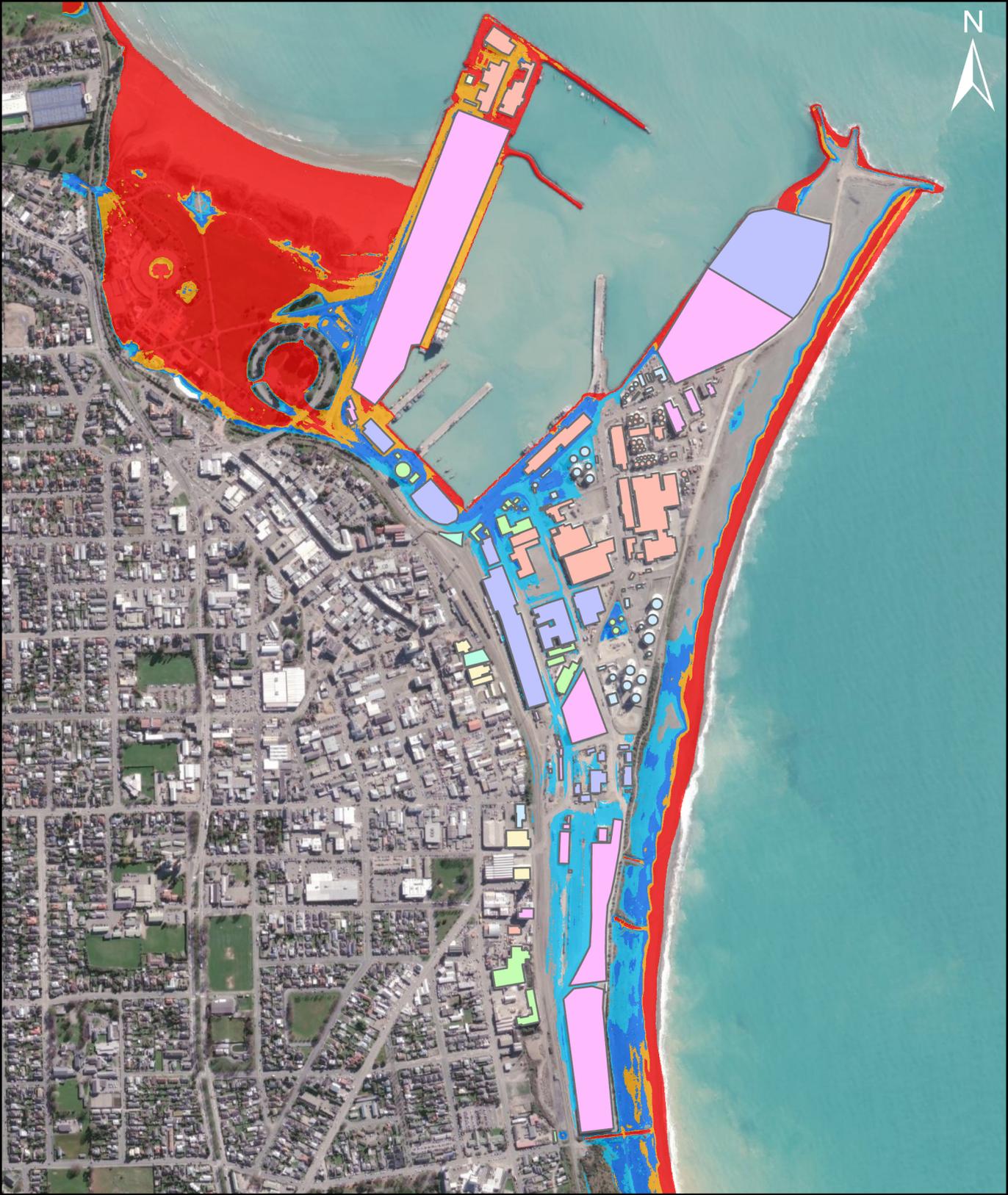
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Timaru District Council  
Timaru, Canterbury



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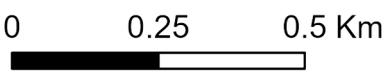
500-Year ARI Flood Depths (m)

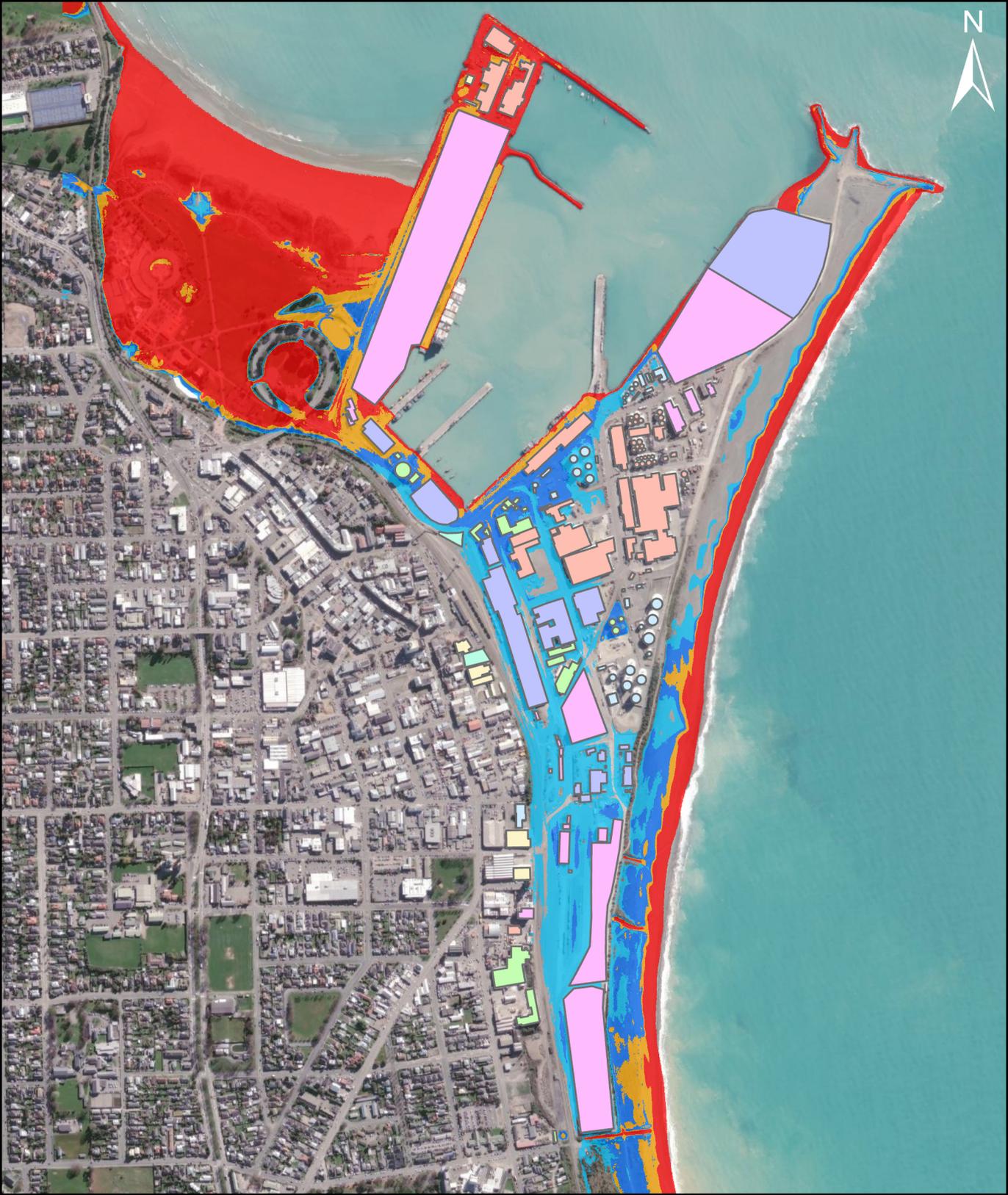
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Timaru District Council  
Timaru, Canterbury



SCALE





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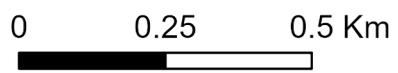
500-Year ARI + 0.2m SLR  
Flood Depths (m)

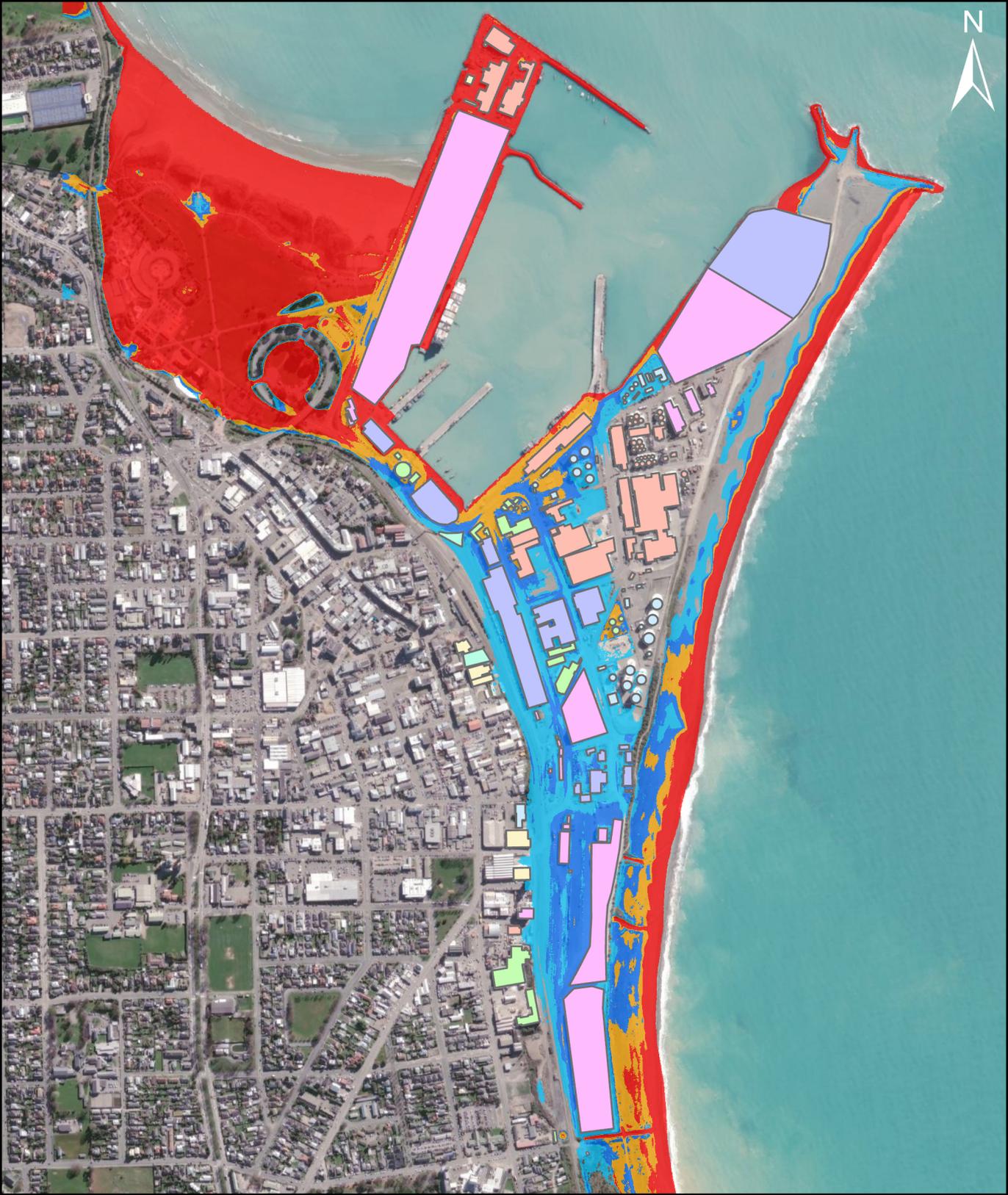
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Timaru District Council  
Timaru, Canterbury



SCALE





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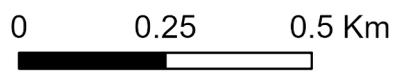
500-Year ARI + 0.5m SLR  
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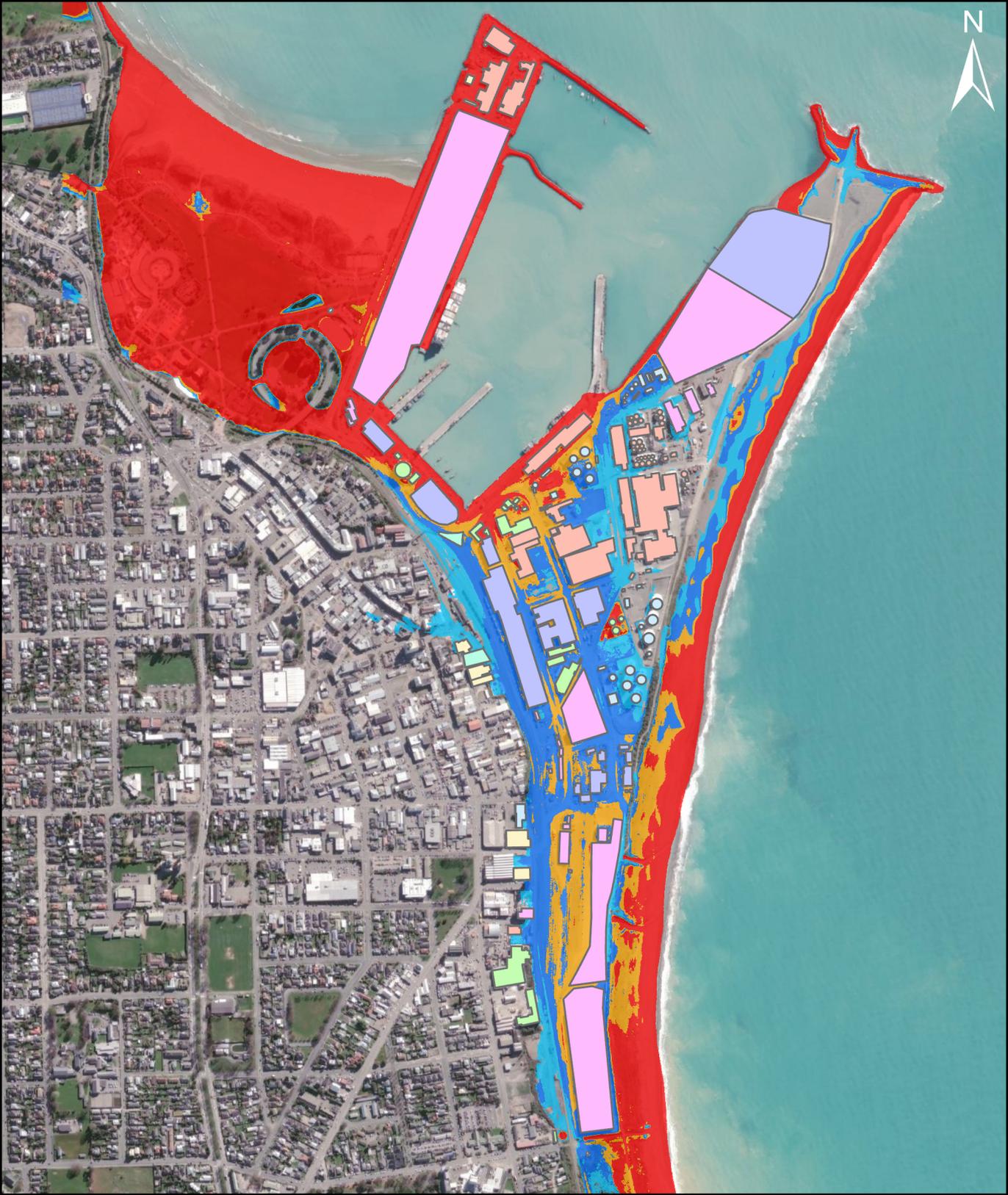
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Timaru District Council  
Timaru, Canterbury



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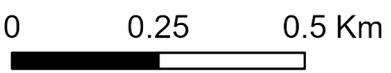
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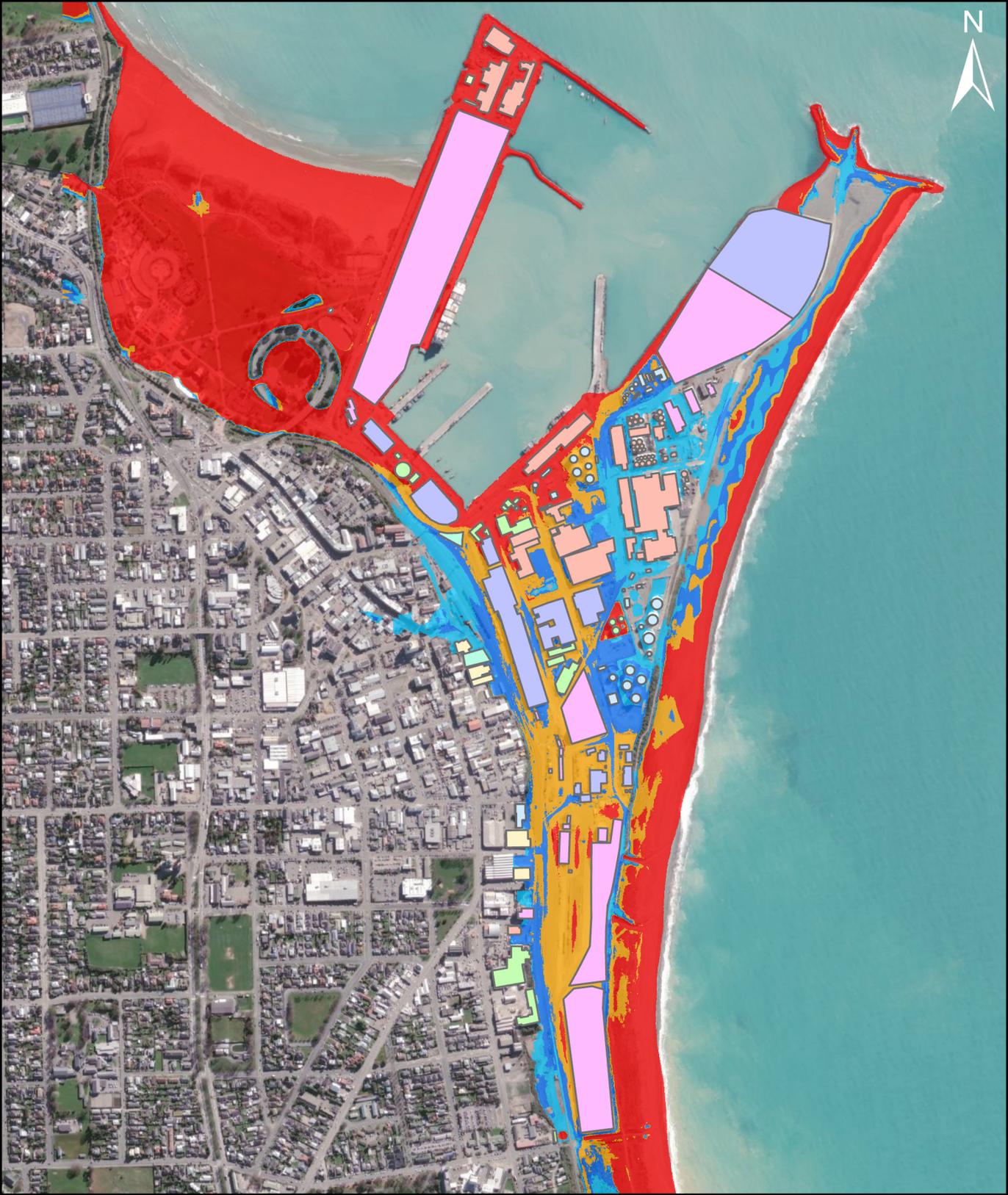
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- 0.5 - 1.0 m
- 0.0 - 0.5 m

Timaru District Council  
Timaru, Canterbury



SCALE





**LEGEND** **PROJECT**

**Categorised Port Activities**

- Hazardous Substances - Chemical/Fuel
- Agricultural/Engineering
- Transportation
- Food Processing and Storage
- Recreational/Art/Cultural
- General Storage
- Carparks and public

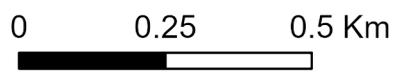
**500-Year ARI + 1.2m SLR  
Flood Depths (m)**

- > 1.5m
- 1.0 - 1.5 m
- 0.5 - 1.0 m
- 0.0 - 0.5 m

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