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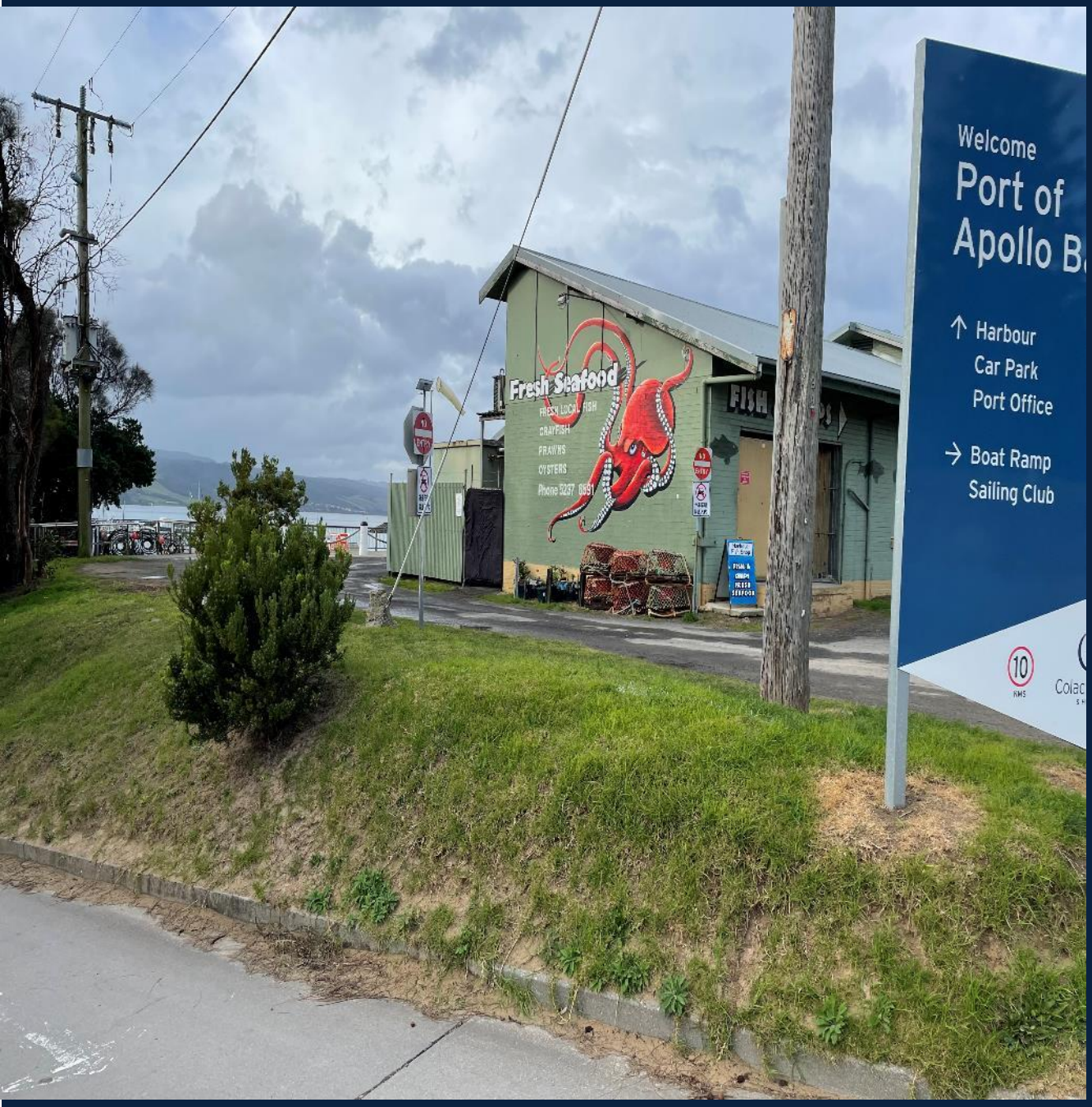

SMEC INTERNAL REF. 30043119E

Detailed Design Road Safety Audit

Apollo Bay Harbour Redevelopment

Reference No. 30043119E

Prepared for Colac Otway Shire

22 February 2022

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1 Introduction

This report presents the finding of a Road Safety Audit conducted in accordance with Austroads Guide to Road Safety, Part 6A: Implementing Road Safety Audits (2019). The Road Safety Audit is a Detailed Design Audit of Apollo Bay Harbour with the aim to inform the design process for the proposed Geelong City Deal funded harbour redevelopment. This audit has been undertaken by a team of independent Department of Transport (DoT) accredited Road Safety Auditors from SMEC's Traffic Engineering team.

In line with Austroads Guide to Road Safety, Part 6, the sites and proposed works are first contextualised in the first half of this report. Then, the audit details and findings, including a corrective action schedule, is presented in the second half.

2 Project Details

The Apollo Bay Harbour Precinct is an important asset and a major tourism opportunity for Apollo Bay and the region. It includes a number of facilities that support tourism, commercial, recreational fishing and marine safety. As just one of three safe blue havens in Victoria, west of Port Phillip Bay, the Harbour is identified in the Planning Scheme as a key development opportunity 'to deliver economic benefits to the Shire and promote Apollo Bay as a tourist destination.'

Colac Otway Shire is the designated Port Manager for the harbour through an agreement with the State Government and is responsible for its management, operations and maintenance. The redevelopment and improvement of the harbour has been a long-term goal for Council and the Community. It would create a major boating, recreational and visitor destination for Apollo Bay and the region, whilst needing to protect the landscape, environment, heritage and authenticity of the harbour.

Growing tourism numbers and a desire to increase port activities are creating amenity and safety concerns which include limited parking (bus, car, boat trailer, etc), pedestrian/cyclist safety and connectivity issues, port operational activities, golf course activities and limited public convenience/amenity.

Specifically, the redevelopment proposed as part of this project will include but not be limited to:

- Upgrading of Mothers Beach Car Park;
- Harbour Precinct Entry Road upgrade;
- Breakwater Road upgrade;
- Provision and/or upgrade of pedestrian and bicycle paths.

A locality plan for the site is provided below in Figure 1 with an aerial image presented in Figure 2, and photographs provided in Appendix A.

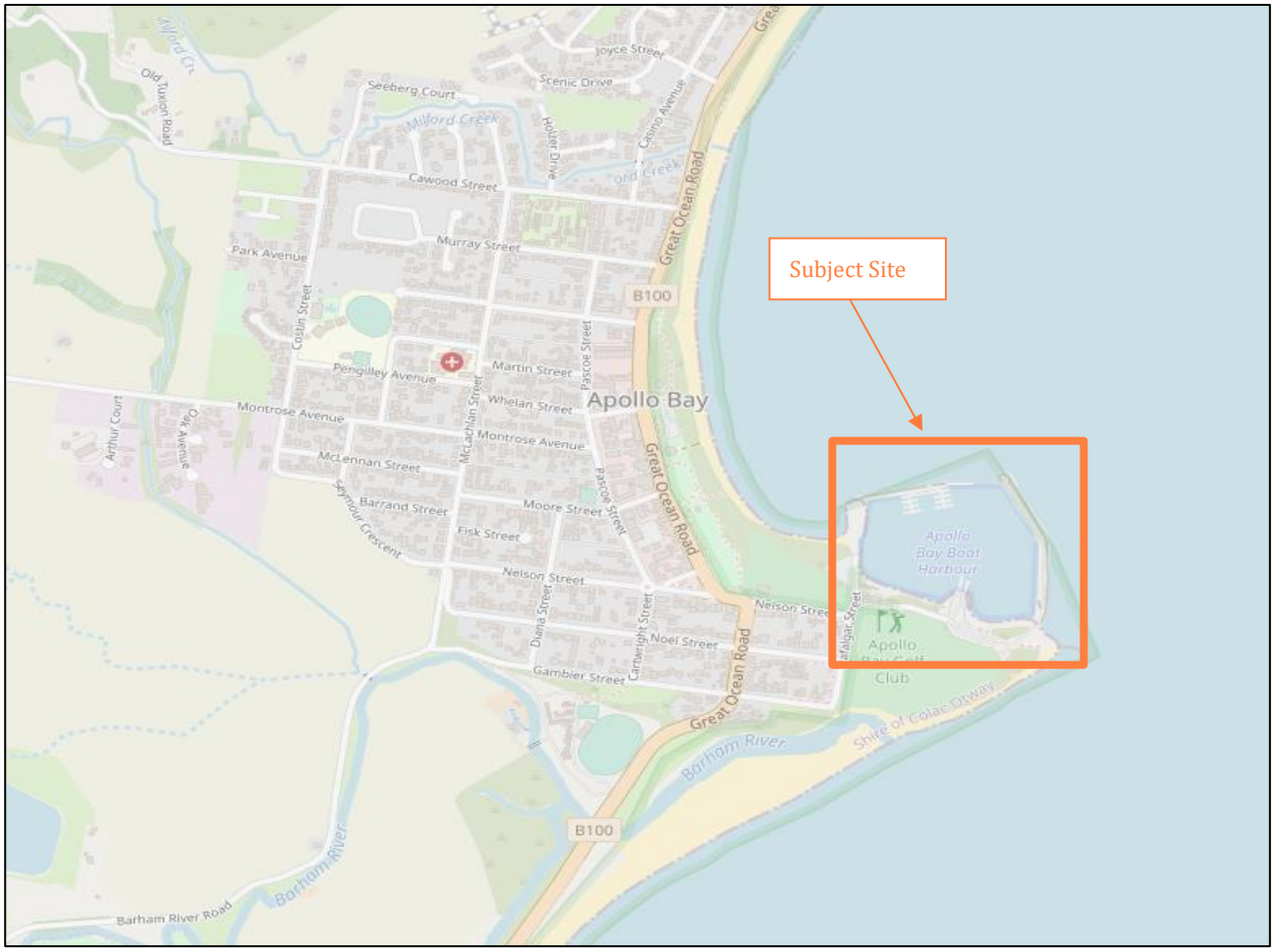


Figure 1. Site locality map (Source: OpenStreetMap.Org)

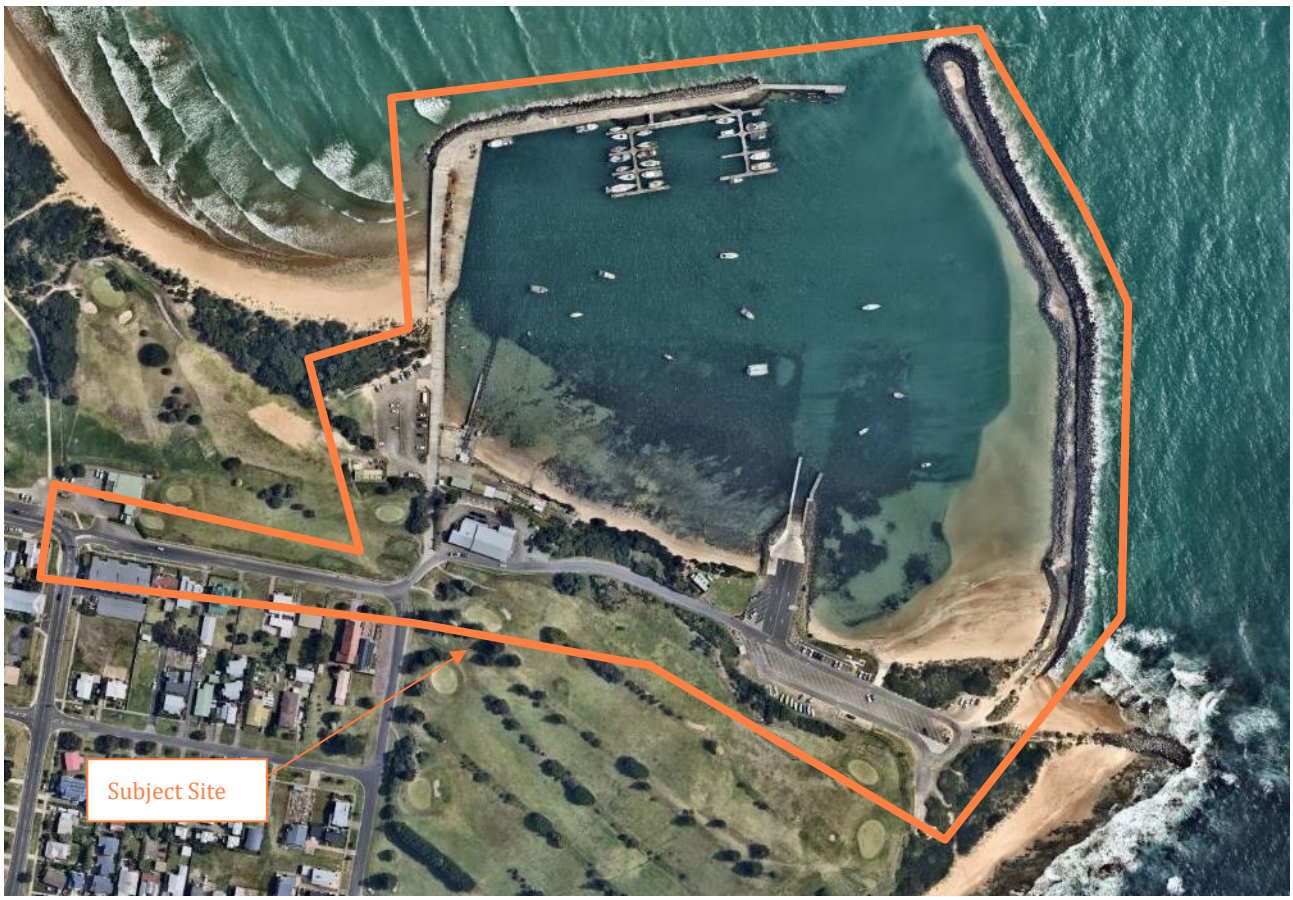


Figure 2. Aerial Imagery (Source: NearMap)

3 Existing Conditions

3.1 Road Network

3.1.1 Arterial Network (Department of Transport Managed)

The Great Ocean Road is an Australian National Heritage listed road connecting Torquay and Allansford generally following the south coast of Victoria. The road is a marked two-lane, two-way B-class arterial road (also known as B100). In the vicinity of the Apollo Bay Harbour, the Great Ocean Road is estimated to carry 3,400 vehicles per day (source: Open Source data) and has a posted speed limit of 40km/h through the main commercial area.

3.1.2 Local Network (Colac Otway Shire Managed)

Nelson Street is an unmarked two-way local road that runs in a general east-west orientation from Great Ocean Road to Trafalgar Street with the urban default speed limit of 50km/h. Nelson Street forms a reverse priority T-intersection with Great Ocean Road with kerb narrowing and a traffic island to highlight the reverse priority. Kerb and channel and footpath are provided on the south side of Nelson Street from Great Ocean Road to three properties east of Great Ocean Road. East of this location Nelson Street is un-kerbed with grassed verges and a narrow seal.

Trafalgar Street is an unmarked two-way local road that runs in a general north-south alignment forming a complex intersection with Nelson Street and Breakwater Road. The urban default speed limit applies south of Nelson Street, while a 10km/h shared zone applies north of this intersection. North of Nelson Street, Trafalgar Street is in a cutting for the level transition to the inner breakwater providing access to the harbor operational area. Access to the inner breakwater is controlled via a boom gate/swipe card near Mothers Beach.

Breakwater Road is an unmarked two-way local road that runs in a general east-west alignment with a posted 10km/h shared zone. Breakwater Road provides a connection between the Fisherman's Co-op, the Sailing Club, boat ramp, boat trailer parking and the eastern breakwater.

3.2 Land Use

The uses in the subject area include General Residential, Public Park and Recreation (Apollo Bay Golf Club) and Special Use (Apollo Bay Harbour).

3.3 Active and Public Transport

3.3.1 Active Transport Facilities

Within the subject area formalised pedestrian paths are limited to the south side of Nelson Street (for three properties) and the west side of Great Ocean Road. The Great Ocean Road provides on-road bicycle lanes in the vicinity of Nelson Street. The path on the east side of Great Ocean Road is a shared user path and connects into the Apollo Bay Foreshore Reserve.

3.3.2 Public Transport Facilities

A PTV bus service to Colac via Apollo Bay, Skenes Creek & Forrest operates on Great Ocean Road near to the subject site. There are no stops near to the subject area and it is noted this service operates Wednesday only.

4 Road Safety Audit Details

4.1 Preface

This Road Safety Audit has been conducted in accordance with the Austroads Guide to Road Safety, Part 6A: Implementing Road Safety Audits (2019). Road Safety Audit is a formalised procedure, which can be applied to all phases of a road project or to an existing road system. The auditor and audit team must be independent of the designer so that the design is viewed with "fresh eyes".

In reviewing the safety aspects of a road, the reporting procedure is not intended as a redesign process. It is instead intended to outline potential or existing road safety issues and establish a basis upon which ongoing designs may produce an acceptable solution to the design intent. This includes a review of identified risks in line with Safe Systems principles, which includes an assessment of the risk in terms of its Safe System energy rating, as well as identification of possible treatment considerations that would result in a solution in line with those principles.

In accordance with the Austroads guide, this audit seeks to identify potential safety hazards, however, auditors cannot guarantee that every deficiency has been identified and if all the recommendations in this report were to be followed, this would not guarantee that this section of road is "safe". Rather, adoption of the recommendations should improve the level of safety for this road.

4.2 Auditors and Audit Process

The independent audit team for this audit consisted of Andrew Backman and Laura Procter. Andrew and Laura are DoT accredited Senior Road Safety Auditors. All auditors have been independent of the design process.

A Corrective Action Schedule summarising the findings of this Road Safety Audit is provided in Section 5 of this report. The Project Manager/Designer shall indicate in this schedule whether the finding is accepted, and if not accepted, shall provide a reason for non-acceptance.

4.3 Previous Audits

SMEC has previously undertaken audits for the Apollo Bay Harbour Redevelopment as follows:

- an existing conditions stage road safety audit dated 6th August 2021; and
- a concept design road safety audit dated 1st October 2021.

The concept design audit highlighted a number of design items to be considered during the detailed design development. These items included:

- Shared Path clearances;
- Cross sectional elements;
- Pedestrian connectivity;
- Car park delineation/layout;
- Intersection delineation/layout; and
- Delineation and signage.

4.4 Design Drawings

The following design documents were reviewed as part of the audit (refer to Appendix A):

- 3119E-001-101, 102, 111, 171, 181, 182, 201, 251, 252, 301, 421, 451, & 456 (Rev A)
- 3119E-002-101, 102, 111, 171, 251, 252, 301, 451, & 456 (Rev A)
- 3119E-003-101, 102, 111, 112, 113, 171, 181, 182, 183, 184, 201, 202, 251, 252, 253, 301, 421, 461, & 462 (Rev A)
- 3119E-004-101, 102, 111, 171, 181, 182, 183, 184, 301, 451, & 456 (Rev A)

4.5 Site Visit

A site visit was undertaken at the Existing Conditions phase for the project of the proposed works zone by a SMEC team of engineers on 15th July, 2021 between 2:30pm and 3:30pm during the day and between 7:00pm and 7:30pm at night-time. The area was dry and the weather clear, dry, and windy during the day. The evening included rain, was partly cloudy and the moon in its first quarter (waxing moon). It is assumed the site has not changed since this time and no additional site inspections have been undertaken.

4.6 Engineering References

The following references were used to conduct this audit:

- Austroads Guide to Road Safety, Part 6A: Implementing Road Safety Audits (2019);
- Austroads Safe System Assessment Framework (2016);
- Austroads Guide to Road Design Series;
- Austroads Guide to Traffic Management Series;
- Australian Standards AS1158 Series;
- Australian Standards AS1428 Series;
- Australian Standards AS1742 Series;
- Australian Standards AS2890 Series;
- VicRoads Traffic Engineering Manuals;
- VicRoads Supplements to the Austroads Guide to Road Design;
- VicRoads Supplements to Australian Standards.

4.7 Safe System Approach

The Safe System approach is a road safety philosophy that requires roads to be designed and managed so that death and serious injury are avoidable. The basic principles are:

- Humans are fallible, and will inevitably make mistakes when driving, riding or walking.
- Despite this, road trauma should not be accepted as inevitable. No one should be killed or seriously injured on our roads.
- To prevent serious trauma, the road system must be forgiving, so that the forces of collisions do not exceed the limits that the human body can tolerate.

The Safe System philosophy underpins Victoria's strategic approach to road safety. It is divided into four core interrelated pillars (shown in Figure 3):

- **Safer Roads:** Relates to both the road itself and the roadside. This considers ways to reduce the chance of a crash occurring as well as the consequence when one does occur.
- **Safer Speeds:** Relates to the speed at which vehicles are likely to travel on the road. Factors that influence operating speeds includes posted speed limits, the level of compliance with the speed limit and physical constraints. Unsafe speeds can increase both likelihood and consequence of a crash.
- **Safer Vehicles:** Relates to the safety features, including intelligent technologies that are incorporated into vehicles of different types, which contribute to crash avoidance and/or reduced crash severity.
- **Safer Road Users:** Relates to road user behaviour, driver/rider training and licensing, levels of compliance and personal safety equipment in the case of vulnerable road users such as cyclists and motorcyclists.
- **Post-Crash Care:** Relates to emergency medical and rescue response, trauma care (both at the scene and in hospital) and injury rehabilitation.

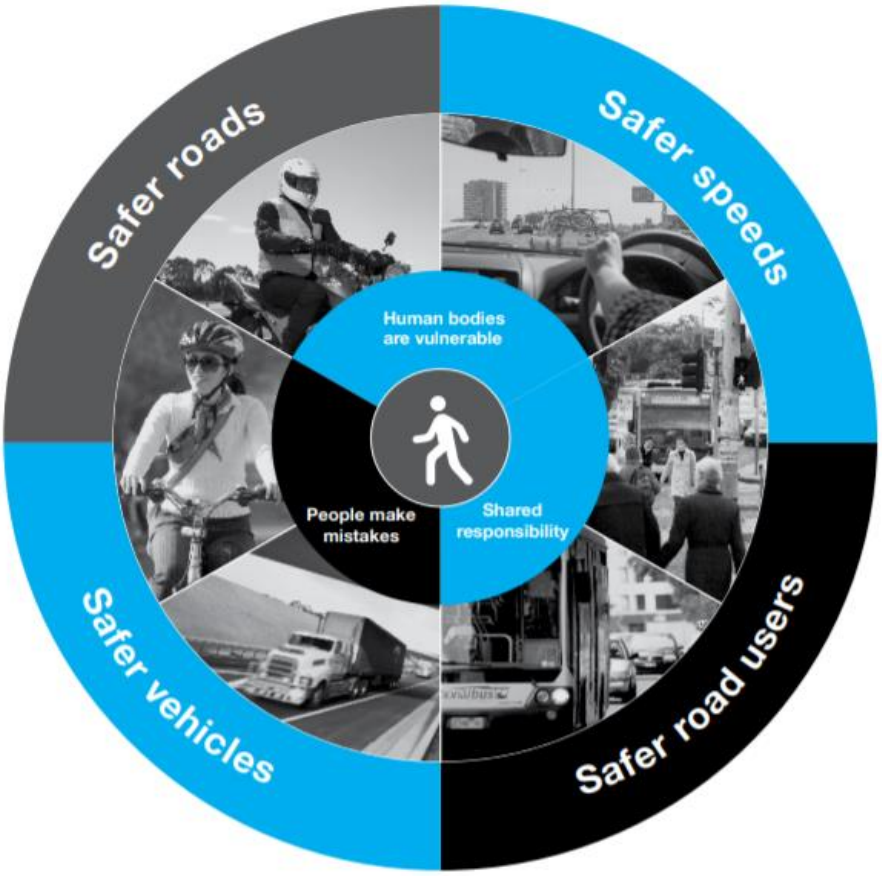


Figure 3: The Safe System (Source: TAC Towards Zero 2016-2020)

4.7.1 Safe System Energy

Safe System Tolerances are an integral reference when considering crash risk. The tolerances describe the human body's capacity to absorb the crash energy for common crash types. Beyond these energy limits, the likelihood of fatal injury is 10% (Jurewicz et al. 2015). Table 1 gives these tolerances.

Table 1. Safe System energy tolerances

Crash Type	Tolerance
Head on	70 km/h
Side impact	50 km/h
Side impact with fixed point hazard (e.g. tree or pole)	30 km/h
Impact with pedestrian, cyclist, or motorcyclist	30 km/h

In describing road safety audit findings, the crash system is either above or below the tolerance limits (those on the limit are considered above the tolerance). For crash systems above the tolerance, the Safe System Energy is considered important. Designers are encouraged to consider treating the crash types and speeds.

4.7.2 Treatments to Improve Safe System Alignment

Treatment options to improve the alignment of the project with Safe System principles will be identified. These potential treatments are outlined in the Austroads Research report AP-509-16 Safe System Assessment Framework.

Treatments are categorised as Primary, Step Towards and Supporting, as follows:

- **Primary treatments** include road planning, design and management considerations that virtually eliminate the potential of fatal and serious injuries occurring in association with the foreseeable crash types.
- **Step Towards treatments** include road planning, design and management considerations that improve the overall level of safety associated with foreseeable crash types but are not expected to virtually eliminate the potential of fatal and serious injuries occurring.
- **Supporting treatments** include road planning, design and management considerations that improve the overall level of safety associated with foreseeable crash types but are not expected to virtually eliminate the potential of fatal and serious injuries occurring. Supporting treatments do not change the ability for a Primary Treatment to be implemented in the future.

4.8 Risk Approach

To assist the Project team, for any safety-related deficiencies identified during the audit, the Likelihood (refer to Table 2) and Severity (refer Table 3) of each risk factor was determined and a risk rating (refer Table 4) was assigned to that risk factor (refer Table 5), in accordance with the Austroads guidelines. Recommendation to mitigate the risk are given in Section 5.

Table 2. How often is the problem likely to lead to a crash? (Source: AGRS – Part 6a, Table 4.1)

LIKELIHOOD	DESCRIPTION
Frequent	Once or more per week
Probable	Once or more per year (but less than once a week)
Occasional	Once every five or ten years
Improbable	Less often than once every ten years

Table 3. What is the likely severity of the resulting crash type? (Source: AGRS – Part 6a, Table 4.2)

SEVERITY	DESCRIPTION	EXAMPLES
Catastrophic	Likely multiple deaths	High-speed, multi-vehicle crash on a freeway. Car runs into crowded bus stop. Bus and petrol tanker collide. Collapse of a bridge or tunnel.
Serious	Likely death or serious injury	High or medium-speed vehicle/vehicle collision. High or medium-speed collision with a fixed roadside object. Pedestrian or cyclist struck by a car.
Minor	Likely minor injury	Some low-speed vehicle collisions. Cyclist falls from bicycle at low speed. Left turn rear-end crash in a slip lane.
Limited	Likely trivial injury or property damage only	Some low-speed vehicle collisions. Pedestrian walks into object (no head injury). Car reverses into post.

Table 4. The resulting level of risk (Source: AGRS – Part 6a, Table 4.3)

	FREQUENT	PROBABLE	OCCASIONAL	IMPROBABLE
Catastrophic	Intolerable	Intolerable	Intolerable	High
Serious	Intolerable	Intolerable	High	Medium
Minor	Intolerable	High	Medium	Low
Limited	High	Medium	Low	Low

Table 5. Treatment Approach (Source: AGRS – Part 6a, Table 4.4)

RISK LEVEL	RESPONSE TIME
Intolerable	Must be corrected.
High	Requiring immediate attention as it presents a hazard likely to result in an accident.
Medium	Presents an accident promoting situation but is not urgent. Should be corrected or the risk significantly reduced.
Low	Should be corrected or the risk reduced.

4.9 Responding to the Audit Report

This formal Road Safety Audit should be responded to in writing including reasons for rejecting an audit recommendation. Where a finding is accepted, the action undertaken should be identified in the Response column.

5 Road Safety Audit Findings

The Road Safety Audit Findings are listed in the following Corrective Action Schedule in Table 6.

Table 6. Corrective Action Schedule.

ITEM	AUDIT FINDING	RISK	SAFE SYSTEM ENERGY	RECOMMENDATION P – Primary ST – Step Towards S – Supporting N – Non-Safe System	ACCEPT / REJECT WITH REASON	ACTION / COMMENTS
1.0	**Nelson Street Upgrade**					
1.1	Drawing 31119E-001-111 shows leaders to two existing signs with the note "Remove and relocate existing sign". No proposed location is nominated. Signage detail should be shown to ensure that existing signs do not contradict proposed. Traffic signs are provided to aid the safe and orderly movement of traffic.	*Noted*	N/A	Ensure that the signage complies with AS1742.2 and VicRoads Supplement to AS1742.2 (S).	Reject	These are large VicRoads directional signage. The intent is for the contractor to remove and reinstate these to suit the outfall drainage works.
1.2	Pedestrian crossings/kerb ramps at the Apollo Bay Golf Club are not shown perpendicular to the direction of travel. Vision impaired pedestrians use the orientation of the ramp to guide them to the continuation of the path. The proposed ramp angles/orientation directs pedestrians to the centre of the road.	*Likelihood* – Occasional *Severity* – Serious **High**	Above tolerable limits (impact with pedestrian at/above 30km/h)	Ensure crossings are in accordance with IDM SD 200 & AS1428.4.1 (S).	Accept	Pram crossings to be made perpendicular to the shared path

ITEM	AUDIT FINDING	RISK	SAFE SYSTEM ENERGY	RECOMMENDATION P – Primary ST – Step Towards S – Supporting N – Non-Safe System	ACCEPT / REJECT WITH REASON	ACTION / COMMENTS
1.3	In the Concept Design RSA the Auditor noted the proposed retaining wall (ranging from 0.3 to 1.1m) along the boundary line with the Apollo Bay Golf Course presented a hazard for path users that inadvertently move off the line of the path. The Auditor was advised that: "*Balustrade to be provided on the retaining wall as part of detailed design*". The detail design plans show a reduced path offset to the retaining wall, however do not indicate the inclusion of a balustrade to protect the drop off on the edge of path.	*Noted*	N/A	Ensure that Structural Design Plans 143953-S-200 include provision for a cyclist safe balustrade (S).	Accept	Balustrade design to be included on structural design for retaining walls

ITEM	AUDIT FINDING	RISK	SAFE SYSTEM ENERGY	RECOMMENDATION P – Primary ST – Step Towards S – Supporting N – Non-Safe System	ACCEPT / REJECT WITH REASON	ACTION / COMMENTS
1.4	Cross Section Ch 40.00 terminates at 10.8m offset (north) from the centreline. The termination is approximately 1m above the existing surface. Cross Section Ch 60.00 does not tie back into existing surface (both). A Shared User Path is to be provided along the north side of Nelson Street. These cross sections suggest a significant drop off adjacent to the SUP. As outlined in AGRD6A, a vertical drop greater than 0.25m within 2m of a path requires a partial barrier fence to prevent injury to errant path users who inadvertently move off the line of the path.	*Likelihood* – Occasional *Severity* – Minor **Medium**	Within tolerable limits	Consider providing either (P): • 1 in 8 batter from edge of path; or • 1 in 3 batter at 1m offset from edge of path. Or Provide partial barrier fence if batter slopes cannot be adjusted (S).	Accept	Cross sections have been amended in REV C Detailed Design
1.5	Sign 2 on Drw No 3119E-001-171 indicates 20 km/h zone ahead. while subsequent plans indicate a 10km/h shared zone. The sign information on this plan contradicts other plans. This may result in driver confusion and lead to motorists driving at the incorrect speed.	*Likelihood* – Frequent *Severity* – Limited **High**	Within tolerable limits	Review proposed speed signs and associated advance warning to ensure information is consistent (S).	Accept	Signage has been amended in REV C Detailed Design

ITEM	AUDIT FINDING	RISK	SAFE SYSTEM ENERGY	RECOMMENDATION P – Primary ST – Step Towards S – Supporting N – Non-Safe System	ACCEPT / REJECT WITH REASON	ACTION / COMMENTS
2.0	**Boat Trailer Parking Upgrade**					
2.1	Ch 52 to 90 (northern design line) is to provide an area to be used for overflow and food van parking. Drw No 3119E-002-251 Cross Section Ch 80 & 90 does not tie back into existing surface (+15cm). Vehicle traversing the M profile kerb may bottom out causing damage to the kerb and/or vehicle.	*Likelihood* – Probable *Severity* – Limited Medium	Within tolerable limits	Review grading / level difference to ensure smooth transitions between design elements (S).	Accept	Cross Sections have been amended in REV C Detailed Design
2.2	Although lighting does not form part of the scope of this assignment (as outlined by the Existing Conditions RSA designer response), AS2890.1 indicates that parking areas and circulation areas, together with pedestrian pathways including those used by people with disabilities shall be adequately lit. An unlit carpark will increase the risk of pedestrian/motorist conflicts in low light/night-time. Poorly lit carparks can lead to deep shadows and people only being visible in silhouette, creating a sense of insecurity. It is noted a public toilet is provided within the greater carpark area. Lighting would enhance a sense of security.	Noted	N/A	Review public lighting to ensure lighting is suitable for intended road users (S). Public lighting to comply with AS1158 series, VicRoads Supplement to AS1158 series and VicRoads Guidelines for Street Lighting Design.	Accept	Public Lighting design currently under investigation by the client

ITEM	AUDIT FINDING	RISK	SAFE SYSTEM ENERGY	RECOMMENDATION P – Primary ST – Step Towards S – Supporting N – Non-Safe System	ACCEPT / REJECT WITH REASON	ACTION / COMMENTS
2.3	The parking module east of the boat ramp is proposed to become one-way operation circulating clockwise around centrally located angled boat trailer parking. It is anticipated that vehicles will exit in a forwards movement as this provides greater visibility to the driver. The left turn is through 45° while the right turn is through 315°. It is anticipated that a high proportion of vehicles will circulate counter clock exiting from the angled parking bays.	*Likelihood* – Probable *Severity* – Limited Medium	Within tolerable limits	Consider: • Retaining the two way operation (S); or • kerbing to enforce appropriate exit and circulating (S).	Accept	Traffic flow has been amended to two-way flow in REV C Detailed Design. This provide a better opportunity for long vehicles to exit the central parking bays.
3.0	**Harbour Road Entry & Breakwater Road Upgrade**					
3.1	As highlighted in the Concept Design RSA Report, multiple pedestrian path kerb ramps are orientated incorrectly directing pedestrians into the centre of the road and not to the path continuation. To ensure ease of crossing and/or appropriate orienting of vision impair pedestrians, ramps shall align with the direction of travel.	*Likelihood* – Improbable *Severity* – Serious Medium	Above tolerable limits (Impact with pedestrian at/above 30km/h)	Ensure all kerb ramps align with AS1428.4.1 and DoTs Accessibility (DDA) Guidelines for Road infrastructure (S).	Accept	Pram crossings to be made perpendicular to the shared path

ITEM	AUDIT FINDING	RISK	SAFE SYSTEM ENERGY	RECOMMENDATION P – Primary ST – Step Towards S – Supporting N – Non-Safe System	ACCEPT / REJECT WITH REASON	ACTION / COMMENTS
3.2	Tactile ground surface indicators (TGSIs) assist people who are blind or have low vision in identifying hazards and wayfinding in the built environment. Similar to Item 3.1, a number of the proposed DDA tiles installations direct users into the centre of the road and not the continuation of the footpath.	*Likelihood* – Improbable *Severity* – Serious Medium	Above tolerable limits (Impact with pedestrian at/above 30km/h)	Ensure all kerb ramps align with AS1428.4.1 and DoTs Accessibility (DDA) Guidelines for Road infrastructure (S).	Accept	Pram crossings & Tactile pavement markers to be re-aligned
3.3	An accessibility space is proposed on the east side of the Fisherman's Coop building. Typically, accessibility bays are located as close to the end destination as possible to minimise the travel distance of the person with mobility needs. It is noted the space is unsigned and does not provide an adjacent 'shared area'. The 'shared area' is provided to ensure appropriate staging area for persons with mobility needs to access/egress a parked vehicle.	*Noted*	N/A	Ensure that the position, layout and signage of on-street parking is provided in accordance with AS2890.5 (S).	Accept	Accessibility bay to be moved closest to the Fish Co-Op entry (northern most bay) & shaded area provided on north side of parking bay.

ITEM	AUDIT FINDING	RISK	SAFE SYSTEM ENERGY	RECOMMENDATION P – Primary ST – Step Towards S – Supporting N – Non-Safe System	ACCEPT / REJECT WITH REASON	ACTION / COMMENTS
3.4	It is noted the existing 'Shared Zone – 10km/h' signage commences between Trafalgar Street and Harbour Access Road capturing Harbour Access Road and Breakwater Road. The plans indicate the 'Shared Zone – 10km/h' will commence ~20m east of the Coop building. Motorists will typically only adopt speed limit changes at or beyond the post location. This may result in vehicles traveling at higher speed (potentially 50km/h) through the high pedestrian activity area around the Coop (ie Harbour Access Road and Breakwater Road adjacent to the Coop building).	*Likelihood* – Improbable *Severity* – Serious Medium	Above tolerable limits (impact with pedestrian above 30km/h)	Reviewing regulatory sign placement to ensure road network is adequately and appropriately signed (S).	Accept	Add Shared Zone – 10km/hr signage on Trafalgar Street. Signage on Nelson Street is considered to be in the correct location as 50 km/hr residential speed limit applies for the majority of Nelson Street
3.5	The raised pedestrian crossing (Wombat Crossing) proposed on Breakwater Road is shown to provide signage to the south of the crossing only. As outlined in the AS1742 series signs are placed on the left of the roadway to ensure visibility to approaching vehicles. Eastbound traffic may not observe the signage due to the non-standard installation and fail to give way to a pedestrian using the crossing.	*Likelihood* – Improbable *Severity* – Serious Medium	Above tolerable limits (impact with pedestrian at/above 30km/h	Reviewing regulatory sign placement to ensure road network is adequately and appropriately signed (S).	Accept	Include additional sign on the Nelson Street approach

ITEM	AUDIT FINDING	RISK	SAFE SYSTEM ENERGY	RECOMMENDATION P – Primary ST – Step Towards S – Supporting N – Non-Safe System	ACCEPT / REJECT WITH REASON	ACTION / COMMENTS
3.6	The raised crossing is to include an advisory speed sign to indicate a desirable speed to comfortably traverse the device. It is noted for westbound traffic the advisory speed is the same speed displayed on the 'Shared Zone' (70m to east). Where the advisory speed is equal to or greater than the legal speed an advisory speed shall not be shown. Improper use of signage reduces the credibly messaging on the road network. Item to be read in conjunction with Item 3.7.	*Noted*	N/A	Ensure signage is provided in accordance with AS1742 series and VicRoads supplements (S).	Accept	Remove advisory speed sign
3.7	A signage installation is proposed to include sign no.s 3 & 7 on Breakwater Road on the east approach to Harbour Entry Road. The number of signs to be installed is to total four (4 No). Too many signs create visual clutter and become a safety hazard as motorists can absorb only limited amounts of information at a time.	*Noted*	N/A	Review signage assembly to ensure appropriate sign faces and numbers are proposed (S).	Accept	Remove advisory speed sign

ITEM	AUDIT FINDING	RISK	SAFE SYSTEM ENERGY	RECOMMENDATION P – Primary ST – Step Towards S – Supporting N – Non-Safe System	ACCEPT / REJECT WITH REASON	ACTION / COMMENTS
3.8	The east approach to the raised pedestrian crossing (Wombat Crossing) is proposed to have advance warning however the same is not proposed on the west approach. The east approach is within a 'Shared Zone – 10km/h' while the west approach is within a 50km/h zone. It is unclear why the low speed approach provides advance warning of the raised crossing and not the high-speed approach. Motorists approaching from the west may not adequately slow and fail to give way to a pedestrian using the crossing Item to be read in conjunction with Item 3.7.	*Likelihood* – Improbable *Severity* – Serious Medium	Above tolerable limits (Impact with pedestrian at/above 30km/h)	Review provision of warning signage to ensure road network is adequately and appropriately signed (S).	Accept	Include additional sign on the Nelson Street approach

ITEM	AUDIT FINDING	RISK	SAFE SYSTEM ENERGY	RECOMMENDATION P – Primary ST – Step Towards S – Supporting N – Non-Safe System	ACCEPT / REJECT WITH REASON	ACTION / COMMENTS
3.9	Sign 7 on Drw No 3119E-003-171 is to be a custom sign "Heavy Vehicle Right Turn Prohibited." Vehicle swept paths provided in the drawing set demonstrate the 8.8m service vehicle and 12.5m single rigid vehicle performing right turns at locations where sign 7 is to be installed. These size vehicles will likely undertake the right turn movement, ignoring the signage, as the swept paths demonstrate it is possible. It is noted that standard signs R2-6 and R6-10-2 convey a similar message. The use of standard signs on the road network is preferable to ensure consistency of messaging and resulting interpretation by motorists.	*Noted*	N/A	Review need for Sign 7 and ensure signage is provided in accordance with AS1742 series and VicRoads supplements (S).	Accept	Remove Custom Sign 7
3.10	Five on street parking bays are proposed to the east of the Co-op building. Only one parking sign is proposed to control all five spaces. The signage does not adequately identify the accessibility bay and may result in the bay being utilised by non-permint holders. Item to be read in conjunction with Item 3.3.	*Noted*	N/A	Review provision of parking signage to ensure road network is adequately and appropriately signed in accordance with AS1742.11 (S).	Accept	Add accessibility signage

ITEM	AUDIT FINDING	RISK	SAFE SYSTEM ENERGY	RECOMMENDATION P – Primary ST – Step Towards S – Supporting N – Non-Safe System	ACCEPT / REJECT WITH REASON	ACTION / COMMENTS
3.11	A low point is shown between set out points A5 & A6 with no proposed drainage pit. This location is likely to result in water ponding. As noted in the Existing Conditions RSA, ponding water will influence how road users interact with the road space. Users may elect to avoid puddles and potentially lead to an increase of conflict situations. The ponding water may contribute to the future pavement failures if adequate pavement drainage is not provided.	*Likelihood* – Occasional *Severity* – Minor Medium	N/A	Ensure the site is adequately graded and drainage infrastructure and pavement drainage are adequately designed and suits the design rain event (S).	Reject	Pit is provided for within the Nelson Street Design
3.12	No lighting treatment is proposed for the raised pedestrian crossing (Wombat Crossing) proposed on Breakwater Road between Trafalgar Street and Harbour Entry Road. Local area traffic management devices (eg road humps) present a potential hazard to a night-time driver and are to be illuminated to alert the driver of device so the driver can adjust their speed accordingly. Illumination at pedestrian crossings is required to provide advance warning to motorists of the crossing and make pedestrians on the crossing more conspicuous to avoid conflicts.	*Likelihood* – Improbable *Severity* – Serious Medium	Within tolerable limits (Impact with pedestrian at/above 30km/h)	Review public lighting to ensure lighting is suitable for intended road users (S). Public lighting to comply with AS1158 series, VicRoads Supplement to AS1158 series and VicRoads Guidelines for Street Lighting Design.	Accept	Public Lighting design currently under investigation by the client

ITEM	AUDIT FINDING	RISK	SAFE SYSTEM ENERGY	RECOMMENDATION P – Primary ST – Step Towards S – Supporting N – Non-Safe System	ACCEPT / REJECT WITH REASON	ACTION / COMMENTS
3.13	The footpath long section (between RWB11 to RWB13) shows grades of 6 to 9%. The SUP long section (between RWB21 and RWB22) show grades of up to 10%. These grades do not align with the requirements of AS1428 series to provide universal access. Pedestrians (including those with prams, wheelchairs, etc) and cyclists will have difficulty along these sections of paths. Downgrade they will struggle to maintain a safe speed. Upgrade users will rapidly lose momentum and adopt extremely slow speeds.	*Likelihood* – Improbable *Severity* – Limited Low	Within tolerable limits	Ensure path meets the requirements of AS1428 or aligns with the Australian Human Rights Commission's Advisory note on streetscape, public outdoor areas, fixtures, fittings and furniture (Australian Human Rights Commission 2013). Consider widening path to cater for passing of slow path users (S).	Reject	The footpath between RWB11 and RWB13 will be reviewed. The footpath between RWB21 and RWB22 is required to match into the existing topography and adjacent road levels. The road cross-section is constrained which does not allow room to navigate the path to change grade. Therefore, DDA compliance cannot be achieved for this footpath. It is noted in the HRC advisory note Clause 8.8.3 that in some circumstances capacity to provide DDA access will be limited.

ITEM	AUDIT FINDING	RISK	SAFE SYSTEM ENERGY	RECOMMENDATION P – Primary ST – Step Towards S – Supporting N – Non-Safe System	ACCEPT / REJECT WITH REASON	ACTION / COMMENTS
4.0	**Mothers Beach Car Park**					
4.1	Item 3.13 highlights the concern of high-speed northbound SUP users. As outlined in the Concept Design RSA, the continuity of the SUP between Stage 3 & 4 is unclear. The Mother's Beach Carpark drawing set does not indicate how the SUP from Stage 3 transitions / terminates at the upgraded path. If a curve must be provided at the bottom of the steep grade then consideration should be given to providing additional path width, and a clear escape route or recovery area adjacent to the outside of the curve.	*Likelihood* – Improbable *Severity* – Minor **Medium**	Within tolerable limits	Ensure appropriate tie in, path width and path alignment is provided between stages (S).	Reject	Mothers Beach carpark is expected to be constructed in advance of Harbour Entry Road. It is expected that the Shared User Path will tie into the footpath constructed as part of the Depot Building.

ITEM	AUDIT FINDING	RISK	SAFE SYSTEM ENERGY	RECOMMENDATION P – Primary ST – Step Towards S – Supporting N – Non-Safe System	ACCEPT / REJECT WITH REASON	ACTION / COMMENTS
4.2	The signage and linemarking plan appears incomplete. The parking signs do not close the proposed restrictions and may lead to confusion around legal parking areas. Two access roads connect through to Harbour Access Road. Both access roads are 6m or greater in width and are located adjacent to each other. It is unclear whether they are to operate with the southern access road as entry and north access road as exit. Both are greater than 6m and can accommodate two-way traffic.	*Noted*	N/A	Ensure signage is provided in accordance with AS1742 series and VicRoads supplements (S).	Accept	"P" signage to be included with carpark designating no time limit. Signage at entry to depot to confirm "Approved Depot Vehicles Only"
4.3	The long section shows a low point at A12-A13. The proposed contours also indicate a low point at A13/A14. This location is likely to result in water ponding. As noted in the Existing Conditions RSA, ponding water will influence how road users interact with the road space. Users may elect to avoid puddles and potentially lead to an increase of conflict situations. The ponding water may contribute to the future pavement failures if adequate pavement drainage is not provided.	*Likelihood* – Occasional *Severity* – Minor Medium	N/A	Ensure the site is adequately graded and drainage infrastructure and pavement drainage are adequately designed and suits the design rain event (S).	Accept	Designer to review kerb drainage

ITEM	AUDIT FINDING	RISK	SAFE SYSTEM ENERGY	RECOMMENDATION P – Primary ST – Step Towards S – Supporting N – Non-Safe System	ACCEPT / REJECT WITH REASON	ACTION / COMMENTS
4.4	Bollards are proposed in the median island (set out line B). The note indicates "Bollard in Access Space" which appears to be a copy/paste error from the disabled parking shared space note. No detail is provided for these bollards (General Note 18.4 does not appear to apply). It is unclear the intent of the bollards. If the intent is for delineation of the horizontal curve, the design should not create an undue hazard for traffic when impacted. The design should also include a retroreflective element to ensure visibility in low light/evening situations. The bollards are also proposed to have limited offset to the kerbline. There is the potential for nuisance knocks.	*Likelihood* – Occasional *Severity* – Limited Low	Within tolerable limits	Ensure bollard design aligns with VicRoads RDN 06-16 Appendix A (S).	Accept	Annotation to be included to specify "Frangible Timber Bollards in accordance with RDN16-16-Appendix A"

ITEM	AUDIT FINDING	RISK	SAFE SYSTEM ENERGY	RECOMMENDATION P – Primary ST – Step Towards S – Supporting N – Non-Safe System	ACCEPT / REJECT WITH REASON	ACTION / COMMENTS
4.5	Although lighting does not form part of the scope of this assignment (as outlined by the Existing Conditions RSA designer response), AS2890.1 indicates that parking areas and circulation areas, together with pedestrian pathways including those used by people with disabilities shall be adequately lit. An unlit carpark will increase the risk of pedestrian/motorist conflicts in low light/night-time. Poorly lit carparks can lead to deep shadows and people only being visible in silhouette, creating a sense of insecurity.	Noted	N/A	Review public lighting to ensure lighting is suitable for intended road users (S). Public lighting to comply with AS1158 series, VicRoads Supplement to AS1158 series and VicRoads Guidelines for Street Lighting Design.	Accept	Public Lighting design currently under investigation by the client

6 Concluding Statement

The extent of Apollo Bay Redevelopment site outlined in Section 2 has been audited to Austroads guidelines. The audit has been carried out for the sole purpose of identifying any features on site that could be altered or removed to promote safety of the project for all users. The findings are included in Section 5 of this report.

_____ 22/02/2022

Laura Procter (Team Leader Traffic Engineering - Transport Planning & Advisory, SMEC)

SENIOR ROAD SAFETY AUDITOR

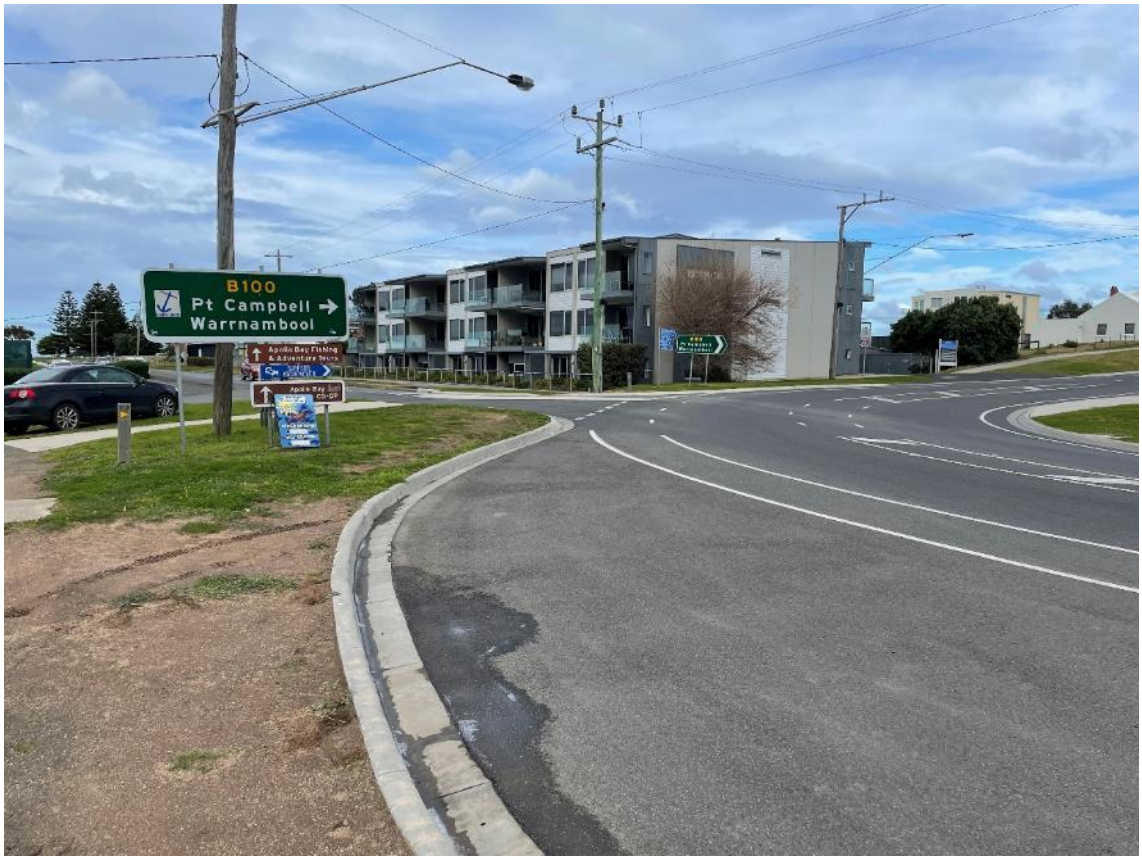
_____ 22/02/2022

Andrew Backman (Associate Engineer - Transport Planning & Advisory, SMEC)

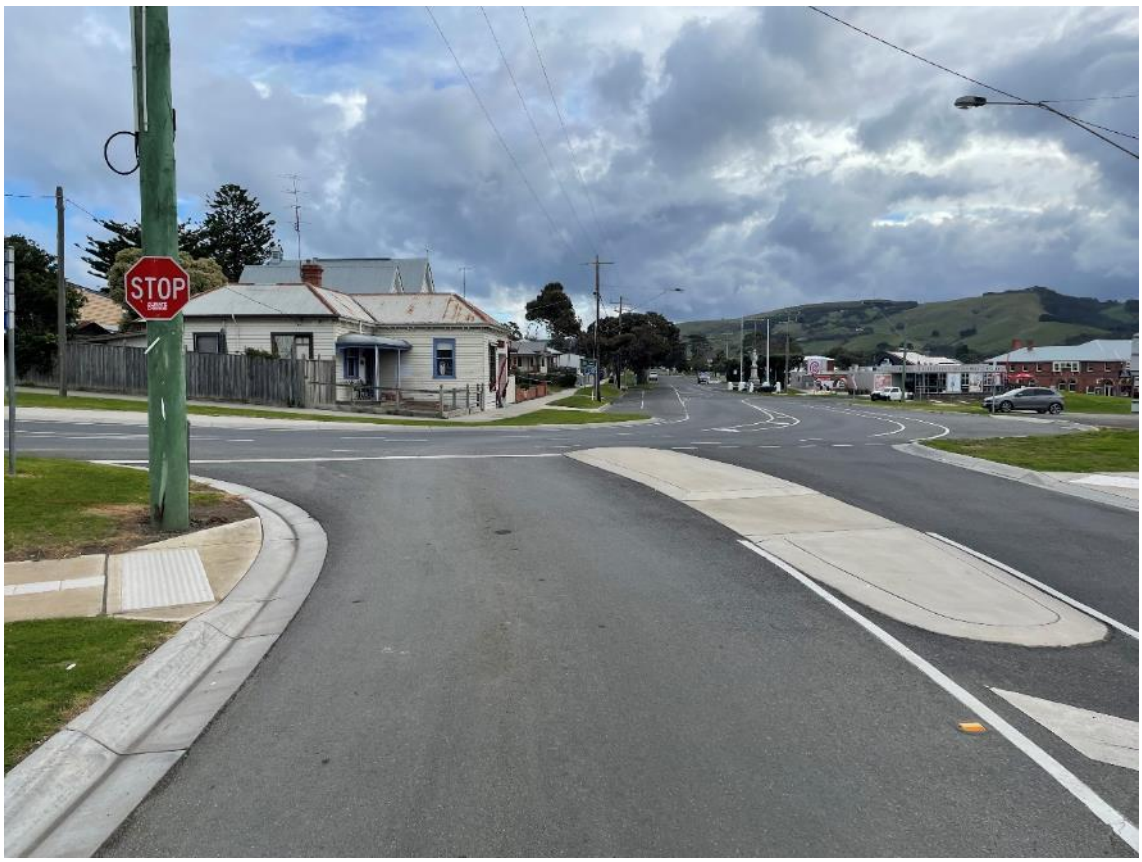
SENIOR ROAD SAFETY AUDITOR/AUDIT TEAM LEADER

Appendix A Detailed Design Drawings

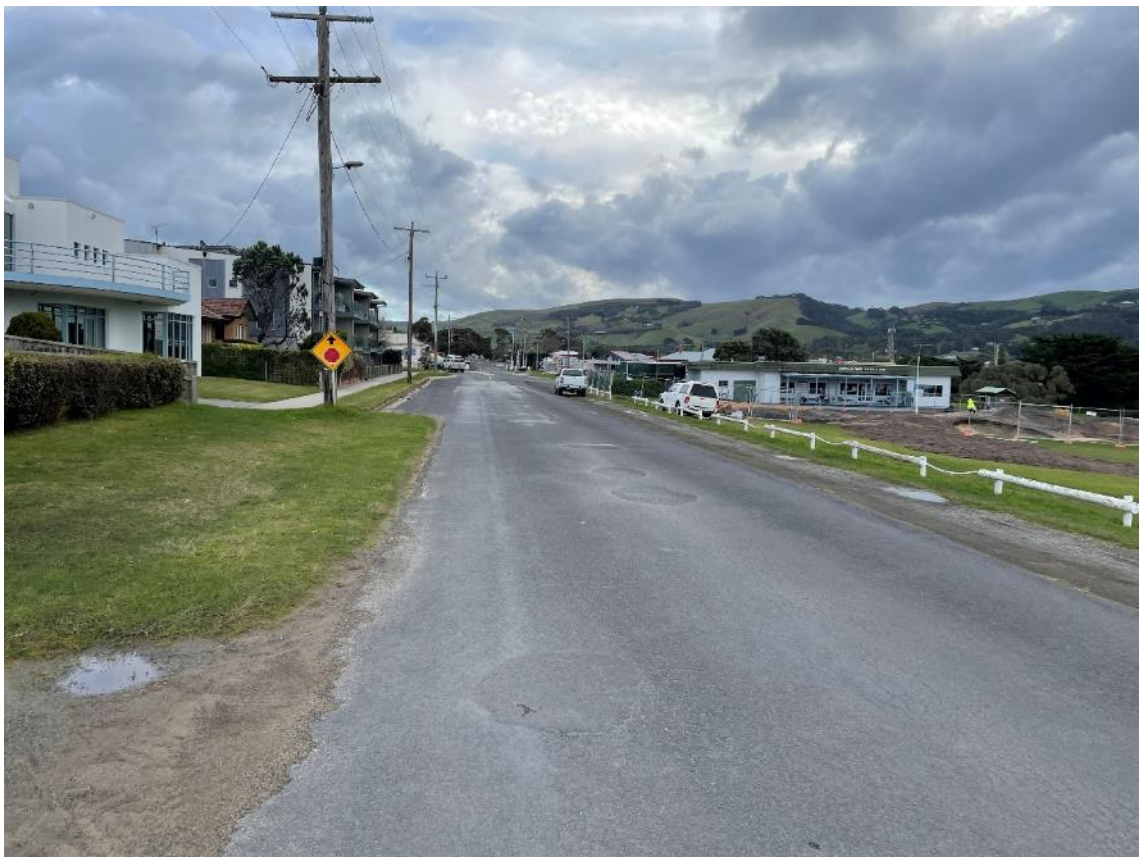
Appendix B Site Photographs



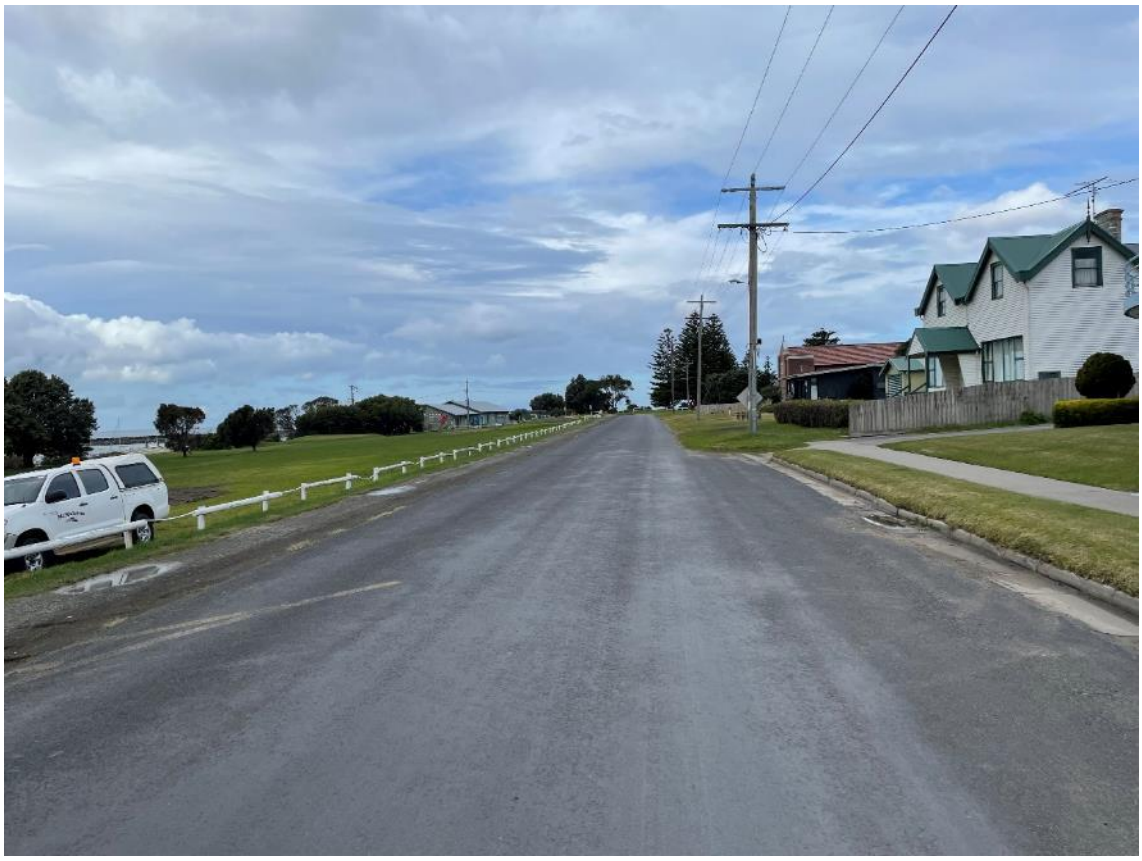
Photograph 1: Great Ocean Road – Nelson Street intersection view to south east.



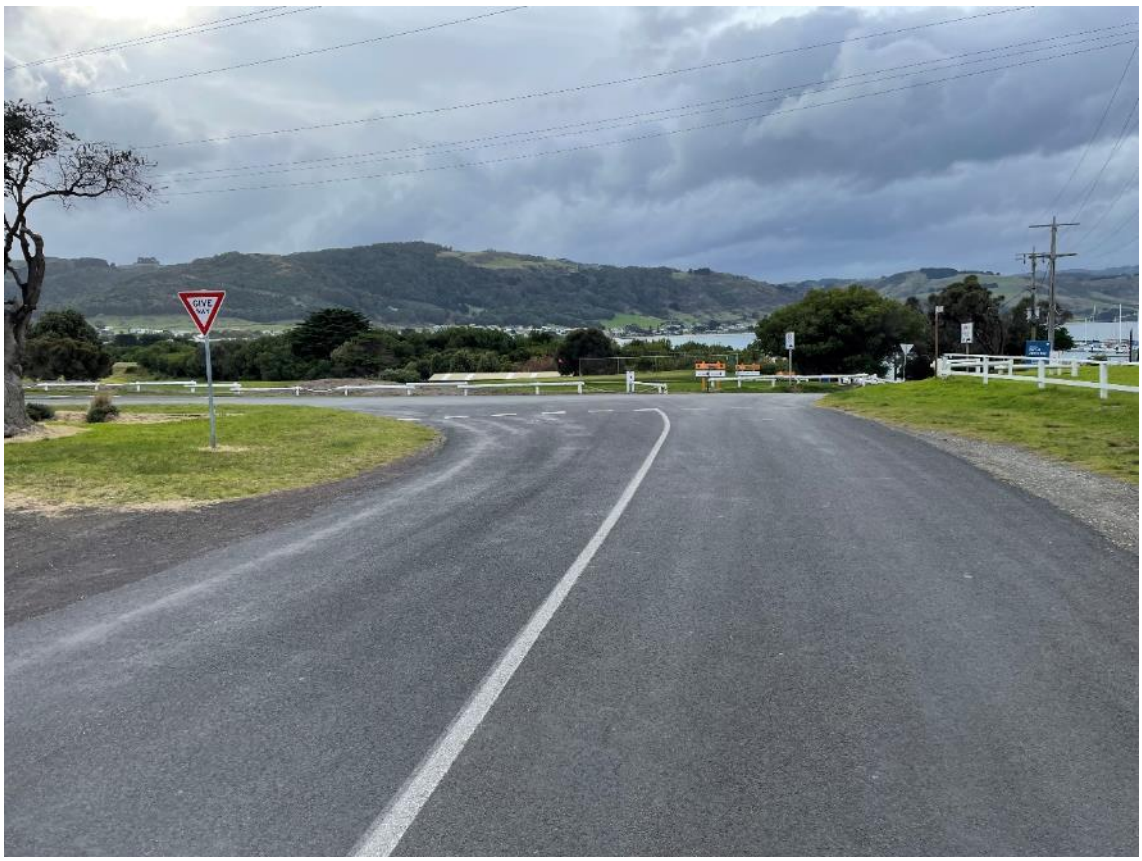
Photograph 2: Nelson Street – Great Ocean Road intersection view to west.



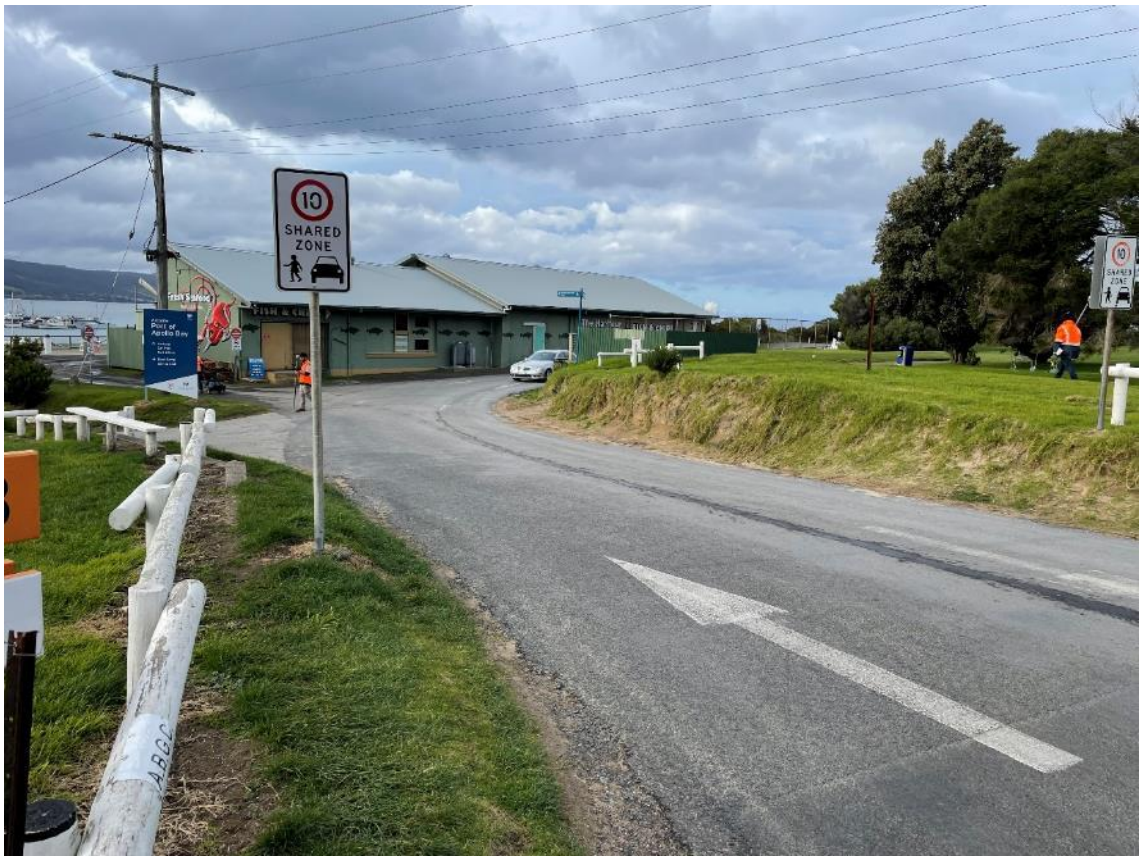
Photograph 3: Nelson Street – midblock view to west.



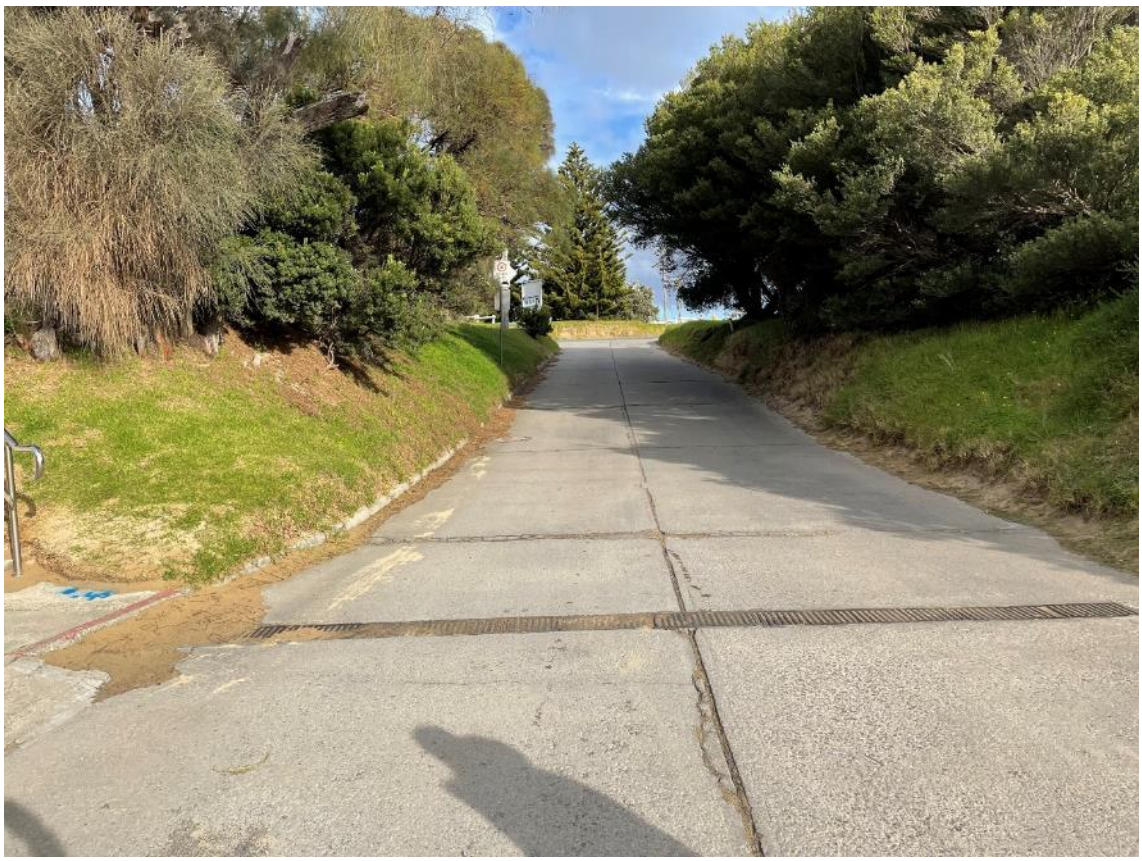
Photograph 4: Nelson Street – midblock view to east.



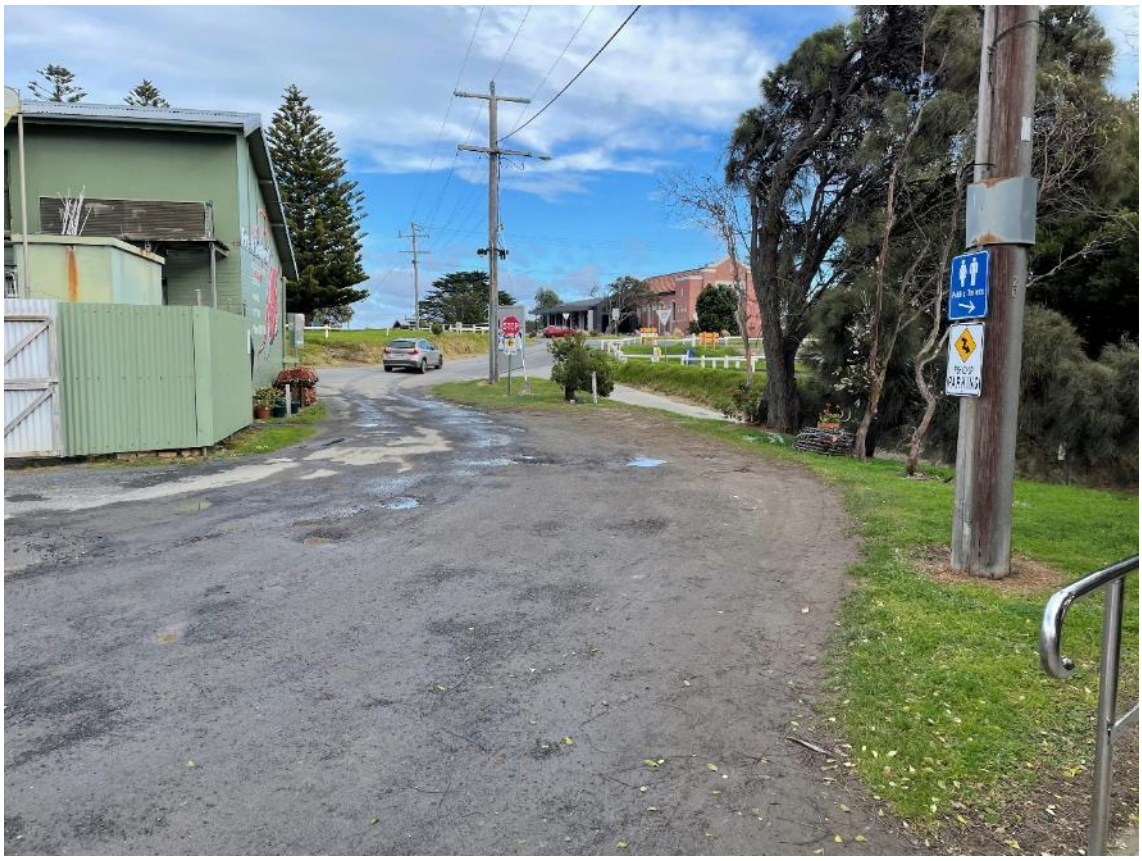
Photograph 5: Trafalgar Street – Nelson Street intersection view to north.



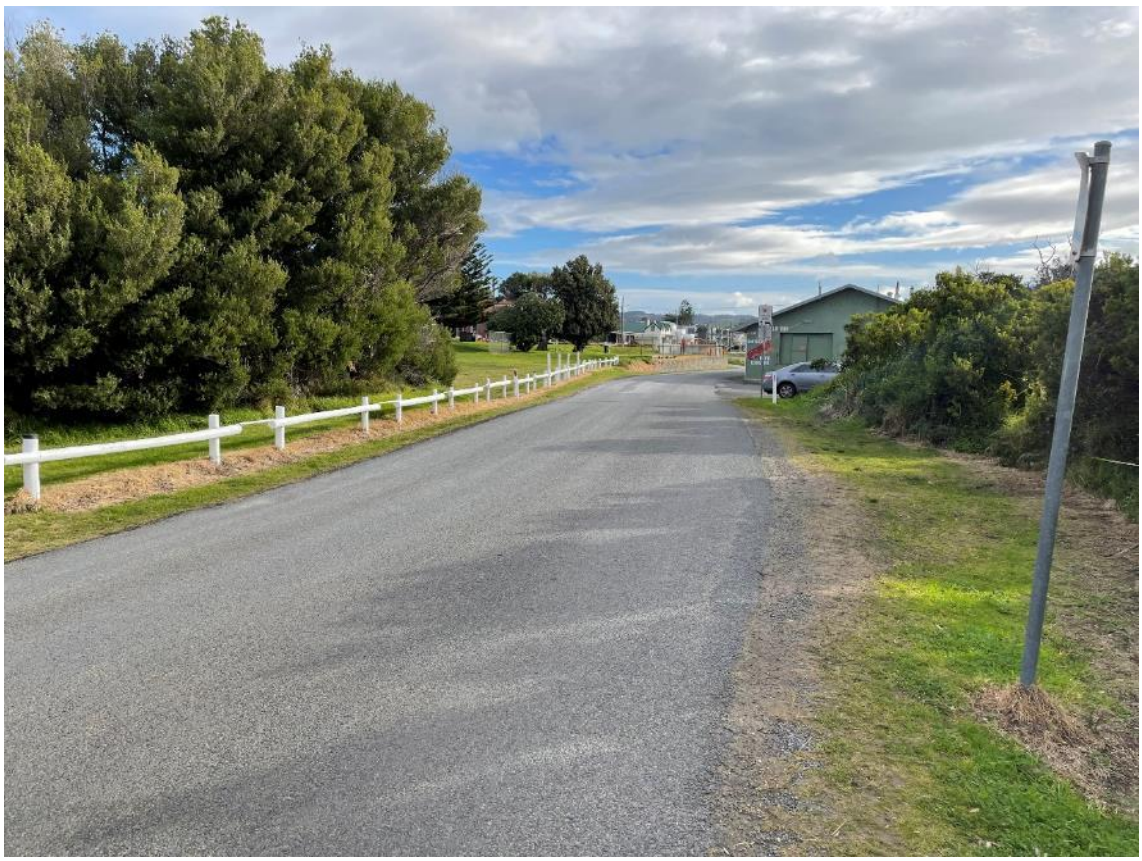
Photograph 6: Nelson Street – Trafalgar Street intersection view to north east.



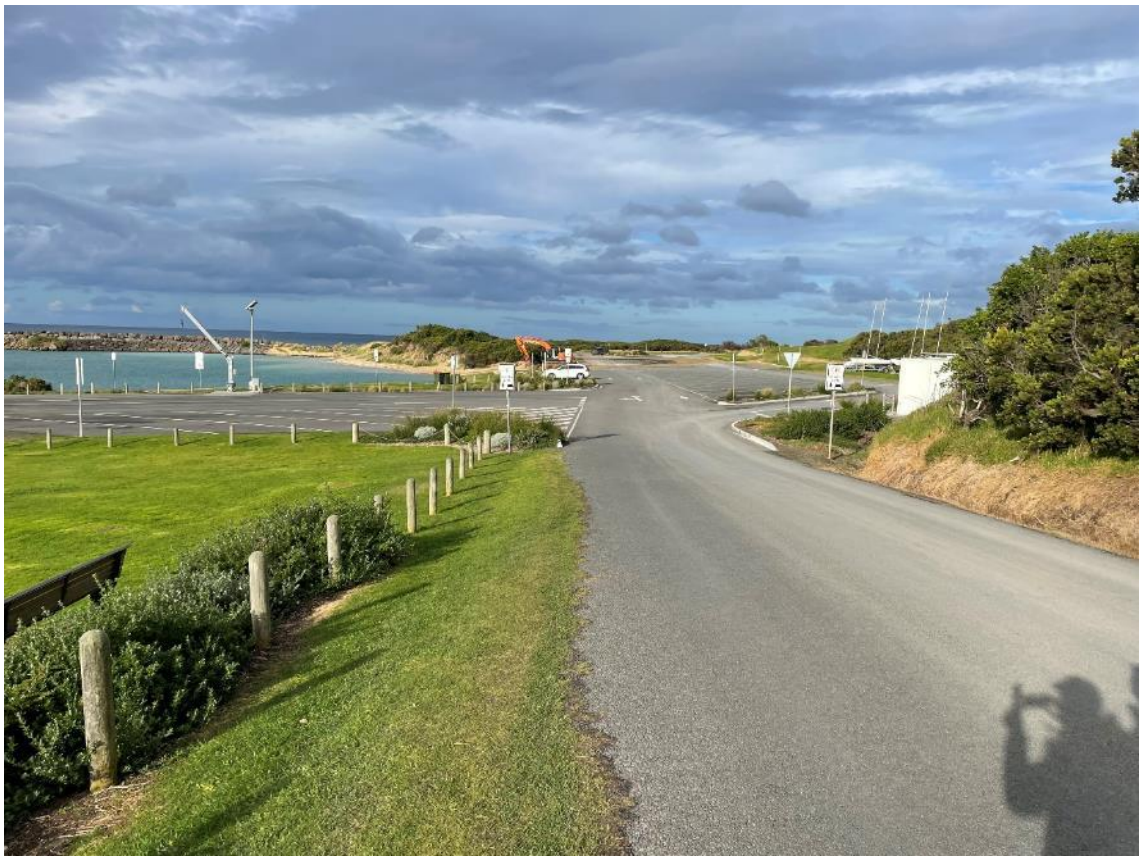
Photograph 7: Trafalgar Street – midblock view to south.



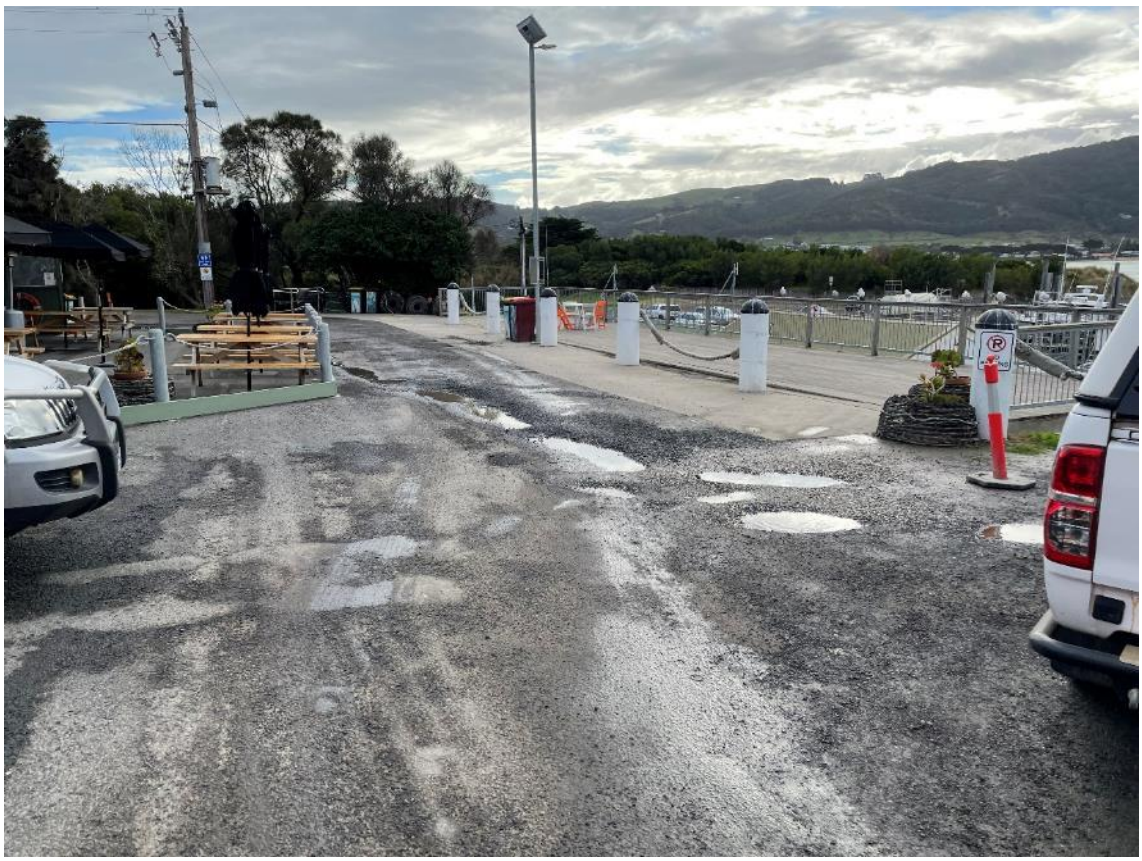
Photograph 8: Fishermen's Co-Op Carpark –view to south.



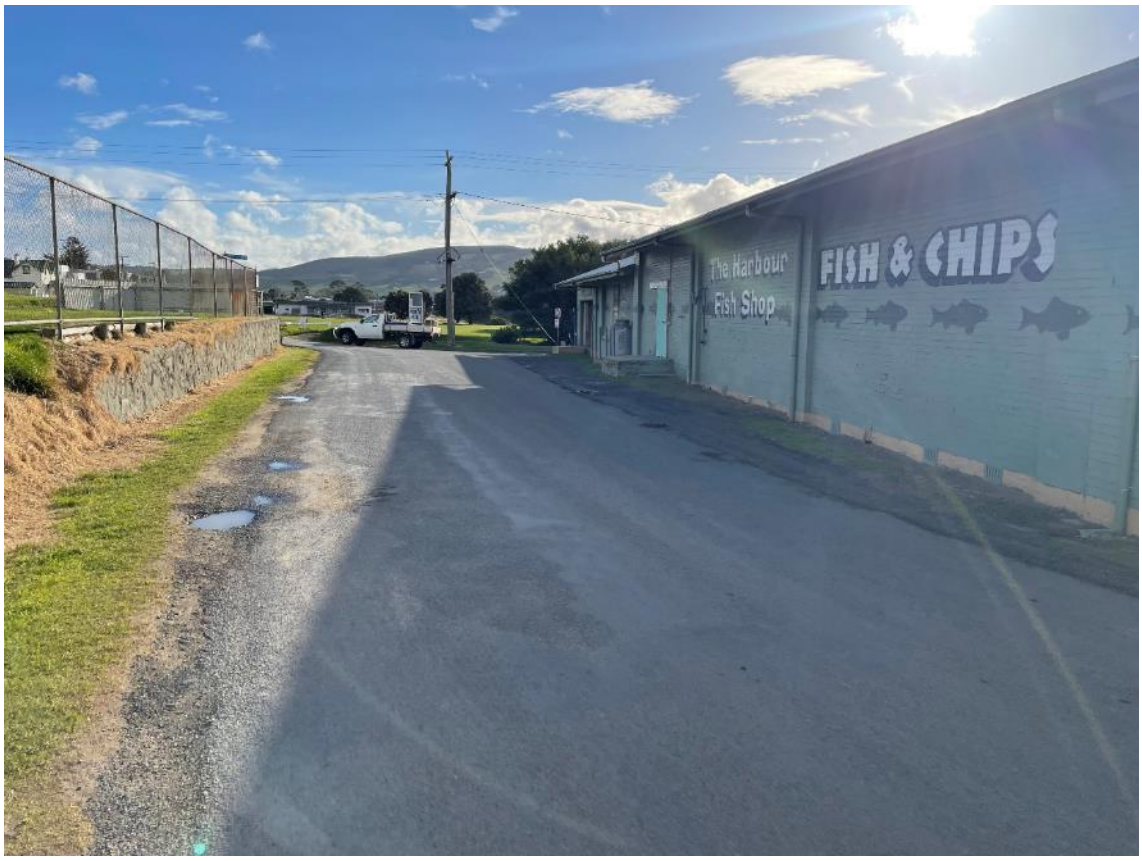
Photograph 9: Breakwater Road – midblock view to west.



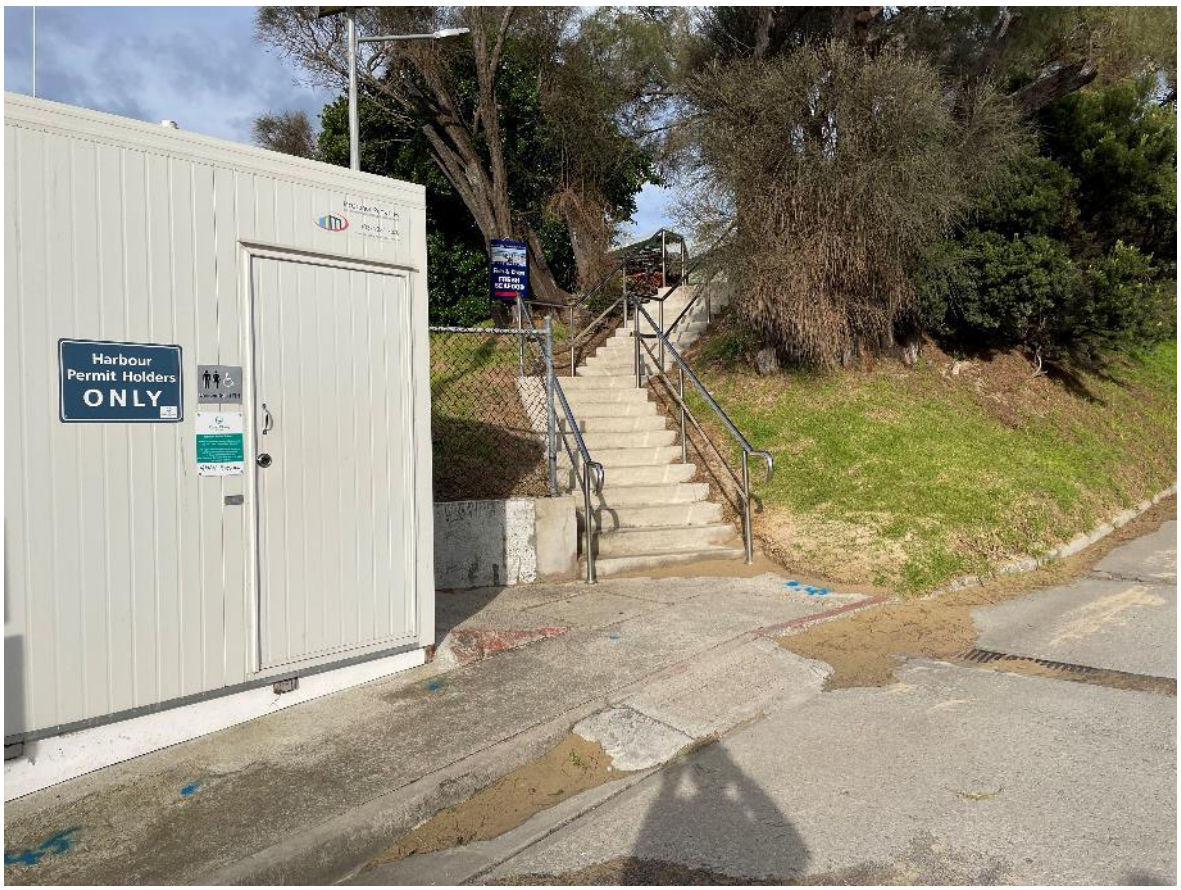
Photograph 10: Breakwater Road – midblock view to east.



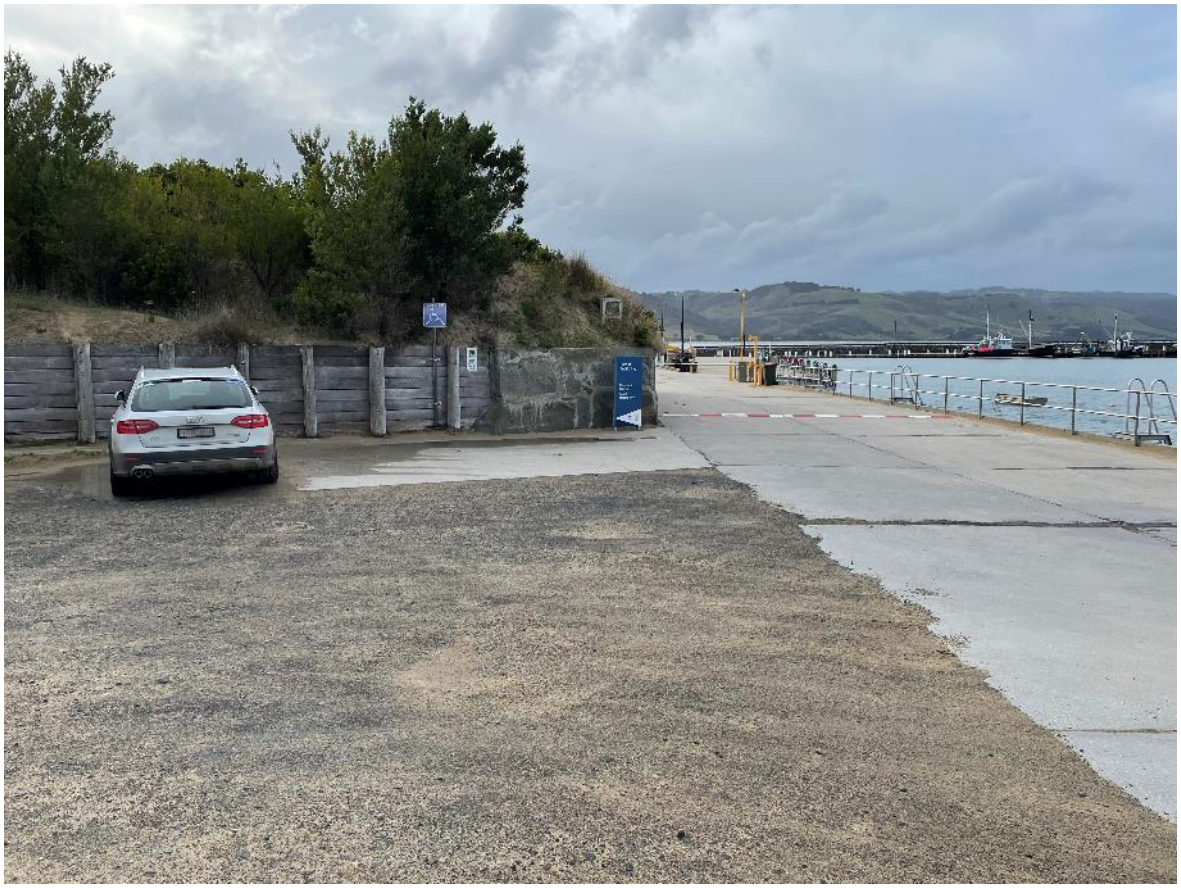
Photograph 11: Fishermen's Co-Op Carpark –view to east.



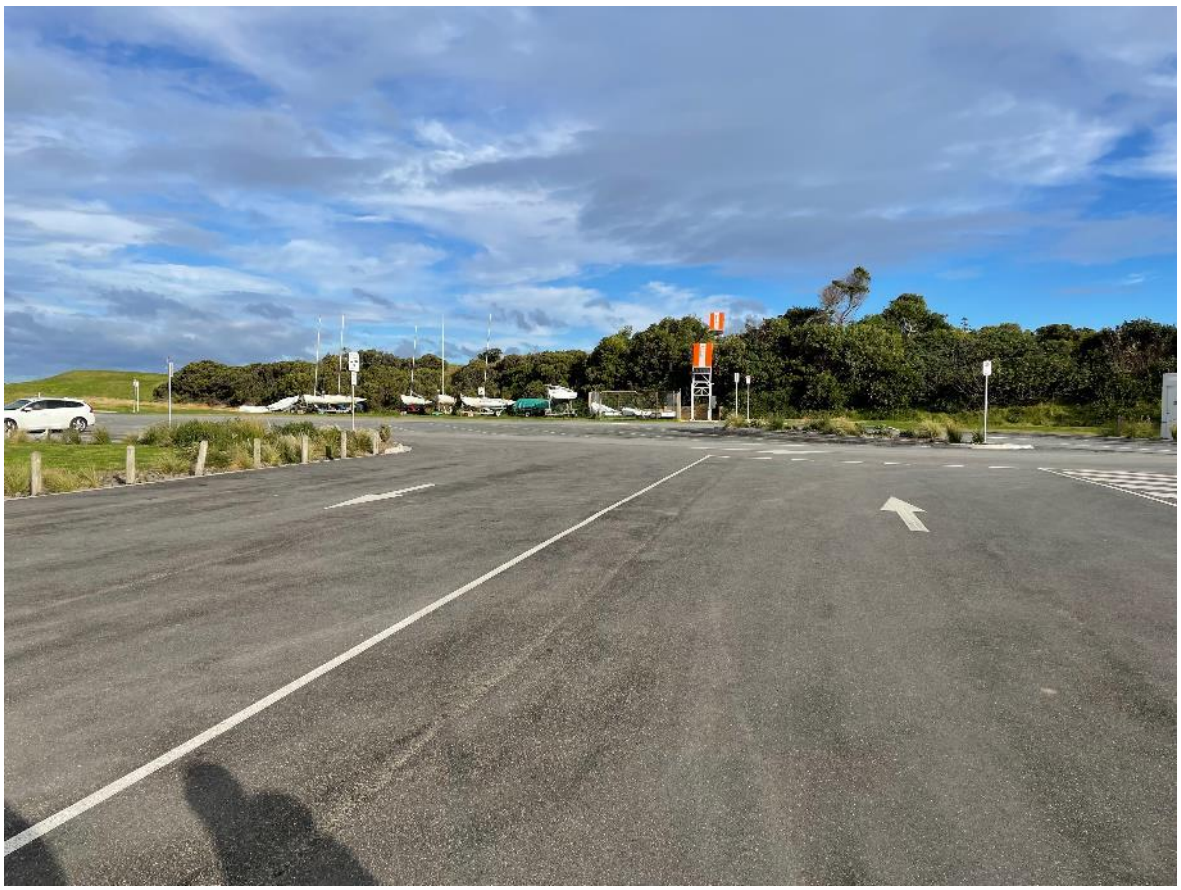
Photograph 12: Breakwater Road – adjacent to Fishermen's Co-op view to west towards golf course crossing.



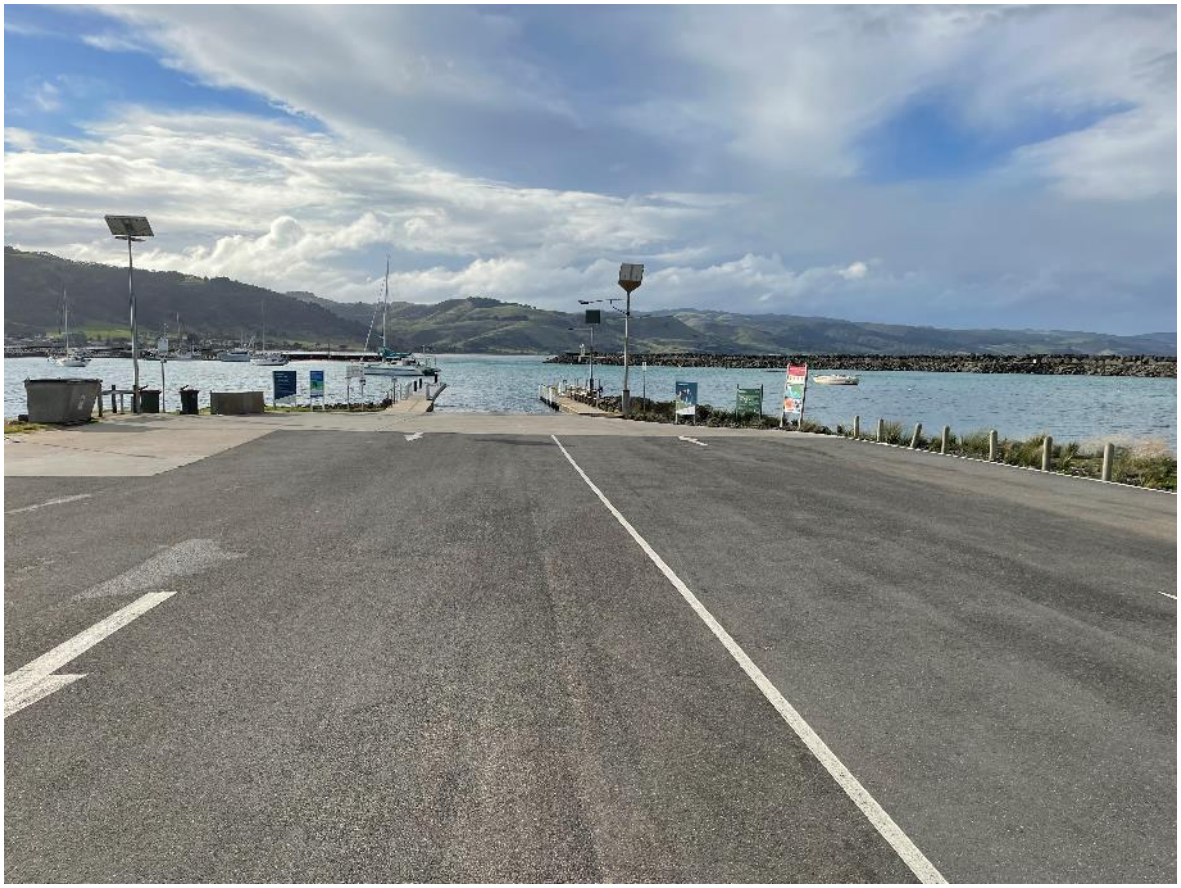
Photograph 13: Trafalgar Street – stair access Fishermen's Co-op view to east.



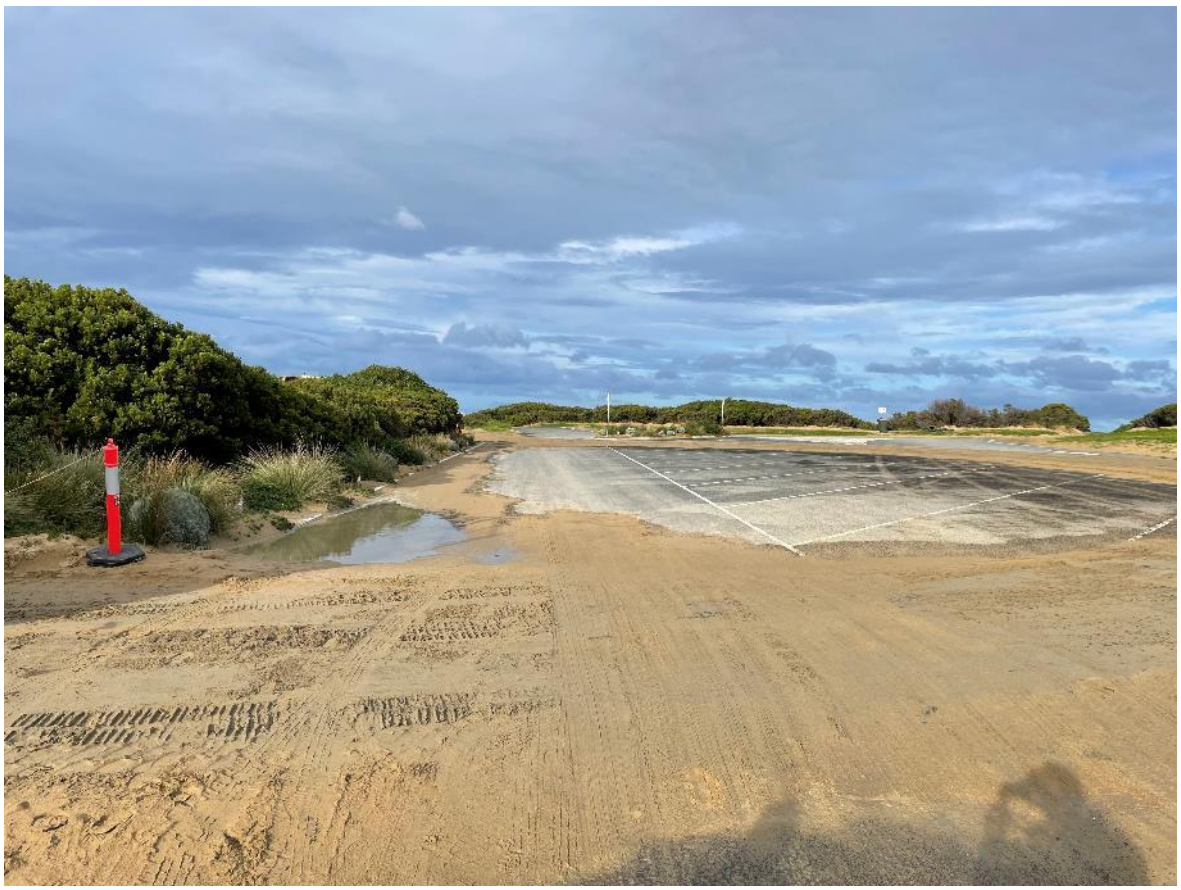
Photograph 14: Western Carpark – Accessibility Parking view to north.



Photograph 15: Boat Ramp – view to south.



Photograph 16: Boat Ramp – view to north.



Photograph 17: Breakwater Road Carpark – sand path view to east.

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