Statement of Environmental Effects

Coastal Protection Works
Reconstruct and Extend Existing Revetment
46 Arrawarra Beach Road, Arrawarra

Prepared for: ARRAWARRA BEACH PTY LTD
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Executive Summary

This Development Application involves the reconstruction and extension of an existing revetment (seawall) which was approved by Coffs Harbour City Council. The revetment is located within Lots 1 and 2 DP 1209371 located at 46 Arrawarra Beach Road, Arrawarra.

The proposed revetment is located within E2 Environmental Conservation zoned land. 'Coastal protection works' (including revetments) are permissible with consent in the E2 zone. The proposed revetment is located entirely within the property boundaries.

The site is situated at the eastern edge of the Arrawarra village at the confluence of the Yarrawarra Creek and the Arrawarra Creek and is approximately 200 m landward of the Pacific Ocean. The site is located within a SEPP71 Sensitive Coastal location. This site is occupied by the Arrawarra Beach Holiday Park.

The Arrawarra Beach Holiday Park is surrounded on two sides by creek frontage and then is open to the estuary and then to the beach. An existing revetment comprised of rock gabion baskets extends approximately 210 m along the creek frontage. This gabion wall has begun to deteriorate and, in some places, warping and settlement is also occurring as a result of wave attack and sediment redistribution at the wall toe and tidal influences.

The existing gabion wall was constructed in 1990 pursuant to DA Consent 224/90 and in accordance with Building Permit 889/90 dated 22 August 1990. Coffs Harbour City Council approved construction of the existing gabion, subject to the conditions of DA Consent 224/90. It is uncertain to the applicant whether a final occupation certificate was provided by Council as it is apparent from our detailed site survey that some of the works were constructed outside the property boundary and there are some discrepancies with the construction works and the design documentation. Design drawings and the relevant approvals of the existing gabion are provided in support of this application.

At the time of construction, the existing gabion wall was built to best practice standards and in accordance with agency requirements, including NSW Agriculture & Fisheries. Since 1990, the rock gabion structure has provided adequate protection of the land boundary, however it is now at the end of its service life. The proposed revetment will replace and extend this gabion with a more suitable structure, that has been designed to meet current coastal engineering standards.

The existing rock gabion wall needs to be replaced with a more suitable and permanent revetment. The creek boundary is used by the public and guests of the caravan park. The need to replace the gabion wall is twofold; firstly, to secure the site boundary from further erosion for environmental and safety reasons. Presently sections of the northern bank are slumping into the creek causing a steep drop-off and loss of vegetation and sediment and erosion

control fencing. Secondly, a permanent revetment is necessary to enable the existing lawfully permitted caravan park licensed by Coffs Harbour City Council to continue to meet contemporary tourism development standards and client expectations into the future.

The proposed 360 m long rock armoured revetment will be located on private land, landward of the Mean High Water Mark (MHWM). The existing gabion wall will be removed and replaced with the proposed revetment. Removal of this gabion wall would remove a structure which is potentially hazardous and no longer able to fulfil its intended purpose, thereby providing a public safety benefit.

The engineering design of the rock-armoured revetment has been undertaken to ensure that buildings and infrastructure located behind the structure (and the structure itself) will not be adversely affected by coastal processes to the year 2100. This includes ensuring that the 100 year Average Recurrence Interval storm event will not adversely affect infrastructure and the revetment within its service life. The design is such that, should future climate change influences (including sea level rise) evolve in a way that is more severe than currently predicted, such effects can be readily accommodated without the need to build a new more robust structure and can instead, be mitigated by simply placing additional armour onto the proposed revetment.

The proposal meets the Coffs Harbour City Council's Coastal Hazard Zone Policy, whereby developments subject to coastal processes are required to be free from the effects of coastal processes for a period of 50 years for commercial/tourism development.

The structural design of the new revetment follows assessment of the 100 year ARI event, peak storm tide level as well as design wave parameters to determine the necessary physical characteristics of the armoured structure. The specific characteristics of the 100 year ARI Design Event used in the design of the revetment comprised of a combination of severe waves and extreme ocean water levels. The methodology applied to the design of the revetment adopted the Design Event having the 100 year ARI storm tide and associated wave characteristics defined by the comprehensive modelling undertaken for the Coffs Harbour Coastal Processes and Hazards Definition Study (BMT WBM, 2011) prepared on behalf of Coffs Harbour City Council.

The revetment has been designed by Water Technology Coastal Engineers to accommodate severe storm impact under present coastal conditions. The revetment incorporates several layers of filter rock and armour rock. The proposal adopts an adaptive risk management approach, whereby the revetment has been designed to accommodate uncertainty in sea level rise and risk predictions by allowing an additional layer of rock armour to be placed over the face of the structure if necessary.

A legally binding arrangement has been drafted to annex the responsibility for constructing the additional layer of rock armour with the land owner. The benefit

of this approach is that the revetment will be suitable for present conditions, however the designed structure will be smaller, will be set back from the creek boundary 1.5 metres and will be less visibly intrusive.

Selective tree removal is required to that the structure is located within the property boundaries and to provide sufficient area for construction and access. Tree removal will be offset by compensatory planting of native trees and shrubs within the E2 zoned riparian buffer to the creek. The proposed landscape treatment using native coastal species will improve biodiversity and habitat corridor values considerably and will significantly improve the visual amenity of the creek edge.

Existing cabins located in the vicinity of the works will be removed, stored within the site, and re-erected at the end of the works.

As set out in the following Statement of Environmental Effects, it is considered that the proposal has merit, both in terms of the engineering rigour of the design and the planning need for the revetment.

The alternative to the subject proposal is to 'do nothing'. This is not a sustainable alternative in terms of public safety, given the continual progressive erosion of the foreshore and the poor structural condition of the rock gabion wall. Protection of the site boundary is not only an imperative for the owners of the land, it will also provide a long-term solution to public safety and protect caravan park infrastructure from severe storm impacts.

The proposal is consistent with key NSW planning instruments, namely *State Environmental Planning Policy (Infrastructure) 2007*, the *Coastal Protection Act 1979* and the *State Environmental Planning Policy No. 71 Coastal Protection* as well as local planning instruments, controls and guidelines.

The proposal has been designed to ensure no adverse impact to the site or surrounding natural or built environment.

The following Statement of Environmental Effects sets out the nature of the proposal, the activities for which consent is required, the statutory framework, the environmental interactions involved and the reasons for the proposal.

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Introduction

1.1 Background

Keiley Hunter has been engaged by Arrawarra Beach Pty Ltd (the Applicant) to act as a Planning Consultant for the preparation of a Statement of Environmental Effects (SoEE) for coastal protection works, namely a rock revetment, to be constructed at 46 Arrawarra Beach Road, Arrawarra. The site is known as the Arrawarra Beach Holiday Park.

The purpose of the proposed rock revetment is to secure the subject land from coastal erosion and wave impacts. The rock revetment has been designed to accommodate predicted sea level rise and climate change impacts with rock armouring of a sufficient size to protect the area from severe storm impacts.

The engineering design of the rock-armoured revetment has been undertaken to ensure that buildings and infrastructure located behind the structure (and the structure itself) will not be adversely affected by coastal processes to the year 2100. This includes ensuring that the 100 year Average Recurrence Interval storm event will not adversely affect infrastructure and the revetment. The design is such that should future climate change influences (including sea level rise) evolve in a way that is more severe than currently predicted, such effects can be readily accommodated without the need to build a new more robust structure but can instead be mitigated by simply placing additional armour onto the revetment."

A previous DA (CP16-001) was lodged with the NSW Coastal Panel (the panel) on 22 February 2016. The purpose of DA CP16-001 was to seek consent for the construction of a revetment to protect future residential land uses within the site. Consent was refused for DA CP16-001 for the following seven reasons:

1. *The Panel is not satisfied that the proposed revetment wall that is the subject of the Development Application will not, over the life of the works, pose or be likely to pose a threat to public safety as required by s55M(1)(a)(ii) of the Coastal Protection Act 1979.*
2. *The Panel is not satisfied that the proposed revetment wall design is structurally adequate as the Development Application has not sufficiently considered the immediate and long-term wave erosion hazard as identified in the BMT WBM Coffs Harbour Coastal Processes and Hazards Definition Study (2011).*
3. *The Panel is not satisfied that the proposed revetment wall will limit storm wave overtopping to safe levels for persons or property.*
4. *The Panel considers that the Development Application does not contain sufficient information to demonstrate how the proposed legally binding arrangement for the ongoing maintenance of the proposed revetment wall may be extended to the*

restoration of adjacent land that may be eroded as a result of the proposed revetment wall, such as the land occupied by saltmarsh vegetation and littoral rainforest on the northern shore of Arrawarra Creek.

5. *The Panel considers that the primary purpose of the proposed revetment wall is to protect future residential development on the site from coastal hazards and is therefore inconsistent with the objectives of the E2 Environmental Conservation zone which seek to protect, manage and restore areas of high ecological or cultural values and prevent development that could have an adverse effect on those values.*
6. *The Panel considers that the proposal's likely impacts on marine and estuarine ecosystems have not been adequately addressed, particularly as reclamation works are proposed, and may result in a significant change to habitat, species diversity and abundance.*
7. *The Panel considers that the potential impacts of the proposed revetment wall have not been fully addressed. It is therefore considered that the subject site is not suitable for the proposed development and, as a result, the granting of consent is not in the public interest.*

The primary issue raised by the panel was based on a view that the revetment would not be suitable on land zoned E2 if its need was to protect a future residential use. This revised application makes it clear that the foremost need for the revetment is to replace and extend and existing seawall to protect an existing lawful caravan park use and associated infrastructure. This application is not reliant on the known outcome of any separate applications, noting that all development applications are required to be independently assessed on their individual merit.

The table of matters raised in the previous assessment is found at Appendix R.

The subject development proposal involves the same revetment, located in the same location as the revetment refused as DA CP 16-001. Key differences between DA CP 16-001 are:

1. The purpose of the revetment is for the protection of the *existing* lawful caravan park and is therefore considered to be consistent with the E2 zone objectives[1].
2. Council's Coastal Hazard Zone Policy provides that '*any development on the lot will need to take into account the effect of coastal processes over an appropriate planning period. …Council requires residential developments to be free from the effects of coastal processes for a period of 100 years and for commercial/tourism development, 50 years.*
3. The revetment was designed to accommodate proposed residential development, consequently, its design life is well in excess of that required to protect and existing caravan park.

[1] The NSW Coastal Panel recently approved coastal protection works within E2 zoned land at Umina (CP13-001). However, it should be noted that the Umina revetment wall was intended to principally protect existing low density residential development on the site rather than to facilitate future development of the scale proposed at Arrawarra. (City Planning Services, Assessment Report, December 2016, pg 29)

4. A draft legally binding agreement for the ongoing maintenance of the proposed revetment including the restoration of adjacent land that may be eroded as a result of the proposed revetment wall has been prepared and is submitted with this application at Appendix P.

1.2 Previous Consent

The existing rock gabion was constructed in 1990 pursuant to DA Consent 224/90 and in accordance with Building Permit 889/90 dated 22 August 1990 (copies at Appendix L).

Coffs Harbour City Council approved construction of the existing gabion, subject to the conditions of DA Consent 224/90. It is uncertain to the applicant whether a final occupation certificate was provided by Council as it is apparent from our detailed site survey that some of the works were constructed outside the property boundary and there are some discrepancies with the construction works and the design documentation.

The existing rock gabion baskets extend approximately 210 m along the creek frontage. This gabion has begun to deteriorate and, in some places, warping and settlement is also occurring as a result of wave attack and sediment redistribution at the wall toe and tidal influences.

At the time of Council approval and construction, the existing gabion was built to best practice standards and in accordance with agency requirements, including NSW Agriculture & Fisheries. Since 1990, the rock gabion structure has provided adequate protection of the land boundary, however it is now at the end of its commercial life. The proposed revetment will replace and extend this gabion with a more suitable structure, that has been designed to meet current coastal engineering standards.

It is noted that, at the time of approval of the existing gabion, the land was zoned 7(b) Environmental Protection (Secondary) under the Coffs Harbour City Council Local Environmental Plan 1988.

1.3 Consent Authority

The subject site is in the Coffs Harbour Local Government Area (LGA). The NSW Coastal Council is the Consent Authority for the proposed Coastal Protection Works. The development is 'integrated development' as the following approvals are required:

- NSW Department of Primary Industries Permit (S200-201 Fisheries Management Act 1994).
- NSW Office of Water Controlled Activity Approval (S91 Water Management Act 2000).

Note: If a coastal zone management plan does not apply to land on which coastal protection works are proposed, the Coastal Panel has the function of determining the development application (Cl 129A of SEPP Infrastructure). It is noted that Coffs Harbour City Council has adopted a Draft Coastal Zone Management Plan, however the Minister is yet to certify this plan. Consequently, a coastal zone management plan does not apply to the site and the Coastal Panel is the consent authority.

1.3 Further Information

Should the NSW Coastal Panel require any additional information, or wish to clarify any matter raised by this proposal, please contact Keiley Hunter on 0458 515963 or email keiley@keileyhunter.com.au.

1.4 Specialist Technical Advice

Specialist advice and design input was sought from consultants listed in Table 1.1 below.

Table 1.1 Specialist Technical Advice

Consultant	*Service*	*Appendix*
Newnham Karl Weir and Partners, Surveyors	Detail Survey Crown Lands Boundary Definition Site plan	*A* *B*
Water Technology	Revetment Seawall Design Seawall Management Plan	*C* *Q*
Umwelt (Australia) Pty Limited	Flooding and Stormwater Assessment Flood Study 2003 Velocity Modelling (revetment)	*D* *E*
NatureCall Environmental	Ecological Assessment	*F*
Ecosure	Ecological Assessment Addendum Vegetation Management Plan	*F* *N*
Everick Heritage Consultants Pty Ltd	Cultural Heritage Assessment	*I*
Martens Consulting Engineers	Geomorphic Impact Assessment 2007	*M*
deGroot and Benson, Consulting Engineers	Geotech and Acid Sulfate Soils	*O*
Pikes Verekers Lawyers, Local Government and Planning Law Specialists	Maintenance Agreement	*P*

1.5 The Site

The site within which the works are proposed is described as Lots 1 & 2 DP 1209371 ('the site') and is located at No. 46 Arrawarra Beach Road, Arrawarra. The site is known as the Arrawarra Beach Holiday Park. The works are proposed on land within part of the site along the northern and eastern boundary ('the land'). The site is located approximately 5 kms north of Woolgoolga and 30 kms north of Coffs Harbour. Illustration 1.1 shows the locality of the subject site. A Site Plan and Detail Survey are provided at Appendix A.

The site is an irregular shaped parcel of land that gently slopes from north to south with an area of 2.598 ha. The site has a 141.43 m frontage to Arrawarra Beach Road and a frontage of approximately 420 m to Yarrawarra and Arrawarra Creeks along the eastern and southern boundaries. Residential land adjoins the site's western boundary. The Arrawarra Village is located approximately 150 m west of the site. An aerial photo is provided at Illustration 1.2.

The site is zoned R2 Low Density Residential and E2 Environmental Conservation under the Coffs Harbour City Local Environmental Plan 2013. The proposed works are located within E2 zoned land.

The site detail survey clearly shows that the seaward boundary has eroded over time. The Mean High Water Mark (MHWM) of the site boundary was redefined by survey in September 2014. The redefined boundary was endorsed by Crown Lands on 17 December 2014. A copy of the Crown Lands endorsement is found at Appendix B.

A public footway is located along the site's western boundary off Arrawarra Beach Road provides access to Yarrawarra Creek and South Corindi Beach at low tide.

A timber footbridge located within the north-eastern corner of the site is licenced to Arrawarra Beach Pty Ltd and provides pedestrian access for occupants of the caravan park over Yarrawarra Creek to South Corindi Beach. Copy of the current licence is found at Appendix J.

An existing rock gabion seawall, constructed in 1990 pursuant to DA 224/90, extends for approximately 210 m along the site's Arrawarra Creek frontage. Copies of approvals are found at Appendix L.

Land Use

The site is currently occupied by the Arrawarra Beach Holiday Park. There is a shop, several pre-fabricated cabins, caravan sites, a site office, amenity buildings and a manager's residence located within the site.

The existing caravan park occupies the entire site, including E2 zoned land. Caravan parks are permissible with consent in the R2 zone and prohibited within the E2 zoned land under the Coffs Harbour LEP 2013. The caravan park is, in part, an *existing use* within the meaning of the EP&A Act.

Approval to operate under S68 of the Local Government Act 1993 was granted to Astoria Group Pty Ltd from 1 September 2014[2] to 31 August 2017, copy attached at Appendix J. Approval to operate comprises 188 sites including:

1. Long term residence – 6
2. Short term residence – 91
3. Camp sites – 21

Land uses immediately surrounding the subject site are predominantly low density residential. The Coffs Coast Regional Park, a nature reserve, is located to the north of the site. Crown land is located to the south of the site.

Coastal Environment
Arrawarra Creek is an ICOLL (Intermittently Closed Open Lake or Lagoon), forming part of the Habitat Protection Zone of the Solitary Islands Marine Park. The site is subject to risk from coastal hazards, which are forecast to significantly increase into the future under climate change-induced sea level rise projections.

Solitary Islands Marine Park
The site is located within the area identified as a 'coastal zone' under the Coastal Protection Act 1979. The site is within 100 m of an estuary and located within the Solitary Islands Marine Park and as such is located within a SEPP71 sensitive coastal location.

Bushfire Prone Land
The site is mapped as Bushfire Prone land.

Acid Sulfate Soils
The site is predominately mapped as Class 5 Acid Sulfate Soils with small areas of Class 3 and Class 1 soils mapped along the eastern and southern boundaries.

Flood Prone Land
The site is located within the 1% AEP Flood Extents area and within a Flood Planning Area.

Vegetation
Secondary koala habitat is mapped along the site's northern boundary and within the mid-southern part of the site. Endangered Ecological Communities (EECs), Dry Sclerophyll Forest, and Forest Wetlands are also identified in these general areas. This vegetation is identified on Council's Preservation of Vegetation Map. Biodiversity (terrestrial) zones that are mapped along the site's boundaries are generally consistent with the riparian land that adjoins Arrawarra Creek and Yarrawarra Creek.

The site is a 'highly modified' comprising remnant native and exotic species occurring in patches, mainly within the middle to southern part of the caravan park and around the site's boundaries.

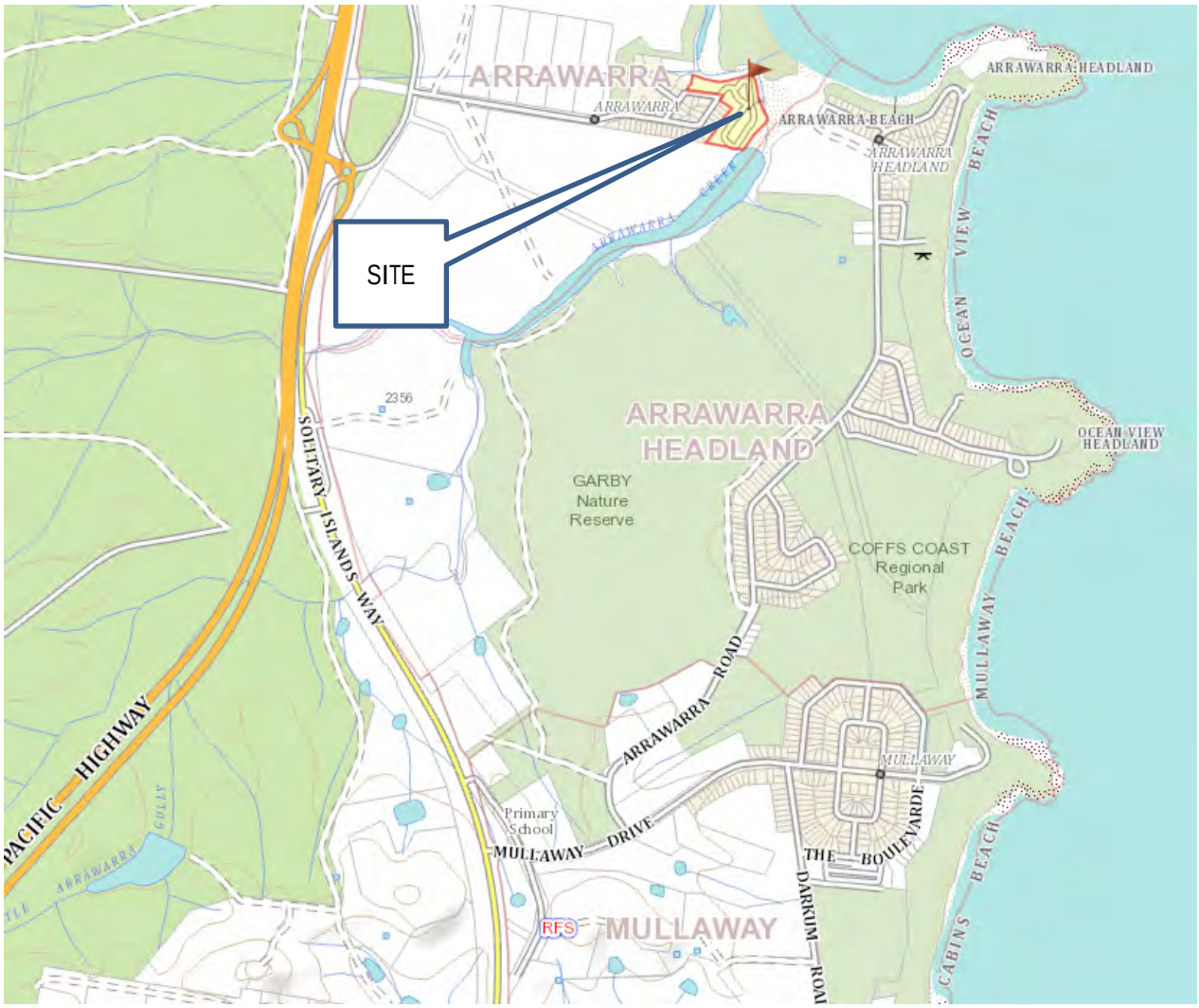
[2] Approval to operate the caravan park has been continuous since the park was constructed by previous land owners.

Remnant native trees located along the site's riparian boundary are subject to undermining from coastal processes and are gradually falling into the creek. The most recent large tree to fall, a swamp mahogany or tallowwood (koala feed tree) occurred in January 2017.

Road, Pedestrian Access and Services

Arrawarra Beach Road is a bitumen sealed, Council maintained, public road. There is a well-formed bitumen access crossing within the site located off Arrawarra Beach Road which has good sight distance in both directions. An internal bitumen access road and hard surface footways are utilised for access within the site. There is a public footway located along the site's western boundary off Arrawarra Beach Road which allows access to Yarrawarra Creek and the coast at low tide. There is a timber footbridge located within the northeast corner of the site that provides pedestrian access over the Yarrawarra Creek to Arrawarra Beach. The timber footbridge is maintained and operated by the Arrawarra Beach Holiday Park under a crown licence.

Illustration 1.1 Site Locality



Source: Six Maps 2015

Illustration 1.2 Aerial Photo

Source: Near Maps 2015

SITE PHOTOS

VIEW OF EXISTING TIMBER FOOTBRIDGE LOCATED WITHIN THE NORTHEAST CORNER OF THE SITE WHICH PROVIDES ACCESS TO THE COASTAL FORESHORE.

VIEW LOOKING ALONG THE SI**TE'S NORTH**-WESTERN BOUNDARY THAT ADJOINS YARRAWARRA CREEK FROM THE TIMBER FOOTBRIDGE

VIEW LOOKING SOUTH-WEST BACK INTO THE SITE FROM THE TIMBER FOOTBRIDGE. SHOWING THE EXISTING GABION BASKET WALL AND TIMBER RETAINING WALL

VIEW LOOKING SOUTH ALONG THE **SITE'S** EASTERN BOUNDARY

VIEW LOOKING SOUTH ALONG **THE SITE'S** EASTERN BOUNDARY ADJOINING ARRAWARRA CREEK.
20 M WIDE E2 ZONED BUFFER

VIEW OF THE FOOTBRIDGE LOOKING NORTHEAST TOWARDS ARRAWARRA BEACH AND THE PACIFIC OCEAN.

PUBLIC RIGHT OF FOOTWAY TO THE BEACH

PUBLIC RIGHT OF FOOTWAY TO THE BEACH

FALLEN TREE
(JAN 2017)

FALLEN TREE
(JAN 2017)

**REFER ECOSURE VMP – TREE # 581 OR 582*

2

The Proposed Development

2.1 General Description of the Proposal

This Development Application (DA) seeks consent for coastal protection works. It is proposed to construct a 360 metre rock armoured revetment within private land above the MHWM and demolish an existing 210 metre failing revetment (rock gabion) located along the estuarine boundary of the site, as shown below:

Water Technology Design Report, 2016

Coastal protection works means activities or works to reduce the impact of coastal hazards on land adjacent to tidal waters and includes seawalls, revetments, groynes and beach nourishment. (Coastal Protection Act 1979 No 13)

Site
The subject land is Lots 1 and 2 DP 1209371 and Lot 1 DP 26125.

Access
Access to the site is off Arrawarra Beach Road. Access, traffic and parking arrangements for the proposal are discussed further in Section 3.4.

The revetment has been designed to enable construction from the landward side enabling the work site to be located wholly within the site boundaries. The revetment is designed with a sloping rather than vertical face to reduce the potential for erosion impacts. The revetment is located approximately 200 m from the ocean, further reducing the potential for erosion impacts.

The proposed revetment wall has been designed in a way that is visually unobtrusive, by using locally sourced rock placed along the boundary of the site. Once the seawall is completed, the landscaped foreshore buffer and rock revetment will provide a secure area for cabins, landscaping, passive recreation and will protect the boundary of the caravan park from coastal erosion.

The revetment will protect an approved land use, an existing caravan park. The revetment will replace and extend an existing gabion that was constructed in 1990 pursuant to DA Consent 224/90 and in accordance with Building Permit 889/90 dated 22 August 1990. The existing rock gabion was approved by Council despite the environmental zoning of the land.

At the time of construction, the existing gabion was built to best practice standards and in accordance with agency requirements. Since 1990, the rock gabion structure has provided adequate protection of the land boundary, however it is now at the end of its commercial life. DA Consent 224/90 (Appendix L) for the existing gabion has been commenced and has validity in perpetuity. It is considered that DA Consent 224/90 has not been finalised, in that there has not been any final certification issued. One option would be to 'complete' the existing approved gabion structure by modifying that consent to enable the structure to be wholly located within the site boundary. The preferred option is to construct a new revetment as proposed in this development application.

The proposed revetment has been designed to structurally withstand a 100 year ARI event and will provide protection to infrastructure located 20 metres behind the wall.

The main benefits arising from the proposal are:

- Protection of the site and surrounding land from coastal erosion; and
- Improving the coastal character of the site and the coastal foreshore; and
- Improved public safety and visual benefit of the replacement of the existing gabion wall that is partially in disrepair; and
- All costs and responsibilities for the construction and maintenance of the revetment will be met by the landowner; and
- The revetment has the potential to protect adjoining public assets over the long term; and
- Ability to "top up" the revetment with armour rock, if climate change and sea level rise impacts are more severe than the adopted predictions.

2.2 Seawall (Revetment)

A revetment is a permanent structure designed to prevent the types of subsidence that commonly occur adjacent to waterways and the ocean. By definition, it is a protective covering on an embankment of earth designed to maintain the slope or to protect it from erosion (GCCC, 2015).

A revetment has been designed by Coastal Engineering Solutions (now Water Technology). The drawing set and design report is found at Appendix C.

The primary function of the revetment is to protect the site boundary and prevent coastal erosion caused by wave activity. The site's boundary along the adjoining creek frontage has been eroded over time by coastal processes as can be seen in the site detail survey at Appendix A. Previous geomorphic investigations (*Geomorphic Impact Assessment*, Martens Consulting Engineers, 2007) found that the site is at risk from wave attack and fluvial erosion and the impact could be significant, with the potential for significant loss of property and existing ecological values from a storm event at some time in the future unless mitigation measures are implemented.

The primary action on the revetment is the wave impact. The function of the revetment is to secure the boundary of the site and to control erosion.

The current revetment structure is made up of rock gabion baskets that extend approximately 210 m along the creek frontage. This gabion has begun to deteriorate and in some places, warping and settlement is also occurring as a result of wave attack and sediment redistribution at the wall toe and tidal influences. The existing gabion was constructed in 1990 pursuant to DA Consent 224/90.

The residual creek bank along Yarrawarra Creek and within the southern part of the site is unprotected and susceptible to future wave attack, fluvial action and scour.

The site's boundary and subsequent revetment wall location has been defined by the Mean High Water Mark (MHWM) site survey undertaken by NKWP Surveyors April 2015. Boundary definition survey provided at Appendix B.

The proposed revetment will be located wholly within the site boundary and within the E2 zone. It is located in such a way that the seawall structure itself (as well as the construction activity to build it) are landward of the property boundary, defined by the surveyed line of the Mean High Water Mark (MHWM) and redefined as shown at DP 1209371.

2.3 Associated Work

Construction of the proposed revetment will involve the temporary removal of cabins located within or nearby the works area, generally as shown at Illustration 2.1.

The existing public right of footpath to the Yarrawarra Creek located in the north-western corner of the site will be reconstructed/reinstated to match existing as part of the works. During construction of the revetment, the right of footway will be temporarily unavailable to the public. Whilst the works are in progress, an alternative public access to the beach will be made available, noting that there is no legal right of access for the public through the caravan park.

Illustration 2.1 Cabins temporarily affected by the works

X Cabins to be temporarily removed and replaced at the completion of the works

2.4 Revetment Design

Detailed revetment design plans and report is provided at Appendix C.

The structural design of the new revetment required the determination of the peak storm tide level as well as design wave parameters (of height, period, and duration) in order to determine the necessary physical characteristics of the armoured structure.

When designing the rock-armouring for the revetment, Coastal Engineering Solutions used a 100 year ARI event. The selection of specific characteristics of the 100 year ARI Design

Event that were used in the design of the revetment was an involved process, as it consists of a combination of severe waves and extreme ocean water levels.

Comprehensive and specialised studies are typically required to establish their joint probability. The methodology applied to the design of the revetment has been to adopt the Design Event having the 100 year ARI storm tide and associated wave characteristics defined by the comprehensive modelling undertaken for the *Coffs Harbour Coastal Processes and Hazards Definition Study (BMT WBM, 2011).*

The following design characteristics have been applied to mitigate any potential damage / failure by erosion of the rock armour:

- Primary armour: Two layers of rock, 50% by number greater than 1 tonne (allowable range in size being 0.35 tonne to 3 tonne).
- Minimum layer thickness of primary armour: 1330mm.
- Underlayer rock: Two layers, average size 100kg (allowable range 30kg to 350kg).
- Minimum underlayer thickness: 620mm.
- Minimum rock density: 2,650 kg/m^3.
- Revetment slope: 1 vertical to 1.5 horizontal
- Suitability of all rock for application in marine works confirmed by petrographic analyses.
- Geotextile on underlying bank slope: Elcomax 600R or an approved equivalent

To mitigate damage by undermining, the revetment design incorporates founding the revetment's armour layer at a depth below the expected level of scour in the creek as shown at Illustration 2.2. This enables the entire structure and all construction work (including excavation/backfilling for the deeper toe) to be located within the property boundary. More importantly, it also minimises any relocation or realignment of the existing creek banks, with associated benefits to retention of adjacent estuarine vegetation.

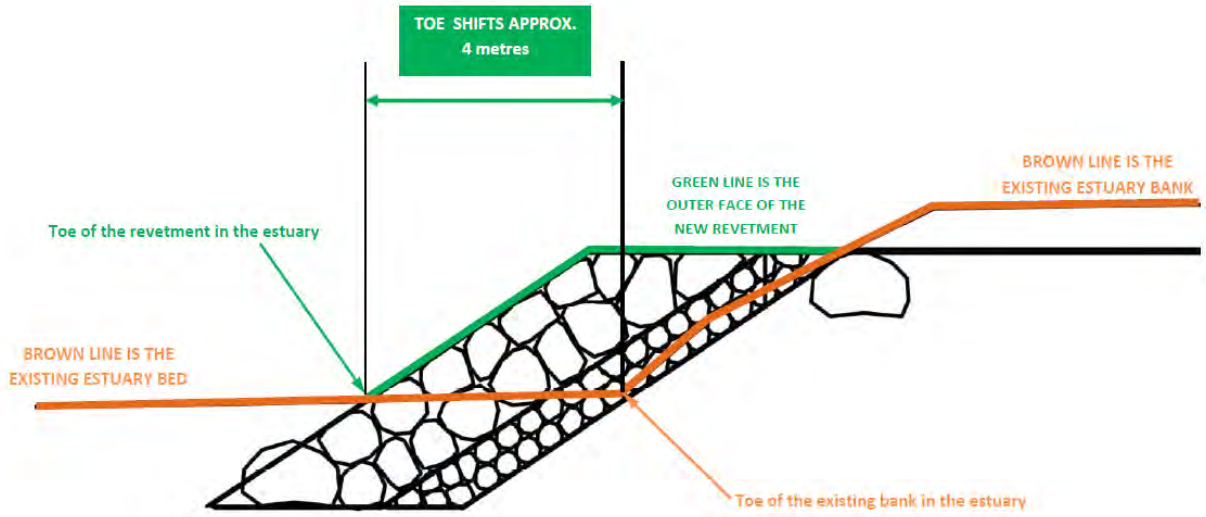
Changes to the bank alignment

Minor changes to the existing bank alignment will occur to accommodate the proposed revetment wholly within the site boundary. The relationship of the existing bank to the proposed revetment is shown in the site plan by Newnham Karl Weir and Partners at Appendix A.

Contrary to claims that the proposed revetment extends 13 m into the estuary (refer CPS DA Assessment Report, December 2016), as shown in the cross section below at Illustration 2.2, at set out point (SOP) 01, the revetment extends only 4 m into Arrawarra Creek and only for short length of the bank. Further along the bank, towards the footbridge, the bank is excavated to accommodate the structure entirely within the property boundary, which makes the creek wider.

Irrespective of the minor areas of "widening" and "narrowing" of the creek, modelling of creek flows by Umwelt shows no change to flow velocity and no adverse impacts overall.

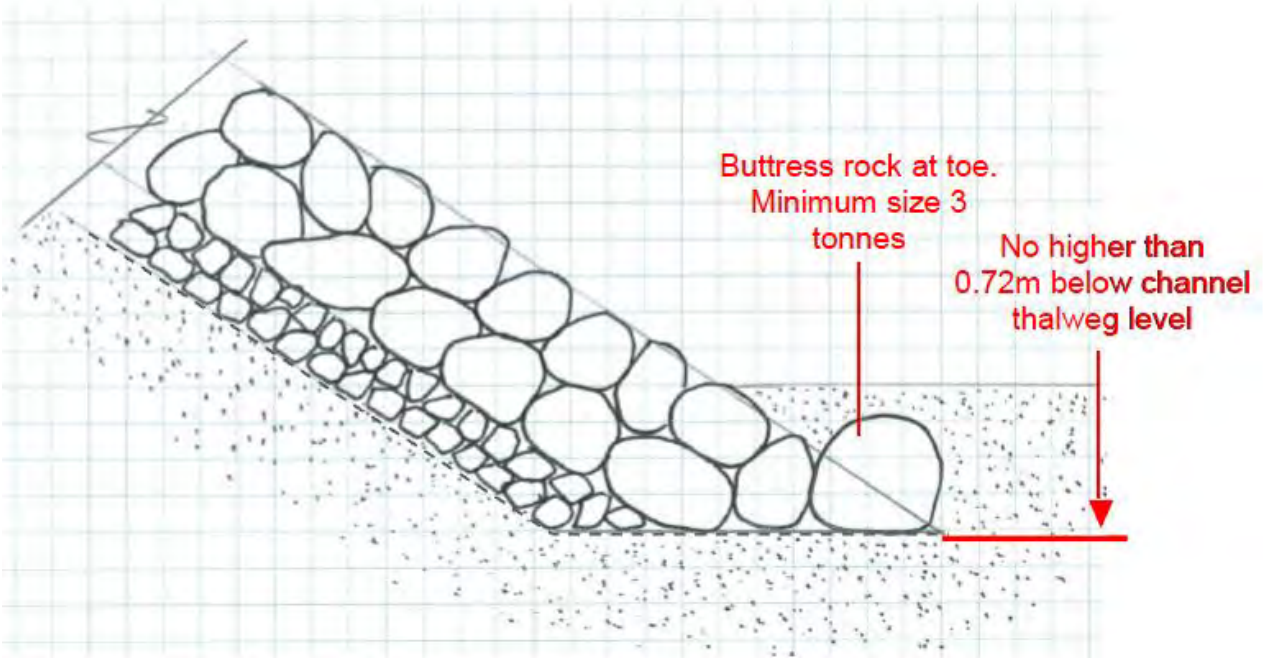
Illustration 2.2 Cross Section of Embankment



Cross Section of existing bank and proposed revetment at Set Out Point (SOP) 01.

A row of large rocks (minimum size of 3 tonnes) is to be placed along the buried toe of the revetment to form a buttress for the armoured slope above. The physical extent of the rock armouring is shown at Illustration 2.3.

Illustration 2.3 Revetment design



WT Design Report, Figure 11

Illustration 2.4 Extent of rock armouring

WT Design Report, Figure 9

2.5 Fit for Purpose

As indicated in Section 3.1 of the design report by Water Technology, the proposed revetment has been designed to meet the relevant Australian Standard AS4997-2005 "*Guidelines for the design of maritime structures*" which nominates a 50-year design life (AS 4997 – 2005 Guidelines for the Design of Maritime Structures. Table 6.1, p.30) for a "normal commercial structure" such as the revetment fronting the development site.

This classification as a "normal commercial structure" (as opposed to that of a "special structure / residential") is adopted since the purpose of the revetment is to protect an existing tourist land use. On this basis, it is considered that the seawall design is fit for purpose.

2.6 Construction Methodology

The construction of the revetment will be undertaken by conventional earthmoving equipment operating from the top of the armoured slope. There will not be a requirement for construction operations to be located within the estuary beyond the property boundary.

It is envisaged that prior to major works being undertaken on the revetment, temporary sheet-piling will be installed along the boundary of the property where it is located within the estuary itself. This will not only isolate the construction activity (and the turbidity that it might generate) from estuary waters, but provide a better "all-tide" working environment for the construction equipment. Once temporary sheet-piling is in place, trimming of the

existing estuary bank, preparation for toe armouring and removal of the existing gabion wall will be undertaken.

Geotextile will be laid on the prepared slope, followed by placement of filter armour layers and then the outer primary armour rocks. This placement would be undertaken by excavators operating from the top of the slope. It is not envisaged that large stockpiles of armour rock will be required at the Caravan Park site. The delivery of rock armour from the quarry to the excavators will be at a rate that closely matches the rate that the delivered armour is placed on the slope. Rocks would be delivered by trucks directly to the location of the excavators that are placing the armour.

As the rock armouring proceeds along the length of the revetment, the temporary sheet-piling can be extracted. The scheduling of this removal of piling would be such as to mitigate any potential for turbidity due to the on-going armouring activities elsewhere on the revetment alignment. The crest armouring across the E2 Zone would be buried using appropriate clean fill material that will be suitable for vegetation planting.

Supply of armour rock

Suitable blue rock is of an Argillite type material is available from Woolgoolga Quarry. One months' notice is required for supply and delivery of the material.

2.7 Maintenance of the Revetment

A legally binding arrangement by way of a positive covenant under S88E of the *Conveyancing Act 1919* for the ongoing management of the revetment and the restoration of adjoining land has been drafted and is provided at Appendix P.

Consent condition(s) regarding the maintenance of the revetment and the restoration of adjoining land may be imposed and may include words to the effect that:

1. A positive covenant under section 88E Conveyancing Act 1919 shall be registered on the title of the land burdening the owners of the land to maintain the revetment to the satisfaction of Coffs Harbour City Council.

2. Pursuant to the provisions of section 55M of the Coastal Protection Act 1979, a legally binding agreement for the life of the works shall be negotiated and executed between Arrawarra Beach Road Pty Ltd and Coffs Harbour City Council to ensure:

    a) the restoration of the beach or Council land adjacent to the beach if any increased erosion of the beach or Council land adjacent the beach is caused by the presence of the revetment;

    b) An agreement the same terms is entered into by any heirs, successors or assigns of Arrawarra Beach Road Pty Ltd and Coffs Harbour City Council

It is noted that a similar arrangement was imposed as a consent condition in DA CP13-001 for a Beachfront Revetment Wall at Umina on18 July 2014.

2.8 Seawall Management Plan

A draft Seawall Management Plan has been prepared by Water Technology in accordance with the *Draft guidelines for assessing the impacts of seawalls*, NSW Environment, Climate Change and Water (DECCW), 2011. Refer to Appendix R.

Draft Emergency Management Plan

In an extreme storm event, large waves will sweep through the estuary entrance and may break on the top of revetment. The structure has been designed to accommodate wave breaking. The section of the lower revetment along the southern part of the site's estuarine perimeter will experience heavy breaking on top, consequently there is (buried) rock placed across the entire 20m width of the E2 Zone. In their assessment of DA CP16-001, Haskoning, (RHDHV) advised the panel that this situation was "unsafe". It has been demonstrated in this application that the proposed revetment will not structurally fail under the design event.

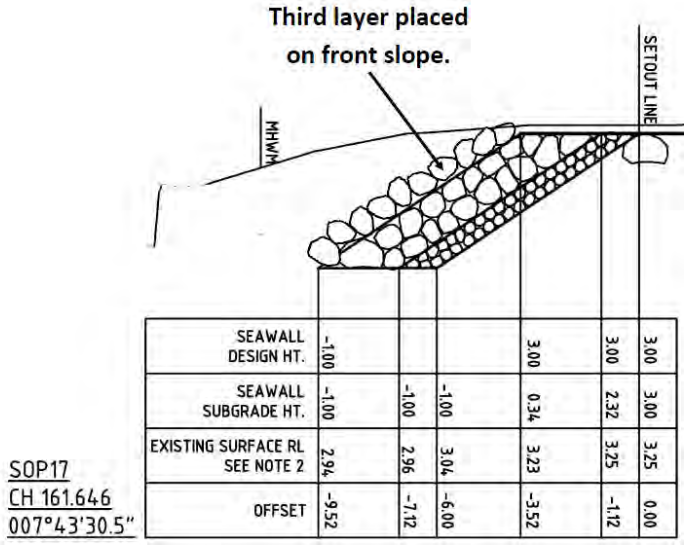
Assuming Haskoning's concern relates to risk to person and property during an extreme storm event, the applicant would accept a condition to prepare a plan of management (PoM) to implement emergency management measures to secure proximate structures and services as best as possible, provide for the evacuation of occupants and to take reasonable actions to keep away potential "spectators" of a storm. The revetment wall together with such a PoM would provide a more responsible approach to reducing risk to persons and property than the alternate 'do nothing' approach.

A draft Emergency Management Plan that primarily provides for risk to people and temporary structures during a severe storm event is provided at Appendix S.

2.9 Accommodating Future Climate Change

Gradual changes to future climate will be matched by gradual morphological changes to the natural processes that shape the lower reaches of the Arrawarra estuary. No attempt has been made during the design of the revetment to determine just what future changes might occur within the estuary. Instead the simplistic approach has been to assume that the channel bed levels that have been surveyed for present-day climate scenario will be the same in future under climate change influences. This then means that the toe levels of the revetment determined for present-day conditions are adequate for future climate conditions in the year 2100.

The revetment design has determined that the front sloping face of the revetment requires two layers of 1 tonne rock to accommodate the 100 year ARI Design Event under present-day climate conditions. However, should climate change influences occur as nominated by the NSW govt policy/guidelines, then these more severe conditions will require the placement of another (third) layer of 1 tonne rocks on the front slope at some future time.



As indicated in the cross section SOP17, the design is such that there is room to place this third layer without the revetment going beyond the property boundary.

Eroded beach level at the entrance to the estuary

The beach level at the entrance to the estuary will determine the size of waves that will erode and wash over the open beach during the 100 year ARI Design Event, then penetrate into the estuary; so as to potentially break on the revetment. As shown in the armour calculations (Appendix C), the structural design of the revetment accounted for these waves.

RHDVH in their assessment of DA CP16-001, considered that the beach will be scoured lower, by 0.3 metres, allowing larger waves into the estuary. If this opinion was adopted, then the (hypothetical) larger waves could be accommodated by placing 1.5 tonne rather than 1 tonne rocks on the revetment face as currently specified. As indicated in their design report, Water Technology disagree with this opinion and maintain that the revetment as designed is suitable for the subject proposal.

Wave overtopping

During the 100 year ARI Design Event, there will potentially be large waves sweeping through the estuary entrance and breaking on the top of revetment. We have designed the structure so that there are large armour rocks on top of the revetment that will accommodate this wave breaking. The section of the lower wall along the southern part of the site's estuarine perimeter will have heavy breaking on top, which is why there is (buried) rock placed across the entire 20m width of the E2 Zone in the current design.

In recent storm events, notably the "east coast lows of July 2016" which combined cyclonic winds with a king tide, the estuarine edge did not sustain significant damage and the caravan park structures, including cabins lining the creek edge, did not sustain storm or wave damage.

Nevertheless, under either scenario, lower (-0.3m RHDHV) or higher (Water Technology calculation), the likelihood of significant to risk to person and/or property located behind the proposed revetment would be rare and would only occur under extreme events. In the event the Coastal Panel agrees with RHDHV and raises concern regarding risk to people and property at the estuarine edge during a significant storm event, the applicant would accept a condition to prepare a plan of management (PoM) to implement

emergency management measures to secure proximate structures and services as best as possible, provide for the evacuation of occupants and to take reasonable actions to keep away potential "spectators" of the storm.

The revetment wall together with such a PoM would provide a more responsible approach to reducing risk to persons and property than the alternate 'do nothing' approach.

3

Environmental Assessment

3.1 Geomorphic Impact Assessment

Martens Consulting Engineers prepared a Geomorphic Impact Assessment for Proposed Seawall, Arrawarra Caravan Park, Arrawarra in January 2007 based on a previous sea wall design comprising rock armouring to the Yarrawarra Creek boundary and repair of the existing gabion at the Arrawarra Creek boundary. The report and drawings are provided at Appendix M. Martens (2007) provided a detailed assessment of geomorphic conditions that remain relevant today.

Potential short and long term impacts on morphology of the subject revetment:

Table 2.1 Potential Impact on Morphology

POTENTIAL IMPACT	SHORT TERM	LONG TERM	COMMENT / MITIGATION MEASURES
Toe scour	n/a	Unlikely	The revetment's armour layer is to be founded at a depth below the expected level of scour in the creek. Founding the revetment slope deeper than the expected scour level of the creek bed enables the entire structure and all construction work (including excavation/backfilling for the deeper toe) to be located within the property boundary. More importantly, it also minimises any relocation or realignment of the existing creek banks, with associated benefits to retention of adjacent estuarine vegetation. Hydro dynamic modelling (Umwelt, October 2016) indicates that flow velocity with and without the revetment are essentially the same.
Soil loss behind wall	N/a	Possible	Any impacts from potential soil loss behind the revetment will occur within the subject land. This is deemed as an acceptable outcome (since the damage can be repaired and costs incurred by the land owner). The placement of rocks greater than 3 tonnes as buttress rocks to the rear of

POTENTIAL IMPACT	SHORT TERM	LONG TERM	COMMENT / MITIGATION MEASURES
			the crest is intended to mitigate any excessive damage to the armour.
Loss of beach face	N/a	N/a	No existing beach exists adjacent to the proposed revetment.
Acid Sulphate Soils (ASS) impacts	Unlikely	Unlikely	A geotechnical investigation undertaken by de Groot & Benson Pty (2005) found no evidence of acid sulfate soils within the site. If required, an ASS management plan would be prepared if ASS is disturbed by construction activities.
Creek bed erosion	N/a	Unlikely	Founding the revetment slope deeper than the expected scour level of the creek bed minimises any relocation or realignment of the existing creek banks, with associated benefits to retention of adjacent estuarine vegetation. The 2-Dimensional hydrodynamic modelling that we have undertaken for the site demonstrates that there is no significant adverse change in bed velocities as a result construction of the proposed revetment. As a result the proposed revetment will not result in changes to the channel bed or erosion rates in the creek system.
Erosion on opposite bank	N/a	Unlikely	Where wave reflection or current deflection is significant, erosion on the opposite bank could occur under adverse conditions. At this site, this is unlikely given that such impacts are not presently manifested for the existing vertical gabion structure. Wave heights within the estuary are very low and travel distances are generally long (> 50 m) over very shallow water. Such conditions promote considerable wave and energy attenuation. Hydro dynamic modelling (Umwelt, October 2016) indicates that flow velocity with and without the revetment are essentially the same.
Change to bed sediment character	Minor	N/a	During construction, minor disturbances to bed sediments may occur through the placement of rock

POTENTIAL IMPACT	SHORT TERM	LONG TERM	COMMENT / MITIGATION MEASURES
			armour. Impacts will be of a short duration and will be subject to settling. Founding the revetment slope deeper than the expected scour level of the creek bed minimises toe scouring and potential changes to bed sediment character. Hydro dynamic modelling (Umwelt, October 2016) indicates that flow velocity with and without the revetment are essentially the same. NSW Office of Water issued General Terms of Approval for the same works in 2016 (DA16-001) subject to their standard conditions including obtaining a Controlled Activity Approval (CAA) prior to commencement of the works. The CAA application will include a final VMP, Sediment and Erosion Control Plan, Works Schedule and construction certificate drawings.
Habitat loss	Minor	Minor	The vegetation structures within the site lack structural complexity and so have a relatively low habitat value. The estuarine boundary of the site is highly modified by urban uses (caravan park). A small fragment of Littoral rainforest on the northern boundary is degraded, comprises 4 trees, exotic grasses and no mid storey. A planted specimen of Coolamon (listed as Vulnerable under the TSC and EPBC Acts) is located within the south-western boundary of the site and would be removed for the development. Two small isolated patches of Coastal Saltmarsh less than 20 m^2 in area will be removed. These patches do not contribute to other communities as a source of propagules or habitat loss. Unlikely to impact habitat for Oxleyan Pigmy Perch. The main impact on marine and estuarine environments will occur during construction. A NSW Department of Primary Industries (Fisheries) permit will be required prior

POTENTIAL IMPACT	SHORT TERM	LONG TERM	COMMENT / MITIGATION MEASURES
			to commencement of works within the water. NSW Office of Water issued General Terms of Approval for the same works in 2016 (DA16-001) subject to their standard conditions including obtaining a Controlled Activity Approval (CAA) prior to commencement of the works. The CAA application will include a final VMP, Sediment and Erosion Control Plan, Works Schedule and construction certificate drawings.

3.2 Heritage

A Cultural Heritage Due Diligence Assessment was carried out by Everick Heritage Consultants Pty Ltd to assess impacts arising from the development. The full assessment is found at Appendix I and is summarised below.

The subject land has been historically used for urban purposes and has been extensively modified from its stabilised natural state by caravan park infrastructure and coastal erosion.

Known sites and relationship between those sites and Project Area.

An analysis of historic aerial photos (1956, 1969, 1984 and 2002) was undertaken. This analysis showed significant land clearing across the project area prior to 1956 and a second phase of disturbance associated with development on the caravan park between 1969 and 1984.

An AHIMS search was undertaken with a buffer of 200 metres. This search returned three recorded Aboriginal sites within 200 m of the Project Area. A second search was conducted with a buffer of 50 m. The search returned no recorded Aboriginal sites for Lot 1 DP789002 and 2 recorded Aboriginal sites for Lot 12 DP835612. A more extensive search identified the following recorded Aboriginal sites:

- 22-1-0034 Arrawarra 3 (AGD 56 518800 6674500) Artefact; and
- 22-1-0392 Arrawarra Headland Site (AGD 56 518761 6674645) Partially Destroyed Artefact and Shell.

The Arrawarra 3 site (#22-1-0034) could not be confidently located without a site card. A site card was requested through AHIMS however returned that the cards were not available within the database system. Issues associated with site Arrawarra 3 are the inaccuracy of the coordinates which suggest it was recorded pre-GPS. As such, without a site card and plan this site cannot be positively located.

The coordinates for the Arrawarra Headland Site (#21-1-0392) place it immediately west of the Project Area, however the name of the site would suggest it is located on Arrawarra Headland.

Everick searched the following databases and did not find any listed within or relevant to the site:

- Commonwealth Heritage List (Australian Heritage Council)
- Register of the National Estate (Australian Heritage Council)
- The State Heritage Register (NSW Heritage Office)
- The State Heritage Inventory
- The Register of the National Trust of Australia
- Coffs Harbour Local Environment Plan 2013 (LEP).
- The National Heritage List (Australian Heritage Council)

The 'Fish traps' at Arrawarra are listed in Schedule 5 of the LEP. They are located 400 m south of the site and will not be impacted upon by the Project.

An Aboriginal Place has not been declared over the Project Area.

Collins (2007) completed an Aboriginal heritage assessment for upgrade of the Pacific Highway from Sapphire to Woolgoolga, immediately west of Arrawarra Beach. Two sites were documented within the highway corridor. These sites are upstream from the subject site. Collins developed a predictive model which proposed that 'coastal alluvial plains' were deemed of having the highest archaeological sensitivity. Although the report argues that in situ archaeological deposits within the highway corridor would be unlikely to have survived, they are still of high social and cultural significance.

Collins (2010) completed an archaeological assessment of the Arrawarra Beach and headland region in response to the proposal to place a rest area east of the Pacific Highway upgrade and south of Arrawarra Beach Road. The report documents several recorded sites within the vicinity of Arrawarra Beach and Arrawarra Headland. The assessment identified and located an artefact scatter near the junction of the Pacific Highway and Nash Road. The report discusses a bora ring in the centre of Arrawarra Headland, the 'fish trap' at Arrawarra Headland and a series of middens along Arrawarra and Corindi Beaches.

The potential for subsurface objects.

Based on geotechnical investigations, which include a summary of 26 descriptions of soil type and inclusions such as shell fragments, it is reasonable to conclude that a subsurface 'lens' type midden does not occur within the project area.

An additional consideration is the amount of subsurface disturbance that has taken place within the site since the establishment of the caravan park which has not resulted in the identification or recording of midden material. Such works include the installation of sub-surface sewerage and water infrastructure; excavation of post holes for bollards and signs around the caravan park; disturbance of soils of gardens at permanent caravan sites and the installation of stormwater drains. Everick's experience with coastal campgrounds on

sand deposits is that middens, if present, typically have a surface expression around areas of disturbance.

Everick's archaeologists are of the opinion that, given the extent of existing disturbance within the development footprint, the proposed rock revetment is unlikely to result in further harm to Aboriginal Heritage. No Aboriginal Objects were identified within the area of proposed works. One known Aboriginal site (Arrawarra Headland Site #22-1-0392) was recorded to extend into the project area however is well within the environmental buffer zone and has been previously disturbed.

Recommendation 1: Aboriginal Objects Find Procedure
Everick Heritage Consultants recommend that if it is suspected that Aboriginal material has been uncovered as a result of development activities within the Project Area:

a) work in the surrounding area is to stop immediately;
b) a temporary fence is to be erected around the site, with a buffer zone of at least 10 metres around the known edge of the site;
c) an appropriately qualified archaeological consultant is to be engaged to identify the material; and
d) if the material is found to be of Aboriginal origin, the Aboriginal community is to be consulted in a manner as outlined in the OEH guidelines: *Aboriginal Cultural Heritage Consultation Requirements for Proponents* (2010).

Recommendation 2: Aboriginal Human Remains
Although it is unlikely that Human Remains will be located at any stage during earthworks within the project area, should this event arise it is recommended that all works must stop in the immediate area to prevent any further impacts on the remains. The site should be cordoned off and the remains themselves should be left untouched. The nearest police station (Coffs Harbour), the Coffs Harbour Local Aboriginal Land Council and the OEH Regional Office (Coffs Harbour) are all to be notified as soon as possible. If the remains are found to be of Aboriginal origin and the police do not wish to investigate the Site for criminal activities, the Aboriginal community and the OEH should be consulted as to how the remains should be dealt with. Work may only resume after agreement is reached between all notified parties, provided it is in accordance with all parties' statutory obligations. It is also recommended that in all dealings with Aboriginal human remains, the Proponent should use respectful language, bearing in mind that they are the remains of Aboriginal people rather than scientific specimens.

Recommendation 3: Notifying the OEH
It is recommended that if Aboriginal cultural materials are uncovered as a result of development activities within the Project Area, they are to be registered as Sites in the AHIMS database managed by the OEH. Any management outcomes for the site will be included in the information provided to the AHIMS.

Recommendation 4: Conservation Principles
It is recommended that all effort must be taken to avoid any impacts on Aboriginal Cultural Heritage values at all stages during the development works. If impacts are unavoidable,

mitigation measures should be negotiated between the Proponent, OEH and the Aboriginal community.
In regard to works in the vicinity of 'the Arrawarra Headland site #22-1-0392, Everick (letter to CHCC 21/6/16) recommend that:

> *Proposed works in this general area include revegetation and the installation of the new seawall to the north of the current creek bank. Potential impacts to this site will be mitigated by undertaking revegetation works by hand and monitoring by a qualified person so as to ensure that the archaeological site is not unnecessarily damaged by machines. Impacts from the seawall and creek bank reclamation will primarily result from backfilling between the existing creek bank and the new wall. Impacts to the archaeological site from these works will be mitigated by temporary fencing, placement of temporary fabric over the site to ensure fill can be easily removed and monitoring machine movements.*

It is further noted that the embankment in the vicinity of this site is subject to erosion and slumping, and the site may already be destroyed or partially destroyed by environmental factors. The risk of erosion without the new revetment to stabilise the banks would pose a greater danger to any aboriginal relics, should they exist.

3.3 Flood and Stormwater Management

A Flooding and Stormwater assessment report was prepared by Umwelt (Australia) Pty Limited and is summarised below. A copy of this report is found at Appendix E.

Umwelt, carried out a flood study for the site in 2003 to determine the 100 year Average Recurrence Interval (ARI) flood levels for the site and also to consider the sensitivity of flood levels, outlet and tidal conditions. Council now requires consideration of sea level rise associated with climate change.

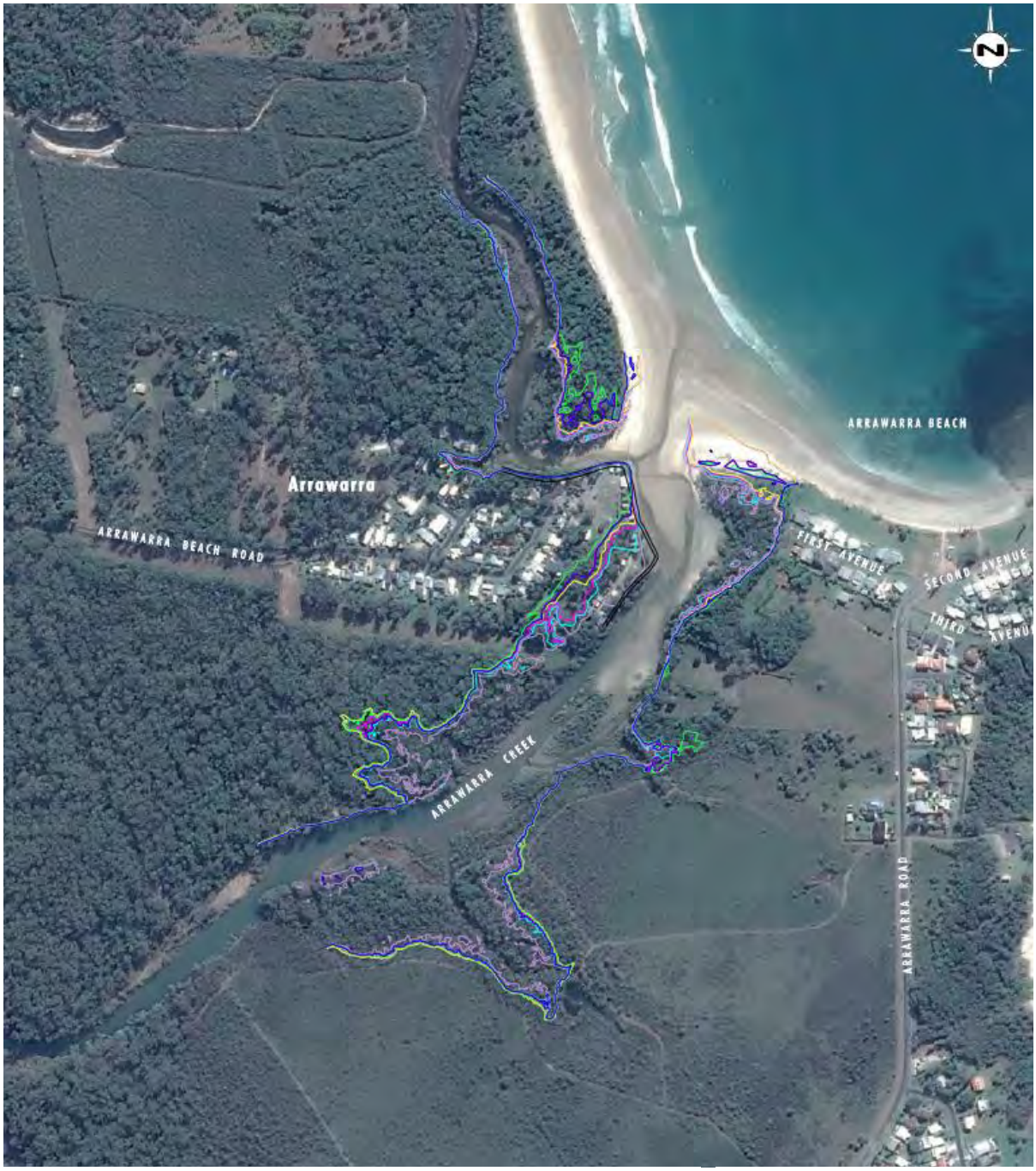
Results of the initial assessment undertaken in 2003 shows that the low tide tailwater conditions were within the design specification of the revetment wall. For extreme storm surge conditions (3.0 m AHD) the peak 100 year ARI flood elevation was estimated at 3.02 m AHD height at the confluence of the two creeks, where the wave action is the greatest contributing factor.

The sensitivity analysis indicated that the tailwater levels dominate the flood regimes adjacent to the site, drowning the effects of varying rainfall intensity, infiltration rate and sand bar height.

Flood extents within the existing landform with the designed revetment are shown at Illustration 2.5.

Sea Level Rise Scenarios
The maximum 100 year flood was modelled with sea level rise scenarios of 0.4 m and 0.9 m respectively for the site pre-development. For the 0.4 m sea level rise scenario, the maximum modelled flood elevation during this event at the creek junction is 2.34 m AHD. The 0.9 m sea level rise scenario maximum modelled flood elevation is 2.57 m AHD.

Illustration 2.5 Flood Extents



Legend

- Proposed Revetment of Arrawarra Caravan Park
- 1% AEP Flood Extent (1% AEP Catchment Flood and 5% AEP Ocean Water Level)
- 1% AEP Flood Extent (5% AEP Catchment Flood and 1% AEP Ocean Water Level)
- 2% AEP Flood Extent
- 5% AEP Flood Extent
- 10% AEP Flood Extent
- 20% AEP Flood Extent
- 50% AEP Flood Extent

1, 5, 10, 20 and 100% AEP Flood Extents, Existing Landform with Sea Wall Designed

Source: Umwelt, 2017

3.4 Traffic and Access,

Access to the site is off the Pacific Highway Arrawarra interchange via Arrawarra Beach Road. Arrawarra Beach Road, is a low traffic volume, bitumen sealed public road that connects with Solitary Islands Way and the Pacific Highway.

The site access has adequate sight distance in both directions to enable safe entry and exit in a forward direction to and from the site. There is sufficient area within the site for the safe and efficient operation of machinery, on-site parking and storage of construction materials associated with the removal of the existing gabion basket and timber retaining walls and revetment works. There is ample area within the site to enable vehicles to safely manoeuvre and to enter and exit the site in a forward direction.

There is a public footway located along the site's western boundary off Arrawarra Beach Road. The footbridge located within the northeast corner of the site is licenced to the caravan park and is not a public footway. Nonetheless, a pedestrian management plan will be prepared to ensure that there is access to the public footway at all times throughout the works.

3.5 Ecological Assessment

Statutory Ecological Assessments were prepared by NatureCall Environmental and Ecosure and are summarised below. The reports are attached at Appendix E.

Coffs Harbour City Council Comprehensive Koala Plan of Management CHCC CKPoM

Primary Koala browse trees identified within the site are Swamp Mahogany and Tallowwood. The north western and southern portions of the site are mapped in the Coffs Harbour City Council Comprehensive Koala Plan of Management (CHCC CKPoM) as Secondary Koala Habitat. However, surveys carried out failed to detect Koala activity within the site. Naturecall considered Koalas are unlikely to be living within the site.

EPBC Act 1999 – Matters of National Environmental Significance

The proposal has been evaluated against the provisions of the EPBC Act 1999 and does not require referral to the Department of Environment (DoE) for approval under the EPBC Act. An analysis of these requirements is provided in Section 9 of the Naturecall SEA provided at Appendix F.

Aquatic Environment

Eco Logical Australia carried out an ecological assessment in 2007 of the Yarrawarra and Arrawarra creek confluence. The following is extracted from their assessment:

> *The estuarine portions of Arrawarra and Yarrawarra Creeks encompass the majority of aquatic habitat within the study area.*
>
> *Arrawarra is the larger of the two creeks bordering the site with a catchment of approximately 925 ha and ranging in width from approximately 25 metres to 80 m within the estuarine zone (Martens 2006). By contrast, Yarrawarra Creek reaches a*

maximum width of approximately 40 m within the study area and has a catchment of approximately 842 ha (Martens 2006).

Arrawarra Creek flows north east toward the sea and at the time of survey, a small channel (approximately 2-3 m wide) was flowing seaward along the western bank before joining Yarrawarra Creek and flowing out to sea. A larger channel (approximately 5-6 m wide) was present along the eastern bank of the creek, however, this did not meet with the small channel and did not, therefore, empty into the sea.

Yarrawarra Creek flows south toward the caravan park before making a right angle turn to the east and joining with Arrawarra Creek before flowing into the sea. At the time of survey, the main channel of Yarrawarra Creek was located against the southern bank of the creek, that is, along the northern boundary of the site.

No aquatic vegetation was observed within the estuarine portions of Arrawarra and Yarrawarra Creek during the current study. Seagrass has, however, been identified within the Arrawarra estuary by previous studies (Smith et al. 1993 cited in Umwelt 2001; Umwelt 2001). Umwelt (2001) recorded small areas of seagrass (Zostera capricorni) within Arrawarra Creek, upstream of the current site. Smith et al. (1993) recorded Zostera capricorni as well as Halophila ovalis within both Arrawarra and Yarrawarra Creeks. Smith et al. (1993) observed a patchy distribution of both species within the two creeks with both species only occurring upstream of the current site.

Seven Part Test assessment

Several EECs and threatened species may occur within the study. An evaluation under the 7 Part Test was carried out due to the potential significant impacts on the following species and communities:

Table 2.2 Seven Part Tests

ECOLOGIST	SPECIES / EEC	COMMENTS
Naturecall Environmental – December 2015	Hoary Bat Grey-headed Flying fox East-coast Freetail Bat Eastern False Pipistrelle	Around 30 potential food trees (plus some palms) will be removed, some of which flower in seasons where nectar is in short supply ie late autumn-winter. While a negative impact, this represents a relatively very minor foraging resource for the bats, and is not roosting habitat. Given the ecology of the species, extent of local habitat, and extent of habitat removed, the loss of this modified woodland is clearly not capable of disrupting the lifecycle of a local population of these bat species. A Species Impact Statement is not recommended.
Naturecall Environmental – December 2015	Osprey	The Osprey was observed as a fly-over. A local pair would use the adjacent creeks and ocean as part of its territory. No nests were observed on or near the site. The proposal will have no direct impact on this species given no nests will be removed, or significant changes to the estuarine ecosystems. The loss of trees will see a relatively minute loss of potential nesting materials, but no likely nesting sites will be removed. Given this and the demonstrated tolerance of this species to residential areas, the proposal clearly has no capacity to significantly impact this species, and hence will not place a local viable population at risk of extinction.
Naturecall Environmental – December 2015	Square-tailed Kite Little Lorikeet Black Bittern Black-necked Stork Sooty Oystercatcher and Pied Oystercatcher Koala Squirrel Glider Common Blossom Bat Yellow-bellied Sheathtail Bat Greater Broad-nosed Bat Eastern and Little Bent-Wing Bats Southern Myotis	Due to their ecology and habitat limitations, the site and study area habitats could provide only part to a small fraction of the home range requirements of the local population of any of these species. A Species Impact Statement is not recommended.

ECOLOGIST	SPECIES / EEC	COMMENTS
Ecosure – June 2016	Coolamon (*Syzygium moorei, Myrtaceae)*	A viable local population of Coolamon is unlikely to exist within the concept design footprint and potential habitat for the species is considered unlikely to occur within the site and therefore unlikely to affect the existence of the species. A viable local population is also unlikely to exist within the broader study area as it is not within the species' natural distribution. For these reasons, it is considered that the habitat affected by the proposal is of relative low importance to the long-term survival of Coolamon. A Species Impact Statement is not recommended.
Ecosure – September 2016	Oxleyan pygmy perch (OPP) (*Nannoperca oxleyana*)	OPP is a freshwater fish with niche habitat requirements, and is typically restricted to acidic freshwater, where their occurrence is commonly associated with coastal lowland 'wallum' ecosystems. They prefer quite dense riparian vegetation cover and very low flow conditions. It was therefore considered that a 7-part test was not required.
Ecosure – September 2016	Littoral Rainforest	The Littoral rainforest community is approximately 600 m^2 in size. The community is degraded and comprises of four trees. The area of occurrence on the site covers an area of less than 0.1 hectares so does not meet the criteria under the EPBC Act for the critically endangered Littoral rainforests and coastal vine thickets of eastern Australia threatened ecological community (TEC). In addition, one of the criteria in order for an area of vegetation to qualify as this TEC is at least 70% canopy cover. With only four trees in an area of around 600 m^2, the community does not meet EPBC Act criterion. There is no minimum size for Littoral Rainforest in the South East Corner, Sydney Basin and NSW North Coast bioregions EEC under the TSC Act. There is also no minimum threshold for canopy cover when determining if the community is Littoral Rainforest under the NSW TSC Act. In addition, the scientific determination states that 'some stands may be regrowth or in the process of regenerating' which

ECOLOGIST	SPECIES / EEC	COMMENTS
		implies that canopy cover could be less than 70% within viable stands of the EEC. Because of these factors, a 7 part test was undertaken. The 7 part test found that it is not expected that the removal of the trees will have a negative impact on the surrounding EEC in the locality given the small number of trees being removed. A Species Impact Statement is not recommended.
Ecosure – September 2016	Coastal Saltmarsh EEC.	Approximately 0.002 ha Coastal Saltmarsh will be removed by the proposal. Alterations in the hydrological regime of the area are expected to be small, and therefore unlikely to significantly impact adjacent patches of this EEC. Patches of Coastal Saltmarsh that remain in Arrawarra Estuary will not be significantly impacted by the proposal. The small size of the two patches to be cleared are likely to be less productive and more likely to be prone to degradation (TSSC 2013). Furthermore, the habitat potentially affected by the proposal is not considered to be of importance to the long-term survival of the EEC within the locality, given they are not considered to contribute to the sharing of propagules. Ecosure found that the Coastal Saltmarsh EECs within the Arrawarra estuary are unlikely to be significantly affected by the proposed action as the two small isolated patches do not form part of the community. A Species Impact Statement is not recommended.

Naturecall's assessment concluded that tree removal for the works are unlikely to place a local population or occurrence of a threatened species, EEC or threatened population at risk of extinction.

Ecosure's ecologists found that:

> *The site, although highly disturbed still retains moderate ecological value. Two assessments of significance under the TSC Act were carried out for the Coolamon and Coastal Saltmarsh.*

No assessment of significance was carried out for the Brush-tailed Phascogale (Phascogale tapoatafa), as we agreed with the assessment made by Naturecall Environmental (2015), that it was highly unlikely to occur or be impacted. The proposed development is unlikely to have a significant effect on Coastal Saltmarsh or Coolamon.

The Littoral rainforest community in the northern section of the site is approximately 600 m² in size. The community is degraded and comprises of four trees. Two larger Littoral rainforest communities are mapped to the north and east of the site (on opposite sides of the creek). It is not expected that the removal of the trees will have a negative impact on the surrounding EEC in the locality given the small number of trees being removed. A Species Impact Statement is not recommended.

The fragment of Littoral rainforest to be removed on site is of relatively low ecological value, and no significant impact on the local occurrence of the rainforest EEC is expected. Any impact will be further reduced by revegetation within the northern section of the site, which will incorporate species to replicate the Littoral rainforest being removed. Over time, this is expected to increase the size, density and functioning of the EEC.

Potential impacts associated with removal of marine vegetation (mangroves and saltmarsh) were addressed and it is recommended that a permit is sought for clearing of this area.

A NSW Department of Primary Industries (Fisheries) permit will be required prior to commencement of works within the watercourse.

3.6 Vegetation Management Plan

A draft vegetation management plan (VMP) has been prepared by Ecosure and is found at Appendix N.

The draft VMP provides an overview of the number of trees that will require removal as part of the proposed development. Tree removal will be offset by planting within the E2 environmental conservation area following completion of the revetment.

Compensatory planting proposed within the preliminary VMP meets the objectives of Section E1.2 of the CHCC Biodiversity DCP to:

- offset impacts associated with the removal (or other specified action) of high conservation value vegetation
- protect and maintain important linkages between habitats.

High conservation value vegetation will be removed from the site, however this vegetation (including koala feed trees and hollow bearing trees) is located within a highly modified urban area (caravan park) and does not currently have any protection in terms of zoning or inclusion within a conservation reserve plan of management.

Following construction of the revetment, compensatory planting will be located within the E2 zoned area. This revegetation area will be protected under the zone requirements and actions of the vegetation management plan.

Habitat linkages from the crown land to the south of the site and the Coffs Coast Regional Park to the north will be significantly improved once new trees, shrubs and groundcovers are established in the E2 environmental conservation zone.

The estimates of trees to be removed/retained are preliminary and subject to final civil design. Once the number of trees to be removed/retained has been determined, the final compensatory numbers will be calculated. Ecosure recommend that an additional survey prior to construction is undertaken to determine the exact location of hollow bearing trees to be removed, as well as the size and number of hollows.

The implementation of measures recommended in the preliminary VMP will assist in mitigating any impacts arising from the removal of vegetation. The ecological value of the E2 zoned land will be improved through the revegetation works and ongoing weed control and maintenance.

3.7 Social and Economic Impact

Social and economic impact arising from the proposed coastal protection works will be positive. The proposed revetment will enable the continued safe occupation of the caravan park up to a 100 year planning horizon in terms of protection of the land from coastal processes arising from predicted climate change and sea level rise.

Protection of the estuarine boundary of the site will facilitate the ongoing use of the land for tourism purposes. In the longer term, the works will ensure that private land and public infrastructure located beyond the site will also be protected from coastal processes.

As a consequence of the proposed revetment, adjoining residences at No.48 Arrawarra Beach Road and No. 8 Ellem Close will benefit from additional protection the rock armouring will provide. In support of this statement, the following comment was made in a public submission to DA CP16-001:

> *We would like to fully support Astoria's rock armoured revetment wall. Two years ago we were able to do the same work with large rocks and Geotech fabric, the result has been a resounding success in that the erosion of the bank on our block is now non-existent and the marine life has absolutely exploded, particularly at night.*

Removal of the existing rock gabion will improve public safety. In their previous assessment of the revetment (DA CP16-001), RHDHV, on behalf of the NSW Coastal Panel, found that:

The 360 m revetment is to be located on private land, above the MHWM. Along approximately one half of the length of this boundary is a gabion wall in a variable state of disrepair. Parts of this wall would currently pose or likely pose in the near future a hazard to persons who access the bed areas of the creek over the gabion wall.

Removal of this gabion wall would remove a structure which is potentially hazardous, thereby providing a safety benefit. It is understood that the remainder of the shoreline is not readily accessible due to a steep bank, thick vegetation and other retaining structures.

Public access to the coastal foreshore will be maintained throughout the works. Public access via the Right of Footway 1 wide located along the western boundary of Lot 1 DP 1209371 will be reinstated at the completion of the works.

3.8 Visual Assessment

The use of rock armour, is visually less obtrusive and visually sympathetic to the surrounding environment particularly when compared to the existing gabion basket and wooden retaining walls. As such, the proposed revetment wall will significantly improve the visual environment.

Over time, the visual impact of the revetment will lessen, as compensatory planting and landscaping within the site matures.

3.9 Flow Velocity

Flow velocity modelling was carried out by Umwelt (Australia) Pty Ltd to determine flow velocity within the creek environment and the potential for offsite impacts.

Umwelt prepared a 2D finite element mesh roughness value model to determine flow velocity under existing landform versus with the proposed revetment. The results are that there is essentially no change in flow velocity as a result of the proposed works.

The full report and figures are provided at Appendix E.

3.10 Guiding Principles for Ecologically Sustainable Development

"Ecologically sustainable development" (ESD) is development that uses, conserves and enhances the community's resources so that the ecological processes on which life depends are maintained and the total quality of life now, and in the future, can be increased (CoA, 1992).

In considering the suitability of the site for the proposed development, principles of ESD as defined in the Local Government Act 1993 are relevant. Principles of ecologically sustainable development means the following statements of principle:

Ecologically sustainable development requires the effective integration of economic and environmental considerations in decision-making processes. Ecologically sustainable development can be achieved through the implementation of the following principles and programs:

(a) the precautionary principle—namely, that if there are threats of serious or irreversible environmental damage, lack of full scientific certainty should not be used as a reason for postponing measures to prevent environmental degradation.

In the application of the precautionary principle, public and private decisions should be guided by:

i. careful evaluation to avoid, wherever practicable, serious or irreversible damage to the environment, and

ii. an assessment of the risk-weighted consequences of various options,

(b) inter-generational equity—namely, that the present generation should ensure that the health, diversity and productivity of the environment is maintained or enhanced for the benefit of future generations,

(c) conservation of biological diversity and ecological integrity—namely, that conservation of biological diversity and ecological integrity should be a fundamental consideration,

(d) improved valuation, pricing and incentive mechanisms—namely, that environmental factors should be included in the valuation of assets and services, such as:

i. polluter pays—that is, those who generate pollution and waste should bear the cost of containment, avoidance or abatement,

ii. the users of goods and services should pay prices based on the full life cycle of costs of providing goods and services, including the use of natural resources and assets and the ultimate disposal of any waste,

iii. environmental goals, having been established, should be pursued in the most cost effective way, by establishing incentive structures, including market mechanisms, that enable those best placed to maximise benefits or minimise costs to develop their own solutions and responses to environmental problems.

This Statement of Environmental Effects has carefully evaluated the environmental, social and economic impacts associated with the proposal. The proposal meets the ESD principles above by:

- precautionary principle - careful and rigorous site assessments and evaluation at the design phase of the revetment;
- intergenerational equality – the environment (the site and surrounding area) are maintained and enhanced for the benefit of future generations;
- rehabilitation and revegetation of the environmental zoned land;
- the design accommodates future climate change impacts (including sea level rise). If such impacts evolve in a way that is more severe than currently predicted, such effects can be readily accommodated without the need to build a new more

robust structure, but can instead be mitigated by simply placing additional armour onto the revetment;

- maintaining the public interest by conforming with Commonwealth, State and Local legislation and planning controls;
- conforming with *NSW Planning's Coastal Planning Guideline: Adapting to Sea Level Rise (August 2010*) by ensuring that the caravan park is protected from potential sea level rise impacts. The guidelines adopt a precautionary approach to land use planning; and
- consistency with the NSW Coastal Policy's goal of '*providing for ecologically sustainable human settlement in the coastal zone'.*

3.11 NSW Government Policy

Following a review by the NSW Chief Scientist and Engineer and stage one coastal management reforms, the NSW Government announced that Councils would have the flexibility to determine their own sea level rise projections to suit their local conditions. The Government would no longer prescribe statewide sea level rise projections for use by councils and the 2009 NSW Sea Level Rise Policy Statement would no longer be NSW Government policy.

Coffs Harbour City Council's Coastal Hazard Zone Policy reflects the NSW Policy Statement. The aim of Council's policy is:

- *To minimise risk, both physical and economic, due to coastal processes.*
- *To minimise the effects of development on land subject to coastal processes.*
- *To give developers guidelines for the requirements of particular development on land subject to coastal processes.*

Council's policy content is that:

- *A coastal Hazards Assessment is required for developments that may be affected by Coastal Processes.*
- *A notation be placed on all properties within the City that are identified within the 100 year Coastal Hazard Zone.*
- *The notation to state that any development on the lot will need to take into account the effect of coastal processes over an appropriate planning period. The notation shall also state that, as a general rule, Council requires residential developments to be free from the effects of coastal processes for a period of 100 years and for commercial/tourism development, 50years. The planning period for other developments, such as extensions, to be assessed on the merits of each case.*

The proposed rock-armoured revetment has been designed to accommodate the effects of a 100 year Average Recurrence Interval storm event with minimal damage (including mitigating the effects of undermining, green water overtopping and erosion of the rock armour). This exceeds Council's requirements for tourism development.

4

Statutory Considerations

The follow section lists and explains the relevant Commonwealth and NSW Acts, Regulations and Environmental Planning Instruments, Policies and Guidelines that apply to the site and the development.

4.1 Environment Protection & Biodiversity Conservation Act

The *Environment Protection and Biodiversity Conservation Act 1999 (EPBC Act)* provides for the protection and management of nationally and internationally important flora, fauna, ecological communities and heritage places, known as matters of national environmental significance.

The Act is relevant where a proposal has the potential to have a significant impact on a matter of national environmental significance. A database search of the EPBC Act listed threatened fauna and migratory species is found in Section 4.6.2 of the Ecological Assessment prepared by NatureCall Environmental, provided at Appendix E.

A Koala assessment was carried out in accordance with the Commonwealth Department of Environment *Referral Guidelines for the Vulnerable Koala* (2014). The assessment determined that the proposal is unlikely to lead to a significant impact. Thus, a referral to DoE for the Koala is not required.

Additionally, marina birds, mammals, reptiles and all fish listed in the EPBC Act database search are irrelevant as the site/study area does not contain habitat and the proposal has no potential to impact these species (p.67).

There are no other known Commonwealth Acts, Regulations or Policies that are relevant to the subject proposal.

4.2 Environmental Planning & Assessment Act

Section 79C of the Act details the matters requiring consideration by the consent authority in determining this application. The relevant matters are addressed throughout this report. Section 91 identifies integrated development. Integrated approvals are required under the *Fisheries Management Act 1994* and *Water Management Act 2000*.

4.3 Coastal Protection Act 1979 No 13

The *Coastal Protection Act (CP Act) 1979* is the key legislation that applies to the NSW coastal zone. It aims to provide for the protection of the coastal environment of the State "for the benefit of both present and future generations". This Act contains provisions relating to the use and supervision of the coastal zone, the carrying out of development within the coastal zone and the preparation of the Coastal Zone Management Plans.

Clause 55M(1) of the CP Act, *Granting of development consent relating to coastal protection works* requires that:

> *Consent must not be granted under the Environmental Planning and Assessment Act 1979 to development for the purpose of coastal protection works, unless the consent authority is satisfied that:*
>
> *a. the works will not over the life of the works:*
> *i. unreasonably limit or be likely to unreasonably limit public access to or the use of a beach or headland; or*
> *ii. pose or be likely to pose a threat to public safety,*

Public access to the foreshore:
As the proposed revetment is to be contained in its entirety within the subject land, public access to the foreshore will not be impeded, nor will the wall pose a threat to public safety. Public access will continue under the present arrangements via the public walkway to Arrawarra Creek located within the Right of Footway, 1 wide, which runs along the western boundary of the site.

The public footway may be temporarily closed during construction, however, an alternative public access will be made available within the site, until the Right of Footway is restored.

Public safety:
The proposed revetment has been designed to meet the relevant Australian Standard AS4997-2005 "Guidelines for the design of maritime structures" which nominates a 50-year design life (AS 4997 – 2005 Guidelines for the Design of Maritime Structures. Table 6.1, p.30) for a "normal commercial structure". The construction works will be carried out by appropriately qualified contractors and will not threaten public safety.

Royal Haskoning DHV, in their engineering assessment of DA16-001 for construction of the same revetment within the same land by the same land owner, prepared on behalf of the NSW Coastal Panel, provided the following opinion in relation to S55M of the CP Act:

> *The 360 m revetment is to be located on private land, above the MHWM. Along approximately one half of the length of this boundary is a gabion wall in a variable state of disrepair. Parts of this wall would currently pose or likely pose in the near future a hazard to persons who access the bed areas of the creek over the gabion wall. [The bed areas of the creek are considered to be included in the definition of "beach" in the Coastal Protection Act 1979]. Removal of this gabion wall would remove a structure which is potentially hazardous, thereby providing a safety*

benefit. It is understood that the remainder of the shoreline is not readily accessible due to a steep bank, thick vegetation and other retaining structures.

The open coast beach at the mouth of Arrawarra Creek is currently accessible from the lightweight timber footbridge which is licenced to the caravan park. According to the SEE this is not a public footway … The structure of the footbridge would not comply with acceptable standards for public access, and the development submission would appear to be silent on the future of the footbridge[3].

An existing footpath runs along parts of the eastern boundary leading to the footbridge. This footpath would need to be demolished to construct the rock revetment. The proposal does not appear to provide for the reconstruction of this footpath, although it is unlikely that this footpath, being located within the caravan park, would have been accessible to the general public in any case.

Maintenance over the life of the works

By constructing the revetment within the subject property boundary, the proponent assumes responsibility for its ongoing maintenance.

Regarding maintenance of the revetment, over the life of the works, RHDHV[4] agreed with the applicant that the following condition of consent, or similar, could be imposed:

Pursuant to the provisions of Section 55M of the Coastal Protection Act 1979, a legally binding arrangement for the life of the works being negotiated and executed with Council to ensure:

- *the restoration of the beach, or land adjacent to the beach, if any increased erosion of the beach or adjacent land is caused by the presence of the works, and*
- *the maintenance of the works.*

An easement in favour of Council being created over the portion of the property affected by the revetment wall, and a positive covenant under Section 88BA of the Conveyancing Act 1919 being established over the easement, burdening the owners of the property and their successors to maintain the revetment wall to the satisfaction of the Council. Such maintenance is to also include management of future "outflanking", public safety and upgrading of the works if necessary in the future to meet changed climatic conditions.

The NSW Coastal Panel imposed a similarly worded condition in DA Consent CP 13-001 for a revetment at Umina to ensure that

(e) A mechanism for a funded contingency plan is provided to address both 'end effects' of the development, if experienced, and the management of the

[3] The footbridge is licenced to the caravan park (Arrawarra Beach Pty Ltd) and is not a public footway. The footbridge may be repaired or rebuilt with approval of crown lands. Following construction of the revetment, the footbridge will be reconstructed to accommodate the revetment.

[4] Item 8 App A RHDHV memo 30/11/16

unprotected beach to the south of the development if erosion impacts are increased as a result of the development; and
(f) The responsibility, and the transfer of responsibility to future owners, is clearly identified for the ongoing management and maintenance, including funding, of the development for its design life and for any upgrades necessary to manage future climate change impacts.

Section 55M(2) of the CP Act provides that:

The arrangements referred to in subsection (1)(b) are to secure adequate funding for the carrying out of any such restoration and maintenance, including by either or both of the following:

a. *by legally binding obligations (including by way of financial assurance or bond) of all or any of the following:*
    i. *the owner or owners from time to time of the land protected by the works,*
    ii. *if the coastal protection works are constructed by or on behalf of landowners or by landowners jointly with a council or public authority*
    iii. *the council or public authority,*
b. *by payment to the relevant council of an annual charge for coastal protection services (within the meaning of the Local Government Act 1993).*

4.4 Fisheries Management Act 1994

The objects of the Fisheries Management Act (FM Act) are to conserve, develop and share the fishery resources of the State for the benefit of present and future generations. A Part 7 Fisheries Management Act permit is required for:

- activities involving dredging and reclamation work;
- activities temporarily or permanently obstructing fish passage;
- using explosives and other dangerous substances;
- harming marine vegetation.

Foreshore works and waterfront developments require a permit from NSW Department of Primary Industries (DPI) under ss200-201 of the FM Act where construction involves dredging and reclamation activities such as jetties or marinas, pontoons, slipways, boat ramps, groynes and seawalls.

Works within or adjacent to a waterway that fit the definition of Key Fish Habitat and/or is mapped as Key Fish Habitat, requires a permit for dredging, reclamation, obstructing fish passage under the *Fisheries Management Act 1994*.

4.5 Water Management Act 2000

A controlled activity approval is required as the development involves works on waterfront land. Under the *Water Management Act 2000* (WM Act), a controlled activity means:

a) the erection of a building or the carrying out of a work (within the meaning of the *EP&A Act)*; or
b) the removal of material (whether or not extractive material) or vegetation from land, whether by way of excavation or otherwise; or
c) the deposition of material (whether or not extractive material) on land, whether by way of landfill operations or otherwise; or
d) the carrying out of any other activity that affects the quantity or flow of water in a water source.

Waterfront land is defined as the bed of any river, lake or estuary and any land within 40 metres of the river banks, lake shore or estuary mean high water mark. The proposal involves works for the revetment within 40 m of waterfront land.

The NSW Department of Primary Industries (NSW DPI), formerly NSW Office of Water, issued General Terms of Approval on 26 April 2016 for the construction of the same revetment on the same land following the integrated development referral of DA16-001 by the NSW Coastal Panel.

4.6 State Environmental Planning Policies

State Environmental Planning Policy (Infrastructure) 2007

The aim of SEPP Infrastructure is to facilitate the effective delivery of infrastructure across the State by:

a) improving regulatory certainty and efficiency through a consistent planning regime for infrastructure and the provision of services, and
b) providing greater flexibility in the location of infrastructure and service facilities, and
c) N/A…, and
d) identifying the environmental assessment category into which different types of infrastructure and services development fall (including identifying certain development of minimal environmental impact as exempt development), and
e) identifying matters to be considered in the assessment of development adjacent to particular types of infrastructure development, and
f) providing for consultation with relevant public authorities about certain development during the assessment process or prior to development commencing.

SEPP Infrastructure prevails over any other EPI except where SEPP 14 (Coastal Wetlands) and SEPP 26 (Littoral Rainforests) apply.

Clause 129A (Development with consent) provides that:

1. *Development for the purposes of a sea wall or beach nourishment may be carried out by any person with consent on the open coast or entrance to a coastal lake.*
2. *If a coastal zone management plan does not apply to the land on which any such development is to be carried out, the Coastal Panel has the function of determining a development application for development to which this clause applies.*

A coastal zone management plan does not apply to the subject land, therefore the NSW Coastal Panel, rather than Council, will determine the development application.

1) *Before determining a development application for development to which this clause applies, the consent authority must take the following matters into consideration:*
   a) *the provisions of any coastal zone management plan applying to the land,*
   b) *the matters set out in clause 8 of State Environmental Planning Policy No 71—Coastal Protection,*
   c) *any guidelines for assessing and managing the impacts of coastal protection works that are issued by the Director-General for the purposes of this clause and published in the Gazette.*

The matters set out in Clause 8 of SEPP 71 are considered at Appendix H. Relevant guidelines for coastal protection works are published by the NSW Office of Environment and Heritage (OEH). Currently, the Draft Coastal Management Bill is on public exhibition.

State Environmental Planning Policy No. 26 – Littoral Rainforests

To the north east of the subject site on the opposite side of Yarrawarra Creek is an area to which this policy applies. The Policy applies to land designated on a map within a heavy black line and land within 100 metres that is not zoned for residential purposes. The SEPP only applies to that part of the site within the E2 Environmental Conservation zone.

The land to which the State Policy applies is separated by over 70 m of estuary/waterway. As shown at Illustration 3.1, there is no littoral rainforest located within the subject land.

A small area of potential littoral rainforest occurs along the northern boundary of the site, consisting of 4 trees with a disturbed understorey. Ecosure, (Appendix F) found that these trees cover an area of less than 0.1 ha and do not have a canopy cover of 70%, and therefore do not meet the criteria under the EPBC Act for critically endangered Littoral rainforests.

There is no minimum size or threshold for canopy cover when determining if a Littoral Rainforest community qualifies as an Endangered Ecological Community under the NSW TSC Act. Ecosure prepared an Assessment of Significance (7-part test) and found that the removal of the trees will not have a negative impact on the surrounding EEC in the locality, given the small number of trees being removed. Accordingly, a Species Impact Statement is not required.

Works for the proposed revetment wall will not impact any littoral rainforest.

The NSW Coastal Panel secretary advised (July 2016) that a SEPP 26 concurrence from the Minister is not required for the proposed revetment[5].

[5] 7*(4) The Council shall not determine an application described in section 91A of the act by granting consent under the Act except with the concurrence of the Minister.* The NSW Coastal Panel rather than a Council will determine the application. *(*http://www.legislation.nsw.gov.au/#/view/EPI/1988/111/cl7*)*

SEPP 71 – Coastal Development

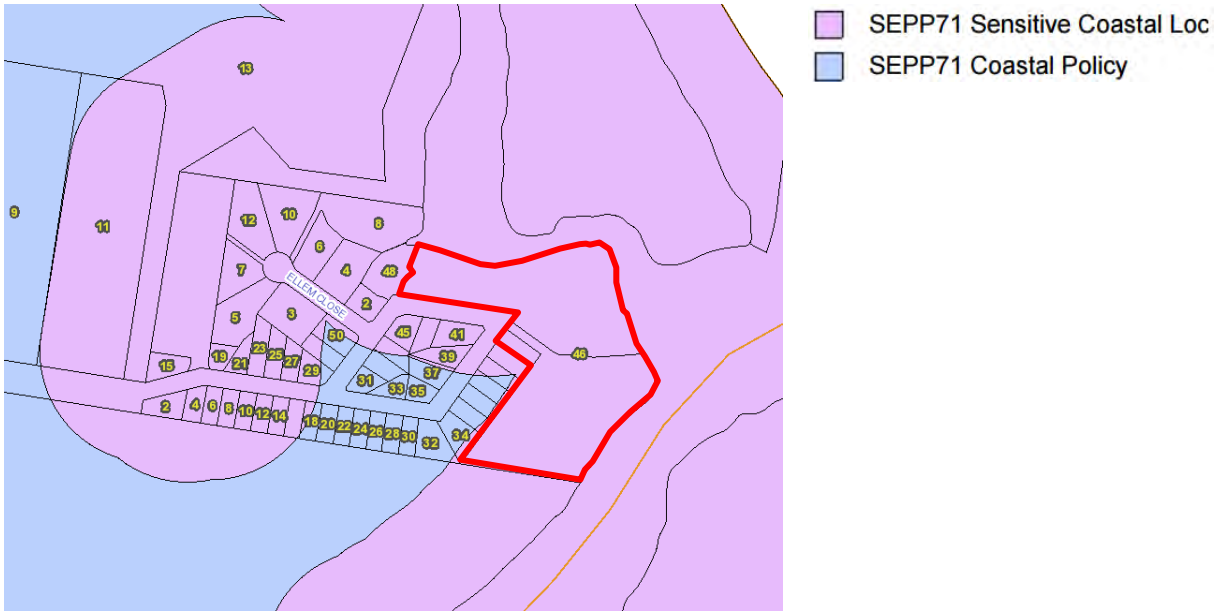
The land is located within the coastal zone and within a sensitive coastal location. Accordingly, the provisions of SEPP 71 are relevant to Council's consideration of this application.

Clause 8 Matters for Consideration

Clause 8 of SEPP 71 sets out matters to be considered for any development within the coastal zone. These matters are stated and addressed in the SEPP 71 table at Appendix H.

Illustration 3.1 100 m Buffer to SEPP 26 Area

Illustration 3.2 SEPP 71 Coastal Policy



Source: CHCC 2017

4.7 Local Environmental Plans

Coffs Harbour Local Environmental (CHLEP)Plan 2013 applies to the subject land. The subject land is zoned R2 Low Density Residential and E2 Environmental Conservation as shown at Illustration 3.3. The revetment works are located within E2 zoned land.

Coastal protection works are permissible with consent in the E2 zone.

Coastal protection works has the same meaning as in the *Coastal Protection Act 1979:*

> *Coastal protection works means activities or works to reduce the impact of coastal hazards on land adjacent to tidal waters and includes seawalls, revetments, groynes and beach nourishment.*

The objectives of the E2 Environmental Conservation Zone are:

- *To protect, manage and restore areas of high ecological, scientific, cultural or aesthetic values.*
- *To prevent development that could destroy, damage or otherwise have an adverse effect on those values.*

A 20 metre wide strip of E2 zoned land is located between the residential zoned land and the Arrawarra Creek and Yarrawarra Creek. The E2 zoned land is occupied by cabins, camping sites, infrastructure, cleared (mown) grass and exotic vegetation. Ecosure ecologists surveyed the E2 zoned land in June 2016 and found that the site, *although highly disturbed still retains moderate ecological value.* The only flora species listed under either the TSC Act or EPBC Act was a single specimen of Coolamon. The site contains two small patches of coastal saltmarsh of approximately 20 m^2 that will need to be removed as part

of the project. These patches do not meet the criteria for inclusion under the EPBC Act listing of Subtropical temperate coastal saltmarsh as the areas are less than 0.4 hectares (ha) and are further than 30 metres (m) from other patches that would total 0.4 ha.

In this regard, there are no areas of high ecological value that need to be protected, managed or restored. Remaining individual native trees of moderate ecological value are presently threatened by coastal processes and continue to perish through undermining and, ultimately, falling into the creek.

The proposed revetment is required to protect the lawful existing use within the land. The Arrawarra Beach Holiday Park is located within the R2 Low Density Residential zoned land and extends into the E2 zoned land.

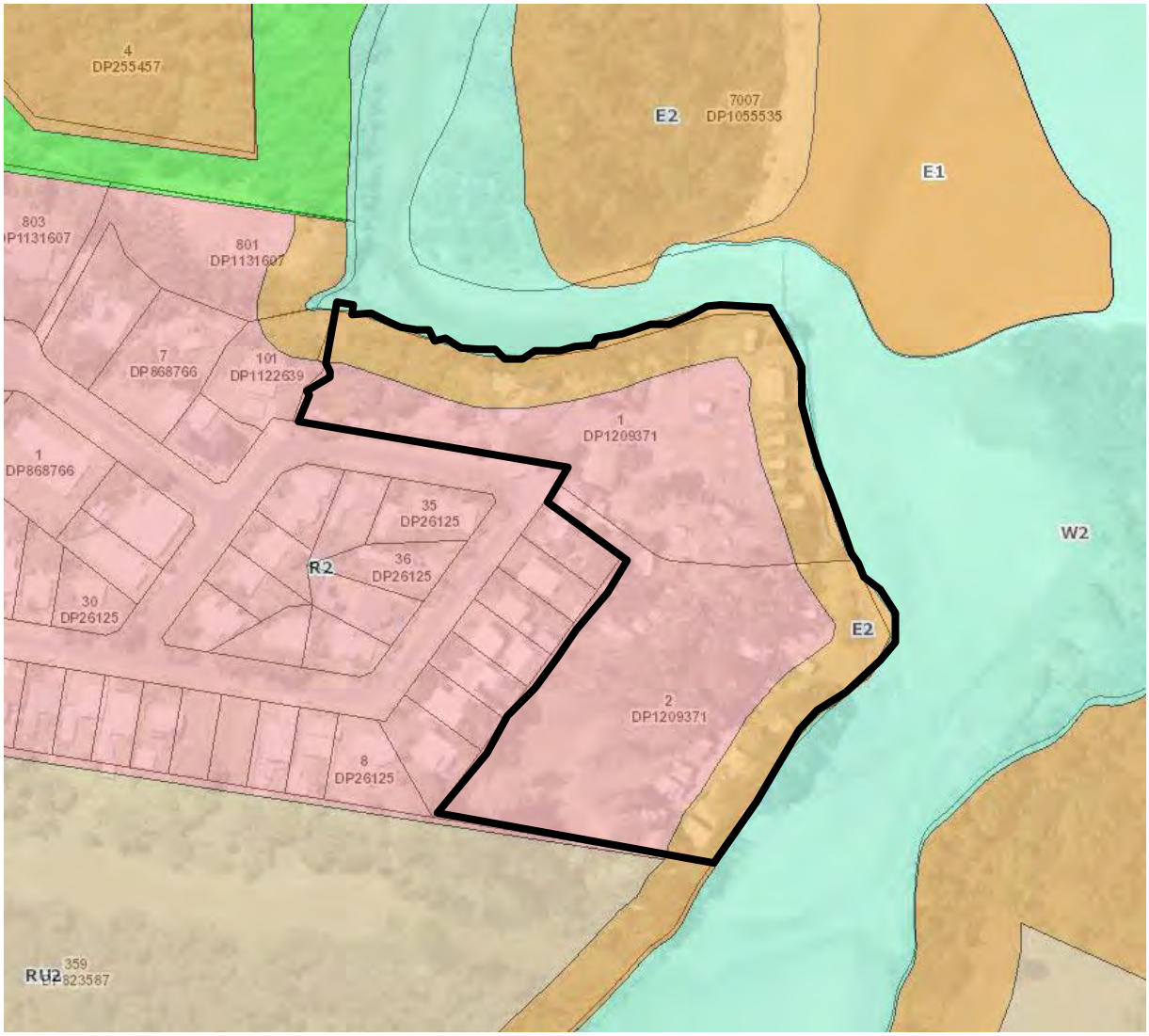
The caravan park buildings and infrastructure located within the E2 zoned land is an existing use[6]. The current approval to operate under S68, Part F2 of the Local Government Act 1993 in respect of the caravan park and camping grounds is attached at Appendix J.

Caravan park buildings and cabins will be temporarily removed from the E2 zone to enable the construction of the revetment. At the completion of the works, the buildings and cabins will be replaced. Part of the E2 zoned land will be revegetated with native species as compensatory planting to offset native tree removal for the construction of the revetment. Landscaping within the E2 zone will improve the biodiversity and visual value of this land.

The proposed revetment has been carefully designed to minimise the potential for adverse impact on E2 zoned land. The use of a sloping rock armour rather than a vertical wall is considered a suitable revetment as it will enable construction from the landward side and, upon completion, will provide new marine habitat. The sloping wall will be aesthetically more suitable than the present rock gabion basket and areas of the boundary where the estuarine edge has already slumped and eroded.

[6] The caravan park within the E2 zone is an existing use pursuant to the EP&A Act. Cl 41– 44 of the Regulations allow an existing use to be rebuilt on the existing site.

Illustration 3.3 Land Zoning Map



Source: NSW P&E 2017

Special Provisions Applicable: The following provisions of the LEP are applicable to the subject development application:

Clause 5.5 Development within the coastal zone.

The subject land is located within the coastal zone therefore the provisions of this clause apply. The objectives of this clause are as follows:

(a) to provide for the protection of the coastal environment of the State for the benefit of both present and future generations through promoting the principles of ecologically sustainable development,

The proposed revetment has been designed to protect the coastal environment of the site to enable the continued safe operation of the existing approved caravan park. As

discussed in Section 3.12, the proposal meets the principles of ecologically sustainable development by

- adopting the precautionary principle through careful and rigorous site assessments and evaluation at the design phase of the revetment; and
- providing for intergenerational equality by maintaining the site and surrounding area for the benefit of future generations; and
- rehabilitation and revegetation of the environmental zoned land upon completion of the work.

Objective (1)(b) of this clause is to implement the provisions of the NSW Coastal Policy. The NSW Coastal Policy is discussed in Section 3.10. A compliance checklist is found at Appendix G.

Clause (2) provides that *Development consent must not be granted to development on land that is wholly or partly within the coastal zone unless the consent authority has considered:*

(a) existing public access to and along the coastal foreshore for pedestrians (including persons with a disability) with a view to:
(i) maintaining existing public access and, where possible, improving that access, and
(ii) identifying opportunities for new public access, and

The existing public right of footpath to Yarrawarra Creek located in the north-western corner of the site will be reconstructed/reinstated to match existing as part of the works. During construction of the revetment, the right of footway will be temporarily unavailable to the public. Whilst the works are in progress, an alternative public access to the beach will be made available, noting that there is no legal right of access for the public through the caravan park.

(b) the suitability of the proposed development, its relationship with the surrounding area and its impact on the natural scenic quality, taking into account:
(i) the type of the proposed development and any associated land uses or activities (including compatibility of any land-based and water-based coastal activities), and
(ii) the location, and
(iii) the bulk, scale, size and overall built form design of any building or work involved, and

The proposal will not alter the existing land use. The caravan park has existed for many years and adjoins existing residential land uses. Replacing the ageing rock gabion with a rock armoured structure and re-landscaping the area will significantly improve the scenic quality of the riparian area.

The revetment is appropriately located, 1.5 metres within the site boundary.

Upon completion of the works, existing cabins will be replaced and there will be minimal long term visual changes to the area. Whilst the proposed revetment will be visible from the seaward side, it will not be highly visible when viewed from the landward side, within

the caravan park. Landscaping and revegetation will further soften the appearance of the revetment.

(c) the impact of the proposed development on the amenity of the coastal foreshore including:
(i) any significant overshadowing of the coastal foreshore, and
(ii) any loss of views from a public place to the coastal foreshore, and

The revetment will be below the existing ground level and will not cause overshadowing of the coastal foreshore or loss of views.

(d) how the visual amenity and scenic qualities of the coast, including coastal headlands, can be protected, and

The revetment will not impact coastal headlands. The rock armoured wall will not be highly visible from the landward edge of the foreshore. Once established and landscaped, the rock armouring will blend into the estuarine environment.

(e) how biodiversity and ecosystems, including:
(i) native coastal vegetation and existing wildlife corridors, and
(ii) rock platforms, and
(iii) water quality of coastal waterbodies, and
(iv) native fauna and native flora, and their habitats,
can be conserved, and

As discussed in this report and the assessments by Ecosure, the site is highly modified by the long term management of the caravan park and comprises predominantly mown grass and ornamental species.

Umwelt's modelling demonstrates insignificant changes pre and post construction to flow velocity in the creek, therefore, adverse impact to water quality and marine biodiversity are highly unlikely as a result of the revetment. Erosion and sediment control measures will be implemented during construction of the revetment to mitigate construction impacts. Construction impacts will be localised and short term.

(f) the cumulative impacts of the proposed development and other development on the coastal catchment.

This is a one-off proposal that will occur wholly within an existing privately owned property. A draft maintenance agreement is attached at Appendix P which sets out the ongoing legal responsibility of the land owners to maintain the revetment and restore adjoining land in the event of any increased erosion caused by the presence of the revetment.

Clause (3) provides that *development consent must not be granted to development on land that is wholly or partly within the coastal zone unless the consent authority is satisfied that:*
(a) the proposed development will not impede or diminish, where practicable, the physical, land-based right of access of the public to or along the coastal foreshore, and
(b) ..., and

(c) the proposed development will not discharge untreated stormwater into the sea, or any beach, estuary, coastal lake, coastal creek or other similar body of water, or a rock platform, and
(d) the proposed development will not:
(i) be significantly affected by coastal hazards, or
(ii) have a significant impact on coastal hazards, or
(iii) increase the risk of coastal hazards in relation to any other land.

As demonstrated in this report, the development will not impede or diminish public access to (or along) the coastal foreshore, impact the amenity of the coastal foreshore or adversely impact coastal biodiversity and ecosystems.

The purpose of the revetment is to protect the site from coastal hazards and has been designed to withstand severe coastal processes.

Flood and flow velocity assessments have been carried out for the proposal and found no impact on upstream flood depths or flow velocities for a 100 year ARI event. The revetment was modelled and found to have negligible impact on flood levels for the tailwater conditions. The development meets the objectives of this clause.

Clause 5.9 Preservation of trees or vegetation.

The objective of this clause is to preserve the amenity of the area, including biodiversity values, through the preservation of trees and other vegetation.

Removal of native trees located in the E2 zone is ancillary to the construction of the proposed revetment. Tree removal will be offset by the planting of native trees and shrubs within the E2 zone, which will significantly enhance the biodiversity value of the land and preserve the amenity of the area.

Ecological assessments prepared for this development find that proposed vegetation removal is unlikely to have a significant impact on threatened species that may occur in the locality, including the local population of the Coastal Saltmarsh and Coolamon species.

Amelioration measures will be implemented to preserve the amenity of the area and biodiversity values as discussed in the Statutory Ecological Assessments by Naturecall and Ecosure provided at Appendix F.

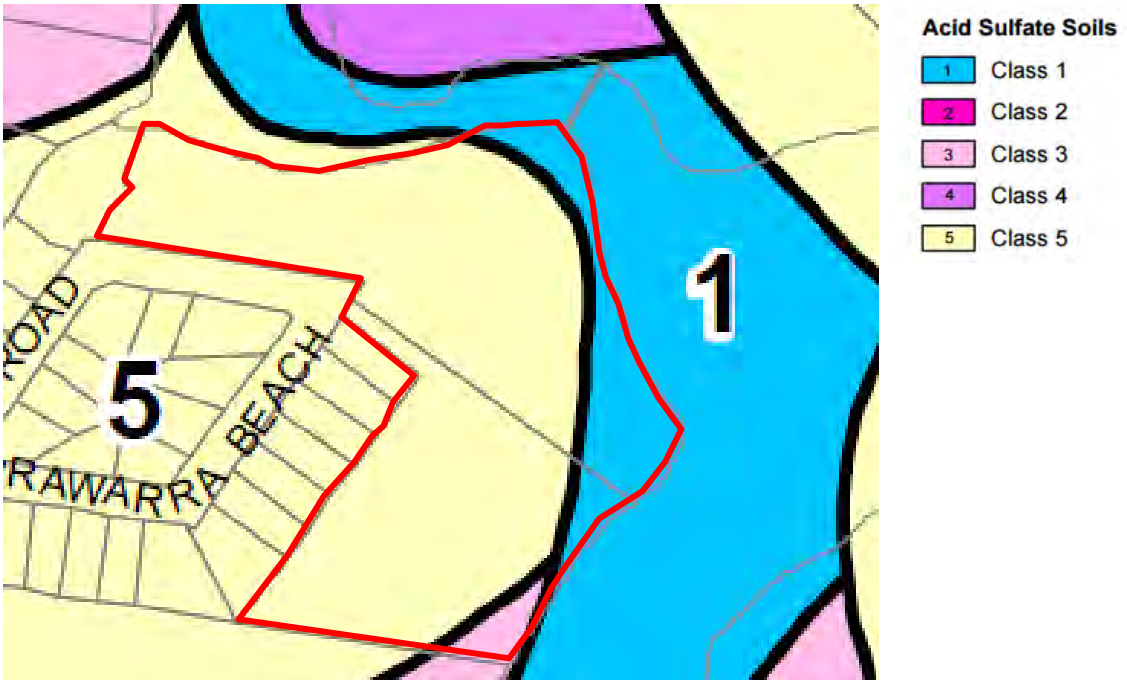
Clause 7.1 Acid Sulfate Soils

The site is predominately mapped as Class 5 Acid Sulfate Soils. However, there is a band of Class 1 soils mapped along the site's eastern boundary that adjoins Arrawarra Creek and a small area of Class 3 soils located within the southwestern corner of the site. Refer Illustration 3.4.

A geotechnical investigation undertaken by de Groot & Benson Pty (2005) found no evidence of acid sulfate soils within the site. The assessment confirmed that the proposed method of revetment works (placing rock material against the existing bank) will ensure that such soils will not be disturbed. An Acid Sulfate Management Plan will be

implemented to manage the potential impact of acid sulfate soils, should acid sulfate soils be found.

Illustration 3.4 Acid Sulfate Soils



Source: NSW Legislation 2016

Clause 7.3 Flood Planning

The objectives of this clause are as follows:

(a) to minimise the flood risk to life and property associated with the use of land,

(b) to allow development on land that is compatible with the land's flood hazard, taking into account projected changes as a result of climate change,

(c) to avoid significant adverse impacts on flood behaviour and the environment.

This clause applies to land at or below the flood planning level. *Flood planning level* means the level of a 1:100 ARI (average recurrent interval) flood event plus 0.5 metre freeboard. Part of the subject land is at or below the flood planning level.

Umwelt carried out a flood study for the site in 2003 to determine the 100 year ARI flood levels for the site. The 2003 model was updated in 2016 to incorporate tail water effects and to include the proposed revetment wall design. In addition to a baseline scenario, sea level rises of 0.4 and 0.9 metres were modelled. Flood studies are found at Appendix D.

Based on updated modelling, Umwelt found that the combination of the 5% AEP storm event and the 1% AEP ocean tide condition resulted in a maximum modelled flood

elevation of 2.65m AHD at the site. The modelled scenario showed no impact on upstream flood depths or flow velocities for the 100 year ARI event.

Flow velocity modelling by Umwelt (that the proposed development will have a negligible impact on off-site erosion and limited potential for scour to occur at the toe of the seawall with predicted increases being localised and typically less than 0.1 m/s to 0.2 m/s.

Clause 7.4 Terrestrial Biodiversity

The riparian areas adjacent to the Yarrawarra Creek and the Arrawarra Creek are identified as "biodiversity" on the Riparian Lands and Watercourses Map as shown at Illustration 3.5. As such, Council must be satisfied that;

(a) the development is designed, sited and will be managed to avoid any significant adverse environmental impact, or

(b) if that impact cannot be reasonably avoided by adopting feasible alternatives—the development is designed, sited and will be managed to minimise that impact, or

(c) if that impact cannot be minimised—the development will be managed to mitigate that impact.

The proposed revetment wall will have a positive impact on the riparian area by protecting the site from wave attack and further coastal erosion. Native vegetation replanting within the E2 zone is proposed. Erosion control measures will be implemented to mitigate any potential adverse impact during construction of the seawall.

Clause 7.6 Riparian Land and Watercourse

Yarrawarra Creek and Arrawarra Creek are identified as a 'watercourse' on the Riparian Lands and Watercourses Map.

The objective of this clause is to protect and maintain the following:
(a) water quality within watercourses,
(b) the stability of the bed and banks of watercourses,
(c) aquatic and riparian habitats,
(d) ecological processes within watercourses and riparian areas.

The proposed revetment will secure and stabilise the bed and banks of the estuary and will result in improved aquatic and riparian habitat. Sediment and erosion controls will be implemented throughout the construction of the revetment to maintain water quality and to protect the surrounding riparian environment.

Clause 7.8 Koala Habitat

The objective of this clause is to provide for the protection of Koalas and their habitat. Areas of Secondary Koala Habitat are mapped within the site. Extensive surveys were undertaken by NatureCall Environmental in December 2015 and Umwelt in 2007. These investigations failed to detect any Koala activity within the site. The assessment concluded

that while Koalas may forage in the area when passing through between more suitable habitats, it is considered Koalas are unlikely to inhabitat the site.

Ecosure carried out a tree survey in June 2016 and updated the tree schedule for the site. A preliminary Vegetation Management Plan (VMP) has been prepared by Ecosure that assesses Koala feed tree removal required for the proposed revetment.

Ecosure found that 12 koala feed trees will be removed. These trees will be replaced at the rate of 1:10. Compensatory planting will be carried out within the E2 zoned riparian area following construction of the revetment. Revegetation within the site, meets the objectives of the Coffs Harbour City Council Koala Plan of Management to improve Koala habitat. As such, the proposal will have positive impact on koala habitat.

4.8 Draft Environmental Planning Instruments

Draft Coastal Management State Environmental Planning Policy

Coastal Management Act 2016 No 20

The Draft Coastal Management SEPP was exhibited from 11 November to 20 January 2017. The Draft SEPP is intended to integrate and improve current coastal-related SEPPs and ensure that future coastal development is appropriate and sensitive to the coastal environment and maintains public access to beaches and foreshore areas. Once published, the Draft SEPP will be the single land use planning policy for coastal development and will bring together and modernise provisions from SEPP 14 (Coastal Wetlands), SEPP 26 (Littoral Rainforests) and SEPP 71 (Coastal Protection).

Part of the subject site is located within the proposed coastal zone under the Coastal Management Act 2016 (not in force) as it contains land identified as 'rainforest proximity area' on the Coastal Wetlands and Littoral Rainforests Area Map.

This development application would be determined by the Northern Joint Regional Planning Panel, if the draft SEPP and Coastal Management Act 2016 were in force.

4.9 Development Control Plans

Coffs Harbour Development Control Plan 2015

Section E1.1 Preservation of Trees and Vegetation of the Coffs Harbour Development Control Plan (DCP) 2015 provides controls for removal of native vegetation.

The preliminary Vegetation Management Plan prepared by Ecosure (Appendix N) has been prepared to meet the requirements of the DCP.

Ecosure found that:

> *As the seawall and E2 zone are classified as the riparian zone, and no hollow bearing trees are being removed, compensatory planting calculations have been based on the highest rate for vegetation removal applicable for this site; riparian zones 1:10.*

4.10 The Regulations

Clause 92 of the *Environmental Planning & Assessment Regulation 2000* (the Regulation) prescribes the provisions of the NSW Coastal Policy as matters to be considered by the consent authority when determining a DA within the coastal zone. In this respect the overriding vision of the Policy is the ecological sustainability of the NSW Coast.

4.11 NSW Coastal Policy 1997

The site is located within the Coastal Zone, therefore the provisions of the NSW Coastal Policy apply. The Coastal Policy outlines a number of Goals and Key Actions relating to coastal planning and management. Tables of Consistency with Goals and Key Actions are found at Appendix G.

The primary purpose of the Coastal Policy is to promote ecologically sustainable development in coastal zones in NSW. The following key goals are identified as relevant to the subject proposal and are met as described below:

▪ *Protecting, rehabilitating and improving the natural environment of the coastal zone.*	The main aim of the revetment if to protect the boundary of the caravan park from further erosion arising from coastal process. The design enables construction from the landward edge, reducing impacts within the creek environment.
▪ *Recognising and accommodating the natural processes of the coastal zone.*	Natural coastal processes have been studied and assessed and have guided the design of the revetment.
▪ *Protecting and enhancing the aesthetic qualities of the coastal zone*	The sloping rock armoured revetment will improve the aesthetic quality of the estuarine boundary by replacing the existing rock gabion with a less vertical structure. The revetment will not be highly visible from the landward side and, over time, will become less visible and landscaping matures and marine and coastal grasses establish within the rock wall.
▪ *Protecting and conserving the cultural heritage of the coastal zone.*	Everick Heritage Consultants are of the opinion that, given the extent of existing disturbance within the development footprint, the proposed rock revetment is unlikely to result in further harm to Aboriginal Heritage. No Aboriginal Objects were identified within the area of proposed works. One known Aboriginal site (Arrawarra Headland Site #22-1-0392) was recorded to extend into the

	project area however is well within the environmental buffer zone and has been previously disturbed. Mitigation measures are proposed to protect and conserve the cultural heritage of the coastal zone.
▪ *Providing for ecologically sustainable development and use of resources*	The proposal meets ESD principles. The primary objective of the revetment is to protect an existing coastal resource, the Arrawarra Beach Holiday Park. Protection of the existing, urban footprint, effectively consolidates impact in the coastal zone to within an already disturbed area. The design balances the need to protect the site from present likely coastal processes, whilst enabling the revetment to be "topped up" in the future, in the event that coastal processes are more severe than presently accepted predictions, alleviating the need for further disturbance in the future.
▪ *Providing for ecologically sustainable human settlement in the coastal zone.*	The subject land is occupied by an existing, approved caravan park. The caravan park provides short term and holiday accommodation within the coastal zone.
▪ *Providing for appropriate public access and use*	The revetment is located within private land. Public access will not be permanently impacted by the proposal.
▪ *Providing information to enable effective management of the coastal zone.*	The Council and the NSW Coastal Panel (OEH) are responsible for the management of the coastal zone.
▪ *Providing for integrated planning and management of the coastal zone*	As stated above.

4.12 Impacts of the Development

The *Draft Guideline for Assessing the Impacts of Seawalls*, prepared on behalf of NSW Department of Environment, Climate Change and Water (now OEH) in 2011 outlines the following potential impacts of seawalls:

Potential physical impact on coastal processes

Impact	Development Response
- *altered erosion and accretion seaward of the wall;*	A 'Geomorphic Impact Assessment' was prepared by Martens Consulting Engineers (Appendix M) in 2007 in relation to a previous sea wall design for the subject land. The assessment found that, since wave heights within the estuary are very low and travel distances are generally long (> 50 m) over very shallow water, erosion on the opposite bank of Arrawarra Creek is unlikely to result from the proposed sea wall. In addition, a 'Flow Velocity Modelling Report' prepared by Umwelt in 2016 (Appendix E) concluded that, based on results of the one and two -dimensional modelling, the proposed revetment wall will have a negligible impact on off-site erosion.
- *altered erosion and accretion along the shore from the wall;*	
- *the propensity for the seawall to form rips;*	The site's estuarine boundary and, consequently, the proposed revetment is approximately 200 m from the coastal shore and will have no impact upon rips.

OEH, draft Coastal SEPP, 2017

– *changes to wave run-up; and*	No changes to wave run-up are likely as a result of the proposal.
– *reduced erosion landward of the seawall.*	This is the objective of the proposal.

The potential social impacts of a seawall include:

Impact	Development Response
– *reduced recreational beach amenity*	Approximately 200 m away from beach environment – detrimental impact highly unlikely.
– *reduced public access to beaches*	Temporary disruption to public access via the Right of Footway, 1m wide. Alternative access will be provided to ensure public access is maintained at all times.
– *changes to surfing amenity*	Highly unlikely.
– *public safety risks from the seawall, including effects of wave overtopping due to smooth and hard structures*	The proposed revetment wall together with a PoM to manage public access would provide a more responsible approach to reducing risk to persons and property than the alternate do nothing approach.

– *benefits through erosion protection of property located landward of the seawall*	No impact to property located 20 m landward of the revetment (residential zoned land). Benefits to public property (public infrastructure) likely in the long term.
– *potential benefits through provision of additional, improved or more secure public recreational space landward of the seawall, which could be integrated with recreational facilities, for example, a cycleway.*	Potential future benefit, subject to support and a negotiated outcome with Council under a separate future process.

The potential environmental impacts include:

Impact	Development Response
– *impacts on the foreshore, including dune vegetation*	Impact to approximately 20 m^2 of coastal saltmarsh. Not significant to the EEC.
– *impacts on inter-tidal ecosystems*	Highly unlikely. It has been demonstrated by Umwelt that there will be no significant change to flow velocity resulting from the proposed revetment.
– *impacts on bird breeding sites.*	Highly unlikely. Development site is a highly modified urban environment.
– *potential benefits through provision of additional, improved or more secure public recreational space landward of the seawall, which could be integrated with recreational facilities, for example, a cycleway.*	Potential future benefit, subject to support and a negotiated outcome with Council under a separate future process.

The potential economic impacts include:

Impact	Development Response
– *changes to property values*	Revetment will protect existing investment.

– *the capital cost from seawall construction and recurrent costs associated with seawall maintenance and managing any off-site erosion impacts*	The full cost of construction and maintenance is the responsibility of the land owner.
– *erosion impacts on adjacent properties*	A legally binding arrangement for the life of the works will be negotiated and executed with Council to ensure: a) the restoration of the beach, or land adjacent to the beach, if any increased erosion of the beach or adjacent land is caused by the presence of the works, and b) the maintenance of the works.
– *visual amenity and beach access impacts.*	Positive impact to visual amenity, resulting from the removal of the old rock gabion and replacement with a sloping rock armoured wall. Beach access – no permanent impact.

Mitigation Measures

The potential exists for minor dust and noise impacts to nearby residences during revetment construction works, however these impacts will be of a short duration and commensurate with any construction work. Long term positive impact will arise at the completion of the revetment in terms of protecting the site and surrounding land from wave attack and coastal erosion. The proposed revetment will be constructed entirely within the subject site and as such, will not adversely affect neighbouring properties.

The proposed environmental mitigation measures are:

Impact	Mitigation
Ecological	Removal of small areas of remnant native vegetation is necessary for the proposed revetment works. Compensatory planting will be carried out within the E2 zone in accordance with the draft Vegetation Management Plan. (Appendix N). Other ameliorative measures such as on-site monitoring and sediment and erosion controls will be employed. These measures reduce the potential for sedimentation and stormwater runoff into nearby watercourses. Environmental safeguards (e.g. sediment fences) will be implemented and maintained for the duration of the proposed revetment construction period consistent with "*Managing Urban Stormwater: Soils and Construction*" (4th Edition Landcom, 2004, (Blue Book)) to ensure that there is no escape of turbid plumes into the adjacent aquatic environment.

	Any material removed from the estuary that is to be temporarily deposited or stockpiled on land will be: - located away from drainage lines and overland flow paths; - above the 1:100 year flood level, and contained by appropriate sediment control devices as outlined in the Blue Book; and As such, while it is acknowledged there will be minor environmental impacts resulting from the proposal, these impacts will be managed in accordance with an Erosion and Sediment Control Plan and will be significantly reduced over time as the vegetation matures.
Social	Ensure public access at all times either via the existing Right of Footway or via an alternate access through the caravan park.
Economic	All costs associated with construction and maintenance of the revetment are the responsibility of the land owner. A Maintenance agreement has been drafted (Appendix P) between the landowner and Council to cover the: – *the restoration of the beach, or land adjacent to the beach, if any increased erosion of the beach or adjacent land is caused by the presence of the works, and* – *the maintenance of the works.*

4.13 Suitability of the Site

The proposed revetment is permissible with development consent having regard to the various environmental planning instruments applying to the site.

Safety factors identified in the design and previous assessment (CP16-001) of the revetment primarily concerned wave overtopping, coastal inundation and the potential erosion effects associated with the proposed revetment.

Wave overtopping has been a significant focus of the revetment design efforts. To accommodate wave overtopping, rock armouring is required on crest of the structure and across the width of the revetment. Such design techniques are widely used by coastal engineers to ensure the structural integrity of the revetment and land levels behind it during the 100 year ARI storm event. Any grassing or vegetation within the E2 Zone will be damaged, but not the revetment structure itself nor any essential infrastructure behind it.

It is pertinent to note that the revetment has been designed to be free from the effects of coastal process for a period of 100 years, whereas, Council requires commercial and tourism development to be free from the effects of coastal process for a period of 50 years.

Removal of the existing rock gabion will result in a significant safety improvement to the site.

A legally binding arrangement for the life of the works will be negotiated and executed with Council to ensure:

c) the restoration of the beach, or land adjacent to the beach, if any increased erosion of the beach or adjacent land is caused by the presence of the works, and
d) the maintenance of the works.

The environmental assessments carried out for this proposal demonstrate that the subject land is suitable for the proposed coastal protection works.

Two-dimensional hydrodynamic modelling undertaken for the proposal demonstrates that there is no significant adverse change in bed velocities as a result construction of the proposed revetment. Consequently, the proposed revetment will not result in changes to the channel bed or erosion rates in the creek system.

The site is suitable in terms of the land's attributes and capacity to accommodate a construction operational area wholly within the site. There is sufficient area within the site to enable the works to be carried out in accordance with the construction methodology. The site is suitable in terms of internal access and manoeuvring area, stock piling areas and operation of machinery entirely within the site boundaries.

The site is well located in terms of proximity to an operational hard rock quarry via a suitable road network.

The proposed revetment will not prejudice the site from development in accordance with the zone objectives. The proposal will not cause conflict between the existing caravan park and any adjoining residential development. The revetment will contribute to the

protection of council assets (stormwater, public roads, sewer services) from potential coastal processes arising from climate change and sea level rise over the 100 year planning horizon.

4.14 The Public Interest

The site is appropriately zoned for the development. Protection of the site boundary from coastal processes is in the public interest. Replacing the existing rock gabion with a sloping rock armoured revetment is, as demonstrated by the above assessment, in the public interest in terms of removing the aging gabion and replacing it with a structure that is 'fit for purpose' and is aesthetically pleasing.

The revetment is located wholly within the boundary of private land. Costs associated with the construction and maintenance of the revetment are the responsibility of the land owner.

A legally binding arrangement for the life of the works will be negotiated and executed with Council to ensure:

a) the restoration of the beach, or land adjacent to the beach, if any increased erosion of the beach or adjacent land is caused by the presence of the works, and
b) the maintenance of the works.

Construction of the revetment meets the principles of ecologically sustainable development by:

- precautionary principle - careful and rigorous site assessments and evaluation at the design phase of the revetment;
- intergenerational equality – the environment (the site and surrounding area) are maintained and enhanced for the benefit of future generations;
- rehabilitation and revegetation of the environmental zoned land;
- the design accommodates future climate change impacts (including sea level rise). If such impacts evolve in a way that is more severe than currently predicted, such effects can be readily accommodated without the need to build a new more robust structure, but can instead be mitigated by simply placing additional armour onto the revetment;
- maintaining the public interest by conforming with Commonwealth, State and Local legislation and planning controls;
- conforming with *NSW Planning's Coastal Planning Guideline: Adapting to Sea Level Rise (August 2010*) by ensuring that the caravan park is protected from potential sea level rise impacts. The guidelines adopt a precautionary approach to land use planning; and
- consistency with the NSW Coastal Policy's goal of '*providing for ecologically sustainable human settlement in the coastal zone'.*

The development is not contrary to any relevant policy statements from Federal or State Government agencies. Approval of the proposed revetment is considered to be in the public interest.

Summary of public submission to CP 16-001

The previously lodged DA, CP16-001, was publicly exhibited from Monday 4 April to Tuesday 3 May 2016. In response, 25 submissions were received, with four generally supporting the proposal and 21 generally objecting.

Table 4.1 Public submissions to CP16-001

Submission Comment	Response
We totally support the proposal.	
We would like to fully support Astoria's rock armoured revetment wall. Two years ago we were able to do the same work with large rocks and Geotech fabric, the result has been a resounding success in that the erosion of the bank on our block is now non-existent and the marine life has absolutely exploded, particularly at night. *We were put through hell be neighbours who screamed environmental recklessness; they suddenly have nothing to say.*	The submission maker's name and address are redacted for privacy reasons, however, it is known that the works referred to occurred adjacent to the subject land in a location with similar attributes.
The proposal will minimise soil erosion and prevent trees from falling into the creek;	The Arrawarra Creek bank has been eroding resulting in trees slumping into the creek and undercutting of the embankment.
The use of rocks in the wall will encourage growth in marine life;	Changing the existing gabion from a vertical face to a sloping face will increase soft sediment areas and increase habitat suitability. Using natural rock of a varying shapes and sizes increases the environmental value of seawalls. (Environmentally Friendly Seawalls, DECC, NSW, 2009).
The revetment work will beautify the area, save the foreshore from more erosion whilst giving ongoing access to the beach for all to enjoy.	The proposed will improve the visual amenity of the area by replacing the existing gabion. Public access to the beach will not change as a result of the proposal.
Support the proposal to replace the existing gabion....(no support for*) reclaimed land area.*	Misunderstands site boundary.
Compensatory planting requirements in the E2 zone will be difficult to comply with as the land is bushfire prone;	The land is mapped as bushfire prone land due to the presence of forest vegetation to the north and south of the site. The identification of the land as bushfire prone has no impact on the suitability of the E2 zoned land for compensatory planting.

Submission Comment	Response
The location of the proposal is not within the site boundary. In Australian case law, land that is lost to the sea ceases to be 'real property' and reverts to Crown ownership. Therefore, any boundary originally defined by survey ceases to exist and cannot be reclaimed;	The proposed revetment is located wholly within the site boundary.
The proposal does not adequately recognise the significance of the Arrawarra locality to Aboriginal people (e.g. a sacred meeting place);	A comprehensive Aboriginal Cultural Heritage assessment was prepared for the development. An Aboriginal Place has not been declared over the subject site.
Given coastal processes and flood risk, a caravan park with relocatable infrastructure is the best use for the land rather than a permanent residential development;	The purpose of the proposed revetment is to protect the boundary of the caravan park from further erosion.
The proposal will result in the loss of car parking on Arrawarra Beach Road, currently utilised by day visitors;	Many local objectors misunderstand the application and the existing legal right of access to the foreshore. Under the present arrangements, the public does not have legal access through the caravan park, they are, in fact, trespassing. Legal public access to the beach is via the Right of Footway 1 wide. The development will not restrict public access to the beach via the public right of footway.
Public access through a community title development does not constitute guaranteed permanent access to Arrawarra Beach. The public could be denied access at a future date;	
Residents of the local Arrawarra village may have access to this beautiful unique coastal site legally denied to them at any time.	
Locals / residents of (little) Arrawarra can only access Arrawarra beach through this park, development of the holiday park will impose numerous negative externalities onto the residents of Arrawarra (little) in terms of: removal or restricted access to the beach, increased traffic flows and noise pollution along the Arrawarra Beach Road; increased death/injury to local wallaby/ kangaroo populations which frequently access and cross Arrawarra Beach Road.	
The wall will also impact on the visual amenity of several neighbours.	Removal of the rock gabion will improve the visual amenity of the area.
Construction could have unforeseen consequences on the natural behaviour of the confluence of the 2 creeks.	Many of the letters of objection were, in fact, form letters and repeated the same or similar points of objection.
The proposal is not sanctioned by the Solitary Islands Authority and is therefore ecologically irresponsible;	The approval process is complex and is not fully understood by the public. The Solitary

Submission Comment	Response
The flood risk to the site is not adequately considered and requires further investigation;	Islands Marine Park is a referral agency only, they have no approval role. Flood risk has been fully assessed by Umwelt. SEPP 26 littoral rainforest mapping presented in the SEE was sourced from OEH.
The depicted location of SEPP26 Littoral Rainforests in the SEE is inaccurate	
It is ecologically irresponsible to seek approval for the proposal when a Coastal Zone Management plan is being prepared for the area;	
DA CP16-001 and DA 0067/16DA should be jointly assessed;	
Development of this scale should require an EIS;	

5 Conclusion

5.1 Conclusion

The assessments provided within this Statement of Environmental Effects demonstrate that the proposed revetment, as designed, is suitable within the location and will not have a significant detrimental environmental impact to surrounding land.

Coastal protection works are permissible with consent within the E2 Environmental Zone. The NSW Coastal Panel is requested to grant consent to the proposed development pursuant to the provisions of Clause 129A (2) and (3) of State Environmental Planning Policy (Infrastructure) 2007. The proposal is consistent with the objectives and guidelines of the NSW Coastal Policy 1997.

The revetment will protect an approved land use, an existing caravan park. The revetment will replace and extend an existing gabion that was constructed in 1990 pursuant to DA Consent 224/90 and in accordance with Building Permit 889/90 dated 22 August 1990. The existing rock gabion was approved by Council at which time an Environmental zoning applied the land similar to that which applies today.

At the time of construction, the existing gabion was built to best practice standards and in accordance with agency requirements. Since 1990, the rock gabion structure has provided adequate protection of the land boundary, however it is now of poor structural standard, being at the end of its service life. DA Consent 224/90 for the existing gabion has been commenced and has validity in perpetuity.

The only options to the land owners are to continue to maintain and repair an aging and failing gabion wall or build a new revetment. The first 'option', to simply repair the existing rock gabion does not align with the land owner's responsibility in maintaining the existing caravan park to mitigate risk and to increase the safety of park users and the general public. Therefore, the only feasible option is to construct a new revetment as proposed in this development application.

The proposed revetment was designed to structurally withstand a 100 year ARI event and will provide protection to infrastructure located 20 metres behind the wall.

The main benefits arising from the proposal are:

- Protection of the site and surrounding land from coastal erosion; and
- Improving the coastal character of the site and the coastal foreshore by replacing the existing gabion wall that is partially in disrepair; and
- Improved public safety; and

- All costs and responsibilities for the construction and maintenance of the revetment will be met by the landowner; and
- The revetment has the potential to protect adjoining private land and public assets over the long term; and
- Ability to "top up" the revetment with armour rock, if climate change and sea level rise impacts are more severe than the adopted predictions.

Two-dimensional hydrodynamic modelling undertaken for the proposal demonstrates that there are no significant adverse changes in bed velocities as a result of construction the proposed revetment. Consequently, the proposed revetment will not result in changes to the channel bed or erosion rates in the creek system.

The development raises no adverse impacts or consequences in regard to the principles of ecologically sustainable development and is considered to be an appropriate use of the land in terms of social, economic and environmental criteria.

The proposal does not involve any changes in land use, rather, it is simply for the purpose of protecting the site boundary from coastal processes that are likely to occur now and in the future.

It is recommended that this proposal be approved based on the justification provided within this report and the provisions of the State Environmental Planning Policy (Infrastructure) 2007, and the Coastal Protection Act 1979 No 13.