

TURNERS BEACH

LOCAL AREA PLAN (URBAN DESIGN GUIDELINES)



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Table of Contents

PART ONE: INTRODUCTION AND METHODOLOGY	5
Introduction.....	6
Historical Facts	8
Recent Demographic Trends	9
Review of relevant documents.....	10
Most valuable qualities and unique characteristics.....	11
New Ideas for Turners Beach.....	12
PART TWO: UNDERSTANDING THE EXISTING URBAN DESIGN CHARACTER OF TURNERS BEACH.....	13
Examination of Turners Beach Settlement	14
Built form characteristics.....	15
Landscape & Environment characteristics	16
Climate change	16
Visual & Spatial Characteristics	17
Connectivity.....	17
Traffic Environment.....	18
Road Safety Performance	20
Parking Provision	22
Public Transport	22
Heritage	23
Aboriginal Heritage.....	23
Provision of Open Space.....	24
Town Planning	25
PART THREE: URBAN DESIGN GUIDELINES	26
Introduction to Urban Design Guidelines.....	27
Urban Design Theme 1: Connectivity	28
Turners Beach Connectivity Improvements	29
Urban Design Theme 1: Connectivity Strategies/Actions	30



Urban Design Theme 2: Open Space & Recreation	31
Turners Beach Recreation Ground Precinct Master Plan	33
Urban Design Theme 2: Open Space & Recreation Strategies/Actions.....	35
Urban Design Theme 3: Traffic Management	36
Vehicle hooning	36
Intersection improvements.....	36
Alternative Access/Exit	36
Maskells Road Intersection.....	37
Boat Ramp Functionality.....	38
Urban Design Theme 3: Traffic Management Strategies/ Actions	39
Urban Design Theme 4: Environmental Protection.....	40
Shoreline Erosion	40
Protection/Management of Vegetation	42
Urban Design Theme 4: Environmental Protection Strategies and Actions.....	44
Urban Design Theme 5: Town Planning.....	45
Heritage	46
Servicing	46
Building Design.....	46
Desired Future Character of Turners Beach	47
The Character of an area.....	47
Statement of Desired Future Character.....	47
Urban Design Theme 5: Town Planning Strategies and Actions.....	50
Additional Matters	51
Turners Beach Consultative Committee	51
Naming of Southern Turners Beach Settlement Area.....	51
Additional Matters: Strategies and Actions	52
Priority Plan	53
Appendix 1: Crash History	58
Appendix 2: Geomorphological Report on Forth River Estuary.....	63



PART ONE: INTRODUCTION AND METHODOLOGY





Northern Turners Beach Round-a-bout



Westella Drive

Introduction

Turners Beach is a small coastal settlement located on the western bank of the Forth River mouth either side of the Bass Highway between Devonport and Ulverstone. Residents and visitors enjoy the areas attractive coastal, river and bushland environments. According to the Turners Beach Community Plan which was adopted by the Central Coast Council in 2007:

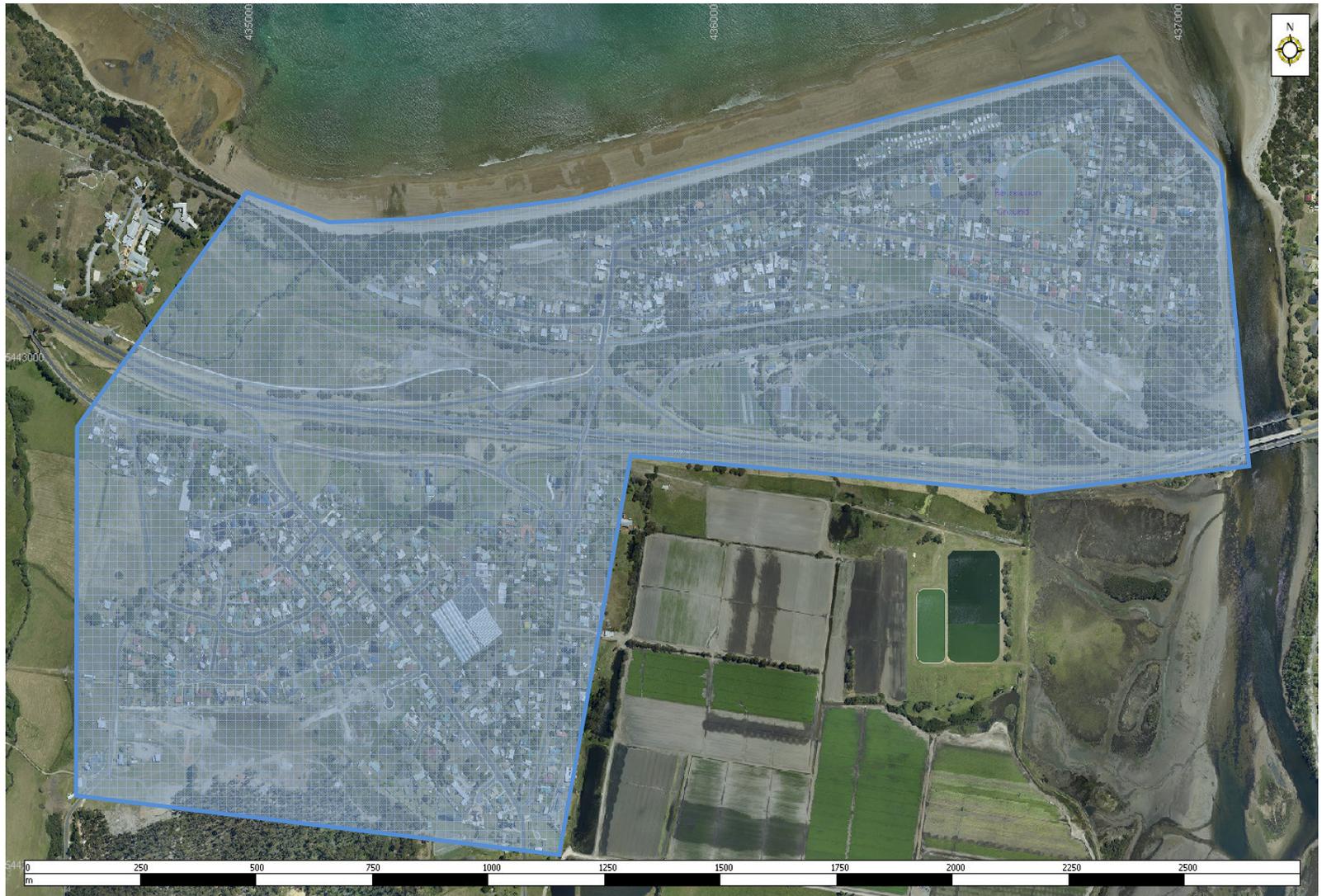
“Turners Beach has its own look, feel and character that needs to be preserved and managed. Lack of respect for the environment, and development not sensitive to the area will destroy the very essence of what is special about Turners Beach.”

The Council is committed to guiding future development in Turners Beach to preserve the area’s character through the facilitation of sensitive urban design. The objective of this Local Area Plan is to provide a set of actions and urban design guidelines to preserve the character of Turners Beach and inform issues such as:

- The longer term future role and size of Turners Beach;
- Identifying the extent of the urban boundaries and location of staged growth areas;
- Identifying assets and values of the area to be retained and enhanced;
- A precinct plan for the community hall/recreation ground precinct [including the lawn bowling facility, Turners Beach hall, tennis courts (etc)];
- Mitigating or adapting to the hazards affecting the area, including flooding and climate change related impacts;
- Natural Resource Management/Coastal Management issues;
- Incorporation of the Turners Beach Vegetation & Fire Management Plan;
- Incorporation of the Council’s Open Space and Recreation Strategy;
- Identifying any traffic management, infrastructure or parking needs; and
- Investigating a service road between Turners Beach and Ulverstone.

The study area is illustrated overleaf.





The study area: Turners Beach





James Fenton Commemorative Cairn

Historical Facts

James Fenton arrived on the Forth estuary from Ireland in 1839 looking for farm land. Returning in 1840 he erected the first dwelling in the area and along with the Risby family and others, formed the basis of a permanent settlement which later become Turners Beach.

Turners Beach was originally known as Scott's Beach, named after the Scott family who operated a flour mill on Claytons Rivulet.

In 1850 the Gables house was built in Gables Park and was originally used as an inn known as The Sailors Return. The inn was de-licensed in 1860 and is now a private residence.

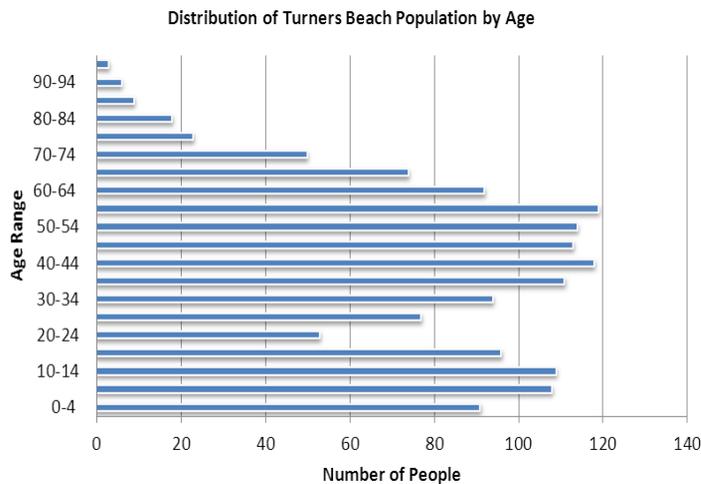
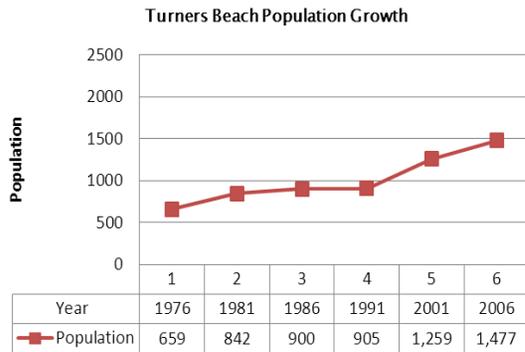
At the end of the Second World War Turners Beach had no formed streets with only a few sandy tracks through the bush. Thus, the township is quite a recent development having evolved from about 1950 before being officially named as the town of Turners Beach on 21 March 1961. It is suggested that Turners Beach was named after the Turner family who lived in The Gables in the 1920's.

In more recent history, the Council engaged John Mongard to develop the first community plan for Turners Beach in 1997 which included a master plan.

In 2007 an updated Turners Beach Community Plan was developed to provide directions and strategic objectives to follow over the 10 years to 2017. These future directions include:

- Keeping our beach, bush and river healthy;
- Guiding future development;
- Cycle ways, pathways and tracks;
- Traffic and transport; and
- Manage and maintain community facilities.





Recent Demographic Trends

There are approximately 1,477 residents in Turners Beach according to the 2006 Australian Census.

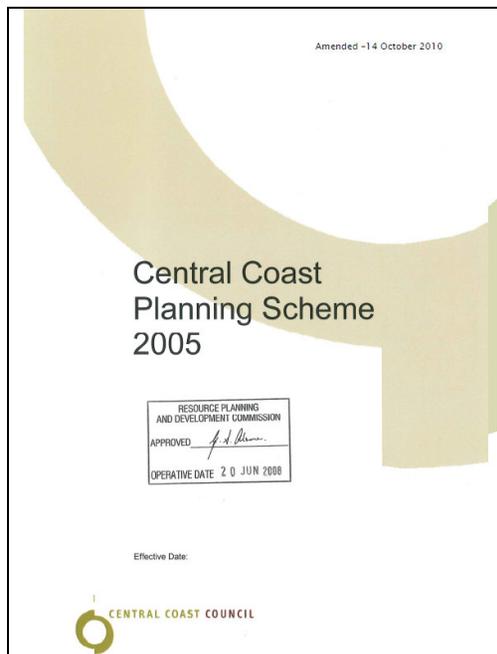
The area has experienced minimal population growth in recent years and prospects for population growth are not substantial in the short to medium-term. According to the Cradle Coast Regional Land Use Planning Framework 2010–2030 the Central Coast municipal area could experience a small decline (457 persons) in population numbers in the period to 2032. It is noted that subdivision developments in recent years has increased the number of dwelling approvals in Turners Beach.

It is considered likely that low population growth will continue in Turners Beach in the short to medium-term which may be offset by population declines in other areas. For instance between the period 2001–2006 the centres of Turners Beach, Ulverstone, Gawler and Sulphur Creek experienced small population growth, while centres such as Forth, Penguin and Heybridge experienced small population declines.

As with all towns and settlement areas in Central Coast, Turners Beach is characterised by an ageing population. Between 2001 and 2006 the population group aged 65 years & over increased as a percentage of the Turners Beach population from 9% to 11%. According to Census data the area’s median age is 40.

Notably for this Local Area Plan, the Turners Beach population includes a high proportion of 5–14 and 35–60 year olds which indicates that there are a high number of families in the area.





Review of relevant documents

The following relevant documents were reviewed in the development of the Turners Beach Local Area Plan (Urban Design Guidelines) to provide background information to inform the urban design issues for Turners Beach:

- Central Coast Strategic Framework for Settlement and Investment (2009)
- Central Coast Strategic Plan 2009–2014
- Central Coast Planning Scheme 2005
- Forth, Leith & Turners Beach Community Plans (1997)
- Forth Valley Land Use Planning Guidelines (2000)
- The Welcome Stop & Interpretive Signage at Turners Beach (2000)
- Turners Beach Community Plan
- Central Coast Council Climate Change Action Plan (2010)
- Turners Beach Vegetation & Fire Management Plan (2011)
- Central Coast Open Space Strategy (2009)
- Central Coast Coastal Management Plan
- North West Tasmania Coastal Pathway Plan (2010)
- Cradle Coast Regional Land Use Planning Framework 2010–2030 (2011)
- Ryan, L. (1996); The Aboriginal Tasmanians, Allen & Unwin, Crow's Nest
- www.beachsafe.org.au

<p>The coastal vegetation/ native flora and fauna</p> <p>Beautiful landscapes connecting sea, valley, river and farmland</p> <p>Relaxed quiet coastal lifestyle</p> <p>Holiday atmosphere</p> <p>Closeness to the beach and the river</p> <p>Central location between Devonport and Ulverstone</p> <p>The array of recreational opportunities</p> <p>Slow traffic environment</p>

Table 1

Most valuable qualities and unique characteristics

The Turners Beach Local Area Plan (Urban Design Guidelines) has been developed in collaboration with the local community.

Community consultation sessions were held in the Turners Beach Community Hall on Friday 10 December 2010 between 10.00am and 5.00pm and Saturday 11 December 2010 between 10.00am and 2.00pm. The sessions were attended by sixty seven people comprising Turners Beach residents, representatives from various community groups, Central Coast Councillors and residents of nearby areas. Participants discussed issues with Council staff including urban design, town planning, open space and recreation and transport.



The most valuable and unique characteristics of Turners Beach identified by the community are listed in Table 1. These characteristics inform the development of this local area plan by identifying the area’s character and key urban design elements. The Turners Beach Community Plan (2007) established the following vision for the area:

*A united, active, healthy community
 Living in a safe and natural environment
 By River and Sea.*

This Local Area Plan (Urban Design Guideline) will seek to achieve this vision by protecting, enhancing and leveraging the area’s most valuable qualities and unique characteristics. The plan will provide a framework for guiding the preferred future form, quality and function of the settlement in terms of its physical surroundings and the social and economic environment.





Bushland Track in Gables Park



Turners Beach Bowls Club

New Ideas for Turners Beach

When asked about the opportunities for improvement in Turners Beach the responses from participants in the public consultation sessions can be grouped into five key urban design themes and an additional matters section:

Urban Design Theme 1: Connectivity

Urban Design Theme 2: Open Space & Recreational

Urban Design Theme 3: Traffic Management

Urban Design Theme 4: Environmental Protection

Urban Design Theme 5: Town Planning



PART TWO: UNDERSTANDING THE EXISTING URBAN DESIGN CHARACTER OF TURNERS BEACH



Examination of Turners Beach Settlement

Turners Beach is similar to many coastal settlements in Tasmania in that it has a strong sense of community, is a walkable size with a community hall, local shops and open spaces. This Part of the Local Area Plan examines the urban design elements of Turners Beach, with some of the key urban design elements depicted below.



Settlement is located on flat topography behind the front sand dunes. Remnant vegetation protects the dunes.

Residential street edges vary from grassed verges with drainage swales to formed kerb and gutter with grassed verges and concrete pedestrian footpaths.

Remnant vegetation and street tree planting throughout the settlement create the sense of a beach side village.

Slow traffic environment.

Variety of public open space including the foreshore, beach, the Forth River corridor, bushland, managed sports oval and open parklands.

Built form ranging from older, modest beach 'shacks' to contemporary one and two storey houses & units with consistent density, alignments and setbacks.

Settlement is generally uniform in density and its extent is clearly defined.

Key Urban Design Elements





Turners Beach Foreshore



The Seaside Service Station

Built form characteristics

Residential buildings in the settlement range from older, modest beach 'shacks' to contemporary one and two storey houses and units. The eclectic mix of housing styles and the low density development throughout the settlement provides a rich overall character. Regardless of their age, residential buildings generally have consistent alignments and setbacks with the 'newer' residential development areas to the south separated from the original settlement by the Bass Highway.

Houses in the newer area south of the highway are generally single-level brick-veneer or rendered finish with traditional height side and rear fences and open front gardens. Streets are generally planted with street trees while street edges are formed kerb and gutter with grassed verges and concrete pedestrian footpaths.

In the area north of the highway remnant vegetation and street tree planting complement the scale of the built form and creates view corridors to the natural surroundings. Residential street edges vary from grassed verges with drainage swales to formed kerb and gutter with grassed verges and concrete pedestrian footpaths. Both fences and plantings are used to define site boundaries, although many dwellings have no fence to the street giving an open informal character.

Residential buildings along the dunes are generally elevated and positioned to take advantage of the views and sea breezes.

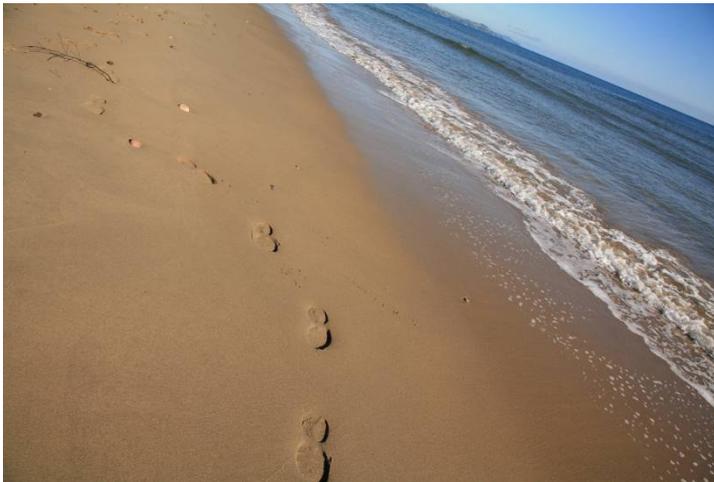
The few commercial buildings which exist throughout the settlement have a low key character which is reflective of the surrounding built form and scale. Signage for these businesses is of an appropriately low key colour and size.

Public buildings such as the community hall and fire station are generally of a timber construction with pitched roofs. These buildings are unobtrusive and integrated with surrounding vegetation.





A Timber Boardwalk onto Turners Beach



Turners Beach

Landscape & Environment characteristics

The Turners Beach settlement is established on the Forth River and is located on flat topography behind the front sand dunes. Remnant vegetation protects the dunes and shields the settlement from on shore winds.

Remnant vegetation and street tree planting create the sense of a suburban beachside character.

The Turners Beach itself, is a straight north–northwest–facing sandy beach that extends from Claytons Rivulet to the 100m wide mouth of Forth River. It is a narrow moderately steep high tide beach composed of sand and cobbles, fronted by a low gradient sandy low tide terrace, which widens to 150 m at spring low tide. Waves averaging less than 1m usually spill across the low gradient beach, with rips only forming in the low tide zone during periods of higher waves. The eastern 100m of beach curves into the river mouth with a deep channel and strong tidal current flowing though the mouth (<http://www.beachsafe.org.au/>).

Sections of the Turners Beach foreshore dune system and the Forth River bank are exhibiting the effects of erosion caused by storm surge events, king tides and flooding.

Climate change

Reports on climate change such as Sharples (2004; 2006) have highlighted that Turners Beach is likely to be impacted by the effects of climate change and sea level rise. Changes in sea level, increasing coastal storm events and the frequency between acute events may place pressure on the management of the coastal foreshore in Turners Beach.

This plan recognises that coastal management adaptation strategies that lessen the adverse impacts of climate change will become increasingly necessary in Turners Beach.





Turners Beach Boat Ramp



Turners Beach Timber Viewing Platform & Boardwalk

Visual & Spatial Characteristics

Turners Beach has a unique set of visual and spatial characteristics that define the settlement. These include:

- Vegetated foreshore dune system;
- Timber boardwalks to the beach;
- The Forth River;
- The hinterland hills and vegetation;
- Street trees and landscaping; and
- Generous public open space and recreational areas.

Connectivity

Turners Beach is provided with a network of pedestrian footpaths in both the northern and southern settlement areas. The northern and southern areas of Turners Beach are connected by an overpass over the Bass Highway.

A shared pathway has recently been provided to connect Turners Beach with Ulverstone, providing safe and convenient travel for pedestrians and cyclists alike.

The street network throughout Turners Beach is provided in a formalised grid pattern and a boat ramp at the mouth of the Forth River provides connectivity to the river and sea.

Connections are provided to the beach through a series of formalised timber boardwalks.





Esplanade and Turners Beach Road Intersection



Esplanade

Traffic Environment

Traffic data was collected between November and December 2010 to analyse the traffic environment in Turners Beach. The analysis is provided below:

Esplanade – The northern most street in Turners Beach which runs east–west along the foreshore. The street has a speed limit of 50kph reducing to 40kph near the caravan park. It receives low vehicle use with an average of 852 vehicles per day. It is a low speed traffic environment with a median vehicle speed of 44.5kph. 90% of vehicles drive at 50kph or less, with 8% driving between 50–55kph and 2% exceeding 60kph.

Susan Street – A 50kph street which runs east–west between Albert Street and Boyes Street. The street receives low vehicle use with an average of 911 vehicles per day. It is a low speed traffic environment with a median vehicle speed of 47.9kph. 62% of vehicles drive at 50kph or less, while the mean speed of vehicles exceeding the limit is 54.7kph.

Turners Avenue – Is a local thoroughfare which runs east–west between Albert Street and Turners Beach Road. The street receives low vehicle use with an average of 1,154 vehicles per day. It is a low speed traffic environment with a 50kph speed limit and a median vehicle speed of 48.6kph. 59% of vehicles travel at 50kph or less, while the mean speed of vehicles exceeding the limit is 55.2kph

Turners Beach Road (north) – Is the main entrance to the northern Turners Beach settlement area which runs north–south between the Bass Highway/Westella Drive and the Esplanade. The street receives low vehicle use with an average of 1,019 vehicles per day. It is a low speed traffic environment with a 50kph speed limit and a median vehicle speed of 50.4kph. 90% of vehicles drive at 50kph or below and the mean speed of the 10% of vehicles which exceed the limit is 64.4kph.





Turners Beach Road (South)



Forth Road

Turners Beach Road (South) – Located on the Southern side of the highway, Turners Beach Road runs north-south between Forth Road and Westella Drive (& the Bass Highway). The Road receives the highest use of any street in Turners Beach with an average of 3,006 vehicles per day. The road represents a significant thoroughfare for vehicles accessing the highway, and the northern Turners Beach area and Forth to the south. Whilst cars represent the highest percentage of users of the road, there are high numbers of trucks using the road to travel between the highway and the rural activities to the South. The road has a speed limit of 50kph and the median speed of vehicles on the road is 42.4kph. 84% of vehicles travel at or below the speed limit. The mean speed of the 16% of vehicles exceeding the speed limit is 54.1 kph.

Forth Road – Located on the Southern side of the highway, Forth Road runs north-west/south-east from Forth to Westella Drive (& the Bass Highway). The Road receives a moderate traffic volume with an average of 1,909 vehicles per day. The Road is a thoroughfare for vehicles accessing the highway and the northern Turners Beach area and Forth to the south. Whilst cars represent the highest percentage of users of the road, there are high numbers of trucks using the road to travel between the highway and the rural activities to the South. The road has a speed limit of 60kph and the median speed of vehicles using the road is 42.4kph. 87% of vehicles travel at or below the speed limit, while the mean speed of the 13% of vehicles exceeding the speed limit is 63.2kph





Forth Road



Westella Drive

Road Safety Performance

Crash history data for Turners Beach over the last five years has been obtained from the Department of Infrastructure Energy and Resources (DIER) (Table 2). Crash history data can provide useful information regarding the safety performance of a road network, although it is limited in determining the relative crash risk of an area

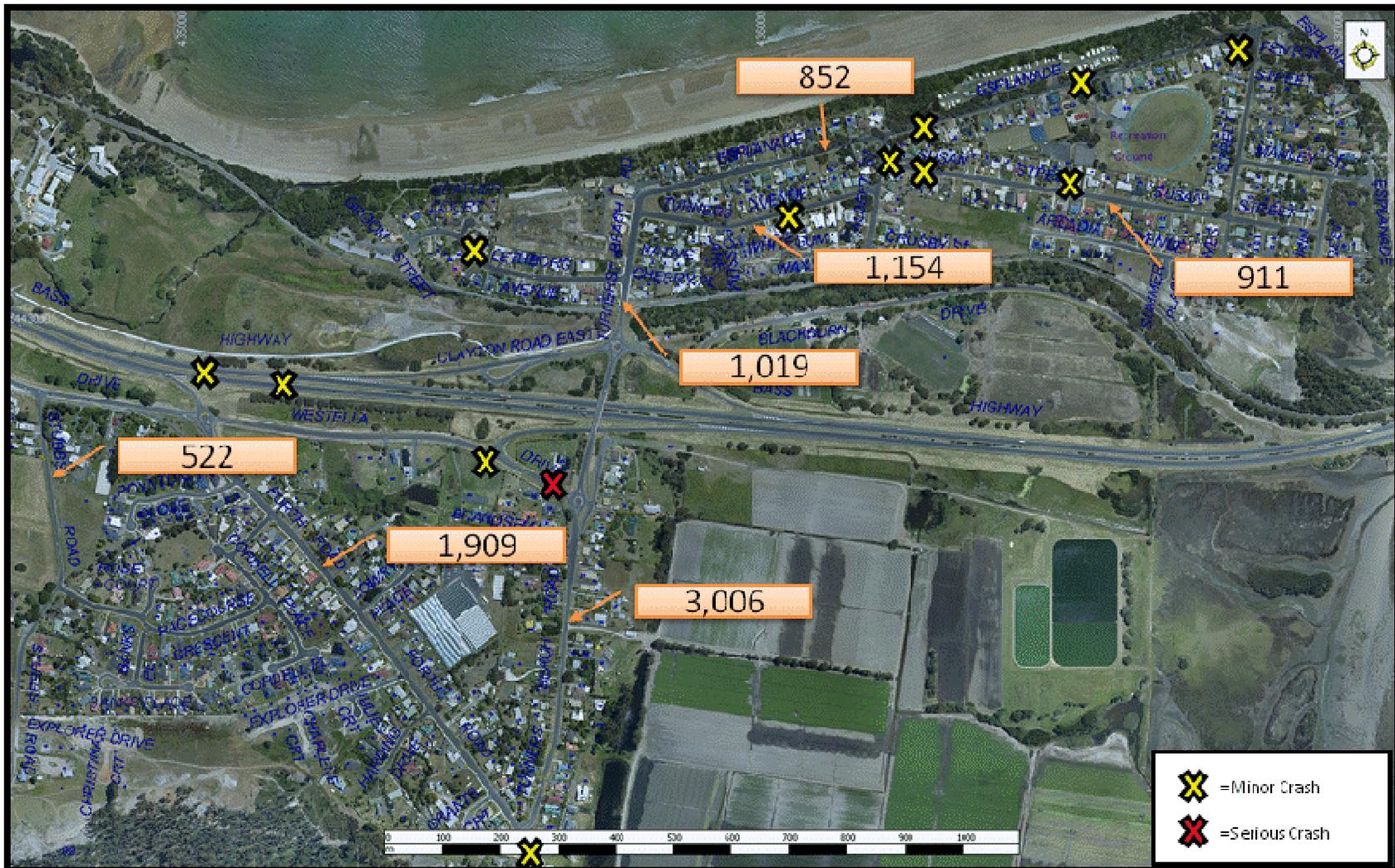
Location	Total Number of Crashes	Number of Property damage	Number of Minor Crashes	Number of Serious Crashes
Forth Road	12	6	1	-
Esplanade	4	3	1	-
Bass Highway	3	1	2	-
Westella Drive	2	1	-	1
Susan Street	2	2	-	-
Banks Place	1	1	-	-
Turners Ave	1	1	-	-
Albert Street	1	1	-	-
Lethborg Ave	1	-	1	-
Off Road	1	1	-	-
TOTAL	28	17	10	1

Table 2 - Turners Beach Crash History Data

On analysing the crash history data the following observations are made:

- No fatalities have occurred as a result of a traffic accident in Turners Beach over the last five years;
- 96% of accidents that occurred in Turners Beach over the last five years were minor or property damage crashes;
- Forth Road recorded the most accidents with the majority of these occurring on the section of road between Forth and Turners Beach; and
- Turners Beach is characterised as a very low crash area.





Average Daily Vehicle Movements & Five Year Crash Distribution



Parking near the Turners Beach Bowls Club



Parking at Eastern End of Esplanade

Parking Provision

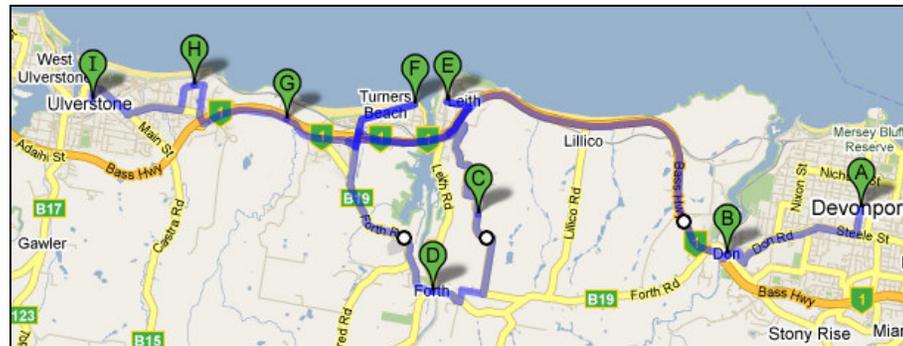
Off-street public parking locations in Turners Beach are listed below:

- Esplanade adjacent to the petrol station;
- off Henry Street near the Turners Beach Bowls Club;
- Eastern end of Esplanade opposite the shop site;
- Limited car parking in front of the Turners Beach Community Hall;
- Informal parking in the Turners Beach Recreation Ground; and
- Car and trailer parking in the Esplanade near the boat ramp and in Manley street

On-street parking is provided throughout the settlement with designated parking bays provided at various locations along the Esplanade

Public Transport

Phoenix Coaches operates a public bus service within Turners Beach between Monday to Saturday each week. This route services the areas between Devonport and Ulverstone and is illustrated below.



A = Devonport; B = Don; C = Braddons Hill Lookout Road; D = Forth; E = Leith; F = Turners Beach;
G = Westella Drive; H = East Ulverstone I = Ulverstone Central Business District (CBD)





The Gables

Heritage

Turners Beach is an area not known for its heritage significance. The settlement has two buildings currently recognised as being of sufficient historic cultural heritage significance to be included on the Tasmanian Heritage Register. These are:

- 2 Lukin Street, and
- The Gables, 124–126 Esplanade.

As previously mentioned the Gables was built in 1850 and was originally used as an inn known as The Sailors Return.

Aboriginal Heritage

According to Ryan (1996), the Aboriginal population of Tasmania was aligned within a broad framework of nine Tribes. The mean population of each Tribe is estimated to have been between 350 and 470 people. Ryan (1996) presents a map showing the approximate boundaries for the nine Tasmanian aboriginal Tribes, which shows that the study area most likely falls within the boundaries of the land occupied by the North Tribe, whose territory extended from Port Sorell to west of Emu Bay.

The North Tribe comprised four separate bands of people, the Punnilerpanner, the Pallitorre, the Noeteeler and the Plairhekehillerplue. The band that most likely occupied the study area is the Punnilerpanner who occupied the area around Port Sorell and west along the coast.

Dunnett (1994) carried out an extensive survey and assessment of Aboriginal sites from Circular Head in the west through to Port Sorell in the east which recorded a total of 474 archaeological sites. One hundred of these sites were located along the coastal strip of within 250m of the high water mark. The most probable interpretation of this archaeological expression is occupation and usage of the region by small groups of people moving through enormous tracts of forests, exploiting dispersed resources.

A search of the Tasmanian Aboriginal Site Index (TASI) data base identifies that there is one registered Aboriginal heritage site located in the study area. The site is classified as an artefact scatter.





East End Park



Cricket Net Facility in the Turners Beach Recreation Ground Precinct

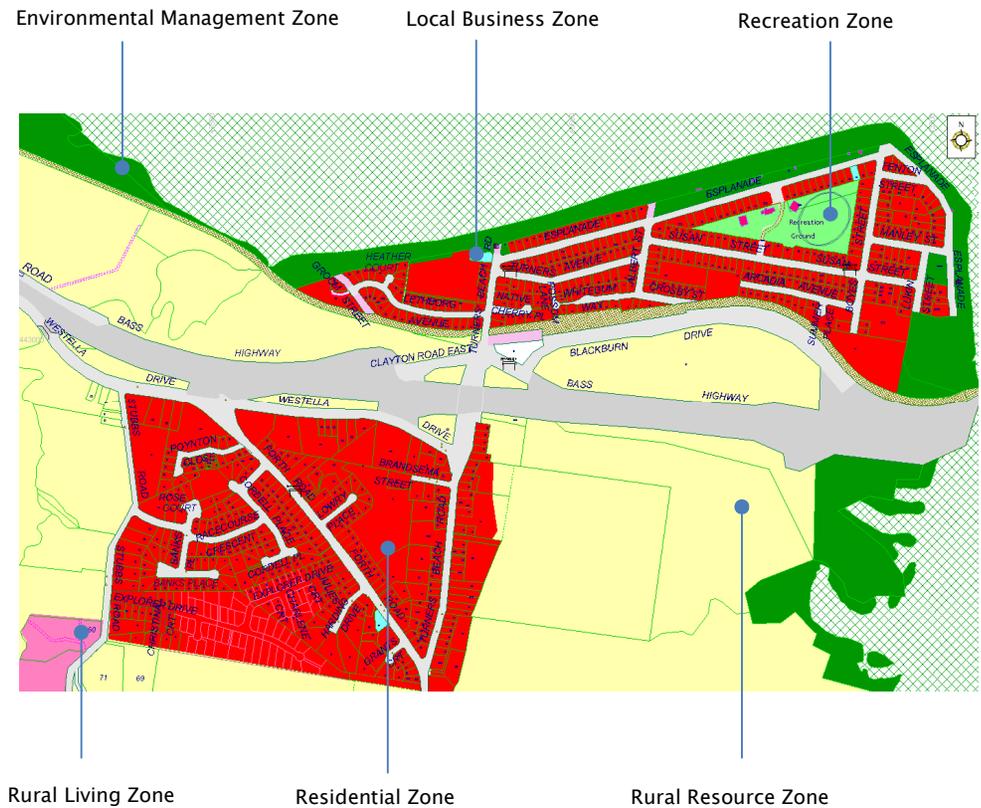
Provision of Open Space

Turners Beach is an area that supports beachside living. It is predominantly a residential centre in which residents have a reliance on car travel for work and to access sporting activities. With its high proportion of families and continued population growth, there will be continued demand for mainstream sport and for varied activities and experiences in open spaces. Social/family recreation spaces that offer play experiences, areas to picnic and space for informal ball games are important in Turners Beach.

There is a mix of landscape settings that offer varied experiences to residents and visitors including the foreshore, beach, the Forth River, bushland, a managed sports oval and open parklands. The Forth River mouth and estuary are attractive waterways with significant natural and landscape values, while the Gables Park and Custom reserve offer unique bushland settings on the Forth River.

The main open spaces in Turners Beach are the foreshore and beach, the Forth River corridor, Gables Park, Custom Reserve, HW Braid Reserve and the Turners Beach Recreation Ground. The functions of open space include social/family recreation, sport, landscape values and water based recreation opportunities including swimming, boating and fishing.





Town Planning

Turners Beach comprises six zones of the Central Coast Planning Scheme 2005. These include the Residential Zone, Recreation Zone, Local Business Zone, Environmental Management Zone, Rural Living Zone and Rural Resource Zone.

The Turners Beach community is currently serviced by local businesses located in both the northern and southern settlement areas. These businesses generally cater for local needs such as petrol, essential grocery items (newspapers, milk, bread (etc.)) and are located on Local Business Zoned sites. Additionally, the Berry Farm provides an alternative food and beverage offering for local residents and visitors alike.

The Environmental Management Zone has been applied to the Turners Beach coastline to ensure that these valuable coastal ecosystems are protected from inappropriate development.

The Rural Resource Zone surrounds Turners Beach to both the West, South and South-East.



PART THREE: URBAN DESIGN GUIDELINES



Introduction to Urban Design Guidelines

Urban design relates to the quality of a place and how it functions. It is concerned with the relationship of public open space and buildings to the community which they serve. Well designed and functional spaces provide better connections between people, places and buildings and result in more efficient use of resources and more liveable communities.

The practice of urban design seeks to create places that contribute positively to people's wellbeing. These places protect environmental and cultural features, provide safe and inclusive public spaces and respect community values.

The Turners Beach Local Area Plan (Urban Design Guidelines) provide a framework that will guide the approach to the future development of Turners Beach and will influence the future form, quality and function of the settlement in terms of its physical surroundings and the social, natural and economic environment. Actions are recommended under the key urban design themes of connectivity, open space & recreation, traffic management, environmental protection and town planning.

The Local Area Plan has been developed to assist and inform the Council, developers and the local community alike.



Maintain and protect the natural coastal environment.

Maintain and enhance public open space and connectivity; prevent privatisation of the foreshore.

Maintain the area's rich character to reinforce visual and physical connections with the coast and river.

Maintain existing density of built form along with consistent alignments and setbacks.

Define boundaries around the settlement to limit outward expansion.

Key Urban Design Guidelines





A view of the Ulverstone to Turners Beach Shared pathway



Users of the Ulverstone to Turners Beach Shared pathway

Urban Design Theme 1: Connectivity

The safe movement and connection between private and public spaces for pedestrian, cycling and vehicular traffic is an integral element to well-designed spaces. Turners Beach is provided with a network of footpaths which are in good condition. However, the footpath network is discontinuous in places and many Turners Beach residents consider that the footpath network needs to be improved as a matter of priority. The streets identified as requiring footpaths to improve connectivity are Westella Drive, Susan Street and Boyes Street. Additionally, in order to complete connections between these streets, it is also recommended that a footpath be provided along Albert Street and from Esplanade to Lukin Street.

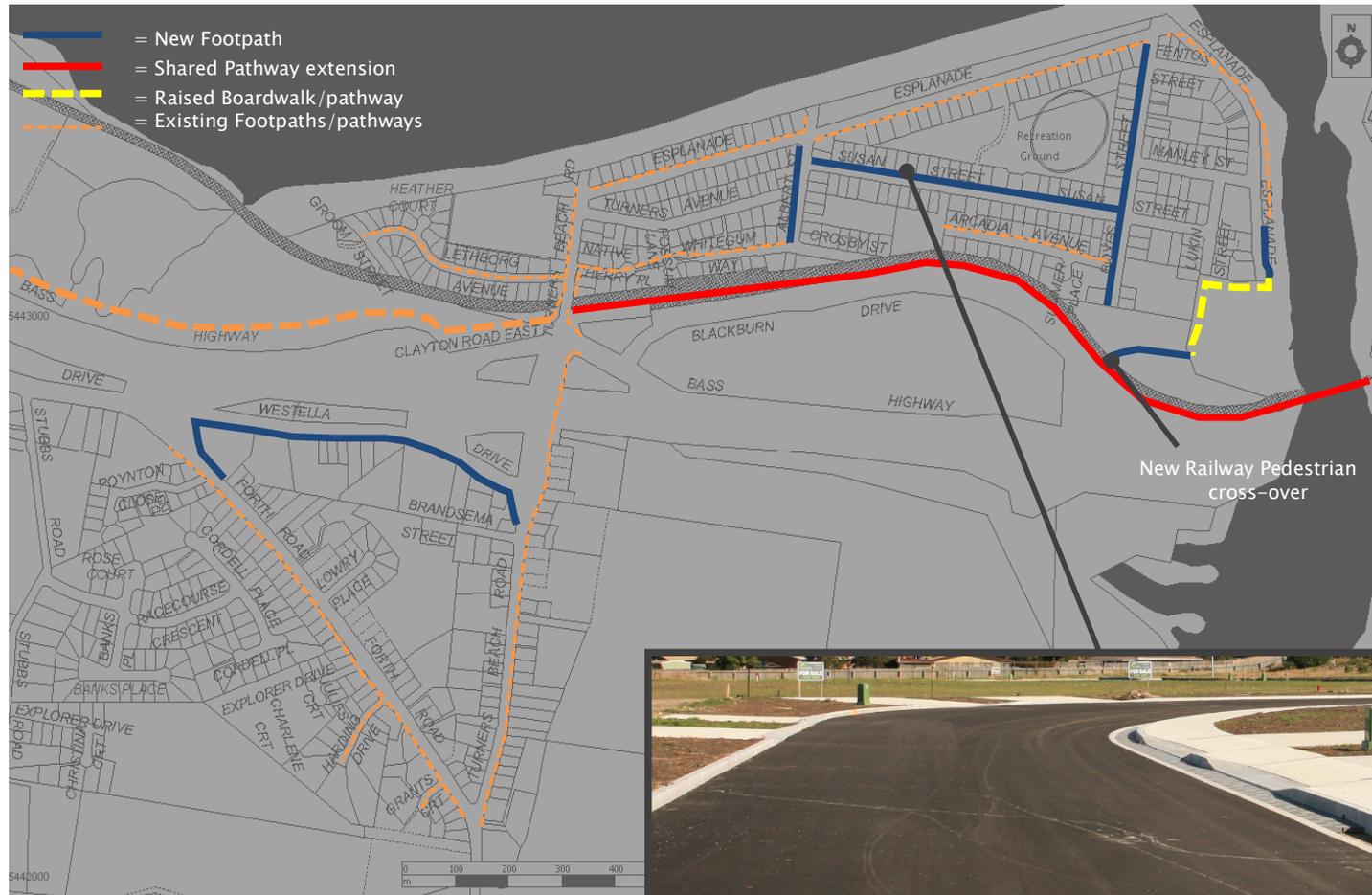
The recently constructed shared pathway connecting Turners Beach and Ulverstone is receiving high levels of use and has become a sense of pride for Turners Beach residents. There is a great deal of community support for extending the shared pathway along Blackburn Drive to Leith and then on to Devonport. To achieve this, a new footbridge over the Forth River is required. The Turners Beach community believe that the most appropriate location for the footbridge is alongside the existing Bass Highway bridge. This action is supported by the North West Tasmania Coastal Pathway Plan (2010). Additionally, the Forth Local Area Plan (Urban Design Guidelines) is proposing that a shared pathway be constructed from Forth to Turners Beach which is supported by this Local Area Plan.

Turners Beach residents wish to encourage the movement of cyclists and pedestrians from the shared pathway through Turners Beach itself. Accordingly, a pathway loop through the northern settlement area is proposed. This would involve the establishment of a raised boardwalk and pathway from the end of the Esplanade, through Gables Park and onto the Blackburn Drive area to complete a link with the proposed extended shared pathway.

The future connectivity improvements are illustrated on the following page.



Turners Beach Connectivity Improvements



Typical Turners Beach footpath provided only on one side of the street



Urban Design Theme 1: Connectivity Strategies/Actions

Strategies	Actions
<p>Improve Connections within Turners Beach</p>	<p>Provide footpaths along Westella Drive, Susan Street and Boyes Street, Albert Street and extend the footpath along the Esplanade near the boat ramp.</p> <p>Construct a raised boardwalk from the end of the Esplanade, through Gables Park onto Blackburn Drive to complete a link with the proposed extended shared pathway. Alternatively, the boardwalk could traverse the low lying wetland area and connect with a pathway through Gables Park onto Blackburn Drive.</p> <p>Providing signage to indicate public use of the access to the beach through the OC Ling Caravan Park</p> <p>Provide a crossover on the footpath between Boyes Street and Esplanade.</p>
<p>Improve/make connections from Turners Beach to nearby towns and settlements</p>	<p>Extend the Ulverstone to Turners Beach shared pathway along Blackburn Drive to the western bank of the Forth River</p> <p>Investigate options for the construction a footbridge over the Forth river alongside the highway bridge to connect with the proposed North West Tasmania Coastal Pathway network</p> <p>Provide further plantings along shared pathway to ‘soften’ the path and provide a barrier to the highway</p>





East End Park



West End Park Public Toilets

Urban Design Theme 2: Open Space & Recreation

Open space is public land that is primarily open to the sky and has established recreation use or leisure benefits. The opportunities offered by open space are for physical activity, improvement to psychological health and wellbeing through the provision of connection to nature and green space, visual appeal and relief from urban surroundings.

The Central Coast Open Space Strategy (2009) has identified that the naturalness and physical environment associated with the beach/foreshore and associated vegetation of Turners Beach is important to the area's character and these should be protected and enhanced. The coastline, river corridor and bushland reserve offer the community unique and varied settings and experience. Under the Strategy it is expected that social/family recreation areas or local parks will be provided within 400m of most households and that one outdoor grassed playing field (or sub-regional park) will be provided within 800m of most households.

The open space distribution plan on page 32 demonstrates that the Turners Beach Recreation Ground is located in the heart of Turners Beach and is within 800m of most residents. It also demonstrates that local parks provided in the Recreation Ground Precinct, HW Braid Reserve, and west End Park are located within 400m of Turners Beach residents. It is apparent therefore that Turners Beach residents enjoy a high level of access to open space.

There is no demonstrated need for further open space in Turners Beach other than the provision of local parks associated with new subdivision development

It is recommended that the Council undertake a review of open space in Turners Beach as part of the Central Coast Open Space Plan development process.





- OPEN SPACE CLASSIFICATION**
- Local
 - Linear
 - Specific Purpose
 - Passive
 - District
 - Regional
 - 400m Local Distribution
 - 800m District Distribution



Turners Beach Open Space Distribution





Additional Carparking to be provided on this site opposite the Tennis Courts

Turners Beach Recreation Ground Precinct Master Plan

The Turners Beach recreation ground precinct is the largest recreational space in Turners Beach and includes a cluster of recreational activities including the recreation ground, the football/cricket club, the bowls club, the Glen Turner Memorial Hall, children's playground and the tennis courts/club. The Turners Beach Community Plan identified the need for a master plan to guide future development of the precinct, to ensure that it caters for the needs of the community.

A precinct master plan has been developed (page 34) as part of this local area plan. The key elements of the master plan are discussed below.

Henry Street runs through the heart of the precinct between Susan Street and Esplanade and presents a high potential for conflict to occur between vehicles and people recreating in the precinct (ie. walking, playing, training etc.). It is widely appreciated by Turners Beach residents that the vehicle speed through Henry Street needs to be controlled in order to minimise the potential for conflict.

Sealed car parking areas are currently provided for the Bowls and Tennis Clubs. Additional parking is available on an informal arrangement on the grassed area around the recreation ground. Residents have identified a shortfall of parking in the precinct when several of the facilities (i.e. cricket, bowls & tennis) are used on the same day. Accordingly, it is proposed to make parking improvements by providing two additional parking areas, a disabled car parking space for the community hall, and improved signage to promote overflow parking on the grassed area near the recreation ground

There is a playground provided to the north of the Community Hall which caters for young children. However, there is no play equipment provided in the precinct to cater for the 10 year old to teenage children. Accordingly, it is proposed to provide an additional older age play area near the recreation ground. Additionally, the Council has received numerous requests for older age play equipment in Turners Beach and a half-court basketball facility will be provided near the existing cricket nets to meet this community need.





- KEY POINTS**
- Formalise car parking along the Esplanade for both the children's play area and community hall and retain existing vegetation
 - Provide a disabled car parking space for the community hall
 - Provide additional shared car parking spaces near the tennis courts
 - Provide signage to identify overflow parking area on grassed area near the recreation ground
 - Install traffic calming devices (speed humps) on Henry Street to signal a priority for recreational users over vehicles
 - Provide an additional playground area near the recreation ground to cater for children aged 10 years to teenager
 - Provide additional seating near the proposed playground
 - Provide a half-court basketball facility near the cricket nets to cater for teenage children

Turners Beach Recreation Ground Precinct Master Plan



Urban Design Theme 2: Open Space & Recreation Strategies/Actions

Strategies	Actions
<p>Asset management and improvement</p> <p>Responding to changing demographics</p> <p>Improve access to sports facilities & enhance their viability</p>	<p>Undertake a review of local open spaces in Turners Beach as part of the Central Coast Open Space Plan development process.</p> <p>Ensure the design of new housing areas addresses the need for social/family function of open space.</p> <p>Improve the quality of barbecue, picnic and play facilities at social/family local parks (sites include at the entry of Gables Park and West end Park).</p> <p>Implement the Turners Beach Recreation Ground Precinct Master Plan to increase the use of ground, community activities and improve the functionality of the community hall.</p> <p>Work with the Turners Beach Tennis Club to facilitate upgrading of the tennis courts.</p> <p>Provide seating on the recently constructed beach look out. (Completed)</p>
<p>Capitalising on the attractiveness physical characteristics of Central Coast</p>	<p>Protect and enhance the naturalness and physical environment associated with the beach/foreshore and associated vegetation.</p>





Intersection of Turners Avenue and Albert Street



Boyes Street

Urban Design Theme 3: Traffic Management

Current traffic levels in Turners Beach are not high and roads run well below capacity. The existing road network is not at risk from future congestion as additional traffic levels are likely to be small. Despite this, there are a number of issues which must be addressed by this plan. These are discussed below.

Vehicle hooning

Turners Beach is a slow traffic environment in which most drivers comply with the posted speed limits. Some residents have expressed concern that vehicles ‘hooning’ in and around Turners Beach is a problem. The data suggests that any problems relating to speeding vehicles is limited to an extremely small number of drivers. At this stage there is little demonstrated need to introduce any additional traffic calming controls in the area, however, the situation will continue to be monitored.

Intersection improvements

It has been identified by residents that vehicles cut corners at the intersections of Turners Avenue and Albert Street and Turners Beach Road into Turners Avenue. To address this concern the use of line marking and signage on the intersection to clearly delineate road lanes and giveaway control will be considered. This is consistent with other intersections in Turners Beach and will provide more certainty for drivers.

Alternative Access/Exit

An issue which has been raised by many residents is the need for an alternative access/exit for the northern area of Turners Beach. Residents are concerned that the current Turners Beach Road access/exit point has the potential to be blocked for a prolonged period by a train derailment or traffic accident.

Whilst this is considered to be an unlikely event, the Council will investigate the establishment of an emergency alternative access/exit point from the northern Turners Beach settlement area, in particular from Boyes Street onto Blackburn Drive.





An aerial view of Turners Beach

Maskells Road Intersection

The Bass Highway – Maskells Road junction was constructed some 30 years ago as a temporary measure which was intended to be downgraded or closed when a planned service road from Industrial Drive to Turners Beach was constructed (see below)



Use of the junction has steadily increased over the years and it is expected that development of the land to the west of Maskells Road will further increase pressure on the junction. The type of developments on land to the west of Maskells Road will also influence the preferred solution for the intersection or construction of the service road.

There is a high level of community opposition to the establishment of the service road from Maskells Road to Turners Beach. While most residents acknowledge that the Maskells Road intersection must be improved, they do not believe that the service road is an appropriate means of doing so.

Accordingly, the Council will also investigate alternative means of addressing the Maskells Road traffic concerns including the following potential measures:

- Extending the service road from Industrial Drive to Maskells Road,
- Making the Maskells Road intersection left turn only, and/or
- Preventing traffic from turning into Maskells Road from the westbound highway lanes.





Turners Beach Boat Ramp Vehicle Manoeuvring Area



Parking along Esplanade

Boat Ramp Functionality

The Turners Beach boat ramp is a single lane concrete construction with a gradient of 1 in 7 which is suitable for launching vessels of between 4.6 to 6m in length.

In response to the fact that the boat ramp receives high usage and that damage was occurring to vegetation in the foreshore area from vehicles parking over vegetation, in 2010 the Council installed barriers between the road and the coastal reserve to protect vegetation by defining parking areas.

Parking now exists along the eastern side of the Esplanade in bays that have been created by installation of the vegetation protection barriers. Parking is also provided near the boat ramp and along Manley Street.

The parking layout at the boat ramp is aimed at directing car and trailer parking to designated areas along the Esplanade and Manley Street, rather than in the boat ramp area itself. Users of the boat ramp have expressed some concern about the altered arrangements. The majority of these concerns appear to have resulted from a lack of awareness of the new designated parking areas. The Council has endeavoured to rectify this by improving signage to direct people into these areas.



Boat ramp users have reported problems with cars and trailers being inappropriately parked in the area to the immediate north of the boat ramp. Such parking has impeded use of manoeuvring space for boat launching. A proposed means of addressing this concern is to prohibit the parking of cars and boat trailers within and directly adjacent to the launching and manoeuvring area.

It is considered that sufficient parking for cars and boat trailers exist within close proximity to the boat ramp and that with additional parking controls and user education, an appropriate balance between functionality and vegetation protection has been achieved.



Urban Design Theme 3: Traffic Management Strategies/ Actions

Strategies	Actions
Resolve traffic & parking issues	<p>Provide line markings on the intersections between Turners Avenue and Albert Street and Turners Beach Road into Turners Avenue to designate Give Way control.</p> <p>Investigate appropriate means of addressing safety issues with the Maskells Road/Bass Highway intersection</p> <p>Investigate the establishment of an emergency alternative access/exit point from the Northern area of Turners Beach, in particular off Boyes Street onto Blackburn Drive</p>
Improve Functionality of the Turners Beach boat ramp	<p>Implement controls to prohibit the parking of car and boat trailers in the area within and adjacent to the boat launching and manoeuvring area and direct car and boat trailer parking to the Esplanade and/or Manley Street</p>





Images of Shoreline erosion

Urban Design Theme 4: Environmental Protection

The Turners Beach community value the area's coastal vegetation and has undertaken a variety of measures to enhance and conserve local environmental values. There is a serious coastal erosion issue occurring at the mouth of the Forth River which must be addressed. This is discussed below.

Shoreline Erosion

An elevated level of shoreline erosion is occurring at the mouth of the Forth River. Such erosion needs to be managed to avert the possible undermining of the Esplanade. The Council engaged Geomorphologist, Dr Frances Mowling to investigate and report on shoreline erosion in the Forth River. Dr Mowling's report entitled '*Initial assessment of the Forth River Estuary including recommendations on suitable risk management and erosion control methods*' (Appendix 2) is used as a basis for recommendations made in this plan.

The current observed status of the eastern Turners Beach shoreline is as follows:

- In the vicinity of the viewing platform and steps to the beach an area of bluestone rock to a height of approximately 2m have been installed seaward of the existing dune within the last five years. This followed an earlier bluestone rock installation some nine years ago. The majority of bluestone rocks remain in place and have provided a hard surface protection in a soft sand environment. 20 + rocks from the earlier installation have been extracted from the wall and transported by wave action away from the wall seaward on to the beach, and laterally some 80–100m towards the estuary mouth.
- A length of approximately 30m of exposed cobble berm, which underlies the dune, is currently being eroded landward towards the bitumen road (Esplanade). The roots of Eucalyptus trees and Banksia shrubs are exposed and the canopies of these trees and plants are either dying or have died. The proximity of the Esplanade to the eroding cobble berm is approximately 3m.





Elco Rock Coastal Erosion Protection System



Elco Rock Coastal Erosion Protection System in Use at Blythe Heads

The 2005 aerial photograph of Turners Beach (below) illustrates wave refraction at the shoreline in proximity to the impacted site. Wave refraction is the focusing of wave energy on a discrete segment of the shoreline that can produce erosion hot spots. Within the designated site there are several 'hot spot' areas which, given the long-term deposition, accretion and erosion processes, wave refraction and the projected rate of sea level rise, are likely to continue the process of erosion and regression which may compromise or damage infrastructure, natural vegetation and habitats.



Given the proximity of the Esplanade to the eroding cobble berm, it has been determined that prompt action needs to be undertaken to mitigate the erosion problem. It is recommended that a soft engineering option be installed in the area that abuts the eroding cobble berm to a height sufficient to protect against elevated wave attack. A suitable soft engineering option that has been successfully applied elsewhere is the ELCORock Coastal Erosion Protection System, sourced from Geofabrics International. Two examples of this product are illustrated (left). The bottom left picture is a local example of the system at Blythe Heads.

The height of the ELCORock Coastal Erosion Protection System should be adequate to stop waves breaking over the installation and eroding from behind. It should then build seawards in a series of steps onto the beach at an angle of response of 20°.

It is further recommended that the Council investigate whether run-off water from





Shoreline erosion



Vegetation along the Banks of the Forth River

Esplanade is contributing to the foreshore erosion, and, if identified as a problem, implement suitable drainage controls. It is also necessary to assess the impact of the existing informal pedestrian access track near the eroding cobble berm at the Forth River mouth and effectively close if necessary

A final recommendation is that the Council undertake ongoing investigation and analysis of erosion occurring at Turners Beach to assist in determining future mitigation measures to manage the erosion problems.

Protection/Management of Vegetation

The Council's Turners Beach Vegetation & Fire Management Plan (2011) has been developed to study the current conditions and characteristics of the environment around Turners Beach including the foreshore and the Forth River Reserve and to identify any factors that impact upon them. The Plan establishes clear directions and strategies for future vegetation management and development of the Turners Beach area including fire management treatment and recognises that the management of the Turners Beach foreshore requires that partnerships between the Central Coast Council, the community and key stakeholders be further fostered to achieve a coordinated and achievable management approach. The objectives of the Plan are to:

- Manage the natural resources identified in all vegetated areas of Turners Beach;
- Maintain and preserve all existing native flora and fauna in a natural state, by:
 - Reducing or eliminating any influence that will impact on the natural resources such as weed infestations and human pressures;
 - Preserving the natural resources and processes that help to maintain biodiversity in the area;
- Restore degraded areas through revegetation/remediation;
- Provide and maintain safe open space for passive recreation;
- Provide and maintain suitable assets to support the community of Turners Beach; and
- Manage the risk of fire.



This plan does not seek to duplicate the Vegetation & Fire Management Plan, rather it integrates the identified strategies and actions into the plan's actions.

Climate Change

The Sharples report Indicative Mapping of Tasmanian Coastal Vulnerability to Climate Change and Sea Level Rise: Explanatory Report, 2nd edition identifies the vulnerability of the Tasmanian coastline to the impacts of climate change and sea-level rise. By integrating geomorphology and topography, the report maps coastal areas potentially vulnerable to climate change impacts such as sea-level rise. Turners Beach has been identified as vulnerable and may be subject to inundation.

Local environmental groups will be encouraged to participate in the Tasmanian Shoreline Monitoring and Archiving Project (Tasmarc). This project involves taking monthly measurements of the beach profile from a permanent survey mark located in the dune. The results from the data can give an indication as to the amount of erosion taking place and can influence management decisions and erosion control methods used.



A view along Turners Beach



(The white paint marks the sand level prior to November 2007)



Urban Design Theme 4: Environmental Protection Strategies and Actions

Strategies	Actions
Mitigate Shoreline erosion	<p>Investigate protection of a suitable soft engineering solution to mitigate the eroding cobble berm at the Forth River mouth.</p> <p>Investigate whether run-off water from Esplanade is contributing to the foreshore erosion. If identified as a problem implement suitable drainage controls.</p> <p>Assess the impact of the existing informal pedestrian access track near the eroding cobble berm at the Forth River mouth and effectively close if necessary.</p> <p>Undertake ongoing investigation and analysis of erosion occurring at Turners Beach.</p> <p>Encourage local environmental groups to participate in the Tasmanian Shoreline Monitoring and Archiving Project (Tasmarc).</p>
Maintain and preserve vegetated areas	<p>Protect the recreational, environmental and landscape values along the coast and river foreshores in accordance with the Turners Beach Vegetation & Fire Management Plan.</p>





New Subdivision Works



Street Trees along Esplanade

Urban Design Theme 5: Town Planning

The Turners Beach area plays an important dormitory function for the larger nearby centres of Ulverstone, Devonport and Burnie.

An analysis of existing available residential land demonstrating that there are currently 182 potential residential lots in Turners Beach. Based on the predicted population growth for Turners Beach it is estimated that there is at least a 12 year supply of residential land in the area. The Council generally plans on a 10 year supply of residential land and, therefore, it is apparent that there is currently an adequate supply of residential land in Turners Beach. This determination will be re-examined as part of the normal planning scheme review processes required by the *Land Use Planning and Approvals Act 1993*.

It is also important that the Turners Beach community be provided with sufficient local business zoned land under the Central Coast Planning Scheme 2005 in order for local services to be provided to maintain the areas liveability. There are currently 3 Local Business Zoned sites in Turners Beach, with one in the southern settlement area and two in the northern settlement area. It is considered that the area is provided with sufficient local business zoned land.

The Environmental Management Zoning of the Turners Beach coastline is appropriate as it ensures that these valuable coastal ecosystems are protected from inappropriate development.

The Rural Resource Zone to the west of Turners Beach is playing an important strategic role by maintaining a separation between Turners Beach and Ulverstone. It is important that each town and locality is able to remain separate and distinguishable. The current zoning is effectively preventing ribbon development which could inadvertently lead to a loss of 'space between the places', frustrating the intention to distinguish between the localities. Therefore, it is a recommendation of this plan that the current Rural Resource zoning of the land be retained to maintain the existing settlement boundaries.





A Typical Street Presentation in Turners Beach

Heritage

Heritage places contribute to the character of this coastal community and are an important historical record of earlier Turners Beach communities. It is important to retain these places, identify any additional heritage places and ensure that new development is sympathetic to them. Specific actions include:

- 1) Undertake a survey of the heritage values in Turners Beach and ensure that buildings of significance are listed on the Tasmanian Heritage Register or the planning scheme;
- 2) Ensure that new development is sympathetic to heritage places; and
- 3) Aboriginal cultural heritage places should be protected.

Servicing

There are no major water and sewerage servicing constraints on the existing supply or on infill development. In some cases mains extensions will be required as part of future subdivision development.

In terms of drainage, the current level of service is considered adequate for a coastal settlement.

Building Design

Building design should be sensitive and sympathetic to the natural environment and existing built form context. The rural backdrop and coastal foreground should influence the design process and result in high quality outcomes that contribute to the settlement. New development should strive for excellence in environmentally sustainable outcomes.

Key elements in building design should include:

- Design responses that reflect the existing urban and natural landscape context in terms of site layout, presentation to the street and building height and mass;
- Design that is responsive to climatic conditions including building orientation to maximise solar exposure and minimise effects of prevailing winds;
- Use of thermal efficient building materials;
- Retaining accessibility to the foreshore;
- Maintain and enhance vistas to landmarks and visual presence of the sea and hinterland hills; and
- Allow adequate sunlight access to adjoining properties.





Remnant stands of trees maintain the areas scenic environmental quality

Desired Future Character of Turners Beach

The Character of an area

Within the planning framework, the concept of character primarily focuses on the physical planning outcomes and the design of the built environment in the public realm. This may include characteristics such as particular groups of land uses, architectural styles, building densities, building heights, building materials and building setbacks as well as the spatial definition. The character of an area may also be partly based on unique topographical or natural landform features, scenic environmental quality of the particular area including significant remnant stands of trees or streets which are lined by a particular tree species. In addition, the character of an area may be based upon the number of heritage items or conservation areas within that particular area.

The following statement of desired future character provides objectives for the future development of Turners Beach and emphasises the important existing features or qualities of the area that should be maintained or enhanced.

Statement of Desired Future Character

From an analysis of the physical environmental attributes of the study area and the public participation process, the “Statement of Desired Future Character” of the Turners Beach is described as follows:-

Turners Beach should retain its eclectic housing styles, suburban density and character with consistent building setbacks to the street. New residential development in waterfront locations, including sand dunes, should appear to nestle within the landscape rather than be of a contrasting scale or appearance.





"The space between the dwelling and front boundary should be set aside and developed principally as garden area"

Buildings should be oriented to the street, typically one or two storeys high, setback from the street boundary and spaced traditional distances apart.

Both fencing and plantings should be used to define site boundaries. Fencing should be visually permeable and use unobtrusive colours and materials, while front fences should be low and allow views between the dwelling and the street.

The space between the dwelling and front boundary should be set aside and developed principally as garden area.

Any new dwelling or major alterations and additions to existing dwellings should be designed to minimise the scale and bulk of the development through the use of such measures as split-level building design or the use of broken form.

The impact of upper storeys of dwellings should be minimised through such measures as a combination of increased front and side setbacks and the selective use of balconies and verandahs. Where front or rear facades of new dwellings are likely to be higher than neighbouring dwellings, the screening of balconies and additional setbacks may be necessary, to minimise any potential privacy loss.

Trees and remnant vegetation in the settlement are important elements in its character and should be protected and managed. Along with street tree plantings such trees and vegetation should continue to complement and create view corridors in residential areas. The generally informal character of the residential area north of the Bass Highway should be enhanced through appropriate street planting, narrow streets and use of swale drains.



Eclectic mix of built form with consistent setbacks

Public open spaces and the range of leisure uses they accommodate within the beachside setting of Turners Beach should be retained and enhanced.

Turners Beach should retain a local convenience store presence with higher order retailing and business service functions continuing to be provided to residents in the nearby centres of Ulverstone and Devonport.

Areas of significant environmental value and the dune system and Forth Estuary areas in particular, should be conserved in a manner that allows natural processes to continue. A limited range of activities may be appropriate, and only where they have a low impact on habitat and visual values.

The dunes area should be allowed to retain its natural beach profile. Access through the dunes should be limited and provided only at specific formalised locations. Only a limited provision of furniture and support facilities, such as toilets and change rooms, should be permitted.

The Forth estuary area should be managed to retain the majority of its Eucalypt forest and understorey. Vehicular and boat access and parking provision should be contained and accommodated in a manner that conserves vegetation and visual qualities. Existing facilities such as shelters, signs and toilets should be progressively upgraded

It is recommended that this statement of desired future character be incorporated into the Central Coast Planning Scheme to guide urban design decision making in Turners Beach.



Urban Design Theme 5: Town Planning Strategies and Actions

Strategies	Actions
Enhance the Central Coast Planning Scheme	<p>Incorporate the statement of desired future character for Turners Beach into the Central Coast Planning Scheme.</p> <p>Undertake ongoing monitoring of land supply in Turners Beach as part of the Planning Scheme review processes.</p>
Retain Heritage Values	<p>Undertake a survey of the heritage values in Turners Beach and ensure that all places of significance are listed on the Tasmanian Heritage Register or the Central Coast Planning Scheme.</p>





Turners Beach Hall

Additional Matters

A number of additional matters were raised by the community during the development of this plan. These matters include the following:

Turners Beach Consultative Committee

It has been suggested that the Council appoint a consultative committee to assist in the implementation of the Turners Beach Local Area Plan (Urban Design Guidelines). A similar committee has operated in the Forth Village in recent years and has proven successful in achieving a sound community development partnership. It is considered that this proposal has merit, provided the committee has a clear understanding of its consultative rather than decision making function and also provided that an appropriate mix of community members can be recruited to serve on the committee.

Therefore, it is recommended that the Council develop a terms of reference or consultative committee charter and call for expressions of interest from persons wishing to serve on a Turners Beach consultative committee for the purposes of implementing the Turners Beach Local Area Plan (Urban Design Guidelines).

Naming of Southern Turners Beach Settlement Area

There is a common view among Turners Beach residents that the Turners Beach settlement area to the South of the Highway should be re-named as it is not perceived as being part of Turners Beach.

Whilst it is not the intention of this local area plan to directly address this matter, it is suggested that an action be included for the Turners Beach consultative committee to consider the re-naming of this area.



Additional Matters: Strategies and Actions

Strategies	Actions
Facilitate Community consultation	<p>Organise a Turners Beach consultative committee for the purposes of implementing the Turners Beach Local Area Plan (Urban Design Guidelines).</p> <p>The Turners Beach consultative committee is to consider the re-naming of the southern Turners Beach settlement area and make a recommendation to the Council.</p>



Priority Plan

This propriety plan has been developed to guide the delivery of the local area plan actions:

Strategic Direction	Strategy	Actions	Related Plans/Strategies	Responsibility
HIGHEST PRIORITY				
THE ENVIRONMENT & SUSTAINABLE INFRASTRUCTURE – <i>Sustaining built infrastructure and the natural environment ...</i>	Mitigate shoreline erosion	Investigate and construct a suitable soft engineering solution to mitigate the eroding cobble berm at the Forth River mouth.	<ul style="list-style-type: none"> • Central Coast Climate Change Action Plan • Turners Beach Vegetation & Fire Management Plan 	Council – Engineering Services Department
	Mitigate shoreline erosion	Investigate whether run-off water from Esplanade is contributing to the foreshore erosion. If identified as a problem implement suitable drainage controls.		
	Maintain and preserve vegetated areas	Protect the recreational, environmental and landscape values along the coast and river foreshores in accordance with the Turners Beach Vegetation & Fire Management Plan.	<ul style="list-style-type: none"> • Turners Beach Vegetation & Fire Management Plan • Central Coast Strategic Framework for Settlement & Investment 	Council – Engineering Services Department / Development & Regulatory Services Department
		Protect and enhance the naturalness and physical environment associated with the beach/foreshore and associated vegetation.		
	Resolve traffic & parking issues	Investigate appropriate means of addressing safety issues with the Maskells Road/Bass Highway intersection.	–	Council – Engineering Services Department
Improve functionality of the Turners Beach Boat Ramp	Implement controls to prohibit the parking of car and boat trailers in the area within and directly adjacent to the boat launching and manoeuvring area and direct car and boat trailer parking to the Esplanade and/or Manley Street.		Council – Engineering Services Department	



Strategic Direction	Strategy	Actions	Related Plans/Strategies	Responsibility
THE SHAPE OF THE PLACE ... <i>“Plan for a vibrant and liveable place”</i>	Enhance the Central Coast Planning Scheme	Incorporate the statement of desired future character for Turners Beach into the Central Coast Planning Scheme.	<ul style="list-style-type: none"> Central Coast Strategic Framework for Settlement & Investment 	Council – Development & Regulatory Services Department
A CONNECTED CENTRAL COAST ... <i>“Seeking to enhance connectivity both within Central Coast and with the region...”</i>	Asset management and improvement	Implement the Turners Beach Recreation Ground Precinct Master Plan to increase the use of ground, community activities and improve the functionality of the community hall	<ul style="list-style-type: none"> Central Coast Open Space Strategy Turners Beach Community Plan Cradle Coast Authority Coastal Pathways Plan 	Council – Engineering Services Department
	Improve connectivity within Turners Beach	Provide footpaths along Westella Drive, Susan Street and Boyes Street, Albert Street and extend the footpath along the Esplanade near the boat ramp.		
		Extend the Ulverstone to Turners Beach shared pathway along Blackburn Drive to the western bank of the Forth River		
MEDIUM PRIORITY				
COUNCIL SUSTAINABILITY & GOVERNANCE ... <i>“A leading Council that ...engages effectively with its community”</i>	Facilitate Community consultation	Organise a Turners Beach Consultative committee for the purposes of implementing the Turners Beach Local Area Plan (Urban Design Guidelines).	–	Council – General Manager’s Office
THE ENVIRONMENT & SUSTAINABLE INFRASTRUCTURE – <i>Sustaining built infrastructure and the natural environment ...</i>	Resolve traffic and parking issues	Provide line markings on the intersections between Turners Avenue and Albert Street and Turners Beach Road into Turners Avenue to designate give way lines.	–	Council – Engineering Services Department
	Asset management and improvement	Undertake a review of local open space in Turners Beach as part of the Central Coast Open Space Plan development process.	<ul style="list-style-type: none"> Central Coast Open Space Strategy 	Council – Engineering Services



Strategic Direction	Strategy	Actions	Related Plans/Strategies	Responsibility
THE ENVIRONMENT & SUSTAINABLE INFRASTRUCTURE – <i>Sustaining built infrastructure and the natural environment ...</i>	Asset management and improvement	Provide seating on the recently constructed beach look out. – Completed	<ul style="list-style-type: none"> Central Coast Open Space Strategy 	Council – Engineering Services Department
		Improve the quality of barbecue, picnic and play facilities at social/family parks (sites include at the entry of Gables Park and West End Park).		
	Mitigate shoreline erosion	<p>Assess the impact of the existing informal pedestrian access track near the eroding cobble berm at the Forth River mouth and effectively close if necessary.</p> <p>Undertake ongoing investigation and analysis of erosion occurring at Turners Beach</p>	<ul style="list-style-type: none"> Central Coast Climate Change Action Plan Turners Beach Vegetation & Fire Management Plan 	Council – Engineering Services Department
A CONNECTED CENTRAL COAST ... <i>“Seeking to enhance connectivity both within Central Coast and with the region...”</i>	Improve connectivity within Turners Beach	Construct a raised boardwalk from the end of the Esplanade, through Gables Park onto Blackburn Drive to complete a link with the proposed extended shared pathway. Alternatively, the boardwalk could traverse the low lying wetland area and connect with a pathway through Gables Park onto Blackburn Drive.	<ul style="list-style-type: none"> Central Coast Open Space Strategy 	Council – Engineering Services Department
		Provide a crossover on the footpath between Boyes Street and Esplanade.		
THE SHAPE OF THE PLACE ... <i>“Plan for a vibrant and liveable place”</i>	Retain Heritage Values	Undertake a survey of the heritage values in Turners Beach and ensure that all buildings of significance are listed on the Tasmanian Heritage Register or Central Coast Planning Scheme.	Central Coast Council Strategic Plan 2009–2014	Council – Development & Regulatory Services Department



Strategic Direction	Strategy	Actions	Related Plans/Strategies	Responsibility
LOWEST PRIORITY				
THE SHAPE OF THE PLACE ... <i>“Plan for a vibrant and liveable place”</i>	Enhance the Central Coast Planning Scheme	Undertake ongoing review of land supply in Turners Beach as part of the Planning Scheme review processes	• Central Coast Strategic Framework for Settlement & Investment	Council – Development & Regulatory Services Department
	Improve /make connections from Turners Beach	Provide further plantings along shared pathway to ‘soften’ the path and provide a barrier to the highway	• Central Coast Open Space Strategy	Council – Engineering Services Department
	Facilitate Community consultation	The Turners Beach consultative committee is to consider the re-naming of the southern Turners Beach settlement area and make a recommendation to the Council.		Council – General Manager’s Office
A CONNECTED CENTRAL COAST ... <i>“Seeking to enhance connectivity both within Central Coast and with the region...”</i>	Asset management and improvement	Ensure the design of new housing areas addresses the need for social/family function of open space.	• Central Coast Open Space Strategy	Council – Engineering Services Department / Development & Regulatory Services Department
THE ENVIRONMENT & SUSTAINABLE INFRASTRUCTURE – <i>Sustaining built infrastructure and the natural environment ...</i>	Improve /make connections from Turners Beach	Investigate the construction of a footbridge over the Forth river alongside the highway bridge to connect with the proposed Cradle Coast Authority coastal pathways network	• Central Coast Open Space Strategy • Turners Beach Community Plan • Cradle Coast Authority Coastal Pathways Plan	Council – Engineering Services Department



Strategic Direction	Strategy	Actions	Related Plans/Strategies	Responsibility
	Resolve traffic and parking issues	Investigate the establishment of an emergency alternative access/exit point from the Northern area of Turners Beach, which will most likely be off Boyes Street onto Blackburn Drive.		Council – Engineering Services Department
	Asset management and improvement	Work with the Turners Beach Tennis Club to facilitate the upgrading of the tennis courts require upgrading	<ul style="list-style-type: none"> • Central Coast Open Space Plan 	Council – Engineering Services Department



Appendix 1: Crash History



Crash History from 01/01/2006 to 28/01/2011

Crash No	Crash Date Time	Severity	Description	Location	Visibility	Surface Type	Surface Condition	Light Condition	Speed Limit	Unit No	BAC*	Unit Type(s)	Traffic Control
30012495	26/01/2006 22:05 THU	Property Damage Only	173 - Right off carriageway into object or parked vehicle	Esplanade, Tumers Beach, Central Coast (436611.55,5443417.86) Trips Ref N/A	Clear	Sealed	Dry	Darkness (with street light)	050	1		Light Vehicle	Not controlled
30012447	03/05/2006 12:48 WED	Minor	181 - Off right bend into object/parked vehicle	Forth Road, Tumers Beach, Central Coast (435948.75,5441161.63) Trips Ref N/A	Heavy rain, hail	Sealed	Wet	Daylight	060	1		Light Vehicle	Not controlled
30003450	28/06/2006 15:55 WED	Property Damage Only	137 - Vehicles in parallel lane/ left turn side swipe	Intersection of Banks Place and Racecourse Crescent, Tumers Beach, Central Coast (434950.47,5442452.02) Trips Ref N/A	Clear	Sealed	Dry	Daylight	050	1		Light Vehicle	Not controlled
30038927	01/08/2006 18:15 TUE	Serious	160 - Parked	Bass Highway, Tumers Beach, Central Coast (435711.65,5442824.37) (A0249,Bass,42 (Archived),B,1.5)	Clear	Sealed	Dry	Darkness (without street light)	110	1		Light Vehicle	Not controlled
30011435	12/11/2006 15:05 SUN	Property Damage Only	182 - Off carriageway left bend	Forth Road, Tumers Beach, Central Coast (435954.83,5441156.05) Trips Ref N/A	Light rain, drizzle	Sealed	Wet	Daylight	080	2		Heavy Vehicle	Not controlled
30051601	12/09/2007 15:15 WED	Property Damage Only	191 - Load or missile struck vehicle	Forth Road, Tumers Beach, Central Coast (435930.96,5441181.74) Trips Ref N/A	Clear	Sealed	Dry	Daylight	070	1		Light Vehicle	Not controlled
30051726	07/10/2007 03:30 SUN	Property Damage Only	169 - Other on path	Tumers Avenue, Tumers Beach, Central Coast (436037,5443169.4) Trips Ref N/A	Clear	Sealed	Dry	Darkness (with street light)	050	1		Light Vehicle	Not controlled
30051728	07/10/2007 19:00 SUN	Property Damage Only	144 - Parking vehicles only	Off road at Tumers Beach, Central Coast (436304.85,5443310.27) Trips Ref N/A	Clear	Sealed	Dry	Dawn / Dusk	<40	2		Light Vehicle	Not controlled
30074954	26/12/2007 08:25 WED	Property Damage Only	109 - Other pedestrian	Forth Road, Tumers Beach, Central Coast (435778.66,5441551.96) Trips Ref N/A	Clear	Sealed	Dry	Daylight	080	1		Light Vehicle	Not controlled
30062382	06/01/2008 17:35 SUN	Property Damage Only	110 - Cross traffic	Intersection of Westella Drive, Tumers Beach, Central Coast (435552.18,5442748.74) (A0249,Bass,42 (Archived),R01,.41)	Clear	Sealed	Dry	Daylight	060	1		Light Vehicle	Not controlled
										2		Motorcycle	Give way



Crash History from 01/01/2006 to 28/01/2011

Crash No	Crash Date Time	Severity	Description	Location	Visibility	Surface Type	Surface Condition	Light Condition	Speed Limit	Unit No	BAC*	Unit Type(s)	Traffic Control
30051755	05/02/2008 18:20 TUE	First Aid	181 - Off right bend into object/parked vehicle	Forth Road, Turners Beach, Central Coast (435921.81,5441195.8) Trips Ref N/A	Light rain, drizzle	Sealed	Wet	Daylight	070	1		Light Vehicle	Not controlled
30039806	16/02/2008 12:50 SAT	Property Damage Only	130 - Vehicles in same lane/ rear end	Forth Road, Turners Beach, Central Coast (435778.29,5441552.82) Trips Ref N/A	Clear	Sealed	Dry	Daylight	080	1		Light Vehicle	Not controlled
										2		Light Vehicle	Not controlled
30051330	09/03/2008 11:30 SUN	Minor	189 - Other curve	Forth Road, Turners Beach, Central Coast (435882.26,5441378.75) Trips Ref N/A	Clear	Sealed	Dry; Gravel or other loose material	Daylight	100	1		Light Vehicle	Not controlled
30069439	06/07/2008 19:50 SUN	Property Damage Only	181 - Off right bend into object/parked vehicle	Forth Road, Turners Beach, Central Coast (435874.51,5441391.91) Trips Ref N/A	Clear	Sealed	Wet	Darkness (without street light)	080	1		Light Vehicle	Not controlled
30061669	12/09/2008 21:50 FRI	Property Damage Only	160 - Parked	Susan Street, Turners Beach, Central Coast (436281.39,5443250.04) Trips Ref N/A	Heavy rain, hail	Sealed	Wet	Darkness (without street light)	050	1		Light Vehicle	Not controlled
										2		Heavy Vehicle	Not controlled
30064517	21/09/2008 11:30 SUN	Property Damage Only	183 - Off left bend into object/parked vehicle	Forth Road, Turners Beach, Central Coast (435912.09,5441271.01) Trips Ref N/A	Clear	Sealed	Gravel or other loose material; Poor road shoulder / verge condition; Wet	Daylight	080	1		Light Vehicle	Not controlled
30036017	26/09/2008 14:35 FRI	First Aid	181 - Off right bend into object/parked vehicle	Forth Road, Turners Beach, Central Coast (435912.42,5441246.46) Trips Ref N/A	Light rain, drizzle	Sealed	Wet	Daylight	080	1		Light Vehicle	Not controlled
30076338	16/03/2009 05:35 MON	Property Damage Only	153 - Cutting in	Bass Highway, Turners Beach, Central Coast (435002.97,5442908.73) Trips Ref N/A	Light rain, drizzle	Sealed	Wet	Darkness (without street light)	110	1		Light Vehicle	Not controlled
										2		Light Vehicle	Not controlled
30085959	11/05/2009 23:55 MON	Property Damage Only	182 - Off carriageway left bend	Intersection of Boyes Street and Esplanade, Turners Beach, Central Coast (436867.64,5443489.73) Trips Ref N/A	Clear	Sealed	Dry	Darkness (with street light)	050	1		Light Vehicle	Give way
30070480	19/06/2009 16:30 FRI	Property Damage Only	152 - Pulling out	Susan Street, Turners Beach, Central Coast (436542.71,5443208.96) Trips Ref N/A	Clear	Sealed	Dry	Daylight	060	1		Light Vehicle	Not controlled
										2		Light Vehicle	Not controlled





Crash History from 01/01/2006 to 28/01/2011

Crash No	Crash Date Time	Severity	Description	Location	Visibility	Surface Type	Surface Condition	Light Condition	Speed Limit	Unit No	BAC*	Unit Type(s)	Traffic Control
30076106	10/09/2009 19:45 THU	Not known	160 - Parked	Esplanade, Turners Beach, Central Coast (436647.69,5443428.01) Trips Ref N/A	Light rain, drizzle	Sealed	Wet	Darkness (with street light)	050	1		Light Vehicle	Not controlled
										2		Light Vehicle	Not controlled
30085943	15/10/2009 04:40 THU	First Aid	173 - Right off carriageway into object or parked vehicle	Bass Highway, Turners Beach, Central Coast (435233.82,5442882.99) (A0249,Bass,42 (Archived),C,1.97)	Clear	Sealed	Dry	Darkness (with street light)	110	1		Light Vehicle	Not controlled
30070088	14/02/2010 01:35 SUN	Property Damage Only	114 - Two right turning	Intersection of Albert Street and Susan Street, Turners Beach, Central Coast (436217.77,5443260.76) Trips Ref N/A	Light rain, drizzle	Sealed	Wet	Darkness (with street light)	050	1		Light Vehicle	Give way
										2		Light Vehicle	Not controlled
30038944	18/03/2010 20:25 THU	First Aid	171 - Left off carriageway into object or parked vehicle	Forth Road, Ulverstone, Central Coast (434934.06,5442900.92) Trips Ref N/A	Light rain, drizzle	Sealed	Wet	Darkness (without street light)	110	1		Light Vehicle	Not controlled
30051636	19/07/2010 17:15 MON	Property Damage Only	120 - Wrong side/other head on (not overtaking)	Esplanade, Turners Beach, Central Coast (436908.62,5443497.95) Trips Ref N/A	Clear	Sealed	Dry	Daylight	040	1		Motorcycle	Not controlled
										2		Light Vehicle	Not controlled
30071049	11/08/2010 11:25 WED	First Aid	171 - Left off carriageway into object or parked vehicle	Lethborg Avenue, Turners Beach, Central Coast (435510.59,5443104.62) Trips Ref N/A	Light rain, drizzle	Sealed	Wet	Daylight	050	1		Light Vehicle	Not controlled
										2		Other	Not controlled
30070181	19/10/2010 17:20 TUE	Serious	173 - Right off carriageway into object or parked vehicle	Bass Highway, Leith, Central Coast (437192.3,5442822.6) (A0249,Bass,43,C (Archived),.01)	Clear	Sealed	Dry	Daylight	110	1		Light Vehicle	Not controlled
30070103	02/12/2010 20:11 THU	Minor	181 - Off right bend into object/parked vehicle	Forth Road, Turners Beach, Central Coast (435911.1,5441284.02) Trips Ref N/A	Light rain, drizzle	Sealed	Wet	Dawn / Dusk	080	1		Light Vehicle	Not controlled
30079057	12/12/2010 10:00 SUN	Minor	120 - Wrong side/other head on (not overtaking)	Bass Highway, Turners Beach, Central Coast (435046.2,5442901.7) (A0249,Bass,43,C (Archived),2.17)	Clear	Sealed	Dry	Daylight	110	1		Light Vehicle	Not controlled
										2		Light Vehicle	Not controlled



Appendix 2: Geomorphological Report on Forth River Estuary



**Initial assessment of the Forth River Estuary
including recommendations on suitable
risk management and erosion control methods.**

by

Frances Mowling Ph.D.

June 2011

P.O. Box 38 Hadspen 7290
M: 0427645552;
E: frances.mowling@bigpond.com

Background

Shoreline erosion in coastal areas where infrastructure, residential dwellings and development exists currently, or is zoned permissible, has become an important political and economic issue because such development is increasingly at risk.

The area of shoreline selected by Central Coast Council for assessment of shore erosion remediation is located in Attachment doc. An on-site visit with Council staff Micheal Stretton, Phillip Adams, Haylee Alderson, two local Coastcare representatives and geomorphologist Frances Mowling was undertaken on 17.5.2011 2.30 pm.

Current observed status of the shoreline located in Attachment doc varies as described below. 1 to 9 below are sequenced from the viewing platform (west) to estuary (east).

- 1) In the vicinity of the viewing platform and steps to beach an area of bluestone rocks to a height of ~ 2 m were installed seaward of the existing dune within the preceding five years, this followed an earlier bluestone rock installation some nine years ago¹. The majority of bluestone rocks remain *in situ* and have provided a hard surface protection in a soft sediment environment. 20+ rocks from the earlier installation have been extracted from the wall and transported by wave action away from the wall seawards onto the beach, and laterally some 80 m to 100 m towards the estuary mouth².
- 2) Coastal foredune overlaying cobble berm³ parallel to beach.
- 3) Fill pushed seaward from bitumen road (evidenced by slabs of formed concrete and bitumen at different elevations embedded in fill, and confused layering of cobbles and sediment).
- 4) A disused formed access track approximately 2.5 m width⁴ that is cut through the dune overlaying cobble berm.
- 5) Approximately 30 m long section of exposed cobble berm that is currently eroding landwards towards the bitumen road (the roots of Eucalyptus trees and Banksia shrubs are exposed and the canopies of these plants have / are dying).
- 6) Cobble berm overlain by shallow sand.
- 7) On two visits by Mowling no incipient dune was observed.
- 8) Within the four week interval between visits by Mowling the beach had transitioned from cobble:sand:rock to soft sand. The Attachment doc illustrates the high proportion of cobbles and rock that are exposed cyclically.
- 9) Coastal reserve of variable width backs the beach. The reserve width abutting the viewing platform and access to beach is ~ 40 m. This width attenuates significantly to ~ 4 m in proximity to the bend in the bitumen road.

¹ Pers. comm, on-site Phillip Adams and Haylee Alderson.

² Observed by Mowling during site visit 21.4.2011.

³ Refer to previous Mowling reports to Council that describe the geomorphology of the Turners Beach and Forth River estuary.

⁴ Coastcare volunteer reported it was an historical access track to a jetty – stumps can be seen at low tide. 1



Initial Assessment

The framework of this initial assessment is the identification of the

- 1) unconsolidated geomorphic landforms, and
- 2) a series of gaps in knowledge that inhibit a quantifiable assessment of the likely rates of shoreline erosion upon which a risk assessment and best management remediation can be made.

Shoreline erosion is a complex physical process linking several natural elements such as antecedent geology, sediment supply, estuary, tidal variations, seasonal variations in wave energy, the frequency and intensity of coincident events of low atmospheric pressure systems with high rainfall, and sea-level rise (after Galgano, 2007:158).

Unconsolidated geomorphic landforms

Shoreline evolution is a cumulative process-response of deposition, accretion, and erosion in the long-term⁵, evidenced in the unconsolidated geomorphic features that give form to the estuarine environment of the Forth River (antecedent geology). Figure 1 shows the late Quaternary morphological landforms of the Forth estuary and Turners Beach described by Colhoun (1976:85-86), and Fish and Yaxley (1966), and ground truthed by Mowling 6.11.2006. The main landforms shown in Figure 1 (Colhoun, 1976:85-86) that are relevant to this initial assessment include:

1. Turners Beach bay mouth spit.
2. Forth River estuary and drainage inlets with associated estuarine deposits and floodplain alluvium, comprised of fine to very fine sand (63.4%) and silt (24.4%);
3. Parallel aeolian dune system overlying large cobble beach ridges, which form the main coastal barrier, extending inland to the railway and Bass Highway;
4. Holocene beach cobbles and blown sand;
5. Holocene swale.

Figures 1, 2 and 3 support the Fish and Yaxley (1966) determination of a spit formed at the mouth of the Forth River that is attached to land at the head of Claytons Bay.

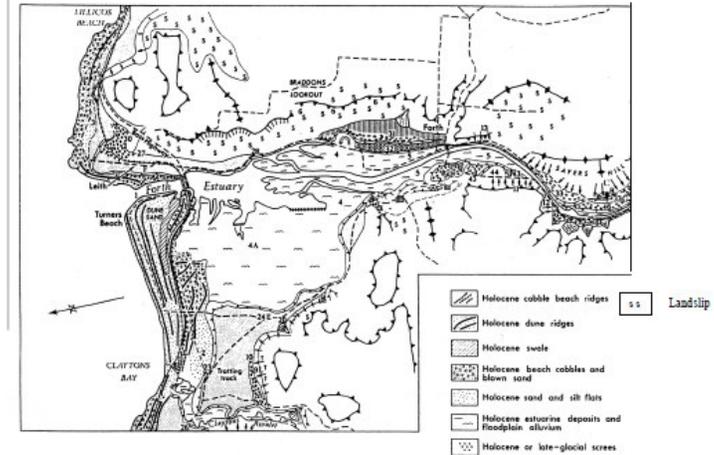


Figure 1. Selected morphological late Quaternary features of the Lower Forth estuary and Turners Beach (Colhoun, 1976).

Shoreline evolution is also a combination of deposition, accretion, and erosion in the short-term – decadal and inter decadal – in response to sediment supply, estuary, tidal variations, seasonal variations in wave energy, the frequency and intensity of coincident events of low atmospheric pressure systems with high rainfall, and sea-level rise.

Cyclic seasonal wave conditions alter beach width and can either replenish beach sand or expose underlying cobbles and rocks. Sporadic high-energy wave events can recycle sand from scarped foredunes to inshore waters, and can change the slope angle of beaches.

Figure 1 shows a sequence of Holocene dune ridges aligned parallel to Turners Beach and Clayton Bay. The evolution of the bay mouth spit is shown in the alignment of these parallel dune ridges. The dunes attenuate where they are attached to land at the head of Claytons Bay, and progressively the width between the parallel dune ridges increases in the vicinity of the head of the spit designated “Turners Beach” in Figure 1, or in present time located by Boyes Road – Esplanade intersection. The width of the head of the spit suggests that the evolution of the spit progressed seaward as cobbles were deposited and accreted, and later overlain by sand sediments.

Figure 2 shows the pattern of wave refraction around the head of the spit.

3

⁵ Late Quaternary - duration of ~ 1 Millennia ; Holocene about 12,000 years BP.





Figure 2. 2005 Aerial photograph of Turners Beach shows the wave refraction at the shoreline in proximity to the Boyes Road – Esplanade intersection.

The wave refraction pattern in Figure 2 would have been set up by the wind and wave direction at the time the photograph was taken. A useful task would be a search of the flight path and time, and then compare this with the Bureau of Meteorology (BoM) wind direction, wind speed, and wave conditions for that time. A further task would be to work through the historic BoM data to develop a framework of these coincident events.

Wave refraction or the focusing of wave energy on a discrete segment of the shoreline is a process-response mechanism that can produce an erosion hot-spot that can persist for a period of decades or longer (Galgano, 2007:163).

Given the long-term deposition, accretion and erosion processes that have given form to the bay head spit at the Turners Beach site (illustrated in Figure 1 and discussed above), the pattern of wave refraction shown in Figure 2, and the projected rate of sea level rise, it is likely that this erosion will continue at a higher rate than at other sites within Clayton Bay.

Figure 3 illustrates that Turners Beach remained undeveloped in 1949, thus infrastructure and dwellings have been located within the preceding fifty years in close proximity to the shoreline.



Figure 3. 1949 aerial photo image of Turners Beach, the Forth River estuary, estuarine flood plain, and the series of Holocene parallel coastal dune ridges. Wave refraction is not as clear in this image. In this photo the influence of the strong fresh water flow from the Forth is evident, and shows how the Forth River flow contributes sediment to the head of the bay mouth spit which mirror images the alignment of the parallel dune ridges that give form to the bay mouth spit and to Turners beach.



Knowledge Gaps

A series of linked knowledge gaps exist in the context of developing a projection of the likely rate of erosion in the designated area shown in Attachment doc. These include tidal variations, seasonal variations in wave energy, the frequency and intensity of coincident events of low atmospheric pressure systems with high rainfall, determining whether there is a link between erosion and episodic high-energy events, and / or whether the rate of erosion is year around, the projected rate of sea-level rise, and inshore bathymetry.

Is the shoreline erosion linked to the installation of dams upriver impeding sediment transport / replenishment downstream? For example, deficits in sediment supply along a segment of beach can generate elevated rates of erosion. The Forth River estuarine deposits, flood plain alluvium and the bay head spit illustrates long-term deposition and accretion sourced from both up-river and along-shore from the West.

Acquiring data to bridge these knowledge gaps is a practical task. The data is available but in some instances may not be site specific to Turners Beach.

Climate Change

Based on the contextual assessment of Turners Beach morphological landforms, and the low lying topography this geomorphic assessment supports the findings of Sharples (2004:94) that the Forth River estuary, estuarine floodplain and the Turners Beach area are potentially vulnerable to storm surge shoreline erosion and regression.

Linked with climate change is a predicted increase in the incidence of large magnitude storm events and associated storm surge. During these storm events there is a temporary increase of local sea level (storm-generated surge above the normal astronomical tide) and wave attack on higher elevations of the beach, dune, and cobble berm, resulting in scarping and slumping of the dune and erosion of beach.

Given the trends that are emerging in climate change, viz sea level rise, an increase in the intensities and frequency of storms, a temporary increase of local sea level (storm-generated surge above the normal astronomical tide), and increased wind speeds (McIntosh, Pook, et al., 2005), an informed assessment is that wave attack at higher elevations of the beach, dune and cobble berm is probable.

Within the designated assessment site there are several areas or 'hot-spots' likely to continue the process of eroding and regression within a fifty year time frame due to the processes identified above. Ongoing shoreline erosion may compromise or damage infrastructure, natural vegetation and habitats.

Recommendations

The following recommendations are not a priority list.

- 1) Given the proximity of the bitumen Esplanade Road to the eroding cobble berm – about 3 m – the adoption of a **precautionary principle activity is recommended whilst data is being collected and analysed from 2 to 4 below:**
 - a) at the site of erosion of cobble berm East of the Boyes Road – Esplanade intersection install a soft engineering option that abuts the eroding cobble berm to a height sufficient to protect against elevated wave attack. The height should be adequate to stop waves breaking over the installation and eroding from behind. Then build seawards in a series of 'steps' onto the beach. The angle of repose is probably 20°. A soft engineering option discussed on site with the Engineer Phillip Adams, that has been successfully applied elsewhere, is the ELCORock Coastal Erosion Protection System, sourced from Geofabrics International.
 - b) Undertake community consultation regarding the soft engineering installation preferably prior to installation.
 - c) Discuss the installation of photo points and monitoring, volunteers may undertake the task.
 - d) Set up photo points to monitor the installation.
 - e) Photo monitor prior to installation,
 - f) following installation,
 - g) following high-energy wind and / or wave events.
 - h) Compare the functionality of the bluestone installation with the soft engineering option photographically; preferably accompanied by notes on observations.
 - i) Monitor the status of the plants that are currently compromised due to undercutting of cobble berm. Photographs of the exposed roots and the crowns of the trees and shrubs may provide a surrogate indicator of the effectiveness of the soft engineering option.
- 2) **To determine the rate of the erosion:**

undertake an analysis of a sequence of vertical aerial photography that is geo and ortho rectified for a period of fifty years would provide an indication of the rate of erosion, and whether there has been an increase in the rate within the preceding 20± years. A temporal analysis of a sequence of vertical aerial photographs with intervals of about 10 to 15 years, commencing with the earliest photo runs (about 1949; 1965; 1980; 1995; 2005-2011) to current time. The coastline for each photograph sequence, following the rectification process, should be digitised in the ARC View GIS program and then overlaid to gain a rate of erosion.
- 3) **To determine the rate of beach erosion and rate of regression:**
 - a) Install a sequence of surveyed bench marks on site on south side of Esplanade Road opposite the eroding / regressing cobble berm; develop a surveyed transect across cobble berm, across beach to low water mark. Option of siting on to dwelling located on Leith headland.



- b) **Or** look at the cost and feasibility of acquiring a small hand pulled dune trolley with a GPS unit to traverse and survey the beach. Cost for equipment, maintenance, trained staff could be shared with other local coastal Councils.

- 4) **To enable informed decisions by Council staff** on best management practice for vulnerable shorelines acquire relevant data to close the **knowledge gaps** identified:
 - a) tidal variations,
 - b) seasonal variations in wave energy,
 - c) frequency and intensity of coincident events of low atmospheric pressure systems with high rainfall,
 - d) determine whether there is a link between erosion and episodic high-energy events, and / or whether the rate of erosion is a steady rate in decadal time frame,
 - e) projected rate of sea-level rise,
 - f) inshore bathymetry,
 - g) sediment supply - is shoreline erosion linked to the installation of dams upriver impeding sediment transport / replenishment downstream?
 - h) Is subsidence a component of sea level rise?
- 5) **Review whether there are any sites of water runoff originating from the bitumen road** that may be contributing to erosion of the foreshore. If there are sites of runoff then **undertake remediation steps**.
- 6) **Assess the informal pedestrian access tracks** within the designated area (see Attachment doc) and close such tracks where necessary, following community consultation.
- 7) **There is the option of Council implementing a 'do nothing' approach whilst information / data is collected and assessed** as suggested above in recommendations 2 – 4. In this context Mowling recommends implementing Recommendation (1) above.

Alternatively, there is the overall option available to Council to adopt a 'do nothing' approach. This **second option** of Council adopting a 'do nothing' approach in the context of waiting and observing the rate of erosion in the designated area needs to be viewed with due diligence because shoreline erosion in coastal areas where infrastructure, residential dwellings and development exists currently, or is zoned permissible, has become an important political and economic issue due to such development being increasingly at risk.





