



National Guideline Towards the Establishment of Coastal Management Lines



environmental affairs

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National Guideline Towards the Establishment of Coastal Management Lines

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FOREWORD

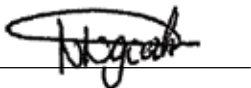
The coast is a dynamic space. It is the interface of human, environmental, meteorological and hydrological interaction. In light of climate change which includes increased frequency and intensity of storms, rising sea levels and exacerbated erosion rates, integrated planning has become a priority.

The Establishment of Coastal Management Lines is a requirement in terms of Section 25 of the National Environmental Management: Integrated Coastal Management Act, (Act 24 of 2008), as amended. In terms of the Act, Coastal Management Lines are intended to protect coastal public property, private property, the coastal protection zone, people and infrastructure from the dynamic processes of the coast in the interest of public safety, and preservation of the aesthetic value of the coastal zone.

The National Coastal Management Programme of South Africa identified the need for effective planning in response to global change as the first out of nine key priorities for coastal development. In addressing the more short-term priorities of the National Coastal Management Programme, we will also be working towards the goal set out in the National Development Plan 2030, which speaks to coordinated planning and investment in infrastructure and services that take into account environmental pressures, creating more resilient communities and reducing socio-economic vulnerability to climate change.

The Department of Environmental Affairs aims to provide the necessary guidance to the Member of the Executive Council of each respective coastal province in the Establishment of Coastal Management Lines and subsequently promoting better planning practices, mitigation strategies and ultimately working towards more resilient coastal communities.

Nosipho Ngcaba



Director-General

Department of Environmental Affairs

Date: 8 August 2017

EXECUTIVE SUMMARY

The National Environmental Management Act: Integrated Coastal Management Act (24 of 2008) (ICM Act) emphasizes the need for establishing Coastal Management Lines (CMLs) (Section 25), with the aim of protecting the coastal public property, coastal protection zone, people and infrastructure from the dynamics of the coastal processes in the interest of public safety, and preserve the aesthetic value of the coastal zone.

The coast is a dynamic zone and bears many hazards. In light of climate change it is predicted that the frequency and intensity of natural hazards such as storm surges will further increase, sea levels will rise, and erosion will be exacerbated beyond the increase observed in the past decades. CMLs are planning tools with the purpose of avoiding or minimizing negative impacts that emanate from natural processes that may have detrimental effects to the people and property, while also serving to protect the coast from human-induced threats to biodiversity and physical features and in so doing, preserve the coastal space. CMLs are thus multidimensional and can be applied to a number of coastal management aspects within the limitations of the ICM Act.

The relevant Member of the Executive Council (MEC) (and by association, the lead agencies responsible for coastal management) is responsible for establishing CMLs in Provinces. This document aims at providing guidance to the coastal provinces during the process of establishing Coastal Management Lines within their provincial jurisdictions. Given that each province is unique, this document provides the minimum considerations to be taken into account when establishing CMLs, by referring to potential data sources, appropriate/available data, data management, components of a situational analysis, spatial planning and stakeholders. However, it does not propose a technical methodology. The minimum considerations in terms of developing CMLs for estuaries are also provided.

The cross-cutting nature of CMLs requires that a range of stakeholders be consulted through this process. CMLs contribute to spatial planning and disaster risk management and as such, they may have an impact on land ownership and land uses along the coast. The CMLs fulfill the function of a planning tool in terms of the ICM Act and are best effected when incorporated into other broader planning processes such as Spatial Development Frameworks (SDFs)

and Land Use Schemes etc., so as to ensure that integrated and harmonious development planning that takes all affected stakeholders into account.

In the context of 'risk', this document also aims to create a broad, basic understanding of disaster risk management and related concepts.

The purpose of this document is to provide guidance to Lead Agencies of Coastal Provinces on the establishment of Coastal Management Lines by the Members of Executive Council (MECs)

ACRONYMS

CMLs	Coastal Management Lines
COGTA	Department of Cooperative Governance and Traditional Affairs
CPP	Coastal Public Property
CPZ	Coastal Protection Zone
CSIR	Council for Scientific and Industrial and Research
DEA	Department of Environmental Affairs
DM	Disaster Management
DMA	Disaster Management Act (Act No. 57 of 2002)
DMF	Disaster Management Framework, 2005
DRDLR	Department of Rural Development and Land Reform
EIA	Environmental Impact Assessment
HWM	High- Water Mark
I&APs	Interested and Affected Parties
ICM Act	Integrated Coastal Management Act (Act No. 24 of 2008), as amended
IDP	Integrated Development Planning
LUS	Land Use Schemes
MEC	Member of the Executive Council
MSL	Mean Sea Level
NCMP	National Coastal Management Programme
NEMA	National Environmental Management Act (Act No. 107 of 2008), as amended
POEs	Permanently Open Estuaries
PCMP	Provincial Coastal Management Programme
SDFs	Spatial Development Frameworks
SLR	Sea-Level Rise
SPLUMA	Spatial Planning and Land Use Management Act (Act No. 16 of 2013)
StatsSA	Statistics South Africa
TOCEs	Temporarily Open/Closed Estuaries

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SECTION A: SETTING THE SCENE

INTRODUCTION

More than a third of people in Eastern and Southern Africa reside within 100km of the coast, resulting in increased pressure on the coastal zone through resource exploitation, land-based pollution and coastal development (UNEP/Nairobi Convention Secretariat, 2009).

The South African coastline is a dynamic space, providing a wealth of natural resources, economic opportunities and recreational spaces. However, the coastal zone is also one of the most affected spaces when considering the close interaction between the man-made and natural environment. The effects of climate change increase the vulnerability of coastal communities to hazards such as storm surges, erosion, flooding and sea level rise.

While past planning did not prioritise the dynamics of the coastal space, and would primarily rely on reactive and/or mitigation measures to protect coastal assets, current and future developments will benefit from an integrated planning approach, thereby creating more resilient coastal communities and sustainable coastal development.

The National Environmental Management: Integrated Coastal Management Act (Act No. 24 of 2008), as amended (ICM Act) has recognised the gap and need for legal mechanisms in order to better implement certain provisions and tools provided for within the Act. These include appropriate planning mechanisms in terms of the Spatial Planning and Land Use Management Act (Act No. 16 of 2013) (SPLUMA), and their incorporation at all levels of planning as well as in planning tools, such as Spatial Development Frameworks (SDFs) and land use schemes (LUS).

The complexity and dynamics of the coastal space and its management lead to a need of the development of Coastal Management Lines in order to achieve the object of Integrated Coastal Management.

1.1 Purpose of the Guide

This document is aimed at providing guidance to Lead Agencies of Coastal

Provinces. The guide will be useful to the following officials: coastal managers, policy makers, planners, engineers, researchers, spatial information practitioners, developers and those involved in the decision making process.

In terms of section 25 of the ICM Act, the Minister is responsible for establishing CMLs in National Protected areas, areas straddling a coastal boundary between two provinces and areas extending up to or straddling the borders of the Republic.

The responsibility of determining Coastal Management Lines lies with the coastal provinces.

This document IS intended to serve as an advisory / guiding document for institutions involved in coastal management, when determining CMLs, by:

- Unpacking Section 25 of the ICM Act;
- Identifying additional legislation that needs to be considered;
- Providing guidance on the process to follow for the establishment of CMLs;
- Providing a broad overview of risk and its components;
- Proposing a potential process for the establishment of CMLs;
- Identifying the broad research areas to be considered;
- Providing additional considerations when delineating CMLs for estuaries;
- Identifying relevant stakeholders;
- Discussing available data that can be used in the process; and
- Providing information regarding the inclusion of CMLs into planning tools.

This document is NOT:

- A prescriptive document;
- Legally binding;
- Intended to provide a methodology for measuring physical processes; and
- A CML implementation guide.

1.2 Comparison Between Coastal Management Lines (ICM Act) and Development Setback Lines (NEMA)

CMLs and their purpose are often confused with Development Setback Lines in terms of the NEMA EIA Regulations. This section attempts to provide clarity.

	Coastal Management Lines	Development Setback Lines
Legislation	Integrated Coastal Management Act (Act No. 24 of 2008)	National Environmental Management Act (Act No. 107 of 2008); Environmental Impact Assessment Regulations
Definition	A line determined by an MEC in accordance with Section 25 of the ICM Act in order to demarcate an area within which development will be prohibited or controlled in order to achieve the objectives of the ICM Act or coastal management objectives	A setback line adopted by the Competent Authority in terms of the NEMA EIA Regulations
Purpose	Prohibit or control development in order to achieve the objectives of the ICM Act or coastal management objectives including development, social, economic, heritage and/or environmental aspects	Control new developments It is a means to reduce the administrative burden of an EIA process where impacts are known and predictable. However any proposed development that may fall on the waterside of such setback line would be controlled the required EIA process
Responsibility	<ul style="list-style-type: none"> MECs within their respective jurisdiction, excluding National Protected Areas Minister in National Protected Areas, areas straddling provincial borders and areas straddling the border of South Africa and other countries 	Competent Authority in terms of the NEMA EIA Regulations (Subject to S24C of NEMA)

	Coastal Management Lines	Development Setback Lines
Legal enforcement	<p>The MEC is required to publish CMLs in provincial gazettes and incorporate CMLs into spatial planning tools at both provincial and municipal level, including:</p> <ul style="list-style-type: none"> Spatial Development Frameworks; and Land Use Schemes <p>The Minister, in consultation with the relevant MEC must delineate CMLs:</p> <ul style="list-style-type: none"> within National Protected Areas as defined in the Protected Areas Act (Act No. 57 of 2003); areas that straddle a coastal boundary between two provinces; and areas that extend up to or straddles the border of the Republic. 	<p>None. Development setback lines may be applicable to new developments and are applicable to the following listed activities in the current (2014) EIA Regulations:</p> <ul style="list-style-type: none"> Listing Notice 1, activities: 12; 17; 18; 19; 48; 49; 55 Listing Notice 2, activities: 26 Listing Notice 3, activities: 4; 5; 10; 11; 12; 13; 14; 18; 21; 22; 23; 24 <p>The above activities are applicable within 100m of the High Water Mark (HWM) where no development setback exists or within the littoral active zone.</p>
Spatial Planning	CMLs are to be incorporated into spatial planning tools at both provincial and municipal level, such as Spatial Development Frameworks and Land Use Schemes	Control development relating to listed activities in terms of the EIA Regulations

Table 1: Comparison between Coastal Management Lines and Development Setback Lines

Coastal Management Lines (CMLs in terms of ICM Act) are established by the MECs with the purpose of attaining coastal management objectives (see section 2). This means that the same area may have multiple CMLs (e.g. reflecting different hazards/physical processes, social considerations, environmental considerations, economic considerations, heritage considerations etc.) or a

finite “risk line” that considers all localized risk and vulnerabilities.

Ultimately, the CML and Development Setback line can be the same line, provided that they fulfill their respective objectives and have been thoroughly consulted with the relevant stakeholders, who also accept that the same line is used.

1.3 The International Context

1.3.1 Environmental Mainstreaming

Dalal-Clayton and Bass (2009:19), defines environmental mainstreaming as the informed insertion of relevant environmental concerns into the decisions of institutions that drive national, local and sectoral development policy, plans, investment and action. It results in a better understanding of the capabilities of environmental assets, the consequences of environmental hazards, and potential impacts of development on the environment.

Such understanding can consequently improve decisions, especially if there is a systematic institutional framework for making such decisions. In its emphasis on integrated approaches and informed trade-offs, environmental mainstreaming is a major practical component of sustainable development. The paper further outlines who the players concerned with environmental mainstreaming are or should be, and it boldly points out to mainstream development agencies, these being sectoral and central planning as well as finance institutions and delivery organisations and corporations.

There is a need for all spheres of government, across all sectors, to understand how environmental issues affect development interests; the associated costs, benefits, risks and their distribution; and how to make appropriate decisions – especially to meet international and national environmental obligations; as such, they will need access to efficient information and decision-making tools, and to advise on building a systematic approach. To fast-track the transition to an integrated, systematic approach, the highest levels of decision-making in government, administration, business and civil society need to be engaged (Dalal-Clayton et al, 2009:22).

1.3.2 Agenda 21, United Nations (UN) Environment Programme

Chapter 8 of the UN Environmental Programme deals with Integrating Environment and Development in Decision-Making. The chapter provides four programme areas which are as follows:

- (a) Integrating environment and development at the policy, planning and management levels;
- (b) Providing an effective legal and regulatory framework;
- (c) Making effective use of economic instruments and market and other incentives;
- (d) Establishing systems for integrated environmental and economic accounting.

For the purpose of the CMLs, the first programme area being: **integrating environment and development at the policy, planning and management levels** is discussed. According to this chapter, the prevailing systems for decision-making in many countries tend to separate economic, social and environmental factors at the policy, planning and management levels. This influences the actions of all groups in society, including governments, industry and individuals, and has important implications for the efficiency and sustainability of development. An adjustment or even a fundamental reshaping of decision-making, in the light of country-specific conditions, may be necessary if environment and development is to be put at the centre of economic and political decision-making, in effect achieving a full integration of these factors.

In recent years, some governments have also begun to make significant changes in their institutional structures in order to enable a more systematic consideration of the environment when decisions are made on economic, social, fiscal, energy, agricultural, transportation, trade and other policies, as well as the implications of policies in these areas for the environment.

New forms of dialogue are also being developed for achieving better integration among national, provincial and local government, industry, science, environmental groups and the public in the process of developing effective approaches to environment and development. The responsibility for bringing about changes lies with governments in partnership with the private sector, and in collaboration with national, regional and international organizations.

Exchange of experience between countries can also be significant. National plans, goals and objectives, national rules, regulations and law, and the specific situation in which different countries are placed are the overall framework in which such integration takes place. In this context, it must be borne in mind that environmental standards may pose severe economic and social costs if they are uniformly applied in developing countries.

The programme further makes some proposals that can be considered in the process of incorporating environmental tools with development tools and these are:

- i. To strengthen institutional structures to allow the full integration of environmental and developmental issues, at all levels of decision-making;
- ii. To develop or improve mechanisms to facilitate the involvement of concerned individuals, groups and organizations in decision-making at all levels; and
- iii. To establish domestically determined procedures to integrate environment and development issues in decision-making.

1.4 Policies and Legislative Requirements

In terms of Section 24 in the Constitution, everyone has the right to:

- (a) An environment that is not harmful to their health or wellbeing; and
- (b) To have their environment protected, for the benefit of present and future generations, through reasonable legislative measures that –
 - i. Prevent pollution and ecological degradation;
 - ii. Promote conservation; and
 - iii. Secure ecologically sustainable development and use of natural resources while promoting justifiable economic and social development.

1.4.1 National Environmental Management Act (Act No. 107 of 1998)

The National Environmental Management Act (No. 107 of 1998) (NEMA) provides the overarching legislative framework for environmental governance in South Africa. The following principles reflect NEMA's core values:

- Environmental management must place people and their needs at the forefront of its concern, and serve their physical, psychological, developmental, cultural and social interests equitably; and
- Development must be environmentally, socially and economically sustainable.

1.4.2 Integrated Coastal Management Act (Act No. 24 of 2008)

In April 2000, the White Paper for Sustainable Coastal Development was adopted, recognizing that the coast was a unique environment, an interface between the land and sea, a limited space that supports a multiplicity of human activities and interconnected biophysical, economic, social and institutional processes. It was clear that there was a need for an integrated management approach, where the coastal space would be managed as a system in order to make optimal use of the opportunities and benefits it provides (South Africa, 2000).

The policy also sets out a number of Goals and Objectives, which are categorized into themes. The establishment of CMLs speaks directly to Theme C: Coastal Planning and Development as described below:

Goal C5: To plan and manage coastal development so as to avoid increasing the incidence and severity of natural hazards and to avoid exposure of people, property and economic activities to significant risk from dynamic coastal processes.

Objective 5.1: Coastal development shall be planned and managed to minimize disruption of dynamic coastal processes and to avoid exposure to significant risk from natural hazards.

Objective 5.2: The potential consequences of medium and long-term climate change and associated sea-level rise shall be taken into account in all coastal planning and management.

The ICM Act assigns the responsibility of delineating CMLs as follows:

- The MEC, in consultation with local municipalities must delineate CMLs within their jurisdiction; and
- The Minister, in consultation with the relevant MEC must delineate CMLs within National Protected Areas as defined in the Protected Areas Act (Act No. 57 of 2003), as well as areas that straddle a coastal boundary between two provinces, and areas that extend up to or straddles the border of the Republic.

With regards to National Protected Areas and recognizing that management plans should already exist for these areas, there needs to be thorough consultation between stakeholders for the incorporation of CMLs into planning tools utilised by the respective National Protected Areas.

The ICM Act recognizes the cross-cutting nature of the CMLs and thus the need for cooperative governance between all spheres of government in this regard.

Section 25 of the ICM Act states:

25. Establishment of coastal management lines

- (1) An MEC must by notice in the Gazette establish or change coastal management lines-
 - (a) to protect coastal public property, private property and public safety;
 - (b) to protect the coastal protection zone;
 - (c) to preserve the aesthetic values of the coastal zone; or
 - (d) for any other reason consistent with the objectives of this Act.
- (1A) An MEC may, in regulations published in the Gazette, prohibit or restrict the building, erection, alteration or extension of structures that are wholly or partially seaward of a coastal management line.
- (1B) When establishing coastal management lines in terms of subsection (1), the MEC must consider the location of immovable property and the ownership and zonation of vacant land.
- (2) Before making or amending a notice referred to in subsection (1), or making the regulations referred to in subsection (1A), the MEC must-
 - (a) consult with any local municipality within whose area of jurisdiction the coastal management line is, or will be, situated; and
 - (b) give interested and affected parties an opportunity to make representations in accordance with Part 5 of Chapter 6.
- (3) A local municipality within whose area of jurisdiction a coastal management line has been established must delineate the coastal management line on a map or maps that form part of its zoning scheme in order to enable the public to determine the position of the coastal management line in relation to existing cadastral boundaries.
- (4) A coastal management line may be situated wholly or partially outside the coastal zone.
- (5) The Minister, after consultation with the relevant MEC, must exercise the powers and perform the functions granted to the MEC in this section, if such power relates to any part of an area that-
 - (a) is a national protected area as defined in the Protected Areas Act;
 - (b) straddles a coastal boundary between two provinces; or
 - (c) extends up to, or straddles, the borders of the Republic.

CMLs are included as National Priorities in terms of The National Coastal Management Programme of South Africa (Department of Environmental Affairs (DEA), 2015).

1.4.3 Coastal Management Programmes in terms of the ICM Act

1.4.3.1 The National Coastal Management Programme (NCMP)

The National Coastal Management Programme is a national policy directive for the management of the coastal zone and is seen to play an important role in bringing together various sectors of government, the private sector and communities along the coast in order to ensure effective management of the coastal environment.

The ICM Act, part 1 of chapter 6, requires that the Minister prepares and adopts a NCMP for managing the coastal zone. The programme should be reviewed every five years. The existing NCMP was adopted by the Minister in March 2015, which included 9 national priorities. CMLs are embedded in Priority 1: Effective planning for coastal vulnerability to global change, the goal of which is:

“Ensuring that all planning and decision-making tools applied by all organs of state within the coastal zone address coastal vulnerability by taking into account the dynamic nature of our coast, sensitive coastal environments, health and safety of people, protection of property rights, illegal structures within the coastal public property, and appropriate placement of infrastructure not to compromise the fiscal investment by the state, as well as the rehabilitation of coastal ecosystems.” (NCMP, 2015).

1.4.3.2 Provincial Coastal Management Programme (PCMP)

The PCMP aims to set out goals and objectives for the achievement of integrated coastal management in the provinces. The programme must (in terms of Section 47 of the ICM Act) provide a provincial policy directive for the management of the coast through an integrated, coordinated, uniform approach to coastal management in the province. It must also ensure consistency with the National CMP and the national estuarine management protocol. The PCMP, like the NCMP should be revised every 5 years.

1.4.3.3 Municipal Coastal Management Programme (MCMP)

Municipalities are required to adopt coastal management programmes (in terms of Section 48 of the ICM Act), which are consistent with the national and provincial coastal management programmes, as part of their respective

integrated development plan and spatial development framework adopted in accordance with the Municipal Systems Act (Act No. 32 of 2000).

While there is no legal mandate for municipalities to develop CMLs, some metropolitans have undertaken to produce their own CMLs, in consultation with their respective provinces. This is a positive and proactive approach in complying with the ICM Act as the implementation phase of CMLs will have a direct impact on municipalities, particularly when being incorporated into land use planning schemes (in terms of SPLUMA). Subsequently, possible development parameters linked to land use schemes and applied through building regulations, could be implemented e.g. with reference to Figure 1, imposing building height restrictions for properties adjacent to coastal public property (CPP) will assist in preserving the scenic landscape and avoid casting shadows over CPP (DEA & SSI, 2010). However, existing property rights must be taken into account and therefore thorough consultation with affected parties must be undertaken (in line with the requirements of Section 53 the ICM Act), regardless of the authority undertaking the task of establishing CMLs.

It should be noted that municipalities play an integral role in the implementation of CMLs and reflecting them on relevant documentation.

The inclusion of CMLs into land use planning tools (e.g. SDFs, LUS, Spatial Planning and Land Use Management Bylaws and development parameters) is thus an important step towards achieving the ICM Act objectives in the interest of the public and preserving the coastal space.



Figure 1: Example of buildings casting shadows over coastal public property (CPP)

1.4.4 Additional Applicable Legislation

While CMLs are provided for in the ICM Act, the issue of risk cannot be isolated to one piece of legislation. The ICM Act therefore recognizes the need for a broad range of role players in order to achieve its objectives. Hazards, vulnerabilities and risks need to be considered in the broader context by recognizing the complexities of human-environmental interactions. Current and future hazards need to be recognized in the context of the human impact of development on coastal systems and the hazards posed by coastal processes to infrastructure such as property, immovable assets etc. (societal, infrastructural and technological vulnerability), while still protecting the public interest (e.g. public coastal access) and implementing mechanisms of resilience (capacity to cope) for existing developments and improved future planning. Notwithstanding the existing provincial level legislation¹ and municipal by-laws², the following national legislation thus also plays an important role:

¹ Each province needs to be aware of the planning legislation applicable in their respective areas of jurisdiction.

² Provinces should consult their municipalities in this regard.

1.4.4.1 Spatial Planning and Land Use Management Act (Act No. 16 of 2013) (SPLUMA)

SPLUMA provides the framework for spatial planning at all levels of government and land use management at the local level, and a relationship between the two. With reference to Chapter 4 of SPLUMA, the inclusion of environmental sector plans and policies in Spatial Development Frameworks (SDFs) (section 12) is an acknowledged requirement, to:

S12(d) guide planning and development decisions across all spheres of government;

S12(j) identifying the long-term risks of particular spatial patterns of growth and development and the policies and strategies to mitigate those risks; and

S12(m) take cognizance of any environmental management instrument adopted by the relevant environmental management authority.

With reference to section 16, a **provincial** spatial development framework must:

S 16(b) indicate the desired and intended pattern of land use development in the province, including the delineation of areas in which development in general or development of a particular type would not be appropriate.

With reference to section 21, a **municipal** spatial development framework must:

S 21(j) include a strategic assessment of the environmental pressures and opportunities within the municipal area, including spatial location of environmental sensitivities, high potential agricultural land and coastal access strips, where applicable.

In turn, section 25 states:

S. 25(1) A land use scheme must give effect to and be consistent with the municipal spatial development framework and determine the use and development of land within the municipal area to which it relates in order to promote –

(a) economic growth;

(b) social inclusion;

(c) efficient land development; and

(d) minimal impact on public health, the environment and natural resources.

The SPLUMA clearly makes a provision for environmental tools and policies to be taken into account during the process of compiling municipal land use management and spatial planning tools at all levels. This has provided the sector with the right and opportunity to incorporate and implement its agenda into such processes.

In terms of the SPLUMA Draft Regulations (Notice 526 of 2014), Chapter 4 Part C., Regulation 23 requires that a Land Use Scheme incorporate environmental requirements into a land use scheme through developing an environmental database that documents amongst others where development is prohibited in terms of environmental laws. The CML should serve as one of such laws that prohibit development where applicable. It is further specified under this regulation that the prescribed environmental database must take into account coastal management requirements (Regulation 23 (3) (o)).

In order to effectively implement the CMLs adopted by the respective coastal Provinces, it is imperative for lead agencies to participate as interested and affected parties as well as stakeholders during the processes of developing land use schemes for coastal municipalities and coastal SDFs at all levels, and in line with legislation.

1.4.4.2 Disaster Management Act (Act No. 57 of 2002) (DMA)

While the ICM Act places the mandate on provinces and to take coastal risk into account, the constitutional mandate in term of risk management lies with the National Disaster Management Centre (in terms of the DMA), situated in the Department of Cooperative Governance and Traditional Affairs (COGTA).

The DMA provides for:

- An integrated and co-ordinated disaster risk management policy that focuses on preventing or reducing disasters, mitigating the severity of disasters, preparedness, rapid and effective response to disasters, and post-disaster recovery;
- The establishment of national, provincial and municipal Disaster Management Centres;
- Disaster risk management volunteers; and
- Matters relating to these issues.

Section 6 and 7 of the DMA necessitates the need for a Disaster Management Framework (DMF), which is the legal instrument intended to provide 'a coherent, transparent and inclusive policy on disaster management that is appropriate for the Republic as a whole' (section 7(1)).

Similar to the ICM Act, the DMF recognises the intrinsic relationship between disasters and development, making it critical for Municipal Disaster Management Centres or officials responsible for disaster risk management to serve on relevant Integrated Development Planning (IDP) structures.

SECTION B: BASIC FRAMEWORK FOR COASTAL MANAGEMENT LINES

2. Management Goals and Objectives

The establishment of CMLs seeks to minimise the human-environmental conflicts that occur on the coast by providing a means to control coastal development with the intention of avoiding the risks emanating from coastal processes that could impact on property, human life, social dynamics, economic opportunities etc. Furthermore, CMLs may also be established with the intention of preserving coastal spaces that have social importance e.g. heritage sites. Unpacking section 25(1) of the ICM Act, the core objectives of the CMLs are to:

Goal	Objectives
To protect public property, private property and enhancing public safety;	<ul style="list-style-type: none"> • Protect and enhance public access to coastal public property and its resources
	<ul style="list-style-type: none"> • Protect and preserve coastal public infrastructure such as beach amenities, public parking areas etc.
	<ul style="list-style-type: none"> • Protect or preserve private property situated along the coast, such as private residences and business properties (i.e. Avoid damage to existing and/or future developments as a result of coastal processes such as flooding, erosion and slumping)
	<ul style="list-style-type: none"> • Discourage inappropriate development in sensitive coastal areas to ensure public safety and sustainable development

Goal	Objectives
To protect the coastal protection zone;	<ul style="list-style-type: none"> • Protect ecological functioning including dune dynamics and hydrodynamics in estuaries, wetlands and swamps
	<ul style="list-style-type: none"> • Protect the public in the face of extreme climate and other natural events i.e. where possible, facilitate a "managed retreat" from areas of the coast that are susceptible to dynamic coastal processes, storm surges and sea-level rise through the implementation of sustainable solutions
	<ul style="list-style-type: none"> • Protect and preserve features of social (cultural) significance
	<ul style="list-style-type: none"> • Protect and preserve heritage sites
	<ul style="list-style-type: none"> • Protect critical infrastructure along the coasts such as transportation facilities, pipelines, electricity infrastructure or any other structures that, if lost or damaged, could result in a disruption of livelihoods
	<ul style="list-style-type: none"> • Protect areas and facilities that enable economic activities e.g. public launch sites
To preserve the aesthetic values of the coastal zone; or	<ul style="list-style-type: none"> • Encourage sustainable future development, particularly with regards to development occurring adjacent to CPP
	<ul style="list-style-type: none"> • Protect the visual integrity of the coast • Preserve the aesthetics or 'sense of place' of the coastal zone
For any other reason consistent with the objectives of this Act	<ul style="list-style-type: none"> • Attain objectives in line with the broader ICM Act

Table 2: Goals and objectives of Coastal Management Lines

While the above objectives may not be achieved by the establishment of one finite CML, the ICM Act makes provision for a suite of CMLs to be established with the purpose of achieving/addressing different coastal management ob-

jectives. For example, one CML might specifically be to mitigate the effects of anticipated erosion, another may be to restrict privatization of coastal access, etc.

3. HAZARD, VULNERABILITY, CAPACITY AND RISK

In terms of the National Disaster Management Framework (NDMF, 2005), **risk** (in the disaster context) is defined as:

"The probability of harmful consequences or expected loss (deaths, injuries, property, livelihoods, disrupted economic activity or environmental damage) resulting from interactions between natural or human-induced hazards and vulnerable conditions."

Conventionally, risk is expressed as the combined effect (product) of the hazard (uncontrollable factor e.g. natural hazard) and vulnerability (controllable factor) i.e.:

$$\text{Risk} = \text{Hazard} * \text{Vulnerability}$$

Equation 1: The risk equation accepted by the UNISDR

While the hazard is usually uncontrolled, the hazard impact and overall risk can be reduced by decreasing the vulnerability (and improving coping capacity) of the affected community through various approaches e.g. education/information, physical hard and/or soft engineering, improved planning (where feasible), coping resources etc.

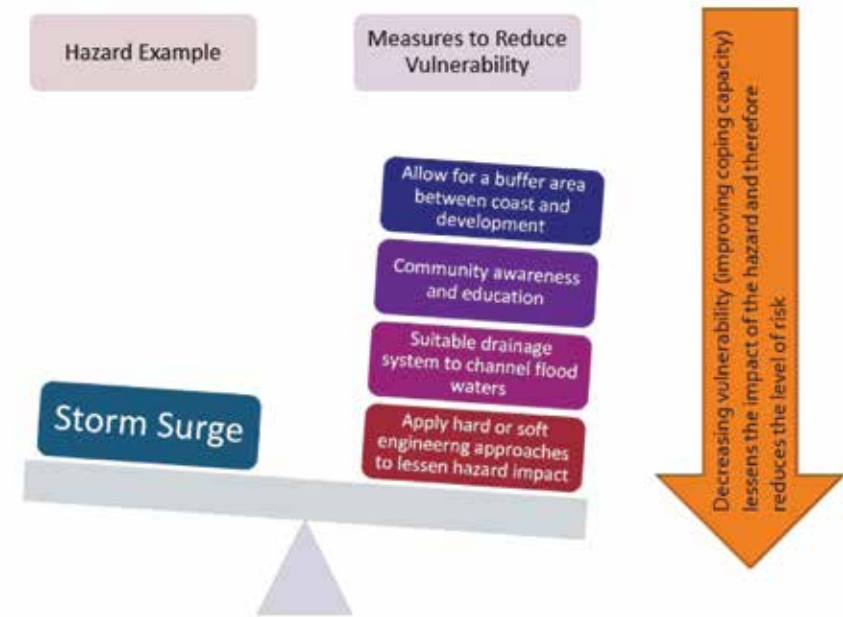


Figure 2: Example illustrating the relationship between hazard and vulnerability

There are three internationally recognized primary components used for risk identification, as defined below (NDMF, 2005):

Hazard: A potentially damaging physical event, phenomenon and/or human activity that may cause the loss of life or injury, property damage, social and economic disruption or environmental degradation. Hazards can include latent conditions that may represent future threats and can have different origins (see Table 3). Hazards can be single, sequential or combined in their origin and effects. Each hazard is characterized by its location, intensity, frequency and probability.

Origin	Hazard Category	Example
Natural	Geological	Landslide, erosion
	Hydrometeorological	Storm surge, strong winds, flooding
	Biological	Algal blooms, disease outbreaks
Human Induced	Environmental Degradation	Loss of biodiversity, deforestation, land degradation
	Technological	Industrial pollution, waste discharge

Table 3: Hazard Classifications (NDMF, 2005)

Figure 3 provides a good example of sequential hazards whereby Wilderness Dunes (Western Cape) experienced high seas, which eroded dunes and resulted in some home owners losing parts of their property. In this case the initial hazard (high seas) increased the erosion process by destabilizing the primary dune.



Figure 3: Example of sequential hazards

Vulnerability: The degree to which an individual, a household, a community, an area or a development may be adversely affected by the impact of a

hazard. Conditions of vulnerability and susceptibility to the impact of hazards are determined by physical, social, economic and environmental factors or processes.

Vulnerability is a multidimensional concept and should be considered in relation to individual hazard. Examples of vulnerability are provided in Table 4, but vulnerability should be considered and unpacked in the local context:

Vulnerability	Example
Physical	Construction material used for building houses (such as brick vs. mud), proximity to hazard origin, poor planning, inappropriate design of infrastructure, inappropriate placement of infrastructure
Social	Head of household, gender, level of education, cultural dynamics (e.g. community dependence on the coast)
Economic	Household income, employment
Environmental	Water quality, erosion

Table 4: Examples of Vulnerability

Capacity: A combination of all strengths and resources available within a community, society or organization that can reduce the level of risk, or the effects of a disaster. Capacity may include physical, institutional, social or economic means as well as skilled personnel or collective attributes such as leadership and management. In the South African context, capacity is primarily achieved through the municipalities in terms of relief funding, provision of services and as first responders to disasters.

CMLs are intended to inform risk management in coastal areas. Different hazards will pose varying degrees of risk and will require different assessment processes. While in many cases, a single risk line may be adequate, multiple lines can be produced to reflect different hazards and consequently, different 'risk zones'. Specialist input may also be required for more complex modeling

4. RECOMMENDED PROCESS FOR THE ESTABLISHMENT OF COASTAL MANAGEMENT LINES

Figure 4 outlines the recommended process to follow when establishing coastal management lines. Stakeholder engagements can take place at various levels i.e. management officials vs. the general public and discretion should be used throughout the process.

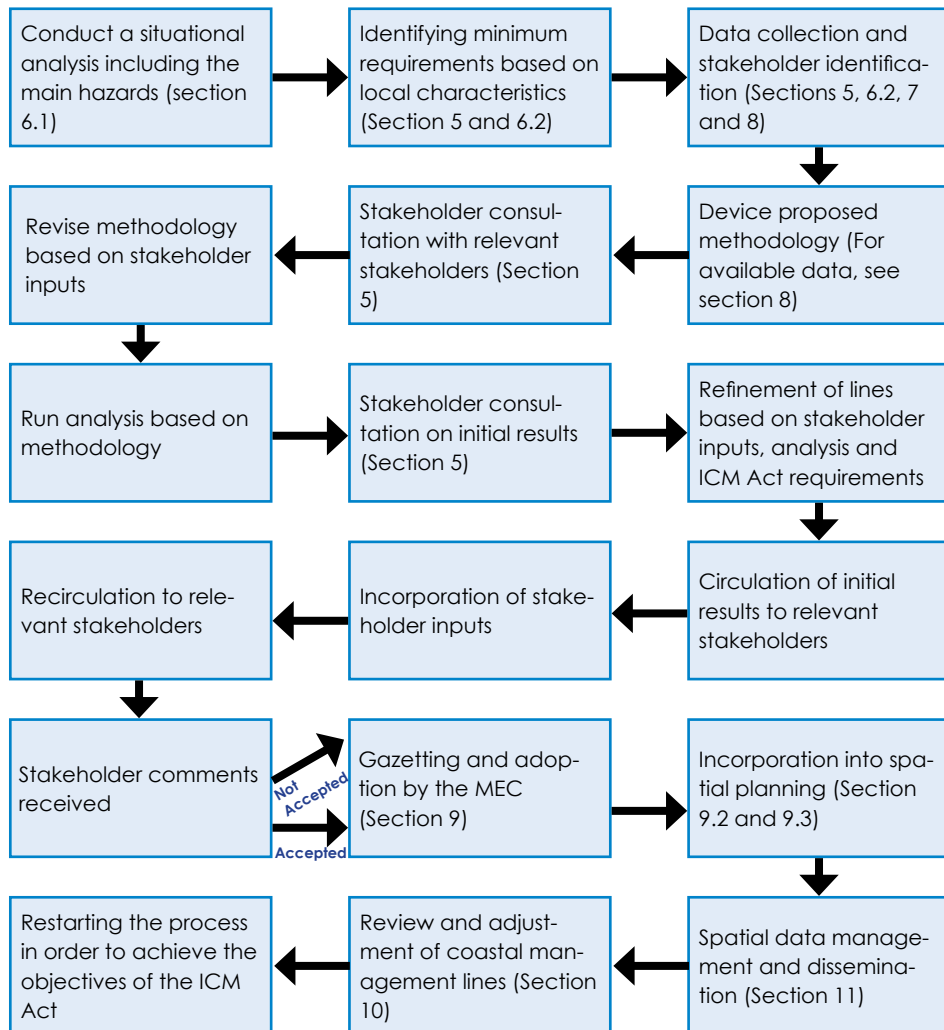


Figure 4: Recommended (potential) process for the establishment of CMLs

The establishment of CMLs in National Protected Areas are the function of the Minister. The following areas are included:

Province	Protected Area Name	Designation	Management Authority
Eastern Cape	Addo Elephant National Park	National Park	South African National Parks
	Garden Route National Park	National Park	
KwaZulu-Natal	iSimangaliso Wetland Park	World Heritage Site	iSimangaliso Wetland Park Authority
Northern Cape	Namaqua National Park	National Park	South African National Parks
	Orange River Mouth Wetland	Ramsar Site	Not Reported
Western Cape	Garden Route National Park	National Park	South African National Parks
	West Coast National Park		
	Table Mountain National Park		
	Agulhas National Park		
	Robben Island	World Heritage Site	Robben Island Museum (terrestrial component)

Table 5: National Protected Areas where the Minister is responsible for the Establishment of CMLs

5. STAKEHOLDERS

In terms of ICM Act:

S25(2) Before making or amending a notice referred to in subsection (1), or making the regulations referred to in subsection (1A), the MEC must-

- (a) consult with any local municipality within whose area of jurisdiction the coastal management line is, or will be, situated; and
- (b) give interested and affected parties an opportunity to make representations in accordance with Part 5 of Chapter 6.

I&APs play a critical role in being able to provide local knowledge of the areas, which should influence the CML so as to accommodate historic information regarding natural events such as storm surges, erosion, etc., relevant socio-economic factors particularly in relation to the existing cadastral boundaries.

In terms of ICM Act (part 5 of chapter 6), section 53 states:

53. Consultation and public participation

- (1) Before exercising a power, which this Act requires to be exercised in accordance with this section, the Minister, MEC, municipality or other person exercising that power must -
 - (a) consult with all Ministers, MECs or municipalities whose areas of responsibilities will be affected by the exercise of the powers in accordance with the principles of co-operative governance as set out in Chapter 3 of the Constitution;
 - (b) publish or broadcast his or her intention to do so in a manner that is reasonably likely to bring it to the attention of the public; and
 - (c) by notice in the Gazette-
 - (i) invite members of the public to submit, within no less than 30 days of such notice, written representations or objections to the proposed exercise of power; and
 - (ii) contain sufficient information to enable members of the public to submit representations or objections.

Public participation is a vital component to ensuring the successful implementation of CMLs.

5.1 Stakeholder Identification

Consultation should occur between all three spheres of government, particularly due to the cross-cutting nature of CMLs and the need for incorporation into development planning, including SDFs and land use schemes. It is suggested that the following stakeholders³ are consulted (where relevant):

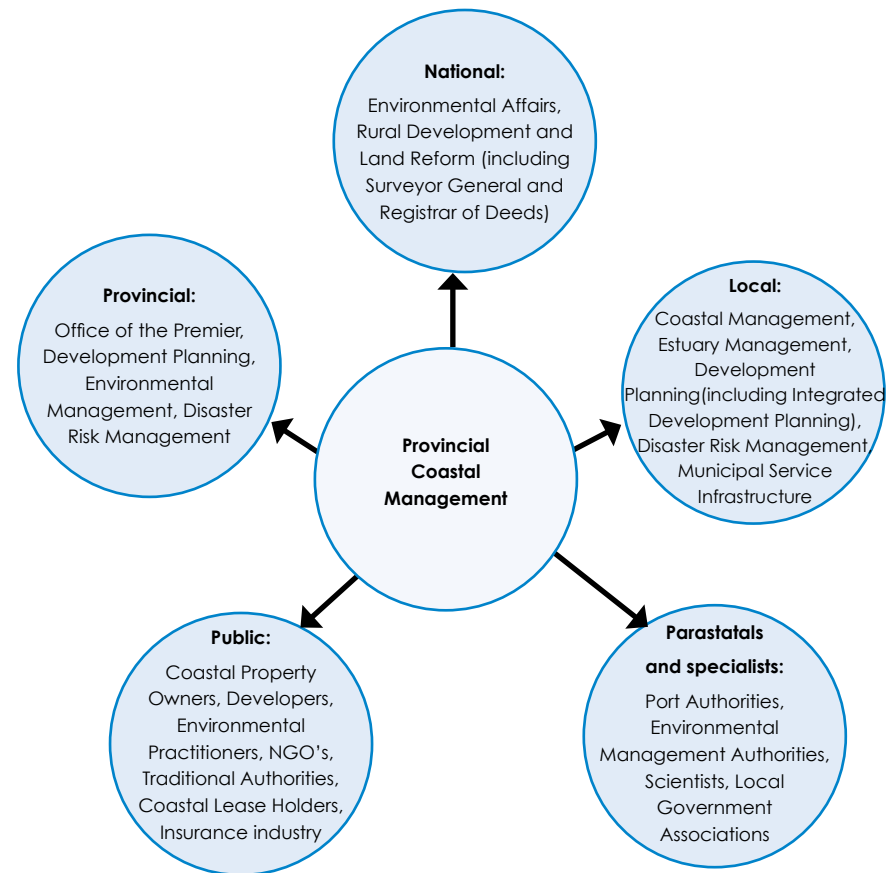


Figure 5: Suggested stakeholders to be consulted

³ While suggested stakeholders are provided, the list should not be considered to be exhaustive. Any additional relevant identified stakeholders should be included in the process.

5.2 Stakeholder Consultation

The consultation process with interested and affected parties (I&APs) is an essential component to the establishment of CMLs. Engagements with the public should be prioritized, particularly where any impacts are going to be seen at a local level. Communities are generally familiar with the area in which they reside as well as the challenges they are faced with. Consultation can thus contribute a wealth of indigenous knowledge including the social dynamics, availability of resources and services, knowledge of seasonal events and extreme events. Relevant subject experts should also be consulted for scientific input.

Prior to any consultation, the positive and negative impacts of establishing CMLs should be identified (see examples in Figure 6 and Figure 7), which may address any initial and obvious concerns that stakeholders may have. It is also important to ensure that all the appropriate stakeholders are informed and invited to participate in consultation processes.



Figure 6: Example of potential negative implications

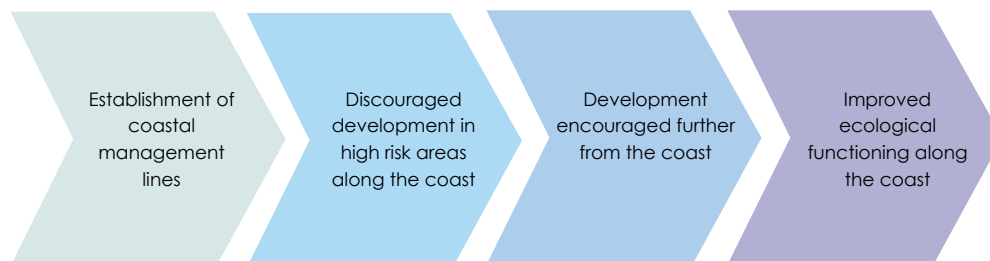


Figure 7: Example of potential benefits

6. CONSIDERATIONS FOR THE ESTABLISHMENT OF COASTAL MANAGEMENT LINES

The establishment of CMLs will have direct impacts on coastal communities and properties, which therefore necessitates the need for extensive stakeholder consultation. While models can be used to determine the likely impacts and/or affected areas as a result of various natural processes e.g. storm surges, it cannot be detached from the socio-economic impacts.

This section aims to provide guidance on the aspects that should be considered for the establishment of CMLs. However, recognizing the variability between provinces, this section should not be considered to be exhaustive, nor binding.

6.1 Situational Analysis

Prior to undertaking analyses and data modelling, a situational analysis based on known scientific and anecdotal information on the main hazards should be conducted in order to understand the physical, economic and social environments in both the local and regional contexts by identifying:

- i. vulnerable communities where the hazard impacts may cause disruption and/or loss of life/infrastructure;
- ii. economic hubs where the hazard impacts may cause disruption and/or loss of life/infrastructure resulting in the loss of economic activity;
- iii. areas where the hazard impacts may cause loss/damage to infrastructure that benefits the community e.g. coastal access, public launch sites, municipal infrastructure such as pipelines and roads;
- iv. areas where the hazard impacts may cause loss/damage to important structures/sites e.g. heritage sites, national key assets;
- v. areas where the hazard impact may cause loss/damage to environmentally sensitive areas; and
- vi. areas demarcated for future development where risk mitigation can be proactively implemented.

6.2 Primary Considerations

Figure 8 provides the overarching categories that should be considered when

establishing CMLs. While a situational analysis might be beneficial in order to understand the area as a whole, the process of establishing CMLs will require the components to be unpacked through more focused assessments and stakeholder engagements.

Legal	<ul style="list-style-type: none"> National Legislation, Provincial Legislation, Municipal By-Laws
Physical	<ul style="list-style-type: none"> Coastal hazards such as erosion, sand movement, inundation, storm surge etc.
Environmental	<ul style="list-style-type: none"> Biodiversity and conservation requirements
Heritage	<ul style="list-style-type: none"> Sites and areas of preservation/cultural significance e.g caves, baptism areas, hiking trails
Social	<ul style="list-style-type: none"> Development rights, coastal access, existence of rural or cultural dwellings
Economic	<ul style="list-style-type: none"> Activities which are reliant or proximity to the sea e.g ecotourism

Figure 8: General considerations for the establishment of coastal management lines

6.2.1 Relevant Legislation

The relevant legislation at all spheres of government should be considered including, but not limited to those identified in section 1.4 particularly due to the need for the incorporation of CMLs into spatial planning tools.

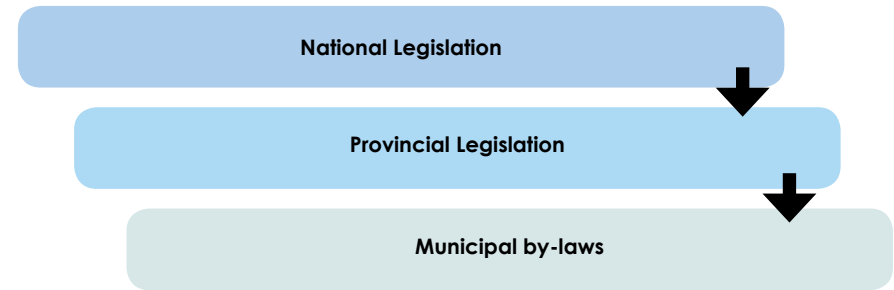


Figure 9: Legislation to be considered

6.2.2 Physical Processes

As part of the situational analysis, it is important to identify the primary coastal processes (and hazards) experienced on the specific coastline. The coast is a dynamic space whereby ocean, atmospheric and terrestrial processes interact. When considering coastal risks, it's important that these processes are viewed holistically rather than isolating them as separate events, especially in light of climate change. The effects of climate change have in many cases altered the severity and/or frequency of coastal hazards to the extent where both human life and property are at (increased) risk during these events (IPCC, 2007). In the long term, the cost of tending to damages after devastating events often exceeds the costs of implementing sustainable mitigation measures.

The International Strategy for Disaster Reduction (ISDR) provides a classification of hazards that has been adopted internationally as well as by the South African National Framework for Disaster Management (2005), in terms of the DMA. Adopting this classification when determining CMLs in terms of ICM Act will ensure uniformity and allows for multisectoral planning across government departments and stakeholders (South African National Framework for Disaster Management, 2005). For the CML process, Natural Hazards will primarily be considered, these include (but are not limited to):

Hazard Category	Hazard	Onset
Geological	Erosion	Gradual or sudden
	Accretion	Gradual
	Dune migration	Gradual
	Slope destabilisation (including Landslides and Rock falls)	Immediate
Hydrometeorological	Storm surge	Immediate
	Flooding (Coastal and Estuaries)	Immediate
	Sea- level rise	Gradual

Table 6: Examples of Coastal Hazards

More often than not, the combined effects of these hazards, aided by poor planning, is proving to increase the risk to coastal communities, for example, storm surges in areas influenced by sea- level rise could lead to increased risk of flooding, particularly in areas where natural barriers, such as dunes, have been removed in favour of aesthetic appeal.

The relevant Disaster Risk Assessments and Risk Prioritisation (in terms of the Disaster Management Act (57 of 2002)) should be consulted during the process of establishing CMLs. Following the situational analysis, the physical processes should be considered in more detail (using the best available scientific data and analyses) for the establishment of CMLs, these include (but are not limited to):

Provision	Description
Long-term ⁴ coastline changes	<ul style="list-style-type: none"> Assessing long-term historical data for the relevant area in order to determine the natural fluctuations in beach profile and to identify any specific trend e.g. an eroding or accreting beach Evaluating the effects of climate change such as sea level rise
Short-term ⁵ coastline variation	<ul style="list-style-type: none"> Incorporating local wave characteristics, currents and wind conditions and the presence of other influences such as river mouths Short term erosion, accounting for dunes
Extreme events (episodic events)	<ul style="list-style-type: none"> Evaluating the layout of the coastline in relation to wave and storm approach taking into account possible screening for future effects e.g. coastal flooding (extreme seaward levels, wave run-up levels, coastal flooding elevations, river and/or estuary flooding), inundation, storm surge Modelling wave run-up levels Determining coastal flooding elevations
Present and future wave climate	<ul style="list-style-type: none"> Inshore wave climate Offshore wave climate
Environmental buffers	<ul style="list-style-type: none"> Determining environmental buffer areas for ecology, biodiversity, environmental conservation aspects Determining where environmental buffers exists or are required for the protection of infrastructure
For more a more localised level analysis	<ul style="list-style-type: none"> Assessing the beach profile for the height above mean sea level (MSL). Assessing frontal dune types and size. Assess wind blown sand, dune/cliff instability, estuary and river dynamics (incl. sediment budgets) Environmental buffers (coastal green belts or dune systems, cliff instability, estuary and/or river mouth dynamics)

Table 7: Considerations for the establishment of CMLs in relation to physical processes (CSIR, 2014a)

⁴ To be defined in the context of the hazard being assessed.

⁵ To be defined in the context of the hazard being assessed.

6.2.3 Environmental considerations (which should be supported by scientific data).

Ecologically sensitive or vulnerable coastal areas must be identified and delineated in order to prohibit or control development in to protect biodiversity in accordance with Section 52(2) of National Environmental Management: Biodiversity Act (Act No. 10 of 2004):

- i. Critically endangered ecosystems are ecosystems that have undergone severe degradation of ecological structure, function or composition as a result of human intervention, and are subject to an extremely high risk of irreversible transformation;
- ii. Endangered ecosystems are ecosystems that have undergone degradation of ecological structure, function or composition as a result of human intervention, and are subject to a significant risk of irreversible transformation (although to a lower extent than critically endangered ecosystems);
- iii. Vulnerable ecosystems are ecosystems that have a high risk of undergoing significant degradation of ecological structure, function or composition as a result of human intervention; their risk of irreversible transformation is less than for critically endangered or endangered ecosystems; and
- iv. Protected ecosystems are ecosystems of high conservation value or of high national or provincial importance, although they are not under immediate risk of irreversible transformation, such as critically endangered, endangered or vulnerable ecosystems; and.
- v. Degraded/sacrificial zones that could be used in support of sustainable development without impacting adversely on the environment.

Data relating to biodiversity can be sourced from SANBI's BGIS website (<http://bgis.sanbi.org/>) as well as the National Biodiversity Assessment documents.

6.2.4 Heritage considerations

The most commonly recognized heritage sites are World Heritage Sites certified by UNESCO. However, South Africa has many nationally recognized sites and areas of preservation that are usually associated with social dynamics. Examples of important areas include shell middens, caves used by Iron and

Bronze Age humanoids, sites of historical battles, baptism areas etc. which need to be considered and require planning for access to these sites (CSIR, 2014c).

Heritage relates to areas/features or structures of historical heritage or cultural/symbolic importance, that are located within the coastal zone, and which therefore need to be preserved by incorporation into setback lines provisions. Historical structures typical of a certain era or style, or national monuments are some examples of heritage structures to be preserved by making appropriate provision in the demarcation of setback lines. Appropriate provincial authorities (such as Heritage Western Cape) and other such bodies can provide reports and maps indicating heritage sites located within the coastal zone. In practice, a site inspection accompanied by a relevant specialist is recommended in order to determine the buffer area that may be required around such features (CSIR, 2014a).

The South African Heritage Resource Agency (SAHRA) is the national administrative body for the protection of South Africa's cultural heritage and is the custodian of the database listing all heritage sites (accessible via: <http://www.sahra.org.za>). However community engagement plays an important role in recognizing areas of importance / cultural significance.

6.2.5 Social considerations

The social component is often the most complex aspect to address. For the purpose of establishing CMLs, it is important to assess the vulnerability of a community holistically to identify where the hazard impact may cause:

- i. Disruption of livelihoods;
- ii. Loss of life;
- iii. Damage to / loss of infrastructure e.g. housing, recreational facilities;
- iv. Damage to / loss of critical service infrastructure e.g. electricity, pipelines;
- v. Damage to / loss of critical access infrastructure e.g. roads, railways, bridges; and
- vi. Loss of coastal resources, particularly those that are valuable to communities e.g. spiritual, fauna, flora etc.

In addition, the social component also includes legal aspects such as property rights and where the establishment of CMLs may have (unintended) financial implications e.g. CMLs impacting on property insurance, which therefore highlights the importance of engaging communities.

In addition, many different groups assign value to the coast in terms of cultural and religious significance. It is important that coastal communities are directly consulted in order to contribute their indigenous knowledge to the process.

As an initial exercise, particularly to obtain a broad understanding of the coastal communities, data from the national census or community surveys can be obtained from Statistics South Africa (StatsSA). StatsSA is the custodian of South Africa's census data as well as various other socio-economic data that might be relevant for studying social aspects of communities. However, field surveys in the form of interviews with community members might also be required.

6.2.5.1 Demographics

The characteristics of the affected population needs to be considered, particularly if the establishment of CMLs will either directly or indirectly affect the population.

Census data (available from Statistics South Africa) can provide a generalized overview of the affected population e.g. population group (including cultural groups), household income, dwelling types, services (access to potable water, electricity, technology etc.).

The population demographics can also provide an indication of the community's ability to cope with and recover from the hazard impacts. The data will provide insight regarding societal vulnerability e.g. in an emergency situation, elderly people and very young people may be more vulnerable as they may not be as mobile and able to move quickly to places of safety. Figure 10 shows the census data items available, highlighting the recommended fields to consider:

Category	Sub-category	Required
Demography	Age	X
	Sex	
	Relationship	
	Marital Status	
	Population Group	
	Language	X
General health and functioning	Visual difficulties	X
	Hearing difficulties	X
	Communication difficulties	X
	Physical difficulties	X
	Mental difficulties	X
	Self-care difficulties	X
	Assistive devices and medication	X
Education	School attendance	
	Educational Institution	
	Public or Private	
	Level of Education	
	Field of education	
	Literacy	X

Figure 10: Census data relating to Social Considerations (Source: StatsSA, 2011)

Figure 11 (below) shows an example of using census data to understand a community by combining the layers whereby the map shows the percentage of the total population that is unemployed, overlaid with the total population with the percentage of the total population earning less than R6400 per month.

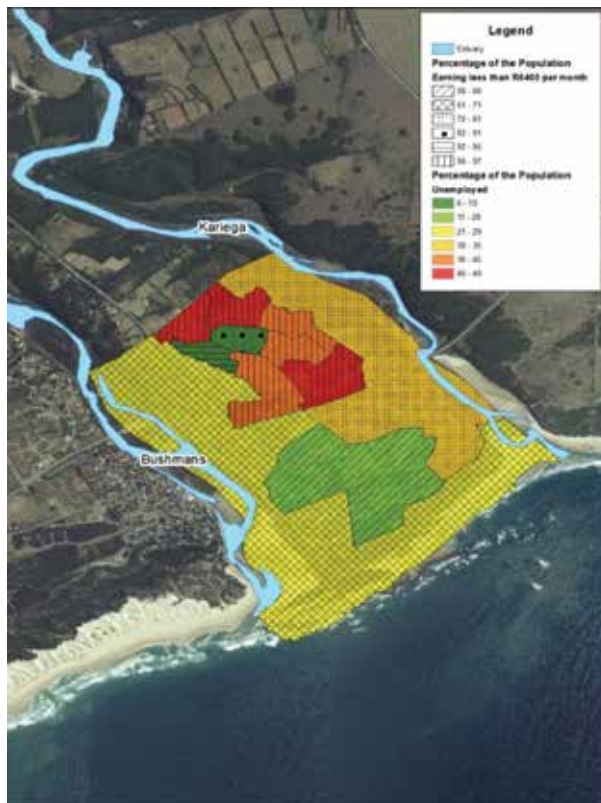


Figure 11: Examples of combining census data to understand the population's characteristics

6.2.5.2 Property rights⁶

Property rights are additional social considerations when establishing CMLs, and reiterates the need for thorough (public) stakeholder engagement and the need to balance the health of the coast and existing property rights. The following components should thus also be taken into account:

- Developments with existing rights (including zoning) as CMLs cannot remove these rights;
- Title deeds of properties may include restrictions, however property owners

have the right to apply for removal of restrictions;

- Private acceptance of liability;
- Proposed developments/growth should be promoted, provided that the development proposals are responsive towards coastal risk and the principles of the ICM Act; and
- Recognition that 'land use' and physical activities are distinct.

The establishment of CMLs will impact on existing property rights, hence the need for thorough consultation with stakeholders prior to the establishment of CMLs.

6.2.5.3 Legal and Zoning Aspects

Implementation of the ICM Act has made it a legal obligation to determine CMLs in all coastal provinces. Negative public response can be generated by the potential legal implications that may arise as a consequence of the position of a CML in relation to private properties with development rights.

According to the ICM Act, the state can "prohibit or restrict the building, erection, alteration, or extension of structures that are wholly or partly seaward of this line". Before a CML can be promulgated, additional legal and planning requirements have to be considered, such as cadastral boundaries, private property rights, zoning boundaries: coastal public property, coastal protection zones, Municipal/Town planning zones, military/other special use areas, special management areas, etc. (CSIR, 2014a).

6.2.5.4 Aesthetic Features

Significant views (or landscapes), some of which define sense of place, such as for example, the R44 route from Gordon's Bay to Pringle Bay are of socio-economic importance and need to be preserved. Similarly, some aesthetic features (for example unique rock formations) which have significant socio-economic value are located within the coastal zone. Thus CML provisions are required to ensure that such features are not detrimentally impacted. In practice, a site inspection accompanied by a relevant specialist (possibly a landscape architect/town planner from a local or regional authority) is recommended in order to determine possible buffer areas that may be required around such features (CSIR, 2014a).

⁶ S84(1)(e) of the ICM Act should be noted. Also see section 9.3 of this document.

6.2.5.5 Shade

Tall buildings near the shoreline can cause shade problems, requiring an extra CML provision. An important attraction of beaches to both local users and tourists is to enjoy the sunshine on the beach. In SA, tall structures built adjacent to the beach on the eastern, northern or western side thereof, may cast large shadow areas on the beach, which in some instances can even persist into the late morning or already become evident from the early afternoon, thus significantly detracting from the value of the beach experience. The Ethekwini Municipality has for example employed building restrictions limiting the height of structures near the shoreline to reduce such impacts. The alternative is to locate such buildings further landward (where practical) to reduce the expanse and duration of shadows that they may cast on the beach (CSIR, 2014a).

6.2.5.6 Financial Implications

The establishment of CMLs may have unforeseen financial implications on property owner such as the increase in insurance premiums or refused insurance in high risk areas. Subsequently, property values may decrease as a result of the CMLs. There should therefore be thorough engagement with property owners and also the private sector in this regards so as to minimize the potential negative impacts (see example in Figure 13).

6.2.6 Economic considerations

Disasters have both a direct and indirect effects on the economy. Direct impact refers to the damages to infrastructure, structures and content as well as personal injury or mortality that occur as a direct result of experiencing the hazard. Indirect impacts primarily focus on the loss of economic activities such as the loss of potential production, increased production costs, loss of income and other welfare losses occurring as a result of the initial damage (Kousky, 2012).

When establishing CMLs, any economic activity or critical facility (e.g. power station) that could cause significant disruption to people's livelihoods in the event of damage or loss, should be noted. In addition, many private businesses, industrial activities and state infrastructure rely on proximity to the coast e.g. recreational watersports and the impact of establishing CMLs may have

an indirect impact such as increased operational costs e.g. property insurance premiums. Conversely, the insurance (and related) industry might benefit financially at the expense of these businesses based on the establishment of CMLs.

Activities that contribute to the economy and occur along the coast should consider the design of infrastructure, which must take cognizance of the desired lifespan of the activity in relation to the magnitude of the impact that the infrastructure will be exposed to.

Census data might also play a role in identifying economic activity at community level (Figure 12). The preferred indications are also noted.

Category	Sub-category	Required
Parental Survival and Income	Father alive	
	Mother alive	
	Income	X
Employment	Employment status	X
	Temporary absence from work	
	Unemployment and economic inactivity	
	Reasons for not working	
	Availability for work	
	Industry	
	Main goods or services	
	Occupation	
	Type of sector	

Category	Sub-category	Required
Housing, household goods and services	Type of living quarters	
	Type of main dwelling	X
	Additional dwelling	
	Construction material	X
	Rooms	
	Tenure status	
	Estimated value of property	
	Age of the property	
	Access to piped water	
	Source of water	
	Reliability of water supply	
	Alternative water source	
	Toilet facilities	
	Energy/fuel	
	Refuse disposal	
	Households goods and services	
	Access to internet	
	Agricultural activities	
	Livestock	
	Place of agricultural activities	

Figure 12: Census data relating to Economic (Socio-economic) Considerations (Source: StatsSA, 2011)

6.2.6.1 Socio-economic considerations

In addition to the impacts on individuals, the establishment of CMLs could also potentially have a negative effect on businesses by due to increased

insurance premiums, decrease in property value (thereby affecting the rental value of property). An example is depicted in Figure 13:



Figure 13: Example of potential negative implications

7. MINIMUM CONSIDERATIONS FOR ESTABLISHING CMLS AROUND ESTUARIES

In addition to the general requirements for establishing CMLs (see sections 5 and 6), this section aims to provide additional guidance for the establishment of CMLs around estuaries.

The South African coastline contains nearly 300 estuaries from the Orange River Mouth on the West Coast to the Kosi Bay estuarine system on the East Coast. Whitfield (2000) classified South African Estuaries into five groups, namely Permanently Open Estuaries (POEs), Temporarily Open/Closed Estuaries (TOCEs), Estuarine Bays, Estuarine Lakes and River Mouths. Overall TOCEs are the most dominant estuarine type in South Africa with nearly 70% of all estuaries falling within the group (Whitfield et al. 2008 cited in CSIR, 2014c).

Estuaries are particularly dynamic ecological systems that display the characteristics of both terrestrial and marine systems, making them extremely complex and sensitive, and consequently challenging to manage. Their physical parameters include the size, depth, tidal amplitudes, mouth state, flushing rate and catchment characteristics e.g. average monthly flow, which provide a robust means to define the natural vulnerability of individual systems to external (primarily anthropogenic) factors and modifications (CSIR, 2014c).

Estuary degradation often results from increasing coastal development and the impact of human activities. In order to preserve the remaining ecological functioning, biodiversity and sustainable use of these sensitive coastal resources, effective cooperative management is required (CSIR, 2014c).

The CSIR (2014c) conducted a comprehensive study on the delineation of coastal management lines for estuaries where they identified, discussed and evaluated the following physical processes that needs to be incorporated (the following sections are taken from CSIR, 2014c):

7.1 Fluvial flooding

Currently, the only spatial data available for estuaries are based on the National Biodiversity Assessment (SANBI, 2011). In terms of the metadata, the estuary floodplain (used interchangeably with estuarine functional zone) areas were captured using SPOT 5 imagery (2008) and Google Earth at a scale of 2.5m. The 5m topographical contour was used as the boundary to delineate

the floodplains. Where the 5m contours were unavailable, the contour was digitized from orthophotos (1:10 000) and where orthophotos were unavailable, the floodplain was digitized from SPOT 5 imagery using the changes in topography and vegetation types as indicators. Table 8 provides additional factors that need to be considered.

Consideration	Description
Shape and size of the estuary	Each estuary is unique in its shape and size, which influences the manner in which a flood will be attenuated in a specific estuary. Less than 15% of estuaries have any bathymetry/topographic data. Ideally LiDAR (along with other survey techniques) should be used to determine the topography of an estuary.
Mouth state	In setting up the initial floodline simulation, assume the estuary mouth is closed in the case of a temporarily open system and very constricted for a permanently open system.
Berm height	Estuary berm height can vary significantly under different coastal conditions. In addition, the longer an estuary mouth is closed the higher the berm will grow.
Flood volume estimate	Determine catchment characteristics such as area, length of river, slope, land use, land cover, water resource development level and related infrastructure and climatic zone. Develop hourly flood hydrograph for a range of flood probabilities i.e. 1:20, 1:50 and 1:100 using measured and /or simulated data.
Tidal effect	The sea water level is influenced by astronomical effects (normal tidal regime), barometric pressure, and oceanographic effects such as coastal trapped long waves, all of which need to be considered in determining the floodline for the estuary.
Nearshore ocean conditions	Estimate wave and related run-up conditions for a range of extreme coastal storms to establish the potential effect on an estuary.
Sea-level rise	Use IPCC predictions or local estimations for sea level rise in the medium and long term e.g. 50 to 100 years. Currently, best estimates indicate 0.5m and 1m sea level rise respectively.

Consideration	Description
Lateral channel migration	Estuary channels are highly dynamic and often move during flood events. Satellite imagery can be used to determine the long term channel dynamics and the rate at which the process has occurred in the past.
Integrate results in the final floodline model	Route the simulated/measured flood discharge through the estuary using a 1D or 2D numerical model under extreme coastal conditions and calculate the estuary floodline from the integrated results.

Table 8: Considerations for establishing CMLs for estuaries (CSIR, 2014c)

Given the dynamics of floodlines, they should be determined conservatively to ensure that any future development is not unintentionally located in a high flood risk area in the estuary flood plain.

7.2 Littoral active zones (e.g. Estuary mouth meandering mobile sands)

The direction, timing and rate of estuary mouth migration are impossible to predict as they are dependent on the interaction between runoff, wave action and outer-bend scouring. Where possible CMLs should be positioned so as to create sufficient space that will allow estuary mouths and channels to migrate as they would do naturally.

Conservative estimates should be applied based on historical imagery, elevation (in hard substrate areas), vegetation changes and/or geological records. Elevation is not necessarily a good indicator of potential mouth position along sandy beaches as coastal dunes can be eroded by floods and coastal storms regardless of their height.

It is also recommended that CMLs applicable to estuaries be instituted for littoral active zones such as dune fields or where Aeolian sediment transport is known to occur.

7.3 Marine influences, beach regression or accretion

Cross-shore transport may result from any currents which have a component in the cross-shore direction and which have sufficient velocity to transport sediment. A typical example of cross-shore transport is the on/offshore sediment transport resulting from (shorter term) changes in the incident wave condi-

tions. Cross-shore sediment transport is usually a swift process whereby sand is eroded near the waterline during a storm (Figure 4.2 below). The sand is transported seawards and deposited in deeper water where it forms an underwater bar on which the storm waves break. When the sea calms down again, sand is slowly transported back to the shore, thus re-establishing approximately the original profile if no net loss of sand has occurred.

If an area consists mainly of sandy sediment, and the wave height in the surf zone is relative large (>2.5m) large amounts of sediment are stirred up into suspension and moved along the bottom. This will be so irrespective of the wave angle (i.e. the longshore sediment transport rate could be anything from zero to very high). Depending mainly on the bottom profile and wave characteristics, large volumes of sediment could then be mobilized. Generally, steep profiles and narrow surf zones will greatly increase the sediment load near the shoreline, while flat slopes and wide surf zones will result in more dissipation in deeper water with less wave energy penetrating to near the shoreline. During storm events the shoreline moves back temporarily, as sand is lost but soon recovers to its pre storm position. This short-term loss is important to determine the estuary management line. Usually this is done from measurements taken from shoreline surveys but for most estuaries this data is lacking.

7.4 Global Sea- level rise (SLR)

Climate change related sea level rise will result in the shoreline moving inland due to inundation as well as increased sediment losses from increased wave energy. Theron (2013) indicated that the best estimate (or 'central estimate') of sea level rise (SLR) by 2100 is ~ 0.85 m to 1 m, with a plausible worst-case scenario of 2 m and a low estimate of 0.5 m. The corresponding best estimate (mid-scenario) projections for 2030 and 2050 are about 0.15 m and 0.35 m, respectively.

7.5 Impact of anthropogenic actions on mouth state

In addition to the natural coastal and estuarine processes that needs to be taken into account in determining a CML applicable to estuaries, anthropogenic actions or developments that may increase vulnerability needs also to be taken into consideration. Examples include:

- River abstraction or dam/weir developments that can cause estuary mouth closure (e.g. Mvoti) or increase the duration of the closed mouth state (e.g. Great Brak Estuary). This increase in mouth closure can also cause a related increase in berm height;
- Artificial breaching at low levels, which can lead to on-going sedimentation in the lower reaches of estuaries;
- Mouth stabilisation which if effective (e.g. Great Berg) can increase tidal flushing and reduce risk of fluvial flooding. However, a stabilised estuary mouth can also increase the risk of coastal flooding if inappropriate developments were to be situated in low lying areas; and/or
- Poorly constructed bridges can cause localised flooding upstream of the structure during flood events, e.g. Searle Bridge at Great Brak and railway bridge over the Swartvlei Estuary.

The considerations listed in Figure 8 and the process in Figure 4 should also be applied when establishing the CMLs for estuaries.

In South Africa, the estuarine functional zone⁷ is promoted as a CML for estuaries as it encapsulates not only the estuary water body, but also the supporting physical and biological processes and habitats necessary for estuarine function and health.

8. DATA AVAILABLE TO ASSIST WITH THE ESTABLISHMENT OF CMLS

For the purpose of establishing CMLs, it is advisable to consider the cumulative impacts of coastal processes and define the likely landward limit. Ideally, the methodology used should represent international best practice, incorporating the best available information and be legally defensible in light of the impact on private property.

⁷ For further information on the delineation of the estuarine functional zone, please refer to: DA Veldkornet, JB Adams & L van Niekerk (2015) Characteristics and landcover of estuarine boundaries: implications for the delineation of the South African estuarine functional zone, *African Journal of Marine Science*, 37:3, 313-323, DOI: 10.2989/1814232X.2015.1072111

The purpose of this section is to broadly describe the methodology used, known limitations and the data generated through the Coastal Vulnerability Study.

The data generated through the study will be available to the provinces for the purpose of establishing their CMLs, however it is NOT compulsory to use the data.

The Coastal Vulnerability Study was NOT intended to replace the processes delegated to provinces for the establishment of CMLs

The Coastal Vulnerability study focused on physical processes, based on scientific input, and the additional aspects in terms of the ICM Act, including broad stakeholder engagements (see sections 5 and 6) have NOT been covered.

Provinces are encouraged to use methodologies that best suit their respective coastlines.

The DEA appointed the CSIR in 2012 to conduct a series of scientific studies focusing on the wave climate and run-up. The data will be available as a medium resolution product for further analysis and to assist in determining the CMLs. While the data provide a good basis for further analysis, the following limitations should be noted:

1. The methodology is only applicable to sandy shores, resulting in approximately 2000 km of South Africa's coastline being covered;
2. The results were obtained at 500-m intervals for each site, resulting in a medium resolution output;
3. The bathymetry data used was relatively coarse and more accurate results would be achievable with higher resolution bathymetry;
4. The storm surges per location were not taken into account; and
5. All relevant data and literature was used at the time of producing the data, however due to the complexities involved during the modelling process, the data generated will not be updated as new data becomes available.

This section intends to inform coastal managers regarding the data available that can be used to assist with the establishment of CMLs.

8.1 Wave Climate & Run-up

Deriving the nearshore wave climate was based on a numerical wave mode-

ling exercise at selected locations along the coastline, including the determination of associated wave run-up, involving the following steps:

- i. Collate available bathymetry^{8,9} data;
- ii. Set up the numerical model grids;
- iii. Identify a set of output locations at an approximate 500m intervals for the 7m and 15m depth contours; and
- iv. Derive the wave time series at selected nearshore output locations for each modeled area.

The study sites are shown in Table 9, which cover major municipal regions as well as rural coastal towns and areas where activities such as subsistence fishing occurs. For each site, results were obtained at 500m intervals along the coast.

Province	Study site	
Northern Cape	Port Nolloth	Hondeklip Bay
Western Cape	Lamberts Bay	Walker Bay (Hermanus, Stanford, Gans Bay)
	St Helena Bay	Still Bay
	Saldanha Bay	Mossel Bay
	Yzerfontein	Plettenberg Bay
	Table Bay	False Bay (Simons Town, Muizenberg, Gordons Bay, Macassar, Rooi Els)
	Hout Bay	
Eastern Cape	Jeffreys Bay	The Haven (Dwesa Nature Reserve)
	Algoa Bay	Port St Johns
	East London	
KwaZulu-Natal	Port Edward	Richards Bay
	Durban	St Lucia

Table 9: Areas selected for the nearshore wave climate analysis (CSIR, 2014b)

⁸ Based on the South African Navy Hydrographic Office (SANHO) bathymetry charts.
⁹ A limitation of the bathymetry used is that most modeled areas were sparsely represented (CSIR, 2014).

The available data for the simulated results are also reflected in Figure 14.



Figure 14: Data output locations (shown in yellow), where simulated outputs are available

The input water levels were combined with the modelled 1:10, 1:30 and 1:50 year wave run-up heights. As a result, 6 scenarios of extreme coastal flooding were produced (Table 10) for each point location (i.e. 6 results per location):

	Run-up height	Spring tide level ¹⁰	Residual ¹¹	Sea-level rise ¹²
Scenario 1	1-in-10 year	Spring tide level	1-in-10 year	0.35m (2050 low scenario)
Scenario 2	1-in-30 year	Spring tide level	1-in-10 year	0.35m (2050 low scenario)
Scenario 3	1-in-50 year	Spring tide level	1-in-10 year	0.35m (2050 low scenario)
Scenario 4	1-in-10 year	Spring tide level	1-in-10 year	1m (2100 scenario)
Scenario 5	1-in-30 year	Spring tide level	1-in-10 year	1m (2100 scenario)
Scenario 6	1-in-50 year	Spring tide level	1-in-10 year	1m (2100 scenario)

Table 10: Modeled scenarios (CSIR, 2014b)

The available data will illustrate the simulated maximum water level above MSL, per scenario.

8.2 Elevation data

In light of climate change, coastlines will respond to predicted sea-level rise, creating a need for detailed topographic information, which will be key in understanding the likely impacts (U.S. Climate Change Science Program, 2009). Gesch (2009) states that most maps of potential inundation have been based on outdated coarse elevation data, and results in crude representations that add minimal value to decision making processes. Sea-level rise inundation modeling relies on a digital elevation model whose vertical accuracy and uncertainty greatly influences the reliability of the results (Gesch, 2009). While the run-up data will be made available, it is not compulsory that the information is utilized. This section aims to provide guidance on the elevation data available in order to undertake similar studies.

8.2.1 LiDAR

Vulnerability maps depicting potential flood regions as a result of sea-level rise will be essential for effective management and planning, particularly those involved in impact mitigation and managing the costs to both communities and ecosystems (Brock and Purkis, 2009). LiDAR provides the means to define low-lying regions susceptible to sea-level rise inundation, storm surge or tsunamis by enabling the analysis of geomorphic structures and change. International literature suggests that current LiDAR systems, often coupled with

passive optical imaging are contributing to a variety of coastal scientific studies including, assessing landslides along sea cliffs, subsidence causing coastal land loss and the topographic monitoring of active volcanoes in continental margins (Brock and Purkis, 2009). Gesch (2009) conducted a study in order to evaluate the importance of accurate elevation data for determining coastal areas vulnerable to sea-level rise. Four elevation datasets were analysed, each having different resolutions.

Elevation Data	Approximate resolution
GTOPO30	1km
SRTM	90m
NED	30m
LiDAR	3m

Table 11: Resolutions of the datasets used in the analysis

This study clearly showed that topography is a key element that determines the quality and reliability of results when considering coastal physical processes, particularly when analyzing data that may have more localized impacts such as sea-level rise and vulnerability of coastal landscapes. Even medium resolution data would be questionable when the intention is to produce highly accurate maps (Gesch, 2009). The results are shown in Figure 15:

¹⁰ Constant for all scenarios based on the available data.

¹¹ Constant for all scenarios based on the available data.

¹² IPCC AR₄ estimates (2007)

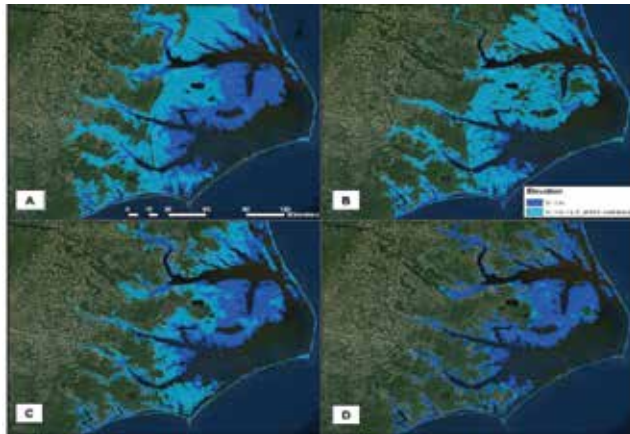


Figure 15: Results13 for (A) GTOPO30, (B) SRTM, (C) 1 arc second NED and (D) LiDAR (Source: Gesch, 2009)

LiDAR is much preferred as it provided the least amount of generalization and therefore, more accurate results. As LiDAR becomes more accessible, it will ultimately advance the science of vulnerability mapping, especially when taking population distribution, land cover, infrastructure and economic activity into account, which will ultimately prove more useful for planners and managers (Gesch, 2009).

8.2.2 Contour lines and Digital Elevation Models (DEMs)

Acknowledging that LiDAR is currently expensive to acquire in South Africa, alternative solutions are available in the absence of LiDAR data.

The Chief Directorate: National Geo-spatial Information (Department of Rural Development and Land Reform) is the custodian of elevation data for South Africa, including contour lines and DEMs. Currently the latest contour lines are available at the following contour intervals (Table 12):

Province	Contour intervals available
Northern Cape	5m contour interval from the Western Cape's border to The Camp, thereafter 20-m contour interval from The Camp to South Africa's border with Namibia
Western Cape	5m
Eastern Cape	5m
KwaZulu-Natal	5m

Table 12: Available contour lines

8.3 Additional Data

Additional data available at national level that may be used towards the establishment of CMLs can be obtained from the following sources provided in Table 13 :

Data	Custodian	Website
Biodiversity	South African National Biodiversity Institute (SANBI)	http://www.sanbi.org/
Protected Areas	Department of Environmental Affairs	http://www.environment.gov.za/ / http://egis.environment.gov.za/
Cadastral Data	Department of Rural Development and Land Reform	http://www.drdir.gov.za/services/national-geomatics-management-services#.VyL-tvn5hQI
Elevation	Department of Rural Development and Land Reform	http://www.drdir.gov.za/services/national-geomatics-management-services#.VyL-tvn5hQI
Census and Population Data	Statistics South Africa (StatsSA)	http://www.statssa.gov.za/
Heritage	South African Heritage Resources Agency (SAHRA)	http://sahra.org.za/
Water	Department of Water and Sanitation	https://www.dwa.gov.za/default.aspx

Table 13: Additional data sources

It is important to note that more detailed information may be available at provincial or municipal level, through various government departments and private organisations.

SECTION C: SPATIAL PLANNING

9. INCORPORATING COASTAL MANAGEMENT LINES INTO SPATIAL PLANNING

This section does not intend to provide the way forward with regards to implementation mechanisms for the establishment of CMLs, however it should be noted that there is immense value in documenting and sharing the lessons learnt and experiences of the coastal provinces through their respective implementation processes.

In order for the CMLs to be implemented effectively, there needs to be a linkage with the current spatial planning and land use tools. This section aims to provide guidance on how to effectively incorporate the CMLs into spatial planning and land use management tools. The guidance provided here is extracted from various Government and non-government high level plans and policies including legislation. In addition to this, a literature review and best practice assessment of local and international guides related to the subject in this section were considered. It is imperative that the CMLs are incorporated into planning tools during establishment of the lines and during the development of Spatial Development Frameworks (SDFs) as well as land use schemes as prescribed by SPLUMA, depending on which process comes first within coastal municipalities and provinces. In so doing, South Africa, particularly in the coastal region, can achieve the harmonisation of plans and the much needed sustainable development.

From a spatial and land use planning perspective, it can be argued that the coast is the area where the sea meets the land, an area that provides rich, diverse and complex natural resources thus having potential to sustain many opportunities of economic development. Furthermore to this, it creates competition, exclusive use and environmental degradation and at times, the same environment that created those resources in the first place, can potentially harm those who are exploiting it including property, infrastructure and human lives. It cannot be the responsibility of the coastal managers alone to manage this space or to mitigate the challenges, rather the integration of plans has been identified as key by various local and international statutes. The CMLs are a befitting tool for the coastal region and should not be viewed as merely an environmental conservation tool but rather a sustainable development tool. Therefore, the establishment of these lines cannot be exclusively

driven by those who advocate for and are bias to environmental conservation without giving cognisance to socio-economic development. In order to efficiently implement the CMLs, there needs to be a balance, integration and a diverse group comprising of various sectors involved in this space at all levels as promoted by the ICM Act and its founding policy principles.

The establishment of coastal management lines must thus be done in accordance with other legislation such as the Municipal Systems Act (Act No. 32 of 2000) and the Spatial Planning and Land Use Management Act (Act No. 16 of 2013) (SPLUMA) in order to ensure cooperative governance, in terms of the objective of the ICM Act.

9.1 Spatial Planning Considerations

It is important to identify developed areas that are currently affected by coastal processes as well as areas earmarked for potential future development to ensure that the risks of developing in these areas are avoided.

Taking the relevant legislation into account, there are also the more localized issues that would have to be considered when implementing CMLs. The ICM Act states:

S25(1A) An MEC may, in regulations published in the Gazette, prohibit or restrict the building, erection, alteration or extension of structures that are wholly or partially seaward of a coastal management line.

S25(1B) When establishing coastal management lines in terms of subsection (1), the MEC must consider the location of immovable property and the ownership and zonation of vacant land.

When planning for future development along the coast, coastal processes must be taken into account, including the role of topographical features such as dunes which serve as the land's defense system against ocean forces (Figure 16 and Figure 17).

How Dunes Protect Your Home During a Hurricane

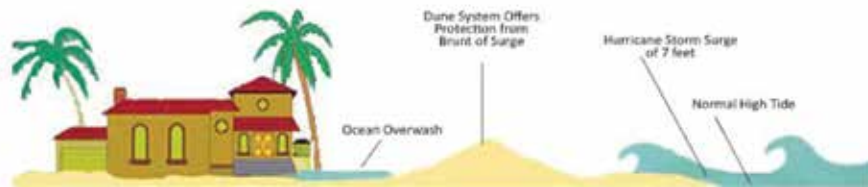


Figure 16: Illustration of how dunes protect infrastructure



Figure 17: Example of good planning in Nature's Valley with vegetated dune buffer between infrastructure and the beach

While regulating current and future development with the aim of protecting both the public and the coastal environment can be considered as proactive planning, existing developments that are subject to the pressures of coastal

process (often exacerbated by climate change) as a result of poor past planning will remain at risk. Other than encourage a managed realignment or retreat, little can also be done regarding existing structures that have a negative impact on the coast e.g. building casting shadows over the CPP, jetties and piers obstructing beach nourishment etc. However, CMLs in spatial planning tools such as SDFs (SPLUMA, Chapter 4) and Land Use Schemes (SPLUMA, Chapter 5) can assist in managing these impacts by including specific development parameters for structures within the coastal zone.

All properties are regulated in order to control development. The regulations are determined by the title deed and/or zoning of the property, which is described in the applicable Land Use Scheme, and determines secondary permissible land uses i.e. floor area ratio, coverage, building lines, parking provisions etc. Implementing CMLs must therefore take the existing rights of property owners into account, before they are established and broadly development should be allowed to proceed provided that the health of the coast is not compromised. CMLs should be a mechanism to temper development rights based on the risks identified and propose suitable development controls.

In terms of SPLUMA, every municipality must adopt and approve a single Land Use Scheme for its entire area within 5 years of the commencement of SPLUMA. Subsequently, CMLs should be incorporated into Municipal Land Use Schemes (in terms of the ICM Act, S25(3)) and should also take other existing legislation into account such as the National Environmental Management Act (107 of 1998); Environmental Impact Assessment Regulations and any provincial legislation and/or bylaws related to spatial planning. Provision must be made for areas where local municipalities propose growth, provided that the development proposals are responsive towards coastal risk and ICM Act principles.

For more localized planning, particularly around estuaries or properties directly affected by coastal processes, the respective MEC may make regulations to provide a means to assist in controlling development on individual properties by restricting development and the use of land on that property (in terms of the ICM Act, S84(1)(e)).

With reference to sections 6.2.5 and 6.2.6, it is important to consider property rights, the legal and zoning aspects as well as potential socio-economic impacts when establishing CMLs.

9.2 Responsibilities of the Minister

The Minister, after consultation with the relevant MEC, is responsible for the establishment of CMLs in an area that:

1. Is National Protected Area as defined in the Protected Areas Act (Act No. 57 of 2003);
2. Straddle a coastal boundary between two provinces, such as a self-contained area e.g. estuary; or
3. Extend up to, or straddles, the borders of the Republic such as the Orange River and iSimangaliso Wetland Park.

9.3 Responsibilities of the MEC

Once CMLs have been established, they need to be incorporated into spatial planning tools. The following should be taken into account:

1. A MEC must, by notice in the gazette, establish or change coastal management lines.
2. Taking into account that in terms of SPLUMA, the spatial planning mandate at provincial level lies with the Premier, and thus the MEC must consult with the Premier's office to ensure that the established CMLs are incorporated in the provincial SDF.
3. The MEC must consult with any local government within whose area of jurisdiction the coastal management lines will be situated in order to ensure that such lines are incorporated into the municipality's Integrated Development Plan and the subsequent policy and regulatory documents such as the Spatial Development Framework and Land Use Scheme.
4. The coastal management line(s) must be available as spatial data for the purpose of overlaying on any map.
5. The resulting coastal management line(s) must be incorporated into the relevant Spatial Development Framework(s).

6. In terms of S84(1)(e) of the ICM Act, the MEC may, after consultation with the Minister, make regulations that are consistent with any national norms or standards that may have been prescribed, relating to coastal management lines, including the granting of permission for the erection, placing, alteration or extension of a structure that is wholly or partially seaward of a coastal management line and the process to be followed for acquiring such permission, including the authority by whom, the circumstances in which and the conditions on which such permission may be given.

9.4 Responsibilities of Municipalities

1. A Municipality should fully participate, led by Province, in the process of delineating the CMLs in the areas of their respective jurisdiction and ensure that:
 - a. Affected local communities are encouraged to participate in the process;
 - b. The proposed CMLs are aligned with the strategic development goals and objectives of that municipality;
2. A municipality must ensure that any coastal management line that has been established in its area of jurisdiction is incorporated in the relevant:
 - a. Municipal Spatial Development Framework;
 - b. Land Use Scheme; and
 - c. Any other relevant tools related to spatial development planning.

In support of these processes, public engagement is crucial. It will also be beneficial to engage stakeholders that could have a post-planning influence on affected areas e.g. insurance industry and potentially form partnerships to assist in public engagements.

10. REVIEW AND ADJUSTMENT OF COASTAL MANAGEMENT LINES

It should be noted that the review of CMLs:

- Is to ensure continued alignment with spatial planning tools (Spatial Development Frameworks and Land Use Management System);
- May only focus on portions of the CML where conflicts/changes have been identified;
- Is to ensure that the CML continues to address coastal management objectives;
- Is recommended to align with the review of other planning tools, but the ultimate decision to review remains with the MEC

10.1 PURPOSE OF REVIEWING CMLS

The review and adjustment of CMLs allows for:

- Amendments where areas of conflict are detected;
- Amendments in light of new and/or finer scale information becoming available;
- Amendments in light of coastal and/or human induced processes changing the coastal landscape;
- Additional and previously overlooked issues and/or objectives may be incorporated; and
- Better alignment with relevant spatial development plans.

10.2 Alignment with SPLUMA

Regarding the review of spatial development frameworks and land use schemes, in terms of SPLUMA:

S13(2) The Minister must review the national spatial development framework at least once every 5 years

S15(5) An Executive Council may amend the provincial spatial development framework when necessary and must review it at least once every 5 years

S21(b) A Municipal spatial development framework must include a written and spatial representation of a 5 year spatial development plan for the spatial from of the municipality

S27(1) A municipality may review its land use scheme in order to achieve consistency with the municipal spatial development framework, and must do so at least every 5 years

10.3 Recommendations in terms of reviewing and adjusting CMLs

10.3.1 Frequency of review

It is noted that both the SDFs and LUS must, in terms of SPLUMA, be reviewed every 5 years. Given that CMLs are to be incorporated into these planning tool, the review and/or adjustment of CML could be conducted in line with these review processes or alternatively, in line with the 5 year review, of the relevant CMP.

10.3.2 Review considerations

Once CMLs have been established, the review process does not imply that the CML(s) in their entirety must be considered. The review process may consider a portion of the CML(s) where areas of conflict or impracticality have been identified.

For any amendments/adjustments to the CMLs, public consultation must be undertaken with all relevant interested and affected parties.

After any amendments/adjustments to the CMLs, the relevant planning documents must be updated accordingly.

11. SPATIAL DATA MANAGEMENT

In line with the requirement for the spatial data to be available for mapping purposes, this section seeks to guide the management of spatial data in line with existing legislation:

- Geomatics Profession Act (Act No. 19 of 2013) (GP Act); and
- Spatial Data Infrastructure Act (Act No. 54 of 2003) (SDI Act).

11.1 Custodianship

The relevant MEC will serve as the identified custodian of the spatial data and metadata for coastal management lines in its area of jurisdiction, in terms of the SDI Act, and the process of creating spatial data must be undertaken in

accordance with the GP Act.

11.2 Software

While an extensive range of both proprietary and non-proprietary GIS software exists, the South African Government has adopted the ESRI suite of ArcGIS products as the national standard for work conducted using GIS. Google Earth is not recognized as appropriate GIS software in order to capture data, however it can be used for display purposes.

11.3 SPATIAL DATA MANAGEMENT

The following recommendations regarding spatial data should be taken into account when establishing CMLs:

1. The spatial data must be available in ESRI shapefile format or as a file geodatabase.
2. The spatial data must have an appropriate spatial reference (geographic coordinate system or projected coordinate system)
3. The spatial data must be captured at an appropriate scale that allows cadastral boundaries to be taken into account, noting the potential impact CMLs may have on properties. It is suggested that the mapping scales be aligned to the respective provincial policies regarding data capturing and fieldwork, also noting that the CMLs must be captured at an appropriate scale in order to be adequately reflected on SDFs and LUS.
4. The metadata must conform to the SANS1878 metadata standard (refer to Annexure 13.1).

11.4 Spatial Data Dissemination

The following must be adhered to (in line with the SDI Act), with regards to data dissemination:

1. The derived spatial data (shapefile and metadata) must be made available to anyone who requests the data.
2. The spatial data must be distributed with the relevant metadata.

3. The metadata can be distributed without the shapefile for information purposes.

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13. APPENDICES

13.1 Available Census Data (Source: StatsSA, 2011)

Census 2011 data items	
Demographics <ul style="list-style-type: none"> • Age • Sex • Relationship • Marital status • Population group • Language 	Migration <ul style="list-style-type: none"> • Country of birth • Province of birth • Citizenship • Province of usual residence • Municipality/magisterial district of previous residence • Year of movement to the current municipality/town of residence
General health and functioning <ul style="list-style-type: none"> • Visual difficulties • Hearing difficulties • Communication difficulties • Physical difficulties • Mental difficulties • Self-care difficulties • Assistive devices and medication 	Parental survival and income <ul style="list-style-type: none"> • Father alive • Mother alive • Income
Education <ul style="list-style-type: none"> • School attendance • Educational institution • Public or private • Level of education • Field of education • Literacy 	Employment <ul style="list-style-type: none"> • Employment status • Temporary absence from work • Unemployment and economic inactivity • Reason for not working • Availability for work • Industry • Main good or services • Occupation • Type of sector

Fertility <ul style="list-style-type: none"> • Children ever born • Age of mother at first birth • Total children ever born • Total children surviving • Total children no longer alive • Date of birth of last born child • Sex of last born child • Survival status of last child 	Housing, household goods and services <ul style="list-style-type: none"> • Type of living quarters • Type of main dwelling • Additional dwelling • Construction material • Rooms • Tenure tatus • Estimated value of property • Age of the property • Access to piped water • Source of water • Reliability of water supply • Alternative water source • Toilet facilities • Energy/ fuel • Refusal disposal • Household goods and services • Access to internet • Agricultural activities • Livestock • Place of agricultural activities
Mortality <ul style="list-style-type: none"> • Number of deaths • Month and year of death • Sex of the deceased • Age of the deceased • Cause of the death • Maternal related deaths <ul style="list-style-type: none"> ◆ Pregnant at time of death ◆ Death during birth ◆ Postnatal death 	

13.2 Metadata Template

*Name of dataset

CORE METADATA ELEMENTS (SANS1878)

Dataset Title	
Dataset Reference Date	
Dataset last updated	
Progress	

Maintenance and update frequency		
Data quality		
*Dataset Responsible Party		
*Geographic Location of the Dataset	West	East
	North	South
Dataset Language		
Dataset Character Set		
Dataset Topic Category		
*Spatial Resolution of the Dataset		
Abstract Describing the Dataset		
*Distribution Format		
Access constraints		
Distribution constraints Additional Extent information for the Dataset (Vertical & Temporal)		
*Spatial Representation Type		
*Reference System		
*Lineage Statement		
On-line Resource		
*Metadata File Identifier		
Metadata Standard Name		
Metadata Standard Version		
*Metadata Language		
*Metadata Character Set		
Metadata Point of Contact		
Postal Address		
Physical Address		
Telephone		

Metadata Date Stamp	
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** Denotes a compulsory field*

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