Where, Exactly, is the Shoreline? The South African example.

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1. SUMMARY

The shoreline – 350 years of South African cadastral documents refer to seaward boundaries variously as: the sea; the shore; the coast; the ocean; edge of water *et al* and, more recently, as the high-water mark or low-water mark. International law adopts maritime baselines in relation to the low-water line and internal waters as being landward of the baselines. Where does the terrestrial cadastre end, and where does the marine cadastre begin? Can these boundaries be determined sufficiently accurately to define jurisdiction and separate administrative functions?

It is imperative that the boundaries of any area of jurisdiction or ownership be clarified, and the positions more clearly defined, especially where there are possible gaps, overlaps or uncertainties. From a terrestrial perspective, any seaward boundary is, with a few exceptions, an ambulatory line, which means that it moves with time. In South Africa, coastal boundaries were originally sketched by eye or surveyed using less accurate survey methods and equipment. There were no prescribed standards. Accuracies that were adequate then are not good enough for today's management of scarce resources – land, water and the whole environment.

Once national laws and international conventions have established what defines the position of these interface boundaries, such boundaries may be visible with reasonable accuracy in current datasets. Member states can therefore plot their maritime/terrestrial jurisdictions sufficiently accurately for spatial planning and decision-making purposes, using data such as aerial imagery that has been confirmed to be rectified into the National Control Survey System.

This paper therefore looks at the legal definitions within the South African legislation, compares them with the International Conventions such as the United Nations Convention on the Law of the Sea (UNCLOS, 1982) and discovers that lack of positional accuracy standards has resulted in uncertainty and almost certainly gaps and overlaps in areas of jurisdiction. While the example is South African, the problem is likely to be far more widespread and many states may have similar issues.

2. INTRODUCTION

The shoreline is a dynamic strip of land and sea along the coast. The shoreline area is moulded by time because of wave action (run-up and swash), tides, sea swells and surges, storms, winds, erosion, accretion (silting), currents, tectonic movements, upwelling of magma from the earth's mantle, change in vegetation cover, climate change and sea level rise (or possibly continental

sink?)! Anthropogenic structures have been erected along many parts of the shore to protect lives and settlements from the sea's activity. These include dykes, sea walls, harbour quays, canals, revetments and the like. (See Figure 5.) Man-made structures may limit the movement of the shoreline for a time but, wherever the shoreline is ambulatory, the position of its boundaries, whenever physically surveyed and cartographically delineated, are only the position of its boundaries on the date of survey. These positions may become outdated over time because of their natural movement and hence the recorded positions may no longer be useful for decision-making purposes. The custodians of any spatial dataset can ensure the enhancement of data quality using modern technologies that can be used to delineate boundaries at accuracies far greater than those shown on many archived documents.

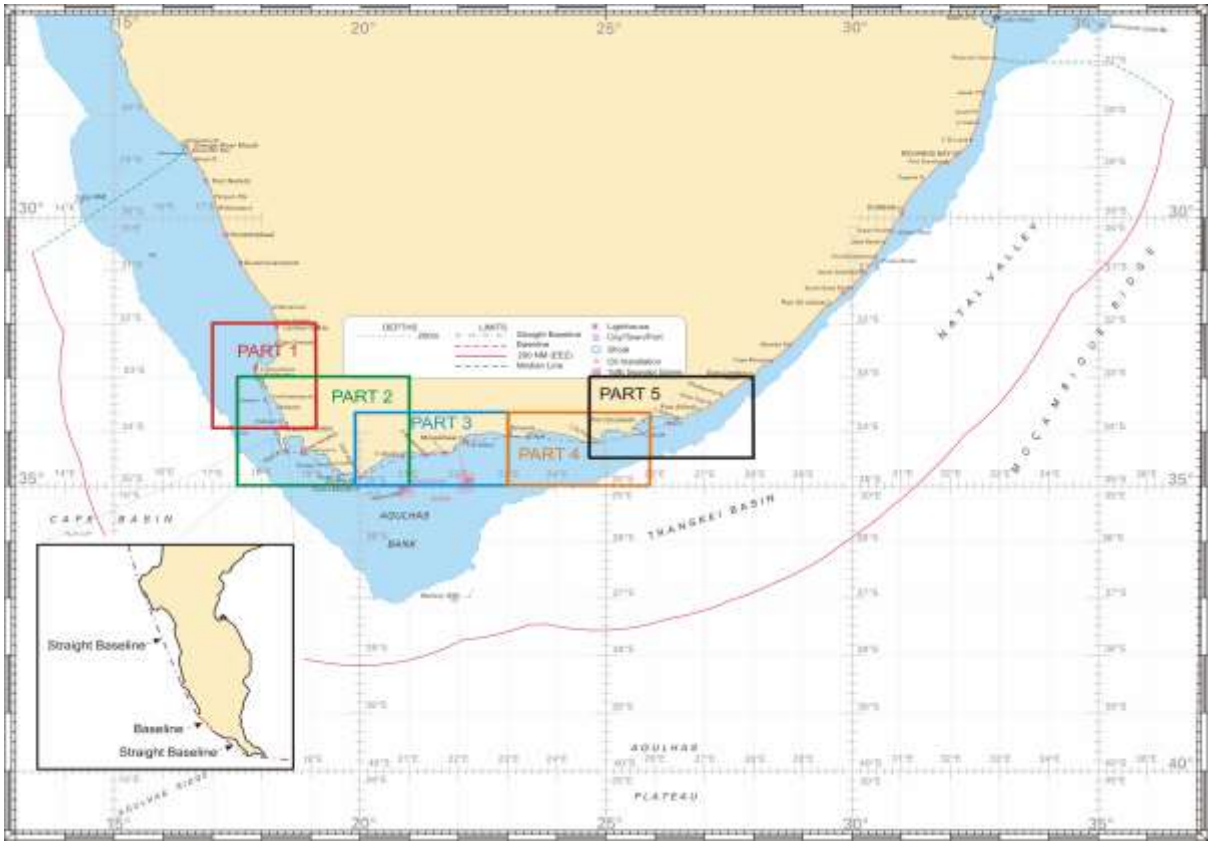

FIGURE 1: MAP OF MAINLAND SOUTH AFRICA SHOWING THE EXCLUSIVE ECONOMIC ZONE AS DETERMINED IN JULY 2012. SOURCE: SANHO

3. MARITIME BOUNDARIES

According to Articles 57 and 74 of UNCLOS (1982) and Section 7 of the MZA (1994), the exclusive economic zone of each member state is the sea beyond the territorial waters but within 200 nautical miles (370.4 kilometres), measured over the surface of the sea from the maritime baselines (Figure 1). Article 15 defines the boundary between the territorial waters (i.e., the first 12 nautical miles or 22.224 kilometres of the exclusive economic zone) of two contiguous States as extending to the median line, every point of which is equidistant from the nearest

points on the maritime baselines from which the breadth of the territorial waters of each of the two States is measured.

Subject to Article 15, Article 74 stipulates that delimitation of the exclusive economic zone between States with opposite or adjacent coasts shall be created by agreement based on international law (UNCLOS, 1982). Generally, states have adopted the principle, set out by the 1958 Geneva Convention on the Territorial Sea and the Contiguous Zone and brought forward into Article 15 of median line points equidistant from the low-water line (Wonnacott, 2001). Hence, the boundaries between the exclusive economic zone of the Republic of South Africa with both her maritime neighbours (Namibia on the west coast and Mozambique on the east coast) extend to the median lines, every point of which is equidistant from the nearest points on the maritime baselines from which the breadth of the exclusive economic zone of each of the two States is measured.

The maritime zones are the internal waters, the territorial waters, the contiguous zone, the exclusive economic zone and the continental shelf (MZA, 1994). According to Article 9 (Mouths of rivers) of UNCLOS (1982), if a river flows directly into the sea, the maritime baseline is a straight line across the mouth of the river between points on the low-water line of its banks. Article 8 of UNCLOS (1982) and Section 3 of the MZA (1994) define the internal waters as all waters landward of the maritime baselines, including all harbours, tidal rivers and estuaries. Several rivers are navigable by sea-going vessels and charting responsibility is therefore extended "up-river". Examples of this are: The Berg River (Velddrif), Knysna River (Knysna) and the Buffalo River (East London). In addition to this, the South African Maritime Safety Authority (SAMSA), in conjunction with SANHO (2018), is planning to produce navigation aids (not maritime charts) of several estuaries and rivers.

Internal waters are assumed to extend to the high-water mark, although it can nowhere be found that the landward limit of the internal waters is defined in maritime legislation. This assumption means that there is an overlap in jurisdiction between the high-water mark and the low-water mark, because the terrestrial jurisdiction extends to the low-water mark – which is land when the tide is out, and the maritime jurisdiction extends to the high-water mark – which is sea when the tide is in!

Overlapping parts of the territorial waters are marine protected areas. In terms of Section 22A of the NEMPAA (2003), the Minister may declare, by notice in the gazette, an area specified in the notice as a marine protected area. Any marine protected area declared in terms of the MLRA (1998) is accepted as having been declared in terms of NEMPAA. Gazette notices are definitive in the delineation of any marine protection area and there are examples of them being described as an area seaward from the high-water mark (e.g., NEMPAA, 2011).

The MLRA (1998) adds more definitions to the already crowded coastal interface (Figure 2). The legislation defines South African waters as the seashore, internal waters, territorial waters, the exclusive economic zone and, in relation to the sedentary species as defined in Article 77 of UNCLOS (1982), the continental shelf as defined in section 7 of the MZA (1994), as well as any tidal lagoons and tidal rivers in which a rise and fall of the water level takes place as a result

of the tides. The NEMPAA (2003) also defines marine waters as waters referred to in the MZA (1994), and includes an estuary defined in the ICMA (2008). Marine waters as defined in the NEMPAA (2003) appear substantially synonymous with coastal waters as defined in the ICMA (2008), with the addition only of the continental shelf as defined in the MZA (1994).

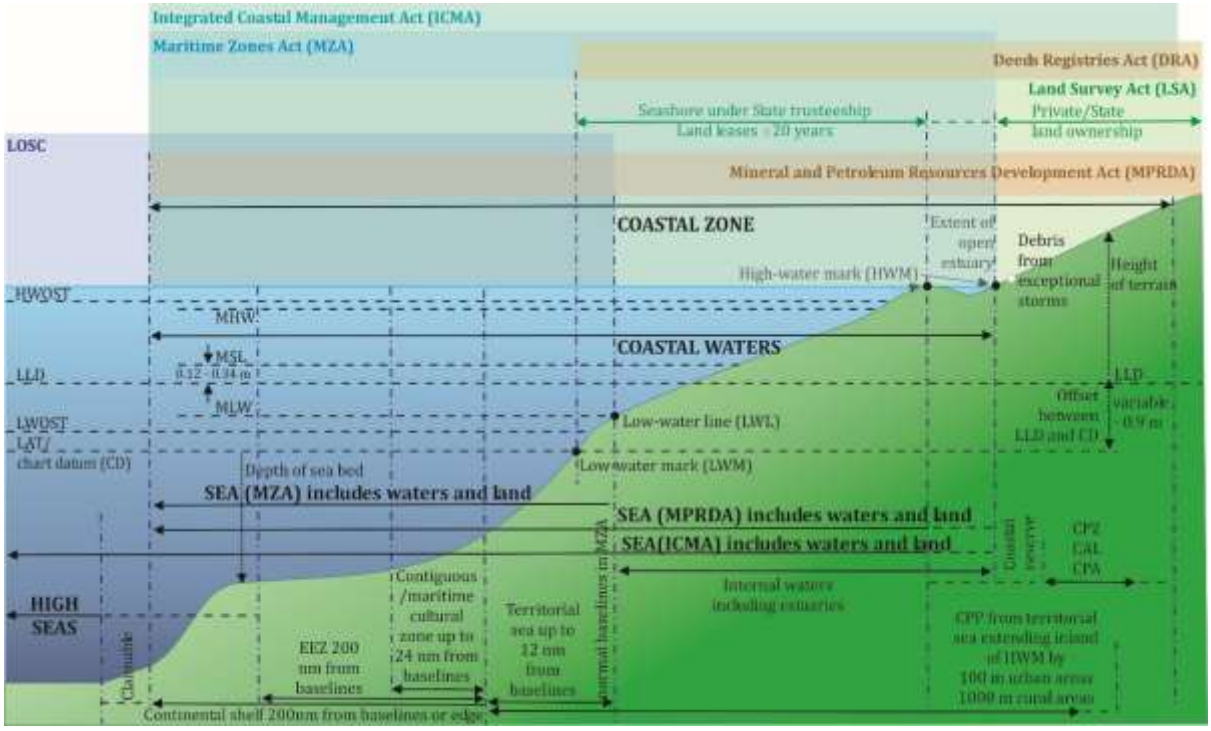

FIGURE 2: THE PLETHORA OF LINES REFERRED TO IN SOUTH AFRICAN LEGISLATION AND POLICY. THE THREE KEY LINES ARE THE HIGH-WATER MARK, THE LOW-WATER LINE AND THE LOW-WATER MARK. SOURCE: JENNIFER WHITTAL

Article 121 of UNCLOS (1982) defines an island as a naturally formed area of land that, although surrounded by water, can sustain human habitation and economic life even at high tide. The territorial sea, the contiguous zone, the exclusive economic zone and the continental shelf of an island are determined in accordance with UNCLOS. In contrast, rocks are naturally formed areas of land that still protrude above water at high tide, but which cannot sustain any human habitation or economic life of their own. Rocks have no exclusive economic zone or continental shelf.

Lastly, in the maritime context, there is the South African Chart Datum, from which all marine heights and depths are measured (hydrographic zero). The Chart Datum used by the South African Navy Hydrographic Office (SANHO) is the Lowest Astronomical Tide (LAT), which is defined by the International Hydrographic Organisation (IHO) as the lowest tide that can be predicted to occur under average meteorological conditions and any astronomical conditions over an 18.6-year period (or lunar nodal cycle). Although the Chart Datum it is not a boundary per se, the difference between the low-water mark and the Lowest Astronomical Tide are small and, for most purposes, can be accepted as the same.

The ICMA (2008) defines the seashore as the area between the low-water mark and the high-water mark. The shoreline then, in accordance with all the legislation, conventions and policy, seems to revolve around three key coastal boundaries: The low-water mark, the maritime baselines (i.e., the low-water line) and the high-water mark, depending on the purpose for which the shoreline is required. Once these three have been defined and can be accurately determined for their specified administrative purposes, the limits of all other properties, zones, areas, reserves and territories can be identified with ease. Each of these will be looked at separately.

4. LOW-WATER MARK

The ICMA (2008) defines the low-water mark as the lowest line to which coastal waters recede during spring tides. The low-water mark is the limit of the terrestrial cadastre. The area of jurisdiction of any Registrar of Deeds (and, by extension the Surveyors-General) extends to the low-water mark as per the published point-to-point description of their limits. Provincial, municipal and magisterial district boundaries may extend to the low-water mark (although this is not explicit in South African law). In terms of land tenure rights, very few extend to the low-water mark – there are a few instances where part of a tidal river or an estuary is included in private property, and only isolated lengths of the coast between the high-water mark and the low-water mark have been registered in the name of the local municipality. Therefore, the low-water mark does not generally require great accuracy in terms of position and is generally accepted to be somewhere between the two levels that can be determined from tide gauge data: the low-water line and the Lowest Astronomical Tide.

It is worth mentioning again that the jurisdiction of terrestrial administration extends to the low-water mark – which is land when the tide is out, and the maritime jurisdiction extends to the high-water mark when the tide is in. There is therefore uncertainty as to which authority is responsible for the management and control of the non-navigable areas between the maritime zone (limited by a straight line across the mouth of the river) and the limits of the low-water mark, sometimes many kilometres upriver. The Great Fish River in the Eastern Cape and Lake St Lucia on the Mkuze River in KwaZulu-Natal are examples. From an administrative perspective, land-based control for safety and security extends below the low-water mark into the sea, wherever it can be administered from the shore.

5. LOW-WATER LINE (MEAN LOW WATER)

Articles 5 and 7 of UNCLOS (1982) define maritime baselines as:

- "Normal baselines, being the low-water line along the coast as marked on large-scale charts officially recognised by the coastal State; and
- Straight baselines, being lines joining appropriate points … selected along the furthest seaward extent of the low-water line".

Having enacted the MZA (1994) prior to becoming a signatory of UNCLOS, SANHO (2018) has, for much of the coast, adopted a method only marginally different from Articles 5 and 7, namely:

- Straight baselines, calculated from GNSS points at the most seaward points above the high-water mark of rocks and islands (vide Article 121 of UNCLOS, 1982) such that minimal land above the high-water mark is seaward of any straight baseline;
- The co-ordinates of the GNSS points of the straight baselines have been published as Schedule 2 (MZA, 2004) (Figure 3); and
- Where there are no straight baselines, the normal baseline follows the low-water line, as defined in the MZA (1994).

Low-water is defined as the mean height of all low-waters for a tidal cycle of 18.6 years. The low-water line means the intersection of the low-water tidal plane with the land and includes the low-water line on a low-tide elevation (MZA, 1994). Therefore, the low-water mark referred to on the previous page and the low-water line are, positionally, not the same. Normal maritime baselines extend to the low-water line, whereas most jurisdictions of land-based authorities extend to the low-water mark. The low-water mark will always be seaward of the low-water line, except on a vertical plane such as a cliff face or sea wall, where the two will coincide. Any island that forms a part of the territory of the Republic of South Africa requires a determination of its low-water line, because it has its own territorial sea and exclusive economic zone.

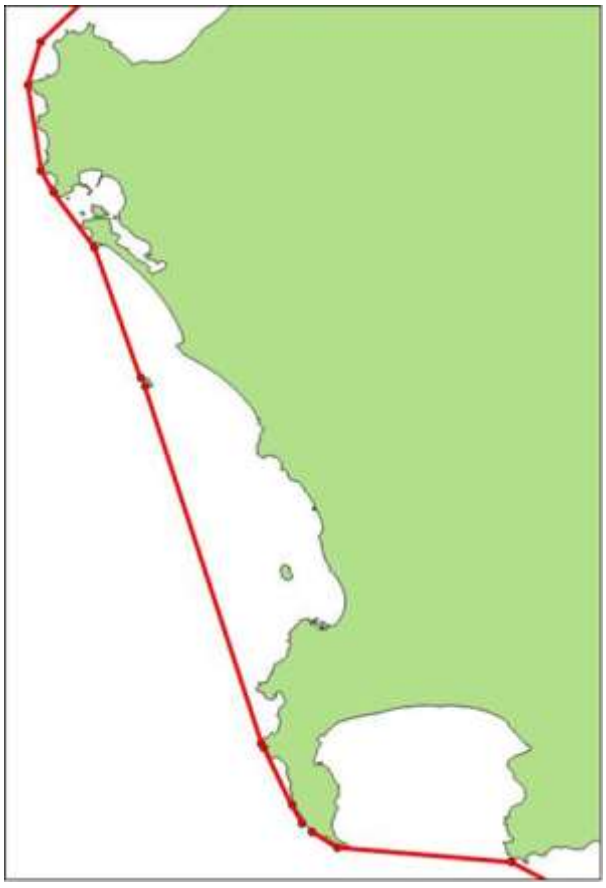

FIGURE 3: STRAIGHT BASELINES ESTABLISHED AROUND THE WESTERN CAPE COAST. SOURCE: SANHO AND NGI

Determining the position of the low-water line is relatively easy with today's technology. Tide gauge data is available at all major South African ports, which has been linked to the terrestrial land levelling data. South Africa also has a National Control Survey System that includes a network of 65 continuously operating GNSS base stations (TrigNet, 2021) that can provide reference and control for sub-metre positioning accuracy for any GNSS-linked surveys.

Airborne Light Detection and Ranging (LiDAR) technology has been identified as an effective technical solution to obtaining topographical information and is becoming more widely employed. The South African Council of Scientific and Industrial Research (CSIR) has established a co-operation agreement and collaboration with the US Army Corps of Engineers' Joint Aerial LiDAR Bathymetric Technical Centre of Expertise (JALBTCX) (JALBTCX, 2021). The JALBTCX team has successfully measured shallow bathymetry to a maximum

water depth of 53 metres and has used the system extensively along the entire US coastline. In another project, the Department of Agriculture, Environment and Rural Affairs of Northern Ireland (DAERA) has embarked on developing a 3D map of the whole of Northern Ireland's 763 kilometres of coastline (GIM, 2021). The data will extend into the marine environment using a bathymetric LiDAR survey. This project is expected to produce a baseline on which coastal change can be monitored.

Bathymetric LiDAR scanning is new to South Africa and it is unlikely that advanced bathymetric LiDAR processing and analysis capability exists in South Africa due to the current significant costs of the technology. Its application in the South African context would be limited to small areas, primarily in the better resourced metropolitan municipalities, but remains largely inaccessible to local municipalities and remote localities. However, knowledge sharing based on advanced JALBTCX research will help South African organisations to fast-track implementation of bathymetric LiDAR surveys in key areas, which will help addressing current crucial data and information gaps on the near shore environment. Most importantly, once implemented, it will facilitate the determination of a reasonably accurate position of the low-water line and the Lowest Astronomical Tide.

The quality of any data is dependent on the quality of the specifications and standards. These need to be established for the South African context and published for common application. JALBTCX has made its LiDAR standards available, which could be used as best practice. Generally, an accuracy of 0.10m is considered reasonable for topographical LiDAR data and 0.15m for shallow bathymetric LiDAR data. Deeper bathymetric LiDAR will be less accurate.

6. HIGH-WATER MARK

A definition of the high-water mark has been in existence since 1935 (SSA, 1935). That definition was superseded by the definition inserted into the ICMA (2008). The position of the high-water mark defines the seaward boundary of most coastal properties, the edge of many estuaries and the boundary of properties abutting tidal rivers. The ICMA (2008) defines the high-water mark as the "highest line reached by coastal waters, but excluding any line reached as a result of—

- exceptional or abnormal weather or sea conditions; or
- an estuary being closed to the sea".

In turn, the ICMA (2008) describes an estuary as "a body of surface water—

- that is permanently or periodically open to the sea;
- in which a rise and fall of the water level as a result of the tides is measurable at spring tides when the body of surface water is open to the sea; or
- in respect of which the salinity is higher than fresh water as a result of the influence of the sea, and where there is a salinity gradient between the tidal reach and the mouth of the body of surface water".

The term estuary, by definition, includes a tidal river. Most land ownership around estuaries extend to the high-water mark, although there are some instances where parts or even the whole

of an estuary is privately owned. Currently, the definition of estuary excludes the floodplains, marshes and ecologically sensitive lands surrounding the "body of surface water", but that concern is being addressed elsewhere.

The Surveyors-General are the custodians of the position of all cadastral property and land rights boundaries (LSA, 1997[1]). Therefore, wherever the high-water mark is a cadastral boundary by reference thereto on an approved cadastral document, the Surveyor-General is the custodian of that positional data. Every cadastral document is dated with the date of survey (carried out by a Professional Land Surveyor) and the date of approval (by the Surveyor-General). The Land Survey Act (LSA, 1997[2]) stipulates that the physical position (in, on, over or under the ground) of beacons and boundaries defining land parcels and land rights supersedes the mathematical or delineated record as documented on the diagrams, unless it can be proven that the physical position found is incorrect or has been moved by anthropogenic activities or unnatural events.

While the high-water mark is, with a few exceptions, a cadastral boundary, it is, by definition, an ambulatory line, which means that it moves dynamically because of the causes referred to in the introduction. Due to its ambulatory nature, the position as physically surveyed is only the legal position of the high-water mark on the date of survey. This position may become outdated over time because of its natural movement and the recorded position may not be useful[3] for decision-making purposes.

Cadastral documents (diagrams, general plans and sectional plans) approved by the Surveyors-General are the legal documents that define the cadastral spatial data. These documents are freely available to all from the scanned image dataset that is accessible through the Chief Surveyor-General's website (CSG, 2021). Every diagram and general plan that describes a land parcel or land right as extending to or bounded by the high-water mark depicts the legal position of the high-water mark at the date on which it was surveyed. The legal position of the high-water mark is lawfully surveyed by Professional Land Surveyors external to the Offices of the

[1] *Vide* Section 6(1)(a).
[2] *Vide* Section 30(a).
[3] The recorded position may no longer be useful because:

- Some of the high-water mark positions shown on old diagrams were not surveyed but simply sketched;
- Before 1935, the coastal boundary was not specifically defined as the high-water mark, so there was uncertainty as to its actual position – the resultant line shown on the diagram may not coincide with the position as it is currently defined and physically existing on the ground;
- Some of the high-water mark positions are inaccurate or incorrectly identified – this is the case even with some recent surveys;
- Some high-water mark positions have moved substantially, even over short periods of time;
- Some coastal properties are not bounded by the high-water mark, but may include estuaries or even extend to the low-water mark, and are therefore lawfully alienated seaward of the high-water mark (*vide* Section 7(2) of ICMA, 2008);
- Anthropogenic activities and structures may have superseded the high-water mark positions and are now generally accepted as the high-water mark.

Surveyors-General. The surveys are done in consultation with the relevant Surveyor-General who shall, if deemed necessary, visit the site with the Professional Land Surveyor appointed to undertake the survey. The Professional Land Surveyor shall lodge the completed survey with the Surveyor-General for examination and record purposes, and the Surveyor-General shall only accept the surveyed position when he or she is satisfied that the position complies with all applicable legislation and good practice (Williams-Wynn, 2012, Fisher and Whittal, 2020, pp. 505 - 574).

From approved diagrams and general plans, the Surveyors-General have created a second dataset – the Cadastral Spatial Information dataset, which is a compilation and visual representation of the positions of all diagrams and general plans in relation to each other. Until recently, these were hand drawn on film or paper compilation sheets. During the 1990s[4], the Offices of the Surveyors-General created a digital map of all land parcels in a very short time. While the digital map was relationally complete, the speed of capture compromised some of the accuracy. Outdated data was simply reproduced, for example, the position of the high-water mark was digitised off the legal documents (no matter the age) or from paper compilations or other available maps.

Over the twenty-five years since the project was initiated, the accuracy of Cadastral Spatial Information as depicted on the continuous map has been improved through the addition of every new batch of survey information submitted to and approved in the Offices of the Surveyors-General. It is this Cadastral Spatial Information, made up of a collation of all legal cadastral boundary determinations surveyed over 350 years, for which the Surveyors-General are the custodians (SDIA, 2003). This includes the position of the high-water mark wherever it is a cadastral boundary.

Notwithstanding the obligation placed on landowners as prescribed (LSA, 1997[5]), there is no mechanism on the part of any organ of state to enforce a property owner (whether private or an organ of state) to provide a reasonably current or a sufficiently accurate position of any cadastral boundary, including the high-water mark, other than at the time of original survey and approval of the cadastral document delineating that land parcel (The result is seen in Figure 4). It is not the function of the Surveyors-General to establish, by resurvey, the legal position of the high-water mark. It is their function to ensure that every survey performed by a Professional Land Surveyor complies with the requirements of the LSA (1997) and the Regulations.

With the implementation of SDIA (2003) and the recognition thereunder of the Cadastral Spatial Information as a key base dataset, there is now a plea for improved positional accuracy of that cadastral dataset. Many organs of state as well as property owners require a reasonably accurate and current position of ambulatory boundaries for spatial planning and decision-making purposes. Because the high-water mark is a swash line resulting from the momentum

[4] In the mid-1990s, the Independent Electoral Commission approached the Chief Surveyor-General with a request to create an electronic "continuous map" of these compilations to facilitate the expansion of election numerator areas to include all South Africans. This became known as "Project Miracle". This dataset was created in terms of Sections 3(1)(d) and 6(1)(f) of LSA, 1997.

[5] Note Section 41.

of the sea running up against the coast, it is not an elevation contour. Therefore, topographic and Bathymetric LiDAR data based on a tide gauge height will give, at best, only a rough, approximate position substantially seaward of the true high-water mark.

FIGURE 4: AN EXAMPLE OF INADEQUATE DATA OF THE HIGH-WATER MARK AT LLANDUDNO. THE YELLOW LINE REPRESENTS A HIGH-WATER MARK DETERMINATION CURRENTLY IN USE, BASED ON OUTDATED AND INACCURATE DATA. THE BLUE LINE REPRESENTS MEAN SEA LEVEL EXTRACTED FROM CURRENT LARGE-SCALE RECTIFIED IMAGERY. SOURCE: NGI AND DWS

The National Geomatics Management Service (NGMS), a Branch in the Department of Agriculture, Land Reform and Rural Development, headed by the Chief Surveyor-General must rely on other information, knowledge and experience at its disposal to be able to delineate a more accurate, reasonably current position of the high-water mark to improve the quality of its delineation on the electronic compilation of the Cadastral Spatial Information.

7. DETERMINATION OF THE POSITION OF THE HIGH-WATER MARK

The Chief Directorate: National Geospatial Information (NGI), the national mapping component of NGMS, will assist the Surveyors-General in generating a reasonable approximation of the position of the high-water mark, based on agreed upon standards, methodology and metadata, using consistent and uniform data sources, which more accurately reflect its current position and is therefore more useful for spatial planning and decision-making purposes[6]. Such delineation of a reasonable approximation of the position of the high-water mark will possibly include a combination of the following datasets:

[6] The approximate high-water mark delineation will be carried out by NGI in terms of Sections 3(1)(d) and 3A(1)(e) of LSA, 1997. This determination by NGI will not be undertaken as a survey in terms of Sections 11, 16, 29 or 32 of LSA, 1997.

- NGI have established a positional line colloquially called the "Mean Sea Level" (or MSL) as their land levelling datum. (Note the blue line in Figure 4). By definition (ICMA, 2008), the high-water mark cannot be below MSL. Therefore, MSL will be the lowest possible limit (most seaward position) of any high-water mark determination;
- Where or when available, LiDAR determination of the elevation of the mean high-water spring (HWS) as defined and determined from the tide gauge records can supersede the MSL as the most seaward position of any high-water mark determination;
- Under normal conditions, maximum tidal range in South Africa is between 2 and 2.5 metres. It is therefore highly unlikely that the high-water mark as defined will ever reach the 5-metre contour determined by NGI in their terrestrial height dataset, based on their heights above MSL. Therefore this 5-metre contour can safely be used as the most inland limit of the high-water mark;
- Between the 5-metre contour and MSL (or HWS), several other datasets are available, from which the high-water mark can be determined at improved accuracy, namely–
    - Features visible on recent high-resolution rectified imagery available from NGI (e.g., note the imagery in Figure 4),
    - Structures such as sea walls, revetments, harbour quays and promenades *etc*.,
    - Hard wood (*mesophyte*) vegetation lines,
    - Rock discolouration from lichen growth, salt water inundation, *etc*., and
    - Deposits of storm *débris* on sandy beaches may identify sand dune toe;
- Any resurvey of a high-water mark undertaken by a Professional Land Surveyor at the behest of the landowner and accepted by the Surveyor-General (LSA, 1997[7]). These resurveys would follow generally accepted principles (Williams-Wynn, 2012 and Fisher and Whittal, 2020, pp 505 - 574);
- Determinations of the high-water mark, tide gauge data and coastal surveys provided by SANHO or other organs of state employing officials registered with SAGC (2013).

It is important to date stamp and describe the source of each segment of the high-water mark delineation, to indicate whether that section of the high-water mark is an approximate position based on a specified data source, or a legal position based on a determination by a Professional Land Surveyor with the concurrence of the Surveyor-General. Further, it is important to note that spatial data ethics must be upheld. Whenever there is an objection, doubt or dispute on the position of the high-water mark, the current position of the high-water mark should be re-established to ensure decisions are made on current information.

FIGURE 5: UNDER NORMAL CONDITIONS, SEA WALLS CONTAIN THE SEA. AN ABNORMAL SEA SURGE BREACHED THE SEA WALL AT SEA POINT, CAPE TOWN ON THE 7TH JUNE 2017. SOURCE: WILHELM VAN ZYL

[7] Sections 11, 16, 29(6) or 32.

The land-owner, or an affected organ of state (having notified the owner), may, at his/her/its expense, approach a Professional Land Surveyor, who will, after consultation with the Surveyor-General, resurvey the current position of the high-water mark and lodge the prescribed survey records with the Surveyor-General for concurrence and acceptance (LSA, 1997[8]) (Figure 6). That re-surveyed position of the high-water mark will, once it is accepted by the Surveyor-General, be endorsed on all relevant cadastral documents and electronic databases as the most recent determination of the high-water mark (LSA, 1997[9]).

FIGURE 6: THE AUTHOR EXAMINING THE SHORELINE EVIDENCE NEAR THE MOUTH OF THE GREAT FISH RIVER WITH PROFESSIONAL LAND SURVEYOR GARY PALMER.

Lastly, it is recommended that any organ of state required to give planning approval based on a development application or environmental impact assessment in terms of any law, and the position of the high-water mark has a material impact on the proposed development, that organ of state should not consider the development application until the applicant has obtained a re-determination of the position of that portion of the high-water mark affecting the property. Such re-determination of the high-water mark affecting the property would be surveyed by a Professional Land Surveyor (LSA, 1997[10]), whose services would be procured by the applicant.

8. CONCLUSION

[8] In terms of Sections 29(6) and 47.
[9] *Vide* Section 29(7).
[10] *Vide* Section 29(6), referring *mutatis mutandis* to Sections 29(1) – (5), and Section 47.

The shoreline is, therefore not a single line, but a strip of land and sea between three lines defined in South African legislation as the high-water mark, the low-water line and the low-water mark. It is an area of dual administration – marine controls extend up to the high-water mark, and terrestrial controls extend down to the low-water mark. Because the high-water mark, the low-water mark and the entire shoreline in between is a dynamic environment, the position of these key boundaries are also dynamic. No matter how good the technology used or precise the survey was to determine the position, it only determines the position at the time of such survey. Some stretches of the shoreline indicate dramatic movement, others are perceived to be substantially static. Re-measurement intervals will need to be determined to ensure relevance and reliability of the data.

In South Africa, the high-water mark defines the landward extent of the maritime authorities and marine reserves. It is the baseline for all coastal environmental controls. In most instances, the high-water mark is the cadastral boundary for coastal properties and land rights. It is therefore essential that its position is known with reasonable accuracy and determined regularly to ensure that its position is useful for administration, control and decision-making purposes of the seashore and the adjoining land.

Similarly, the low-water mark defines the seaward extent of the terrestrial authorities. However, it serves very little other purpose because the low-water line (not the low-water mark), where it is not replaced by straight baselines between accurately co-ordinated points, is the baseline of the maritime zones and territories. The position of the ambulatory low-water line should also be known with reasonable accuracy and determined regularly to ensure that its position is useful for administration, control and decision-making purposes of the seashore and the adjoining sea.

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[11] The ICMA appeared in Government Notice 138 in Government Gazette 31884 dated 11 February 2009. Its commencement date was 1 December 2009 – with the exclusion of sections 11, 65, 66, 95, 96 and 98, of which the commencement date of sections 65, 66, 95, 96 and 98 was 5 February 2016. The ICMA was amended by the National Environmental Management: Integrated Coastal

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10. BIOGRAPHICAL NOTES

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[12] The South African Geomatics Council registers Professional Land Surveyors and persons in applicable branches of the geomatics profession in terms of Section 13 of the Geomatics Professions Act, Act No. 19 of 2013

[13] According to the Hydrographic Bill, (B 17B-2018), South African Navy Hydrographic Office (SANHO) is responsible for hydrographic data "obtained from the measurement and description of the physical features of the exclusive economic zone, all internal waters and adjacent terrain, including the depth of the water, configuration and the nature of the topography beneath, the direction and force of currents, heights and times of tides and water stages, location of topographic features and fixed objects for survey and navigation" … "taking into account the resolutions and recommendations of the International Hydrographic Organisation".

[14] South Africa became a signatory to the UNCLOS on the 23rd December 1997.

Chris Williams-Wynn grew up in the Eastern Cape, South Africa, and went to school at St Andrew's College in Grahamstown. He completed a BSc (Honours) degree in Land Surveying from what is now the University of KwaZulu-Natal in 1981 and his Master's degree in Public and Development Management at the University of the Witwatersrand in 2007.

Mr. Williams-Wynn is a Registered Professional Land Surveyor, a Registered Sectional Titles Practitioner and a Registered Township Planner. Having worked for 17 years in the private sector, he moved into the government sector due to his deteriorating physical ability. He was appointed the Surveyor-General: KwaZulu-Natal on 1st May 1998 and transferred at his own request to establish the Office of the Surveyor-General: Eastern Cape on 1st July 2010.

Mr. Williams-Wynn advises Government institutions on land issues, with particular interest in legislation affecting property development approvals and land administration. He serves on the Townships Board, the Land Use Regulations Board and the Spatial Planning and Land Use Management Steering Committee. He has had papers published in the PositionIT magazine, the Deeds Journal and on the FIG website. One of his main passions is to see people in the Traditional Communities also benefit from the Land Rights system of the country.

Outside of his survey career, Mr. Williams-Wynn is interested in environmental conservation, with special interests in birds, trees and estuaries. This interest has benefited his knowledge concerning coastal public property and the legal position of boundaries adjoining the high-water mark of the sea and rivers. He is a Society Steward of the Methodist Church. He is married to Glenda, a Natural Sciences Graduate, who has worked in the Conservation Ecology Research field and is a qualified water exercise and rehabilitation instructor. They live in Kidd's Beach, South Africa.

11. CONTACTS

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