S.S. Karin

Shipwreck Report

by

Vanessa Maitland

Durban Harbour Entrance Widening
Kwazulu-Natal
South Africa
June 2010

Table of Contents

Appendices

Figures

Hawseholes

Portholes

Bulwarks

Washports

Keel and Floors

Fixed Keel

The Bow

The Stern

Hull Attachments and Deck Equipment

Pillars and Railings

Masts

Doors

Rigging Equipment

Anchors

Boiler

Engine

Condenser

Pumps

Miscellaneous Artefacts

Galley Utensils

Stone

Enameled Artefacts

Glass

Ceramic Artefacts

Tiles

Everyday Ceramics

Stoneware

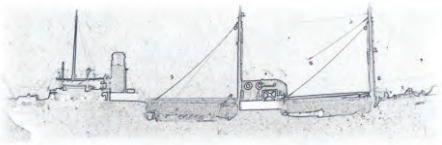
Earthernware

Acknowledgements

Thank you to all the people who made this report possible. Special acknowledgements to the following people. Kevin Weerts and Allen Schultz from HMG, Joint Venture; Colin Donald and Peter Renda for tirelessly answering technical questions; all the Subtech divers who worked on the wreck. Thanks to Charlotte Firbank-King for tirelessly editing, and especially to my children for putting up with my incessent fascination with “old junk”.

Vanessa Maitland
BA Hons Archaeology (Wits)
082 490 4066
031 563 2417
finfin@telkomsa.net

The Historical Background of the



S.S. Karin

Introduction

In 2009, during the Durban Harbour Entrance Widening project, an iron, riveted vessel was found. SAHRA was contacted to investigate and the wreck was established as being older than 60 years. Thus, under the National Heritage Resources Act, it was designated as of historical interest. Its removal was approved under the control of an archaeologist.

Durban, South Africa

Durban is situated on the south-east coast of Africa. The prevailing winds are from the north-east and south for most of the year. August to October are considered the most “boisterous” months, where the barometer fluctuates. Ebb tides are usually about 3.5 knots. Pilots of heavy vessels are advised to exercise care when approaching the entrance of the harbour (Sailing Directions 1986: 34).

Durban Shipwrecks

The first shipwreck, *Good Hope*, was recorded in 1685. Since then, in excess of 140 vessels have come to grief in and around Durban (Maitland Unpublished Shipwreck Database).

Figure 1: Map showing the exact location of the *S.S. Karin* wreck site at 29° 51'34.3" S 31°03'56.2" E. It lies 1.18km from the end of the North Breakwater (Google Earth 2009)

History of the *Steamship Karin*

Name	Date	Registered Owner	Port of Registration
Leksveer	1918	N.V. Rotterdam Algemeene Scheepvart Mij.	Rotterdam, Netherlands
Maastad	1920	N.V. Algemeene Rotterdam Overzee Scheepvart Mij.	Rotterdam, Netherlands
Maggie O'Regan	1921	Thomas Murray (Queenstown) Limited	Cork, Ireland
Karin	1923	African Coasters Limited	London, Great Britain
Karin	1924	C.G. Smith & Co. Limited	Durban, South Africa
Karin	1927	Smith's Coasters (Pty) Limited	Durban, South Africa

The *S.S. Karin* was built in 1818 as the *Leksveer* in Slikkerveer by De Maas Intl.Yard (The Miramar Ship Index; Appendix A: 3)

Figure 2: The launch of the *Leksveer* in 1818 (Photo: Zwama)

Rotterdam, South Holland, Netherlands

The first mode of transport that started binding the cities of Amsterdam, Haarlem, The Hague, Rotterdam, Leiden and Delft into a 'Randstadt' or conurbation was the barges. In the sixteenth and seventeenth centuries canals were built in the north and south-west of Holland, connecting all the main cities.
During the 1830s and 1840s, railways were built between these cities and they superseded the barge system. In the latter half of the nineteenth century, the Netherlands began to industrialise (Kooij & van de Laar 2003:113 - 115).
In 1864 the central government constructed the open waterway connecting Rotterdam to the sea and by the late nineteenth century Rotterdam's geographical position and prior investment into port infrastructure began to pay off. The local government invested heavily in developing private ports on the south bank of the River Maas. This development was a response to the demands of the industrial age. Apart from maritime, there was little large-scale industrial development in Rotterdam (Kooij & van de Laar 2003:115 - 116).

Slikkerveer Village

This village is on the south bank of the Niewe Maas River that connects to Rotterdam. It is in the municipality of Ridderkerk (Wikipedia 2010).

Figure 3: Map showing the location of Slikkerveer in relation to Rotterdam and the Niewe Maas River linking them (Google Earth 2010)

De Maas International Shipbuilders

The shipyards below Rotterdam were very successful. From 1915-1918 the average number of new ships built there was 53 per year (Davids & Schippers 2003:7).
De Maas International launched four boats in 1818, from four yards (Miramar Ship Index).
In the early 1900s the shipbuilders introduced new elements in the large RDM yard which was an extension of the De Maas yard. The layout of the yard was more efficient, bigger slipways were built, larger cranes and new machines were introduced. One of these was a hydraulic riveter for manufacturing boilers. The yard also produced their own electricity. This yard was one of the most modern in the Netherlands (Davids & Schippers 2003:16).

C.G. Smith & Co. Limited

Charles Smith emigrated to South Africa in 1861 with his parents. He was originally employed by a local sugar merchant. Smith established his first business in 1887. It was centred around horses, cattle and sugar distribution. Initially Smith chartered a vessel; in 1896 he bought his first vessel, the *Umzimvubu*. After 1901, Smith sent his vessels to East London, Port Elizabeth and Knysna.
The depression in shipping, following the First World War, led to Smith separating the shipping section of his business from his expanding sugar business. The *Karin* and *Kate* were added to the little fleet. The depressed coastal shipping trade led to the formation of Smith's Coasters (Pty) Ltd in April 1927. The sinking of the *Karin* almost led to the collapse of the new company. However, Smith believed that the industry would improve and he used his sugar empire to prop up the coasters.
Smith was knighted for his services to the Natal economy and passed away in 1941.
Smith's Coasters merged with Unicorn Lines in 1966 (Ingpen: 25 - 38).

Captain Ole C. Asdal

Capt. Asdal, a Norwegian, was the master of the whaler *Norman II* when she was wrecked off St. Lucia Estuary in 1926. He was the master of the *Karin* when she sank in 1927. He supervised the salvage of the *Border*, which ran aground in the Umzimvubu River at Port St. Johns. Captain Asdal retired in 1965 after 65 years at sea (Ingpen: 24, 30, 55)

Figure 4: The toasting of Captain Asdal (centre), prior to his final voyage as master of the *Voortrekker* (Ingpen: 55)

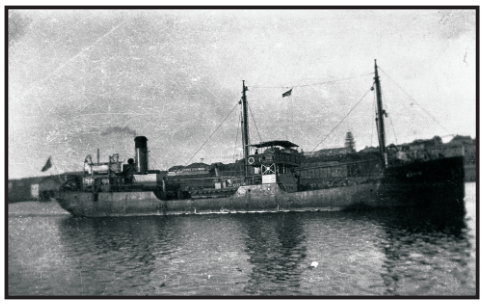


Figure 5: The *Karin* in East London during the 1920s (Photo: Iziko Maritime Centre)

Figure 6: The *Karin* in Cape Town, date unknown (Photo: Pretoria Archives Repository)

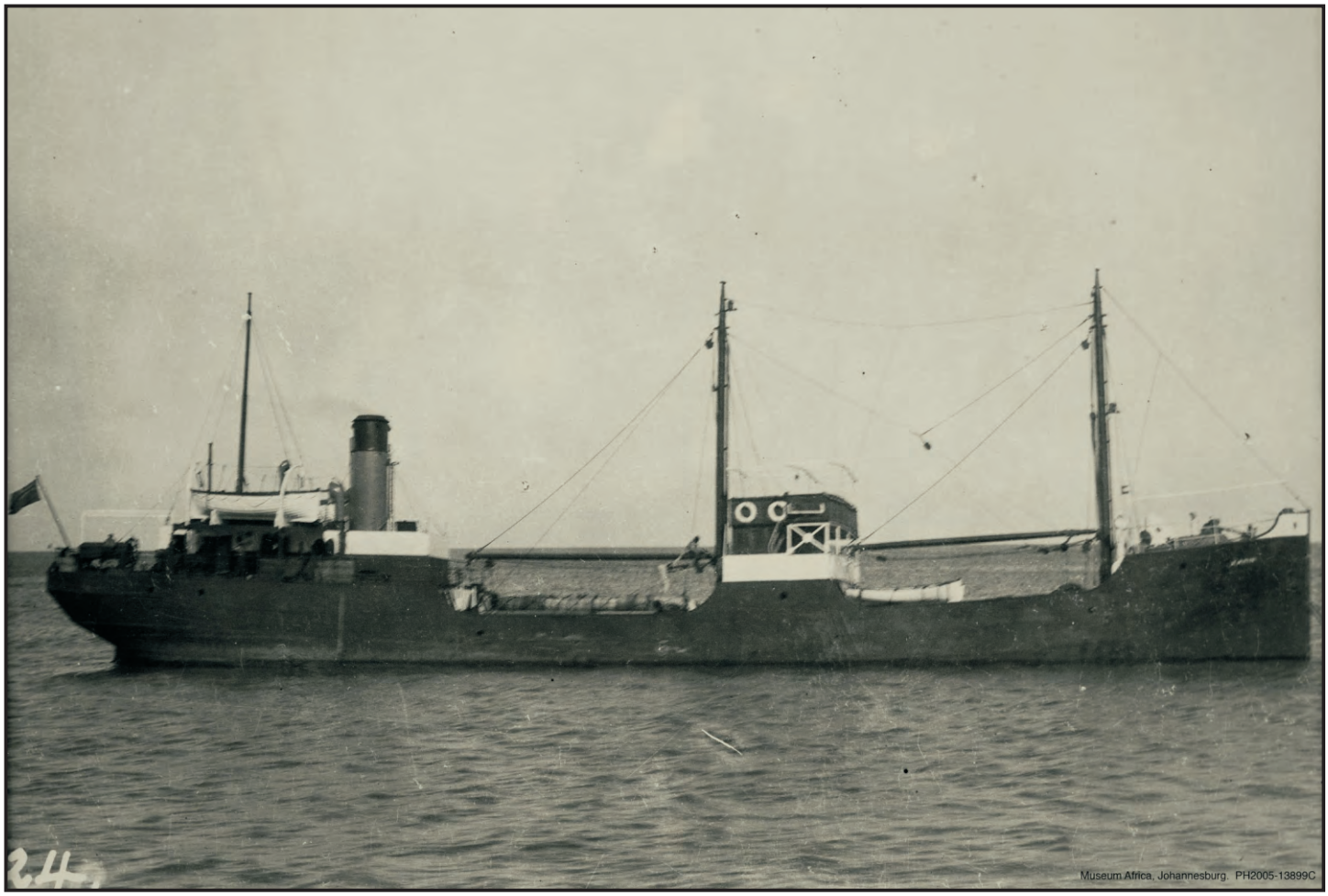


Figure 7: The *Karin*, location and date unknown (Photo: Museum Africa)

Karin's Crew in October 1927

Master	-	Capt. O.C. Asdal
Mate	-	P.B. Sale
Bosun	-	E. Morgan
Quartermaster	-	P. Laurence
First Engineer	-	D. McNaughton
Second Engineer	-	C. Cuthbert

The balance of the crew was made up of 12 "Natives", their names are not recorded. The only "native" crewman mentioned by name is the man that drowned and this is simply stated as "Elias" (Appendix A: 112 - 114).

The Weather, 22 October 1927

The official weather report for the day was a heavy easterly swell, moderate sea with a moderate north-easterly wind (Appendix B: 213). The Point signal man, James Bailey, stated "Moderate north-east breeze in the forenoon bearing to eastward at noon and onwards. Weather fine and hazy the whole day. Heavy easterly swell and a moderate north east sea. The entrance was smooth except on the ebb tide." (Appendix A: 64)
However, the crew of the *Karin* state that there was a heavy swell on the outside of the bar and a cross-swell across the bar this, according to them, led to difficulties. According to the *Karin's* mate, Sale, there was a strong ebb or half-ebb tide, a fresh NW wind and a choppy sea (Appendix A: 22).

Loading of the *Karin*, October 1927

The *Karin* should have departed Durban Harbour on Thursday, 20 October but was delayed due to heavy rains which caused congestion at the berths (Appendix A: 10).

The *Karin* was loaded with petrol, sugar, rice, methylated spirits, ether, molasses, oil, jarrah timber and general cargo including four mailbags (Appendix A: 9,10, 97; Appendix B: 219, 221).

The mate, P.B. Sale, drew a plan of how the deck cargo was loaded, from memory. The cargo loading was of some concern to the Court of Inquiry; they believed the vessel may have been badly loaded, contributing to her to sinking (Appendix A: 8).

Sugar was loaded at Congella, through the forward hatch, between two tiers of petrol drums. The sugar was placed on 9" wattle dunnage poles over a ballast tank (Appendix A: 27).

Two tiers of 44 gallon petrol drums were stowed. The drums had built-in hoops on the ends and two raised edges in the middle and measured 2' x 2' x 2' 10.5" each. The tiers reached a height of 3' 9" (Appendix A: 11, 27).

The *Karin* moved to "C" shed where petrol was loaded on the bottom of the hold, fore and aft, bilge to bilge, it was not stowed on end (Appendix A: 27).

According to C.J. Ballard, shipping manager for Smith's Coasters, the petrol was placed on dunnage, laying longitudinally fore and aft. But according to P.B. Sale there was no dunnage used under the petrol. "Never used dunnage for petrol drums. A petrol drum is not like a barrel, it is perfectly cylindrical." (Appendix A: 12, 27)

The forward section of the hold contained 2 or, according to Sale, 3 tiers of petrol (Appendix A: 11, 27). The *Karin* returned to Congella where more sugar was laid over the petrol through both hatches. The central bags of sugar apparently helped to steady the drums. It was common practice to stow a potentially leaky cargo below a perishable cargo. There was a separation cloth over each end of the petrol where it came into contact with the sugar (Appendix A: 27). Some sugar was laid at the bottom of the hold between the petrol because these were destined for Algoa Bay and would be unloaded last. The rest of the cargo was destined for East London (Appendix A: 11).

The aft end of the forward section of the hold contained jarrah timber and general cargo (Appendix A: 97).

Over all the aforementioned cargo, sugar was filled to the beams of the hold (Appendix A: 28).

P.B Sale roughly calculated the weights of the cargo as follows: 20 pockets sugar = 1 ton, 11 drums petrol = 1 ton (Appendix A: 38).

P.B Sale later stated that he never liked to go to sea with a full cargo in the *Karin*; he preferred a half or three-quarter cargo. He had nothing to back up this preference other than a “feeling”, but he had nothing bad to say about the vessel (Appendix A: 39). I find the above statement enlightening and indicative of the pressure placed on the coastal shipping industry, due to the economy, that the mate, in charge of loading would go against his better judgement and overload the vessel, putting ship and crew at risk.

Deck cargo consisted of 15 drums of methylated spirits, 5 cases of ether, 1 (25 gallon) drum of molasses and 2 cases of oil. These were initially stored on the starboard side of the forewell deck. This cargo caused the ship to list to port when she was travelling down the Maydon Channel. They moved 5 of the methylated spirit drums to the starboard side, correcting the list (Appendix A: 41).

The ballast tanks were all empty. The only tanks that contained water were the aft peak tank which held water for the boiler and the two 3 ton domestic water tanks (Appendix A: 92).

The *Karin* was loaded 11' 2" forward and 12' 2" aft, this was a mean draft of 11' 6". P.B. Sale stated that he allowed an inch for loading a fixed keel (Appendix A: 41). This keel is not mentioned again in the documents. It was found welded to the hull, a post-construction addition.

It was accepted practise to load petrol beneath sugar, as sugar is perishable(Appendix A: 131). However, the specific gravity of sugar is twice that of petrol. In the case of the *Karin*, the Court concluded the following:
The *Karin* was loaded to 11' 7.5" which was 2.5" light of the centre of the disc. The cargo filled the entire hold except for a section of No. 1 hatchway. However, another 4 tons was loaded on the deck, this gave the vessel a 'metacentric' height of 4" and the high stowage of the sugar in the hold, together with the weight of the deck cargo, contributed to the wreck (Appendix A:170 - 175).

The Wrecking of the *Karin*

The *Karin* had been owned by Smith’s Coasters for about 4 and a half years. She undertook about 48 voyages per annum. She completed about 200 voyages for the company (Appendix A:15).

According to P.B Sale, when they left their berth at Congella at 16h00, under the pilotage of Pat Laurence, the quartermaster, they had a 2° list to port. When the vessel turned in the Congella Basin, water came through the scuppers and she developed a bigger list. The drums were moved to the starboard side, to correct the list. The mate checked the clinometers on the bridge and apparently the vessel was on an even keel (Appendix A: 22, 60).

According to V.C. Large, a former ship's captain and stevedore, the fact that the *Karin* heeled over while turning in the harbour, indicated that the vessel was “tender”. That the list was righted by moving only 1.5 tons of deck cargo also indicated a certain “tenderness”. In his opinion, the master of the vessel should have returned and re-stowed the cargo (Appendix A: 139 - 141).

There were a number of witnesses to the fact that the Karin was listing to port more dramatically than was claimed. C.I.D. Sergeant Cairns and Detective Combrink, two policemen who were fishing at Congella, stated that there was a heavy list to the port and the vessel seemed heavy in the water and appeared to be hard to steer as the steersman was constantly pulling the wheel around. According to the other witnesses the plimsoll marks on the port side were well below water while those on the starboard side were high above the water (Appendix A: 17 - 21).

The *Karin* went across the bar at full speed on an even keel at 17h12. The ship left the harbour on an easterly course. Half a mile from the bar, they started their turn to the south-west. Before they completed the turn, they took a heavy swell on the port side. It filled the well decks and before she could right herself, she took another two swells across her deck. The welldecks filled with water to 5' 6" and she only had a free board of 11' 6" (Appendix A: 42 - 43).

The engines apparently became unmanageable and because of the lack of power, the captain did not attempt to make it back into the harbour. Instead they tried to turn the bow into the sea. At this stage it is estimated that there was at least 50 tons of water on the decks. The water entered through the portside washports and it was unable to run off due to the washports being under water. It was also during this time that it was noticed the lavatory door was stoved in. This allowed water to enter into the Master's cabin and the saloon as these internal doors were often left open (Appendix A: 112 - 113).

The *Karin* then hailed the tug *Sir John* and made a towrope fast on the starboard side. The tug attempted to turn them. The *Karin* also called the *Harry Escombe*, but before a line could be attached, the *Karin* was on its beam end (Appendix A: 24).

According to P.B. Sale, twenty minutes prior to the vessel foundering, the deckhands were offered lifebelts, but apparently they were “laughed” off. A “native” deckhand was seen clinging to the keel and then disappeared. The first engineer, MacNaughton apparently tried to push an oar to the drowning crewman, but he was unable to take it. At this time the *Karin* had turned turtle and the crew were on the keel. According to Capt. Asdal, the crewman was only known as “Elias” (Appendix A: 24, 76, 114). The body of Elias washed up on the Durban Beach Front close to Snell Parade the 28 October 1927 (Appendix B: 223).

The two tugs put out two lifeboats each to rescue the crew. P.B. Sale was exhausted and going down for the third time when he was pulled into the lifeboat by his hair (Appendix B: 215).

The *Karin* had lifebelts and lifeboats, but there was no time to launch them and the lifeboats had not been tested since February when P.B. Sale joined the vessel (Appendix A: 43).

The sinking of the *Karin* was an exciting event on that Saturday evening in Durban, so many people rushed down to the Point area that there were traffic jams and some women apparently fainted while viewing the action (Appendix B: 217).

The *Karin* finally sank at 17h50 (Appendix A:72).

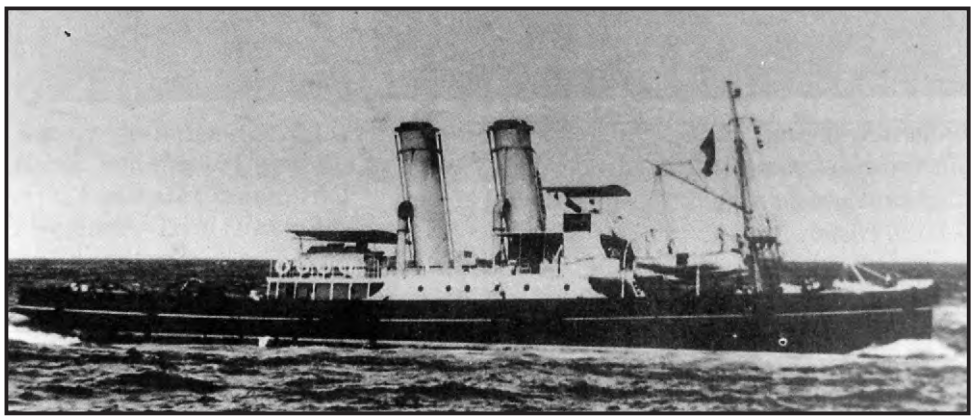


Figure 8: The tug *Sir John* (Pearson 1995: 78)

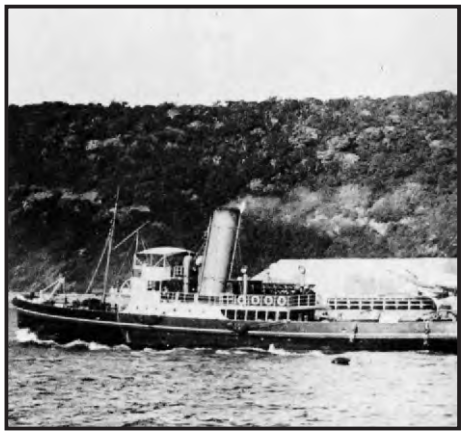


Figure 9: The tug *Harry Escombe* (Pearson 1995: 78)

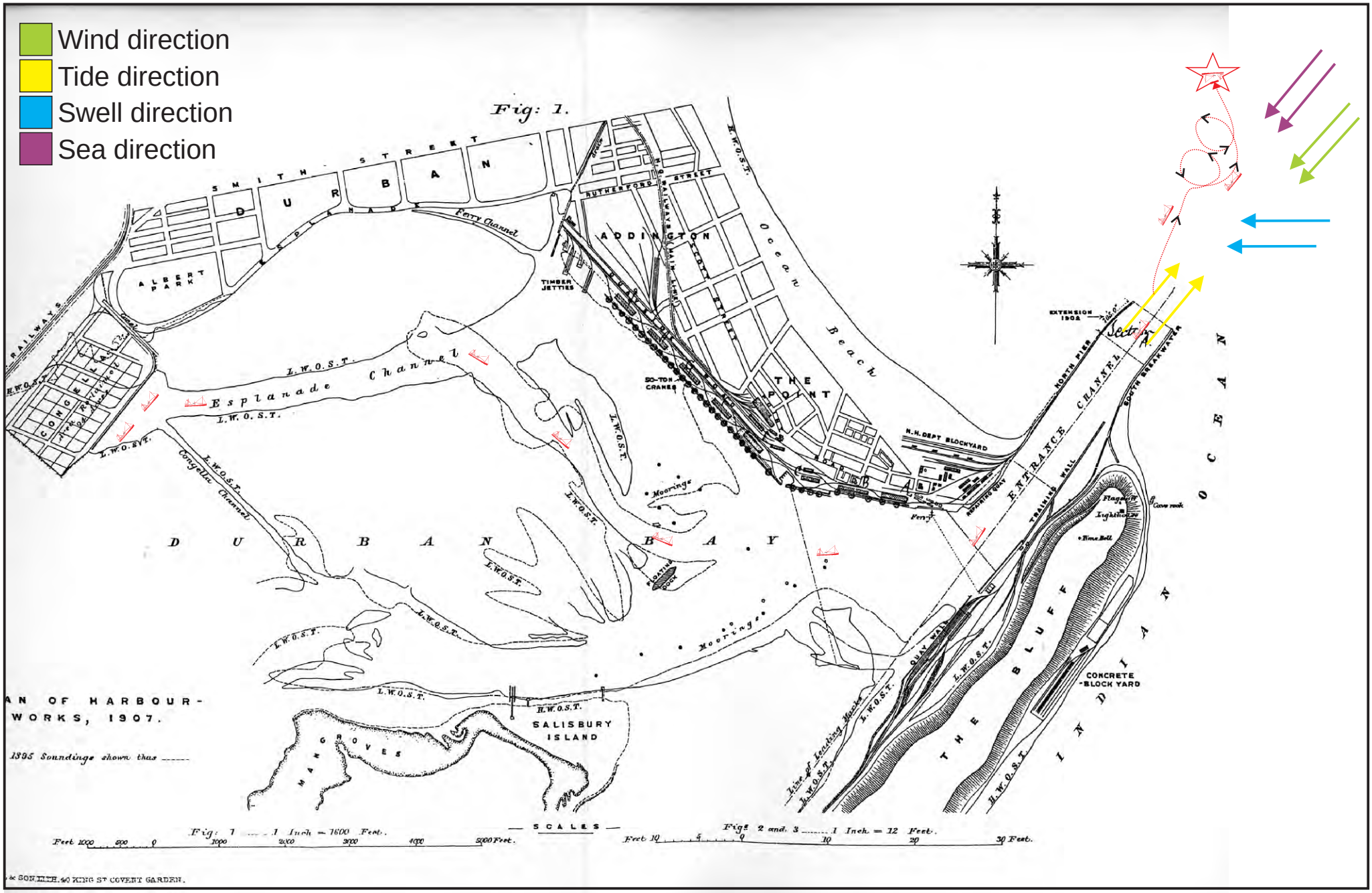


Figure 10: Durban harbour map from 1907, showing the probable route of the *Karin* on 22 October 1927, showing wind, tide, swell and sea directions (Bender 1988:148, drawing on information from Pearson 1995 and Appendix A: 8 - 162)

The official inquiry decided the *Karin* was unable to right herself quickly enough after shipping the first sea because, although there were three scuppers on each side in each well, they were too small to allow the quick release of water. In addition if open railings instead of closed bulwarks had been fitted it is unlikely the vessel would have capsized. Thereafter, water entered through the broken lavatory door, flooding the interior. Water may also have entered the air pipes leading to the double bottom, these pipes were 2" in diameter, with open ends just under the bulwark rails. The water flow would be relatively slow, but effective as the vessel stayed afloat for nearly 30 minutes after the bulwarks went under the water. (Appendix A: 165 - 175).

While the vessel was loaded similarly to previous voyages, the deck load was the deciding factor in making the vessel unstable. (Appendix A: 173)

The Court of Inquiry summarises the reasons for the loss of the *Karin* in the following extract:

> "Taking into consideration the specific gravities of the two main commodities in the cargo, viz. petrol and sugar, the Court is of the opinion that the petrol in drums with the broken stowage that would occur on the flooring, must be classed as a light cargo, and the sugar in bags stowing as one solid mass, must be classed as heavy cargo. Had the sugar and petrol been stowed on the half-hatch principle for the two ports the centre of gravity would not have been so high and the vessel would have been properly stable. The method of stowage employed, considering the large amount of petrol in relation to the other cargo in this small vessel cannot be too strongly condemned. Referring to 'Stevens on Stowage' 7th edition, page 748 the following lines appear, 'Generally speaking, goods lighter than water should not be stowed in the bottom of the hold and goods heavier than water above them'.
> After careful consideration of all the evidence the Court is of the opinion that the loss of the Karin is attributable purely and solely to the way the cargo was stowed in the hold, thereby making the vessel 'crank'; that the Master should have realised that she was crank when the moving of a small quantity of deck cargo could adjust a heavy list, and also from the fact of her heeling so much when turning round in the basin at Congella; he should have taken steps to rectify this, and that had he done so and the vessel been stable she could easily have rid herself of the water on deck through the washports, even though the bathroom door had allowed water into the saloon etc; and that, as far as the state of the wind and sea was concerned there was nothing abnormal to account for the casualty." (Appendix A: 167 - 168)

On 16 November 1927, the government diver, T.P. Theron (Appendix A: 169) reports about the state of the wreck of the *Karin*. He stated that the wreck's stern and bow were orientated on a north-south axis respectively. She was lying on her port bulwarks, perpendicular to the seabed. The sand was washing away from the bow and stern sections, which negated the public opinion that the *Karin* would disappear into the sand (Appendix B: 228). Theron mentions that the covers were off both of the hatches and that there were some barrels and a stove lying nearby. This discovery explains how some of the barrels from the cargo and a mailbag washed up on the beach in Umhlanga (Appendix B: 217 -9). The diver states that working on the wreck for salvage purposes would be very difficult even in ideal weather conditions. He reports a strong surge and the entanglement of his air hose and life line.

The Dispersal of the *Karin* 1927 - 1932

Tenders were called for the salvaging of the *Karin*, however none were submitted (Appendix B: 220, 224). The owners refused responsibility for clearing the wreck (Appendix A: 176).The Lloyd's agents in Durban, John T. Rennie & Sons (Appendix A: 177) wrote to the general manager of the S.A. Railways and Harbours in June 1928 claiming that the wreck was a hazard in the shipping lane under certain weather conditions; they demanded its removal or dispersal. Under the Harbour Regulations, the port authorities took over the responsibility of removing the wreck and the claiming of expenses from the owners (Appendix A: 176, 193 - 194).

In July 1928 tenders were once again invited for the removal of the wreck (Appendix A: 180).
A tender from Refloating Limited, a British firm, was accepted by the South African Railways and Harbours. However, there was disagreement from the *Karin's* owners regarding the cost of the removal, they claimed it was too high. In addition, the owners claimed that the wreck was "sinking by a natural process and would in time disappear altogether, without substantial cost to anyone." (Appendix A: 182)
The port authorities replied that in fact, the wreck was filling up with sand and would eventually form a

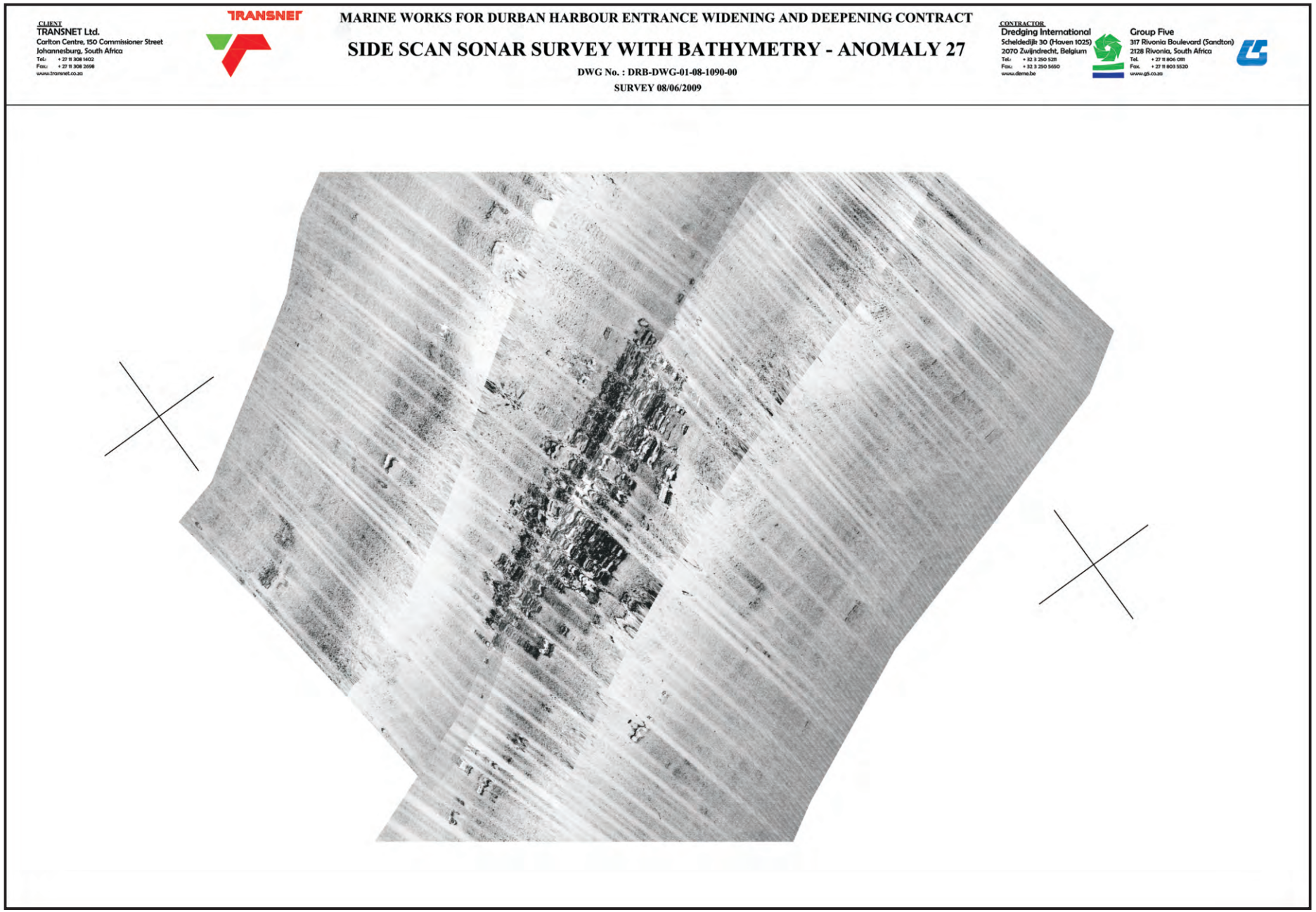


Figure 11: Side Scan Sonar of the *Karin*, 2009. The sonar image looks deceptively like a ship. In reality there was no coherent structure, due to the 1927 - 1932 wreck dispersal process. There is also a noticeable debris field around the wreck (Transnet)

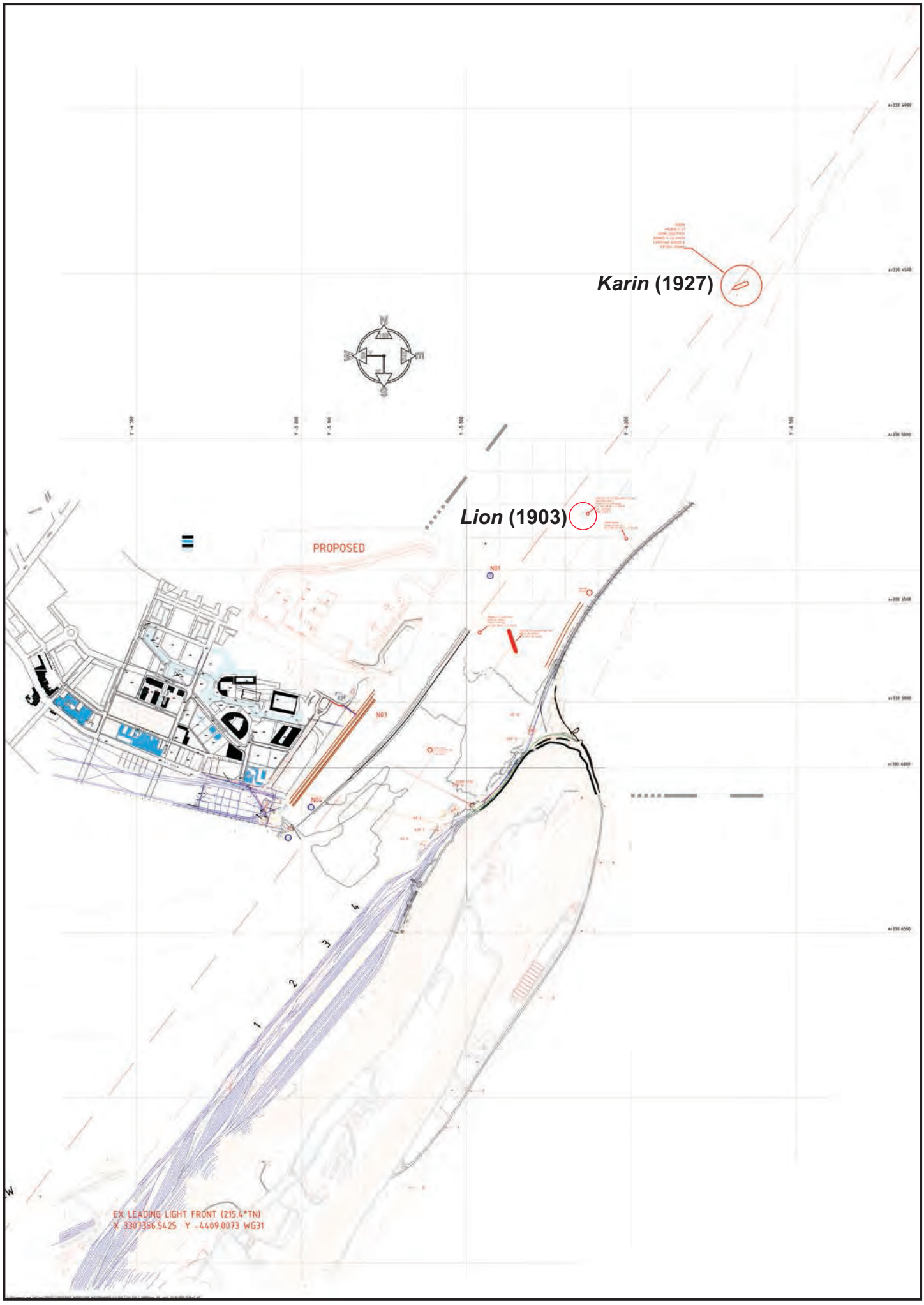


Figure 12: HMG - Joint Venture schematic showing the position of the *Karin* and the position of the iron riveted ship wreck that may be the *Lion* (1904), the information regarding this wreck is in the last section of this report (Picture: HMG - Joint Venture: 2010)

sand bank and would thereafter be harder to disperse. Soundings taken in July 1928 proved that in ten months the wreck had not sunk at all (Appendix A: 183). Due to the fact that the port authorities had to take over responsibility for removing the wreck, they requested the Commissioner of Customs and Excise inform them of any attempt made by the owners to transfer ownership of any of their assets (Appendix A: 184). In addition the Administration states that there was only one tender received for the removal of the hazard and that the only method for removal was the dispersal of the wreck, they had no choice but to accept the amount (Appendix A: 185).
An agreement was signed between Refloating Limited and the Ministers of Railways and Harbours on 27 February 1929 (Appendix A: 186 - 192).

The *Karin* was removed by the following process (Appendix B: 243 - 245):
- The debris field around the wreck was removed, this included cutting away the rigging and the derrick
- Holes were bored into the wreck for the placing of two and three inch thick skins, packed with dynamite
- One was laid along the keel, inside the ship
- Another was laid along the length of the ship, below the bulwarks
- Along each bulkhead, from keel to bulwark, more explosive skins were laid.
- The resulting pile of scrap metal was then dredged below the seabed, leaving a 50 foot clearance

The wreck was finally declared clear In June 1929 (Appendix B: 246).
However, that was not the end of the story. What followed was a protracted legal battle between the South African Railways and Harbours and the owners C.G. Smith & Co. (Pty) Ltd (Smith's Coasters (Pty) Ltd). The initial cost of the removal of the *Karin* was £7 780.3.3. It was eventually settled in May 1932 when Smith's Coasters paid the South African Railways and Harbours £5 000 (Appendix A: 195 - 211).
The *Karin* was valued, by Lloyd's, at £6 000 (Appendix B: 227).

The Dispersal of the *Karin* 2009 - 2010

Once again the *Karin* became a hazard to shipping.
During the Durban Harbour Widening project, a magnetic anomaly was discovered in the shipping channel. Named 'Anomaly 27', it was buried under 2 – 3 metres of overburden. The dredger removed most of it. Divers were sent to investigate and an iron or steel riveted shipwreck was discovered, measuring 52 x 11.5 metres (Appendix C).

According to available databases, the *Karin* had been refloated and scuttled further from the coast (Ingpen 1979: 25; Levine: Unpublished manuscript). However, Pearson (1995: 38) states:

> "In 1929 a small coaster the "Karin" loaded with drums of petrol in addition to the usual bags of sugar, capsized immediately after leaving harbour and sank in the roadstead. The wreck had to be removed by blasting and these blasting operations shook the lighthouse (on the Bluff) so badly that the mercury was spilled out of the balance receptacle."

This statement led me to believe that the original databases were incorrect, because if the explosions shook the lighthouse, she could not have been scuttled far out to sea but rather had to be close inshore.
I then went to the newspaper archives at the Central Durban Library, the articles there further reinforced the idea that 'Anomaly 27' was the *Karin*. Further research at the Pretoria Archive Repository uncovered all the files dealing with the wreck of the *Karin* and her dispersal and I was confident of my identification of 'Anomaly 27' as the remains of the *S.S. Karin*. However, towards the end of my report, I found the cabin name plate of O.C. Asdal, the proverbial smoking gun.

At the end of 2009, several dives were done on the wreck to record it in-situ. As Durban is the busiest port in Africa, these dives were not very productive due to the limited dive windows and limited visibility. The time and financial constraints dictated a rapid removal of the wreck.

The wreck had become solid with conglomerate in the 83 years since her sinking. The location of the wreck dictates that the excavation of the wreck be seen in terms of Rescue Archaeology, I had to get as much information as possible in the shortest amount of time. Shaped charges were used to break up the conglomerated wreck. A barge, the *Aegir 30,* anchored over the site and grabbed the wreck off the seabed. The wreckage was then transported to the quay. SAHRA (South African Heritage Resources Agency) gave permission to recycle the metal after thorough records of the artefacts had been taken (Appendix C: 248 - 249). The more interesting artefacts are being curated by the Natal Museum.

The Future

However, that is not the end of the story. The last remains of the *Karin* were dredged under the seabed. Note to future maritime archaeologists, it is possible that future harbour upgrades will uncover the last remains of the *S.S. Karin.*

Figure 13: View of Durban harbour from the wreck site of the *Karin* (Photo: Maitland)

Figure 14: Conglomerated wreck of the *Karin* (Photo: Subtech)

Figure 15: The barge *Aegir 30* anchored over the *Karin* wreck site (Photo: Maitland)

Figure 16: Subtech collecting dead fish after the blast - these were taken to Ushaka to feed the marine creatures (Photo: Maitland)

Figure 17: The *Aegir 30* entering Durban harbour to offload the removed wreckage (Photo: Maitland)

Figure 18: Unloading the removed wreckage from the barge onto the quay for processing (Photo: Maitland)

Figure 19: The initial wreckage pile prior to processing (Photo: Maitland)

Figure 20: The excavator removed the larger pieces which were photographed and/or drawn (Photo: Maitland)

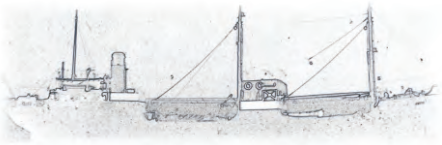
Figure 21: The excavator rotating a large artefact in order to photograph both sides (Photo: Maitland)

Figure 22: The majority of the remaining sand and mud was raked over and small artefacts collected (Photo: Maitland)

Figure 23: A sample of approximately 1 ton was sifted through a 3mm mesh sieve. However, the cost/benefit of this exercise made it unviable (Photo: Maitland)

Figure 24: The processed wreckage pile. This was subsequently recycled (Photo: Maitland)

The Construction of the



S.S. Karin

The *Karin* was classed 100 A1 - Lloyd's coasting, she was a screw steel vessel with a gross tonnage of 457 and a net tonnage of 229. Her length was 154.8 x 25.1 x 10.3 feet. Her moulded depth was 12' 8", with a freeboard of 1' 1" and a corresponding draught of 11' 10" (Appendix A: 2-3).

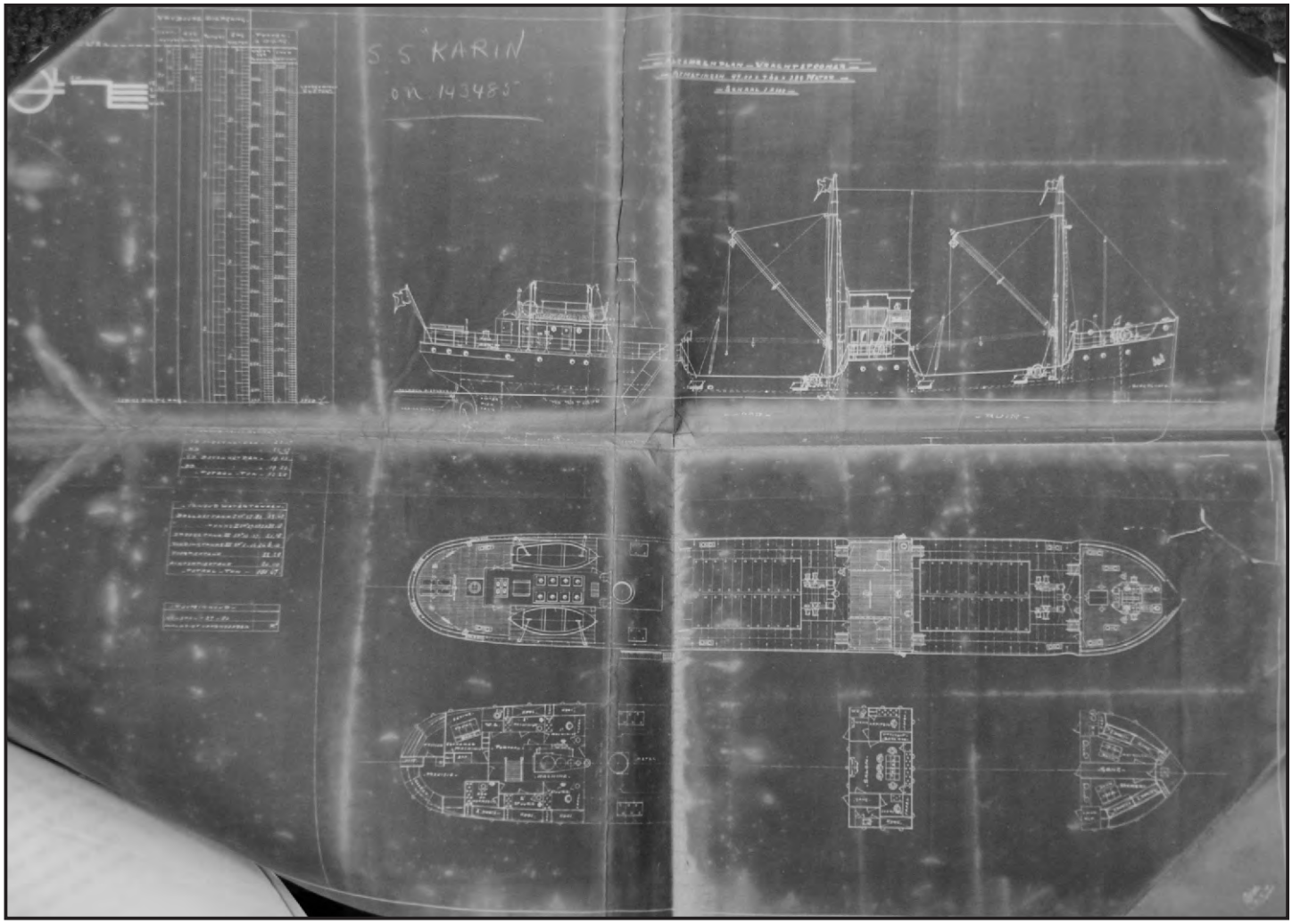


Figure 25: Blue print of the *Karin*, the originals as well as the log book went down with the vessel in 1927 (Pretoria Archives Repository; Appendix A: 8).

A lot of material was recovered from the site of the *Karin*. When the vessel sank, she was fairly intact, according to witnesses at the time, only the mizzen mast may have broken off during the sinking (Appendix A: 48). The floating derrick that was visible over the wreck site at low tide, was removed in 1928 and brought back to the harbour. Debris around the wreck was removed at this time in order to facilitate the destruction of the wreck (Appendix B: 244 - 245).

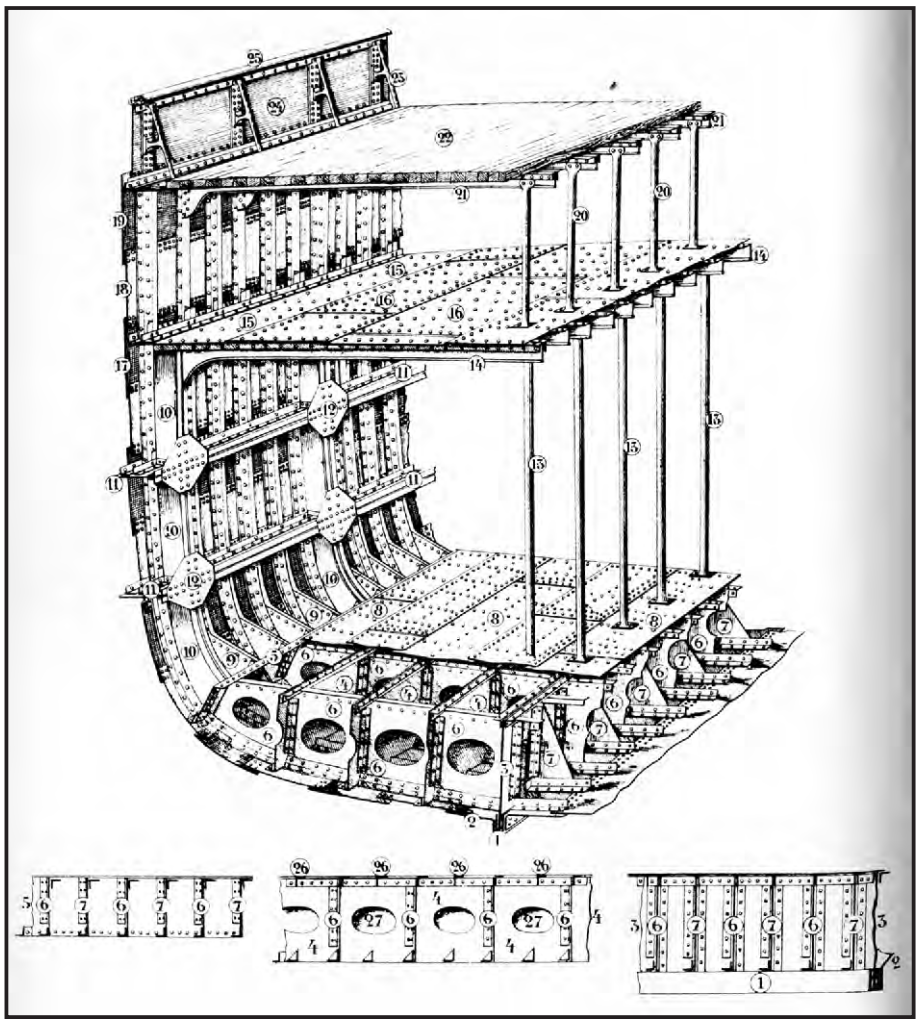
Three charges of dynamite of 500, 700 and 1 000 pounds were used. The remains were then dredged under the sand (Appendix B: 246).

In 2009, while deepening the shipping channel, a dredger uncovered the remains of the *Karin*. The conglomerated wreck was then again subjected to explosive charges and scooped with a grab.

All these post-depositional factors compromised the contextual relationships of the site. Most of the artefacts are very damaged and the report is a catalogue of recovered artefacts without the context associations of a normal archaeological excavation.

The Hull

The *Karin* had a cubic capacity of 23 938 feet³. One steel deck, one hold, two hatchways and, three bulkheads (Appendix A: 3)



Key:

1. Keel
2. Garboard strake
3. Centre girder; vertical centre plate
4. Side girders
5. Margin plate
6. Floors; intercostal floors
7. Brackets on centre girder
8. Inner bottom; top of double bottom; top of tank
9. Bracket frames
10. Web frames
11. Side stringers
12. Diamond plates
13. Hold pillars
14. Main deck beams
15. Main deck stringer; main deck beam stringer plate
16. Main deck; main deck plating
17. Main sheerstrake; main deck sheerstrake
18. Topside strake
19. Upper sheerstrake; upper deck sheerstrake
20. Upper deck pillars; upper deck stanchions
21. Upper deck beams
22. Upper deck; upper deck planking
23. Bulwark stay
24. Bulwark plating
25. main rail; roughtree rail
26. Intermediate reversed frames
27. Man holes

Figure 26: Diagram of a web-frame steamer with a cellular double bottom and continuous girders (Paasch 1890: Plate 21)

Plating

Figure 27: In-situ hull plating (Photo: Subtech)

Figure 28: In-situ hull plating and boiler pipes (Photo: Subtech)

Figure 29: The largest section of hull plating removed intact, showing frames and stringers (Photo: Maitland)

Figure 30: Close-up of the hull plating and the turn of the bilge (Photo: Maitland)

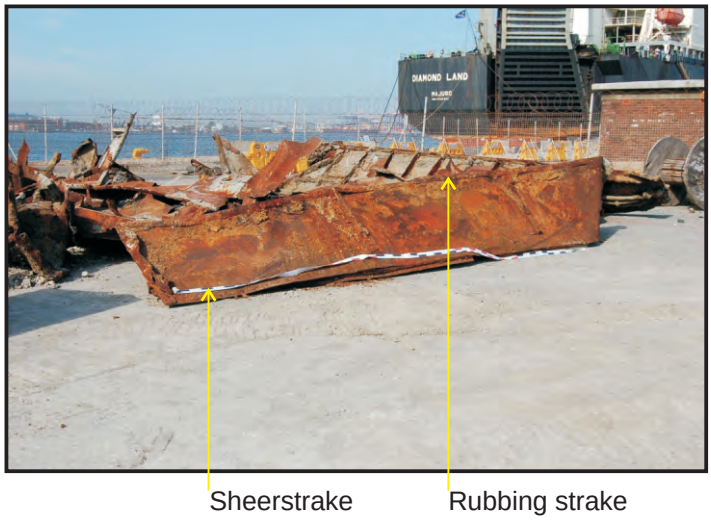


Figure 31: External sheerstrake with the rubbing strake. The rubbing strake is placed on the outside of the gunwale and strengthens the join between the sheerstrake and the bulwark (Photo: Maitland)

Figure 32: Internal view of the sheerstrake showing the steel deck plating (Photo: Maitland)

Figure 33: Close-up of the rubbing strake (Photo: Maitland)

Figure 34: Close-up of the gunwale, where the sheerstrake, bulwark and deck intersect (Photo: Maitland)

Figure 35: Joggled plating, this method of constructing the side plating did not require liners and was cheaper and lighter than previous methods (Pursey 1950: 82; Photo: Maitland)

Figure 36: Long section of hull plating, the *Karin* hull was severely distorted due to post-depositional damage (Photo: Maitland)

Figure 37: Internal view of the hull plating showing frames (Photo: Maitland)

Figure 38: Close-up of bulb angle frames, they are stronger than frame-and-reverse, corrode less and require less riveting, they are also more suitable for joggled plates (Pursey 1950: 50; Photo: Maitland)

Figure 39: Triple steel plates, thinner than the hull plating (Photo: Maitland)

Figure 40: Hull plating with double riveting (Photo: Maitland)

Figure 41: Hull plating with double riveted butt strap (Photo: Maitland)

Figure 42: Diamond plate, used to connect the face bars of web frames and stringers (Pursey 1950: 10; Photo: Maitland)

Figure 43: Internal view of hull plating with a portion of the steel deck and a scuttle (Photo: Maitland)

Figure 44: Hull plating with large support structures, possibly from the engine room (Photo: Maitland)

Figures 45 - 46: Double angle bar beam, possibly a deck support structure (Photo: Maitland)

Figure 47: Possible beam knee, a deck support (Photo: Maitland)

Figure 48: Deck bracket knee (Photo: Maitland)

Figures 49 - 50: Front and back of an access hatchway, these were placed throughout the vessel. This has two handles and was bolted shut (Photo: Maitland)

Hawseholes

One anchor hawsehole can be seen on the starboard side on the blueprint, it must have been mirrored on the port side.

Figures 51 - 52: Top and side view of the bow hawsehole, there is an extra reinforcing plate around it (Photos: Maitland)

Portholes

The portholes in the *Karin* were possibly as follows:

- Chief engineer's cabin - 2
- Second engineer's room - 1
- Lavatory - 1
- Engineer's mess room - 3
- Saloon - 5
- Captain's cabin - 3

(Appendix A: 36; Blueprint)

Figures 53 - 54: Internal and external view of porthole, note the strengthening plate on the external side (Photos: Maitland)

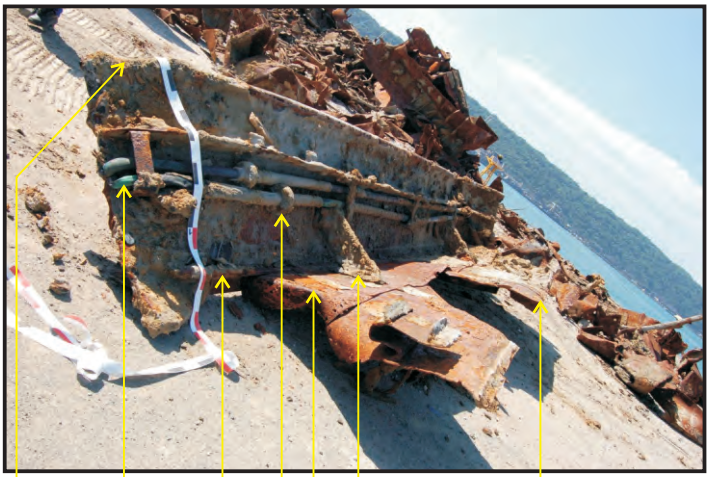
Figure 55: Porthole frame (Photo: Maitland)

Figure 56: Brass porthole securing clip (Photo: Maitland)

Figure 57: Complete porthole frame with intact rubber seal, broken sections with porthole clips (Photo: Maitland)

Bulwarks

The *Karin* was a well deck ship, that is she had a raised quarter deck and bridge combined and a forecastle, the deepening between these structures formed a 'well' (Paasch 1890: 3). The plated bulwarks as opposed to railings may have contributed to her inability to shed the large amount of water that washed onto her deck, which led to her sinking.



Figures 58 - 59: External and internal view of the bulwarks, showing various features (Paasch 1890: ; Photos: Maitland)

Figure 60: Close-up of the bulwark main rail (Photo: Maitland)

Figure 61: Section of deck plating near the bulwark with wood planks, the wood may have served as a base for deck equipment (Photo: Maitland)

Figure 62: Bulwark with mooring pipe and deck plating with wooden base plate, the proximity of these items indicates bollards may have been attached to the base plate (Photo: Maitland)

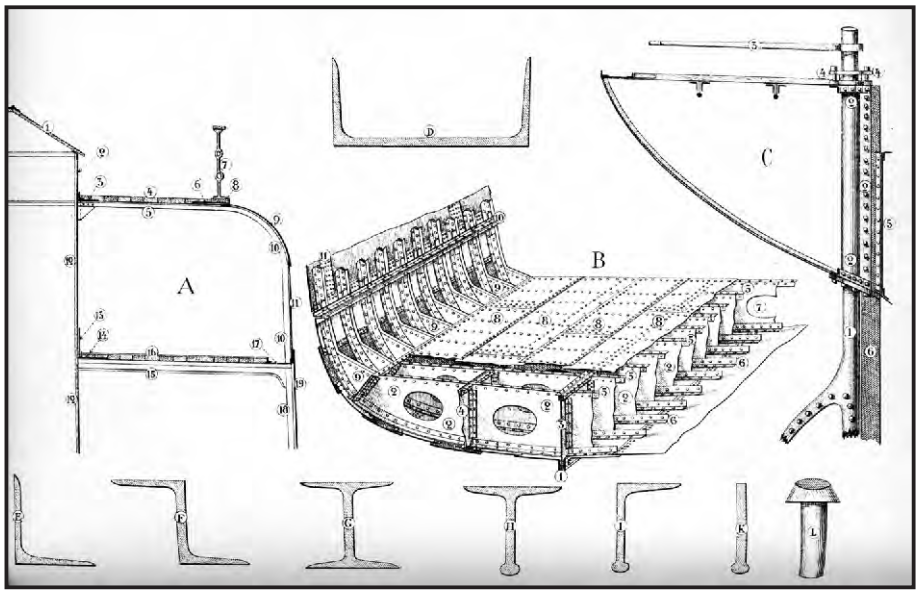
Figure 63: Section of bulwark showing the curve of the well deck (Photo: Maitland)

Washports

There was a lot of discussion in the Court of Inquiry regarding whether the washports were sufficient to release the water on deck. P.B. sale, the mate of the *Karin* states that the washports measured 2' 6" x 18", which tallies with the pictures below. McNaughton, the *Karin's* chief engineer stated that the washports opened "by a hinge, a special patent," (Appendix A: 26,84). According to Pursey (1950: 92) the regulations regarding washports are "Bars, spaced not more than 9 inches apart, must be fitted across the port. Where hinged flaps are fitted, they are to have brass pins and must not have any fittings for keeping them closed." The depth of the washports on the *Karin* was 18" and there was one bar across the port.

Figure 64: External view of a washport, the curve of the well deck bulwark is also visible (Photo: Maitland)

Figure 65: Internal view of a washport, the strengthening frame and cross bar is visible (Photo: Maitland)



Key to B:

1. Keel
2. Floors
3. Centre girder
4. Side girder
5. Reversed frames
6. Frames
7. Manhole
8. Inner bottom; top of double bottom; top of tank
9. Bracket frames
10. Side stringer
11. Butt strap

Figure 66: Diagram of part of a cellular double bottom with continuous floors (Paasch 1890: Plate 29)

Figure 67: Keel and plating, probably the forward section where the vessel narrows towards the bow (Photo: Maitland)

Figure 68: Close-up showing part of the centre keelson (Photo: Maitland)

Figures 69 - 70: Two views of the keel, probably forward of midships, these frames are at the turn of the bilge, also bracket frames are visible (Photos: Maitland)

Figure 71: Manhole cover (Paasch 1890: Plate 20; Photo: Maitland)

Figure 72: Floor girder (Photo: Maitland)

Figure 73: Bracket frame with water course (Photo: Maitland)

Figure 74: Breasthook or crutch depending on whether it is from the bow or the stern; a plate that strengthens these areas (Photo: Maitland)

Figure 75: Web frame with pipe flange coupling (Photo: Maitland)

Figure 76: Plating with coal embedded in the corrosion, this section of plating is probably part of the coal bunkers, the *Karin* carried 85 tons of bunker coal (Appendix A: 3; Photo: Maitland)

Fixed Keel

P.B. Sale, the mate of the *Karin*, mentions that he allowed an inch less on the loading lines due to the "putting on a fixed keel" (Appendix A: 41). This implies that the fixed keel had been attached to the vessel after her last Lloyd's survey, otherwise the plimsoll mark would have been changed. This tallies with the welding found on the fixed keel, the rest of the vessel is connected with rivets.

Figure 77: A fixed keel was probably fitted to protect the vessel against damage if running aground (Paasch 1890: 15; Photo: Maitland)

Figure 78: The aft or forward end of the fixed keel (Photo: Maitland)

Figure 79: The aft or forward end of the fixed keel (Photo: Maitland)

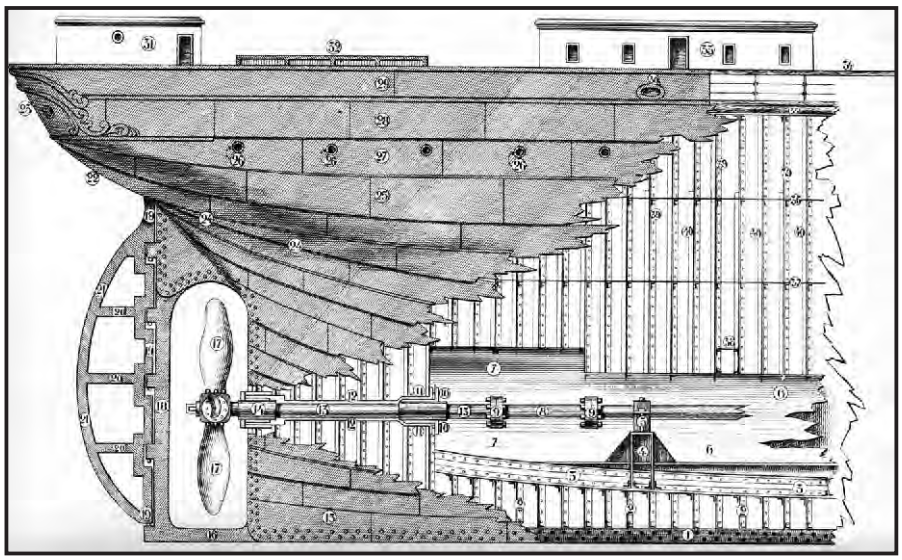
Figure 80: Close-up of the fixed keel - this is the only welding on the vessel (Photo: Maitland)

The Bow

Figures 81 - 82: Top and cross-section view of the bow, it has a reinforcing stem (Photos: Maitland)

The Stern

The *Karin* had a single steel screw (Appendix A: 3).



Key:

1. Keel
2. Floors
3. Keelson
4. Pedestal
5. Plummer block
6. Tunnel; shaft tunnel
7. Tunnel recess
8. Adjusting shaft
9. Couplings; shaft couplings
10. Stuffing box gland
11. Stuffing box
12. Stern tube
13. Propeller shaft
14. Stern bush
15. Garboard strake
16. Sole piece of stern frame
17. Propeller blades
18. Stern post
19. Main piece of rudder
20. Rudder stays
21. Rudder frame; bow of rudder
22. Counter; lower stern
23. Stern; upper stern
24. Buttock
25. Main sheerstrake; main deck sheerstrake
26. Side lights; side scuttles
27. Topside strake
28. Upper sheerstrake; upper deck sheerstrake
29. Bulwark plating
30. Mooring pipe
31. Wheel house
32. Cabin skylight
33. Cabin companion
34. Main rail; roughtree rail
35. Upper deck
36. Main deck
37. Lower deck
38. Semi-box orlop beam
39. Frames
40. Reversed frames

Figure 83: Diagram of aft-end of a screw steamer, showing part of the tunnel (Paasch 1890: Plate 25)

Figure 84: Sole piece of stern frame (Photo: Maitland)

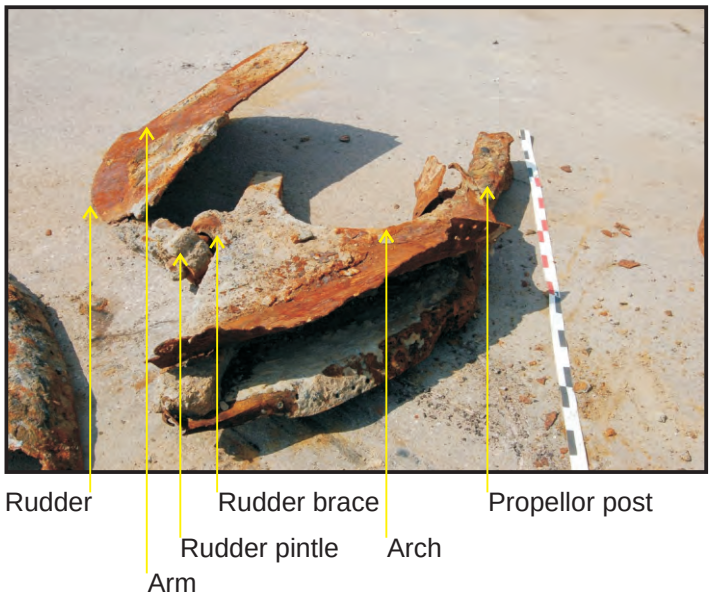


Figure 85: Arch piece of stern frame with remains of the rudder (Photo: Maitland)

Figure 86: Close-up of the remains of the rudder, the arm is more visible in this view (Photo: Maitland)

Figure 87: Upper part of the rudder stock. The horizontal coupling connects the two parts of the stock, allowing disconnection when necessary (Brown 1931: 465; Photo: Maitland)

Hull Attachments and Deck Equipment

There were various attachments on the hull structures. These were used for loading cargo and lashing down deck cargo and equipment.

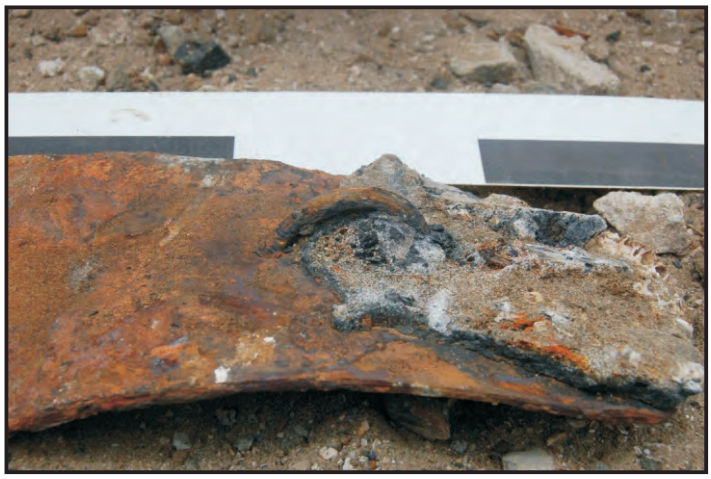


Figure 88: Lashing eye (Photo: Maitland)

Figure 89: Deck shackle (Photo: Maitland)

Figure 90: Cleat (Photo: Maitland)

Figure 91: Non-slip sheeting, this would be attached on gangways etc. (Photo: Maitland)

Figure 92: Derrick support (Photo: Maitland)

Figure 93: Square mast or gaff fitting (Carpenter 1917: 555; Photo: Maitland)

Figure 94 -95: Two deck capstan rollers, the first is still attached to the deck plating (Renda 2010; Photo: Maitland)

Figure 96: Bollard. According to the blueprint, the *Karin* had at least 20 bollards and capstan rollers on her deck (Photo: Maitland)

Figure 97: Deck bitt with concreted cable (Photo: Maitland)

Figure 98: Winch handle (Carpenter 1917: 518; Photo: Maitland)

Figures 99 - 100: Steam windlass. According to the Lloyd's Survey of 1921, the *Karin* had a steam windlass. This was usually placed on the upper fore-castle deck and was used for hauling up bower anchors (Appendix A: 3; Paasch 1890: 156; Photos: Maitland)

Pillars and Railings

Figure 101: Possible hold pillar (Photo: Maitland)

Figure 102: Possible deck railing. The *Karin* had railings fore and aft (Photo: Maitland)

Masts

Figure 103: Section of mast constructed of two plates on the round, although the mizzen mast was apparently washed away during the wreck, sections would still have remained (Pursey 1950: 144; Photo: Maitland)

Figure 104: Section of mast, the flange where it was stepped onto the vessel is on the left end (Photo: Maitland)

Figure 105: Section of mast with a rigging shackle (Photo: Maitland)

Figure 106: This 'mast' is constructed of solid steel therefore may actually be the eduction pipe from the condenser (Photo: Maitland)

Doors

Figure 107: Frame from a watertight door (Manual of Seamanship 1951:47; Photo: Maitland)

Figure 108: Securing clip on the frame of a watertight door (Photo: Maitland)

Figure 109: Door hook (Photo: Maitland)

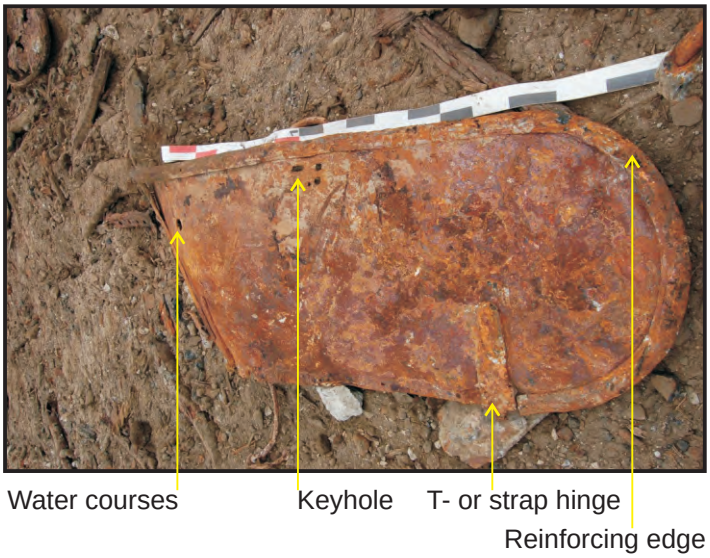


Figure 110: Front of a cabin door, this is not a watertight door as it has no wedge pieces for clips (Photo: Maitland)

Figure 111: Inside of cabin door with lock (Photo: Maitland)

Figure 112: Close-up of lock (Photo: Maitland)

Figure 113: Handle of the cabin door (Photo: Maitland)

Figure 114: Cupboard hinge, locks and door knob (Photo: Maitland)

Figure 115: Door hanging hooks (Photo: Maitland)

Figure 116: Door plates from the mess room and cabin. If I had any doubt as to my identification of the wreck as the *Karin*, this artefact removed them. The name on the plate is O.C. Asdal, who was the master of the *Karin* (Photo: Maitland)

Figure 117: Two cargo blocks were recovered, the one pictured was stamped—BULLIVANTS LONDON HONI31; the other was stamped TO (L?)_ _ T SINGLE TEST 2 W1. Bullivants & Co., from Millwall, London produced a wide range of deck and hull equipment in the early 20th century (www.naval-history.net; Photo: Maitland)

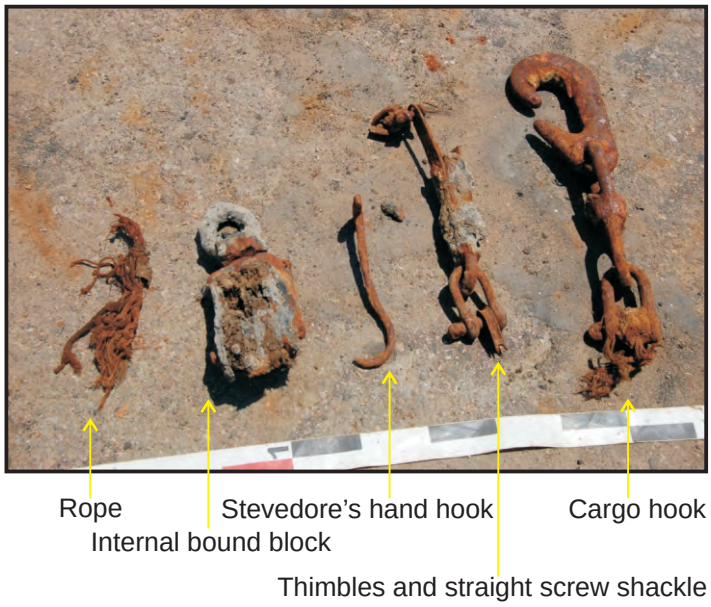


Figure 118: Various rigging items (McLeod 1977; 110; Manual of Seamanship 1951: 142 - 150; Photo: Maitland)

Figure 119: Running pulley, probably part of the derrick (Photo: Maitland)

Figure 120: Derrick sheave with a guard (Carpenter 1917: 550)

Figure 121: Deck guide sheave (Renda 2010; Photo: Maitland)

Figure 122: Turning-in screw with thimble, these are used to break in a wire rope (Manual of Seamanship 1951: 147; Photo: Maitland)

Figure 123: Heart-shaped open thimble (Manual of Seamanship 1951: 169; Photo: Maitland)

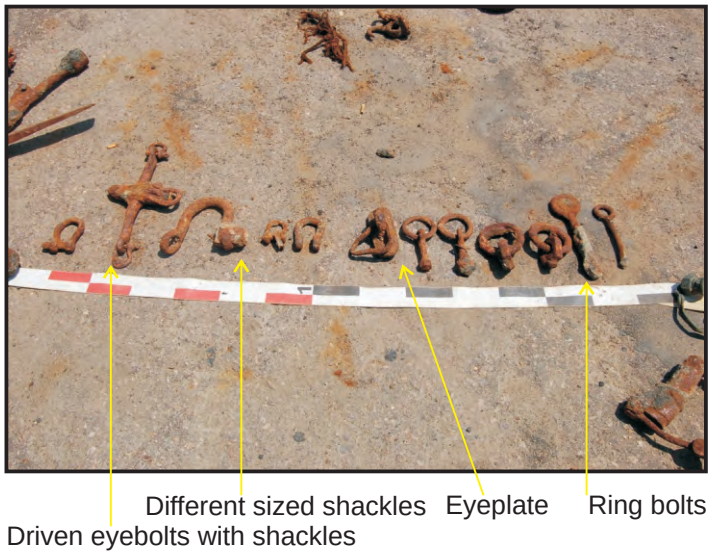


Figure 124: Various rigging fittings (Photo: Maitland)

Figure 125: Straight screw shackle with rope still attached (Photo: Maitland)

Figure 126: In-situ hook (Photo: Subtech)

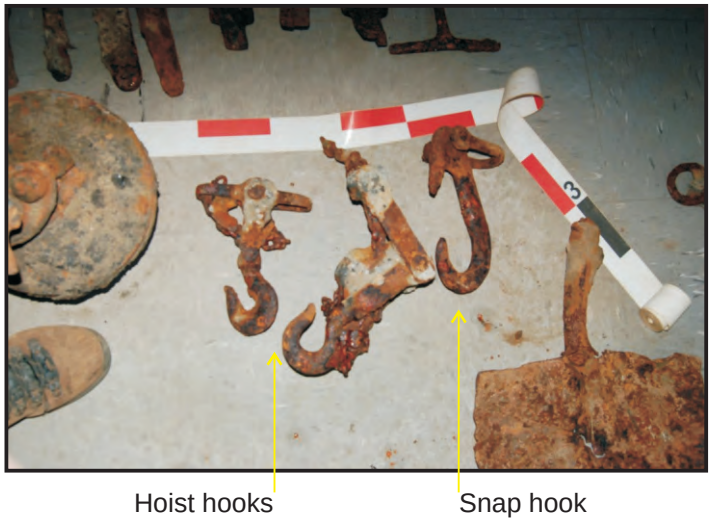


Figure 127: Various hooks (Photo: Maitland)

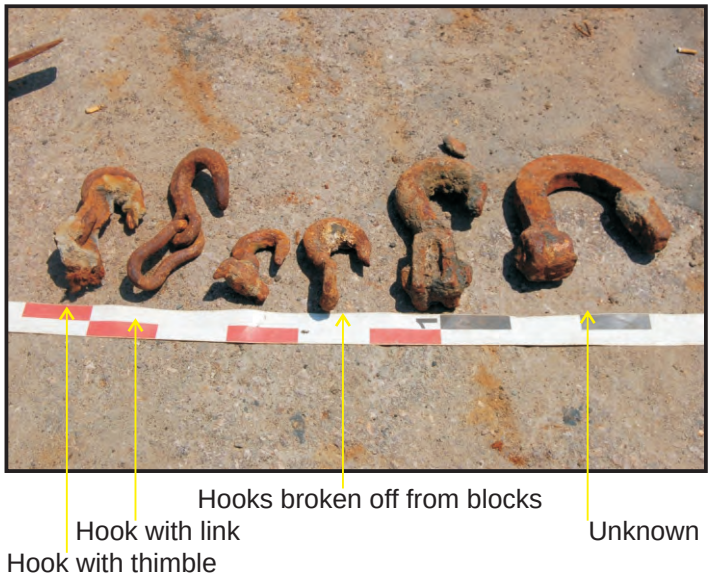


Figure 128: Selection of hooks (Photo: Maitland)

Figure 129: Double hook attached to a pipe clamp, there is a link on the obverse side and a short lenth of small chain (Photo: Maitland)

Figures 130 - 131: The opposing ends of a turnbuckle, the first is a fixed eye on the end of a screw and the second is a shackle on the end of a screw. These were used to adjust the tension or length of rigging wires (Manual of Seamanship 1951; Photo: Maitland)

Figure 132: Blake slip (House 2004: 91; Photo: Maitland)

Figure 133: Band clamp (Donald 2010; Photo: Maitland)

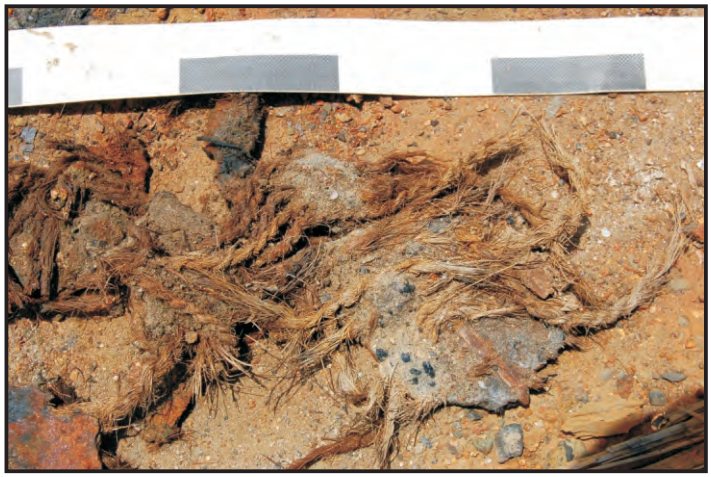


Figure 134: Remains of manila or hemp hawser-laid rope (Brown 1931: 8; Photo: Maitland)

Figure 135: Remains of wire cable with a hemp core that was spliced to form a hawser eye (Manual of Seamanship 1951: 95 - 96; Photo: Maitland)

Figure 136: In-situ stud link chain (Photo: Maitland)

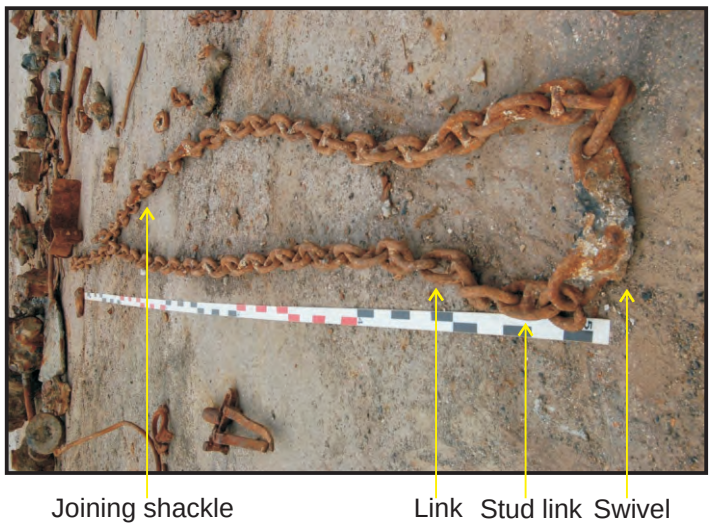


Figure 137: About 10 meters of stud link anchor cable (Paasch 1890: Plate 65; Photo: Maitland)

Figure 138: Length of stud link chain, the conglomerated section is probably the cable clench from the chain locker (Manual of Seamanship 1951:205; Photo: Maitland)

Figure 139: Stud-link, common straight link and open link chains of various sizes and gauges (Carpenter 1917: 600; Manual of Seamanship 1951: 147; Photo: Maitland)

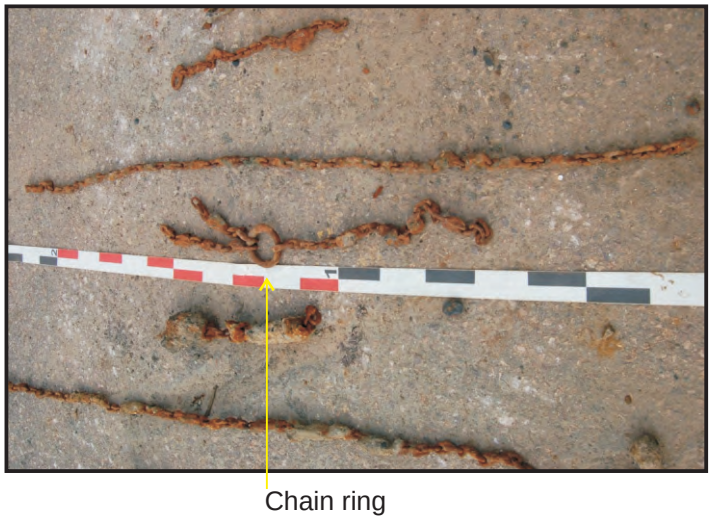


Figure 140: Different chain sizes and gauges (Photo: Maitland)

Anchors

Anchors were usually marked with a maker's name, progressive number and weight on the crown. This anchor was too corroded to see these. All steamers, except very small ones, carried two bower anchors, one spare bower and a steam anchor (Brown 1931: 115).

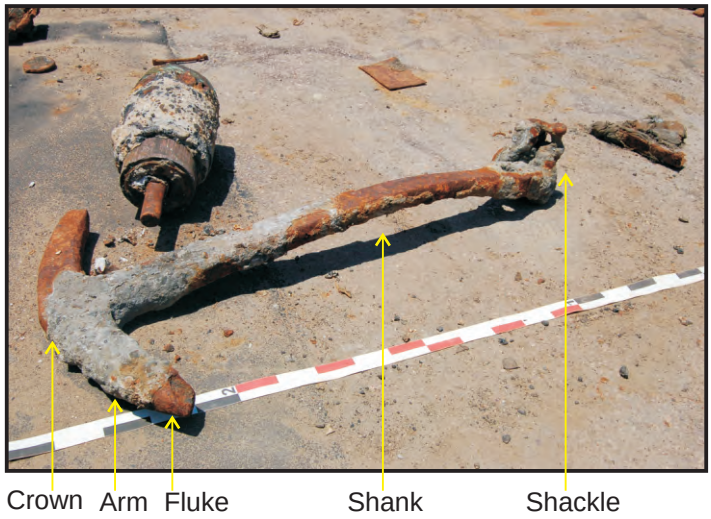


Figure 141: Stockless anchor (Miller 1884: 14; Photo: Maitland)

Figure 142: Close-up of the anchor shackle (Photo: Maitland)