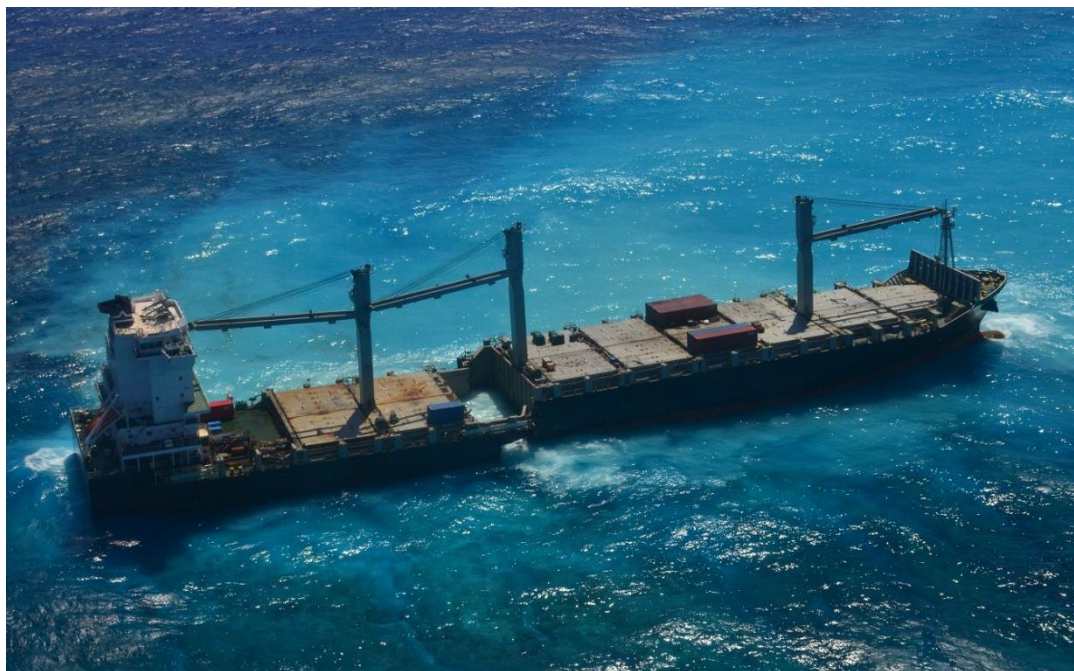




Marine Safety Investigation Unit



Transport Malta



MARINE SAFETY INVESTIGATION REPORT

Safety investigation into the grounding of the
Maltese registered container ship

Kea Trader

in position 22° 02.28' S 168° 38.25' E

on 12 July 2017

MARINE SAFETY INVESTIGATION REPORT NO. 14/2018

FINAL

Investigations into marine casualties are conducted under the provisions of the Merchant Shipping (Accident and Incident Safety Investigation) Regulations, 2011 and therefore in accordance with Regulation XI-I/6 of the International Convention for the Safety of Life at Sea (SOLAS), and Directive 2009/18/EC of the European Parliament and of the Council of 23 April 2009, establishing the fundamental principles governing the investigation of accidents in the maritime transport sector and amending Council Directive 1999/35/EC and Directive 2002/59/EC of the European Parliament and of the Council.

This safety investigation report is not written, in terms of content and style, with litigation in mind and pursuant to Regulation 13(7) of the Merchant Shipping (Accident and Incident Safety Investigation) Regulations, 2011, shall be inadmissible in any judicial proceedings whose purpose or one of whose purposes is to attribute or apportion liability or blame, unless, under prescribed conditions, a Court determines otherwise.

The objective of this safety investigation report is precautionary and seeks to avoid a repeat occurrence through an understanding of the events of 27 November 2016. Its sole purpose is confined to the promulgation of safety lessons and therefore may be misleading if used for other purposes.

The findings of the safety investigation are not binding on any party and the conclusions reached and recommendations made shall in no case create a presumption of liability (criminal and/or civil) or blame. It should be therefore noted that the content of this safety investigation report does not constitute legal advice in any way and should not be construed as such.

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LIST OF REFERENCES AND SOURCES OF INFORMATION

Crew members *MV Kea Trader*

Managers *MV Kea Trader*

SITREP by Salvage Company

VDR *Kea Trader*

GLOSSARY OF TERMS AND ABBREVIATIONS

°C	Degrees Celsius
AB	Able seafarer
ARPA	Automatic Radar Plotting Aid
BOM	Bridge operations manual
E	East
ECDIS	Electronic Chart Display and Information System
ENC	Electronic navigation chart
ETA	Estimated time of arrival
GPS	Global Positioning System
GMDSS	Global Maritime Distress and Safety System
GT	Gross tonnage
HFO	Heavy fuel oil
IMO	International Maritime Organization
kW	Kilowatt
m	Metre
MARPOL	International Convention for the Prevention of Pollution from Ships 1973/78, as amended
MGO	Marine gas oil
min	Minutes
MSIU	Marine Safety Investigation Unit
nm	Nautical miles
OOW	Officer of the Watch
DNV-GL	Det Norske Veritas-Germanischer Lloyd
RPM	Revolutions per Minute
S	South
SMS	Safety Management System
SOLAS	International Convention on the Safety of Life at Sea, 1974 as amended
STCW	International Convention on Standards of Training, Certification and Watchkeeping for Seafarers, 1978, as amended
TEU	Twenty foot equivalent unit
UMS	Unmanned machinery space
UTC	Universal Time Coordinated
VDR	Voyage Data Recorder
XTL	Cross Track Limit
ZOC	Zone of Confidence

SUMMARY

At 0055¹ on 12 July 2017, the Maltese registered container ship *Kea Trader* ran aground and stranded in position 22° 02.28' S 168° 38.25' E (*Recif Durand*) in the Pacific Ocean. At the time, the vessel was on a passage from Papeete, Tahiti, to Noumea, New Caledonia.

Kea Trader was using electronic chart display and information system (ECDIS) as the primary means of navigation and there were no paper charts on board. The officer of the watch (OOW) was monitoring a route displayed on the ECDIS. The zone of confidence (ZOC) of the electronic navigation chart (ENC) was 'D' and displayed a caution symbol and textual message “[t]his chart cannot be accurately referred to WGS 84 datum; see caution message”.

A salvage company was contracted by the managers to salvage the vessel and to prevent marine pollution. The salvors reported water ingress in the double bottom tanks, duct keel and cargo holds. Containers in the lower tiers of the hold were flooded and fuel oil was detected in one of the cargo hold. Pounded repetitively by heavy swell, *Kea Trader*'s engine-room bulkhead failed on 23 July. No oil pollution was reportedly observed in the sea. The vessel was declared a constructive total loss on 28 September.

On 12 November, the vessel was again struck by heavy weather, fracturing the hull in way of frame 92. Consequently, all personnel were evacuated from the vessel. On 04 December, *Kea Trader* broke her back approximately in the same position.

As a result of this investigation, the Marine Safety Investigation Unit (MSIU) has made recommendations to the managers of *Kea Trader* aimed at improving the standard of navigation of officers in their fleet using ECDIS as the primary means of navigation.

¹ Unless otherwise stated, all times are ship time (UTC + 11).

1 FACTUAL INFORMATION

1.1 Vessel, Voyage and Marine Casualty Particulars

Name	<i>Kea Trader</i>
Flag	Malta
Classification Society	DNV GL
IMO Number	9701281
Type	Container
Registered Owner	Belgravia Container Shipping Limited
Managers	Columbia Shipmanagement GmbH, Germany
Construction	Steel (Double bottom)
Length overall	184.99 m
Registered Length	178.14 m
Gross Tonnage	25145
Minimum Safe Manning	15
Authorised Cargo	Containers
Port of Departure	Papeete, Tahiti
Port of Arrival	Noumea, New Caledonia
Type of Voyage	International
Cargo Information	General cargo in containers
Manning	18
Date and Time	12 July 2017 at 0055
Type of Marine Casualty	Very Serious Marine Casualty
Location of Occurrence	22° 02.28' S 168° 38.25' E (<i>Recif Durand</i>)
Place on Board	Ship / cargo hold / overside / other
Injuries/Fatalities	None
Damage/Environmental Impact	Constructive Total Loss / Damage to the reef
Ship Operation	On passage
Voyage Segment	Transit
External & Internal Environment	The weather was partly cloudy and visibility 10 nautical miles. The wind was Southeast 13 knots and the swell was Southwest 1.5 m to 2.0 m. The air temperature was 23 °C.
Persons on Board	18

1.2 Description of Vessel

1.2.1 MV *Kea Trader*

The Maltese registered *Kea Trader* was a 2,194 TEU container vessel of 25,145 gross tonnage (GT). The vessel was built by Guangzhou Wenchong, China and delivered to owners Belgravia Container Shipping Limited in January 2017 and was managed by Columbia Shipmanagement GmbH, Germany. Her length overall was 184.99 m, had a beam of 30.04 m and a depth 16.50 m. *Kea Trader*'s summer draft was 9.50 m, corresponding to a deadweight of 21,000 tonnes.

Kea Trader's propulsive power was provided by a HMM, MAN B&W 6S60ME diesel engine, producing 13,000 kW at 105 rpm, giving a service speed of 19.0 knots. The engine-room was certified as an Unmanned Machinery Space (UMS). The vessel was classed by Det Norske Veritas-Germanischer Lloyd (DNV GL).

The vessel's general arrangement plan is shown in Figure 1.

1.2.2 Navigational equipment and bridge layout

The bridge was fitted with S-band and X-band radars, an ARPA, a global positioning system (GPS), two gyro compass and automatic identification system (AIS). Both the GMDSS station and chart table were located at the aft end of the wheelhouse. The vessel was also fitted with two JRC ECDIS model JAN-901B. One ECDIS was fitted on the bridge front console and the second ECDIS (providing a back-up) was located on the chart table. *Kea Trader* carried no paper charts and ECDIS was the principal means of navigation. The ship's gyro, GPS, speed log, echo sounder, and AIS were interphased to the ECDIS. Both ECDIS were compliant with the chart carriage requirements of Regulation V/19 and V/27 of the IMO Convention on Safety of Life at Sea, 1974, as amended (SOLAS).

The layout of navigational equipment fitted in the wheelhouse, and the chart table is shown in Figures 2 and 3. The ENC and ENC updates were supplied by NAVTOR, the Company's chart supplier. All charts and nautical publications were corrected up to Notice to Mariners 25/17.

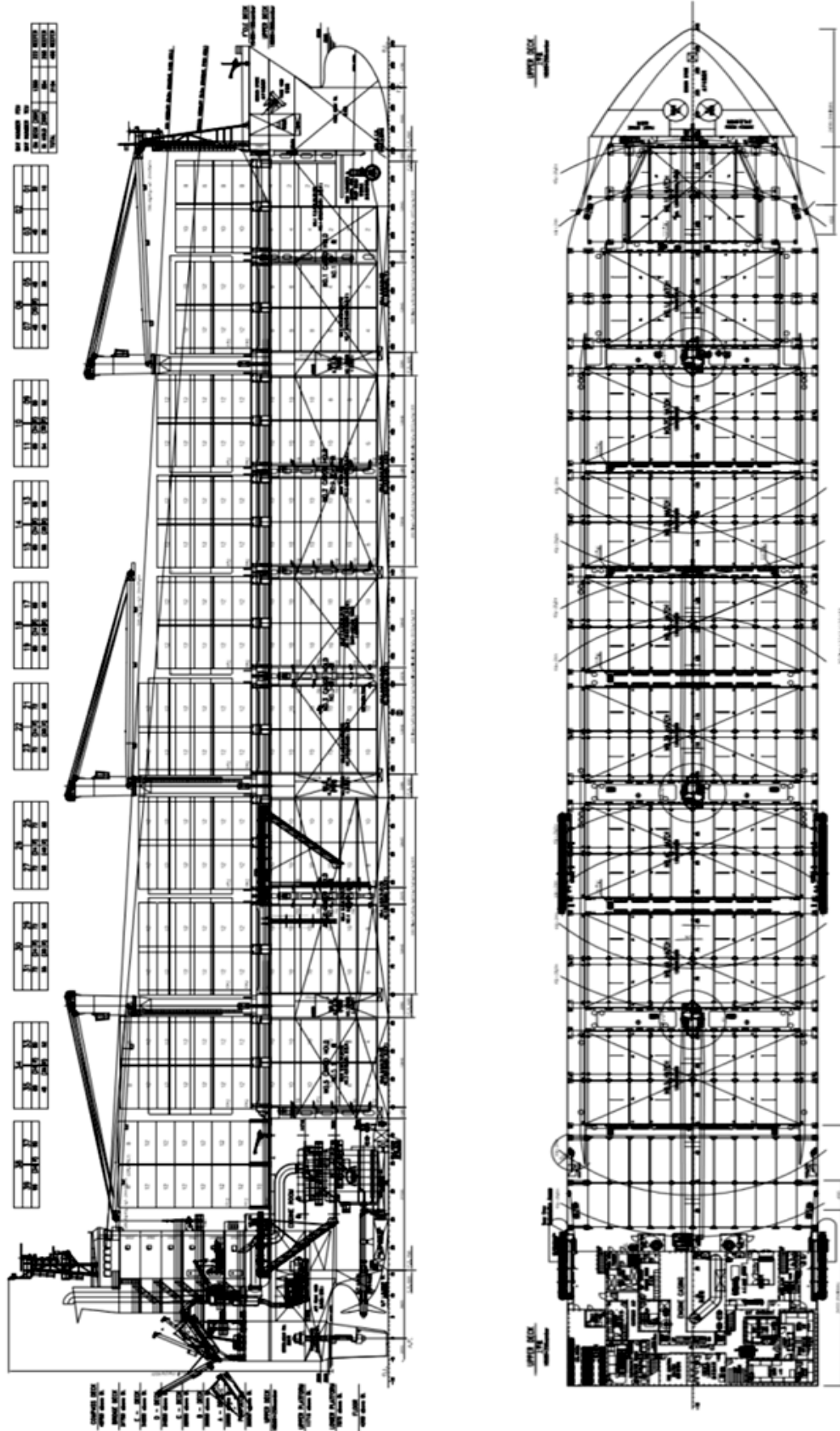


Figure 1: Kea Trader's General Arrangement Plan



Figure 2: Wheelhouse and layout of navigation equipment

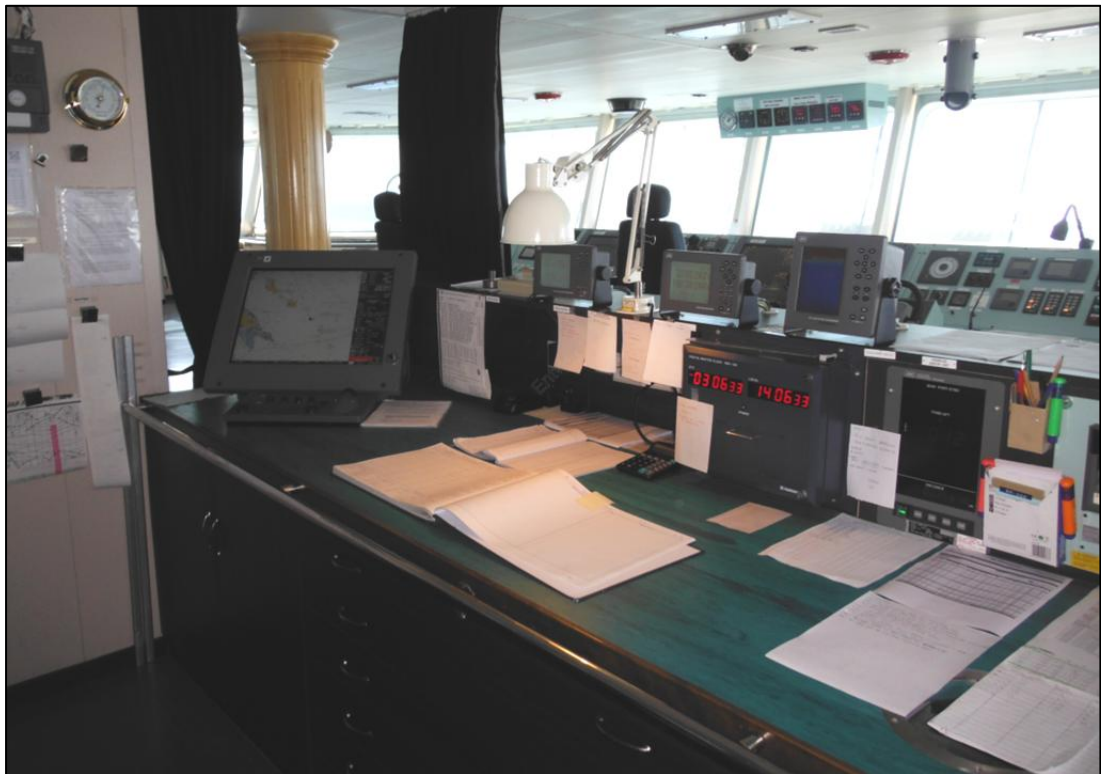


Figure 3: Chart table

1.3 Key Crew Members

The crew compliment on *Kea Trader* was in accordance with the Minimum Safe Manning Certificate, issued by the flag State Administration. The master was a Croatian national while the deck officers and ratings were from the Philippines. The working language on board was English.

1.3.1 Master

The master was 41 years old and had over eight years of experience working as a master. He held a valid Croatian Certificate of Competency and attended IMO Model Course 1.27 in Split, Croatia. His ECDIS certificate was dated 29 October 2010. An on-line type-specific training on ECDIS was provided by Safebridge on 24 April 2017. He had sailed with the previous master for four days before assuming command of *Kea Trader* on 19 May 2017.

1.3.2 Navigational officer

The second mate was the ship's navigational officer and kept the 1200 - 1600 and 0000 - 0400 watch at sea. He was 38 years old and had a Certificate of Competency as chief mate issued by the Republic of the Philippines on 17 October 2016. He had first joined Columbia Shipmanagement in 2004 as ordinary seaman. He had also attended IMO Model Course 1.27 in 2007. The navigational officer was re-assessed in the Philippines and issued with a new ECDIS certificate on 14 November 2016. The type-specific training was provided on-line by Safebridge between 21 and 25 December 2016. The familiarisation of bridge equipment was carried out shortly after joining the vessel on 09 January 2017.

1.4 Navigation Assessment and Audit

On 18 January 2017, on a maiden voyage from Guangzhou, China to Hong Kong, a marine inspection of the vessel and navigational assessment of deck officers was carried out by the Company. The Bridge Equipment Familiarisation forms were also completed. The superintendent carrying out the navigational assessment recommended further familiarisation of the navigation equipment, planning and monitoring of passage on ECDIS.

In a second marine inspection and navigation audit conducted on 09 and 10 April 2017, past passage plans and route on ECDIS were reviewed. Two non-conformities with respect to navigation were identified:

- ECDIS passage planning and monitoring; and
- responsibilities of deck officers in charge of navigational watch.

The audit report recommended:

- deck officers to familiarise themselves with the on board navigation procedures and ECDIS operation;
- the navigational officer to ensure implementation of ECDIS passage planning requirements; and
- the master to discuss with the deck officers the requirements of appraisal, planning, execution and monitoring, and to exercise control over passage planning.

On 05 May 2017, before signing-off the vessel, the previous master reportedly implemented corrective measures identified in the audit².

Over a period of one month, between 20 May and 20 June 2017, the relieving master carried out a navigational assessment of the deck officers. The purpose of the assessment was to raise awareness and provide guidance on safe navigation. The Navigation Assessment Form BOF-7.1 was completed and no negative findings were identified by the master on bridge management, passage planning, familiarisation with the operation of bridge equipment, bridge operating procedures and documentation.

1.5 ECDIS Configuration and Safety Alarm³

The guidance on passage planning and navigation was provided in the Company's Bridge Operations Manual (BOM)⁴ and Marine Information Notice 31. The navigational officer is responsible for setting up the ECDIS equipment. A detailed

² Company's verification of implementation of corrective measures was pending at the time of the accident.

³ The safety alarm is intended to make the bridge team aware of impending navigational danger that requires action to keep the ship safe.

⁴ BOM revised on 13 June 2017 was not available on board at the time of the accident.

procedure was provided in BOPR 5.2 – ECDIS Configuration, Settings and Maintenance. The Company’s recommended configuration was given in BOATT 5.2a. A quick guide to ENC symbols - BOATT 5.2b - was posted on the bridge. The BOM procedures stipulated that safety settings on the ECDIS made a significant improvement to navigational safety. They identified chart objects that pose hazards to navigation and set off alarms to enable preventive action by the OOW.

The safety settings for this voyage were made by the navigational officer, approved by master, and entered in the ECDIS Setting Card BOF 5.2. The values in the safety setting card were uploaded into the ECDIS and checked prior to the departure and on changeover of the watch at sea. The safety settings included safety depth, safety contour and safety frame. Safety depths are depths that are considered to be a danger to navigation and are determined by calculating limiting depths using Form BOF 2.2b - UKC Calculation. A depth that is equal to or less than the safety depth is highlighted on the chart in bold type.

The safety contour separates safe from unsafe waters and generates alarms and warnings when safety contours are breached. Safety contours are highlighted on the chart with a prominent line. The procedures stipulated the drawing of ‘limiting danger lines’ around isolated dangers, where the safety contour setting would result in a ‘no-go’ area.

A safety frame was used for setting the size of the area that will be used to activate anti-grounding alarm, area alerts and navigational warnings. The procedures recommended the following ahead settings:

- pilotage areas 3 min
- coastal waters 12 min
- ocean waters 18 min,

whereas, between 0.1 nm and 0.2 nm for port and starboard was recommended, depending on the navigating area and vessel size.

1.6 Environmental Conditions

The weather was clear with visibility of about 10 nm. There was a moderate swell and the wind was Southeasterly Beaufort force 3 to 4. The air and sea temperatures were 24 °C and 23 °C respectively.

1.7 Narrative

On 12 June 2017, *Kea Trader* departed Port de Rouen, France for Papeete, Tahiti via the Panama Canal. She was scheduled to arrive at Papeete at 0600 (UTC – 10) on 05 July 2017.

1.7.1 Passage plan

On 04 July 2017, a day before her arrival at Papeete, a passage plan to Noumea, New Caledonia, was prepared by the navigational officer. The route was drawn on the ECDIS using guidelines and checklists provided in the BOM. The waypoints, courses and distances between waypoints were entered in the Passage Planning Form BOF 2.1b (**Annex 1**). The sea segment of the route terminated at Passe de Dumbea Pilot Station, in position 22° 22.8' S 166° 13.7' E. Thereafter, a distance of 15.2 nm to the berth was covered under pilotage.

The vessel's under keel clearance and limiting depth were calculated and the cross track limit⁵ (XTL) was set at 0.50 nm. The navigational officer checked the navigational alarms on the ECDIS, carried out visual and ECDIS route check⁶, and filled-in the ECDIS Setting Card BOF 5.2 (**Annex 2**). The passage plan, MARPOL discharge limits and ballast water exchange areas were discussed with the deck officers and approved by the master. The plan was then co-signed by the deck officers.

Kea Trader departed Papeete on 05 July with 5,232 tonnes of cargo in 756 TEUs. Her departure draft was 6.44 m forward and 7.67 m aft. Prior to her departure, the safety settings in Form BOF 5.2 were uploaded into the ECDIS and the ECDIS was reportedly set-up as per the recommended configuration provided in BOATT 5.2b.

⁵ XTL are limits of deviation from the planned route. Navigation beyond the XTL would activate an off-course alarm.

⁶ The ECDIS route check function scans the route for navigational hazards within the user-defined XTL.

On 09 July, the master sent an email to the agents in Noumea, giving notice of arrival as 12 July at 0900. The agent suggested a better arrival time at Havannah Pilot Station in position 22° 20.65' S 167° 02.9' E. The master noted the new pilot station, which lay on the Eastern side of New Caledonia and instructed the second mate to make the necessary adjustments to the passage plan.

1.7.2 Revised passage plan

During his afternoon watch, the second mate shifted the waypoint from Passe de Dumbea Pilot Station to Havannah Pilot Station and advised the master of the distance to the new pilot position. The master advised the agent with the new ETA of 12 July 0700 at Havannah Pilot Station.

The revised track to Havannah Pilot Station involved an alteration of course from 255° to 259°. The second mate noted an isolated danger symbol and zoomed-in on the relevant section of the chart. He stated that the track passed about 0.6 nm South of the isolated danger symbol and outside of the XTL limit. After finishing the pilotage segment of the passage, he visually checked the track and judged it safe for navigation. He amended the Passage Plan Form BOF-2.1b (**Annex 3**) and left it on the chart table for the master and OOW to take note of the revised passage to Noumea.

On 09 July, *Kea Trader* crossed the date line and the 10 July was skipped. At 0100 (UTC - 12), the clocks were retarded by one hour and the ship's date and time were changed to 11 July, 0001(UTC + 11). At about 0700, the master went on the bridge to check the vessel's ETA, course and speed. He saw the written passage plan and noted that it contained no warnings. He deemed the route safe and approved the revised plan. The changes made in the plan were acknowledged and accepted by the deck officers. At about 1800, the master wrote his night orders in the Night Order Book and retired for the night.

1.7.3 Route monitoring

On 12 July 2017 at 0000, the second mate and an able seaman (AB) arrived on the bridge to relieve the third mate. *Kea Trader's* engine was on bridge control, steering 259° on autopilot, and making 18 knots over the ground. The echo sounder was on

the maximum depth setting. The X-band and S-band radars were on. The vessel was about 584 metres North of the planned route, in position 21° 59.2' S 168° 55.4' E.

At 0042, the OOW adjusted the ship's heading to 256° to regain the charted track and left the wheelhouse area to prepare the next passage plan on the chart table ECDIS in the bridge. At 0054, he felt a strong vibration. He noted that the course was 258° but the speed had dropped. He called the master who was already woken up by the shuddering noise. The master noted 1.5 knot on the Doppler log in his day-room and rushed to the bridge. He checked the ECDIS display and saw the isolated danger symbol about six cables Northwest of the vessel's position.

The RPM reading was 101 but the vessel was almost stationary. He set the engine telegraph to stop and re-set the echo sounder, which read between 1.5 m and 2.0 m. The deck lights were switched on and a search light was directed into the water. The visual sightings of the rock under the ship's hull affirmed grounding on *Recif Durand*⁷, in position 22° 02.28' S 168° 38.25' E (Figures 4 and 5).



Figure 4: *Kea Trader* hard aground on *Recif Durand*

⁷ Admiralty Sailing Directions (NP 61) Pacific Islands Pilot Vol. II describes *Recif Durand* as a dangerous rock, six cables in diameter midway between Ile Walpole and Ile Marie, in position 22° 02' S 168° 57' E.



Figure 5: Location of *Recif Durand*.

1.8 Post Grounding Events

The crew were woken up and informed of the situation. The chief mate was instructed to sound the vessel. The chief engineer reported 733.3 tonnes of HFO and 81 tonnes of MGO on board. Following the first inspections, no fuel was found leaking from any of the fuel oil tanks. The pipe tunnel, however, was flooded and a decision was taken to open the bilge injection valve to prevent the engine-room from flooding. At 0330, the master informed the ship's managers of the situation. In the meantime, the chief mate reported water ingress in ballast tanks nos. 1, 2, 3 and 4.

The water around the vessel was sounded between 7.2 m to 7.9 m at the bow and between 8.0 m and 8.10 m aft. At about 0730, MRCC New Caledonia was informed of the vessel's grounding. Shortly afterwards, a French helicopter landed on the forward containers and naval officers descended the vessel. In the afternoon, a navy vessel arrived on the scene. At about 2120, a cargo hold bilge alarm was triggered and the vessel started pumping out water from the cargo holds.

On 13 July 2017, a salvage team from Ardent comprising specialist marine personnel arrived on board. Initial assessment by the salvage team confirmed water ingress in the double bottom tanks and duct keel; containers in the lower section of the cargo holds were flooded and minor traces of heavy fuel was observed in cargo hold no. 5. Preparations were then made by the salvage team and ship's crew to prevent marine pollution, to off-load containers, transfer fuel oil, and eventually refloat the vessel.

By 23 July, *Kea Trader* had been pounded by heavy swell, damaging the engine-room bulkhead. However, no oil pollution was observed around the vessel. On 28 September 2017, the owners declared *Kea Trader* a constructive total loss and the salvors were re-engaged for wreck removal. On 12 November, the vessel was again struck by heavy weather, necessitating the evacuation of all personnel from the vessel.

In the afternoon, the starboard shell plating in way of frame 92 fractured, leaving an opening of about 2.5 m and exposing the hull to further breach. On 04 December 2017, *Kea Trader* broke in two, in approximately in way of the same frame (Figure 6). By this time, 674 containers had been air lifted and landed ashore (one container was lost overboard), recovered 207 m³ of slops and 596 m³ of fuel oil.



Figure 6: *Kea Trader*'s structural failure, in way of frame 92

2 ANALYSIS

2.1 Purpose


The purpose of a marine safety investigation is to determine the circumstances and safety factors of the accident as a basis for making recommendations, to prevent further marine casualties or incidents from occurring in the future.

2.2 Pilot Station

It is apparent that the agent's message, suggesting an earlier arrival at Havannah Pilot Station, had influenced the master to revise the original passage. However, a copy of revised passage plan BOF-2.1b through Canal de La Havannah indicated a pilotage passage of 46.6 nm and *Kea Trader*'s arrival at Noumea, calculated at 8 knots by the navigational officer, worked out much later than what was originally planned. The master, guided by the agent's message⁸ to arrive earlier at Havannah Pilot Station, missed to take note of the protracted pilotage caused by the changes in the route to reach the berth.

2.3 Revised Passage Plan

The need to change a passage plan while at sea was recognised and addressed in the Company's BOM. In such instances, the bridge operating procedures recommended that revised documented courses are checked for navigational safety on the ECDIS and visually at 1:1 scale as a final route safety check, and the bridge team briefed to ensure that the changes made were understood.

The revised route (by shifting the waypoint from Passe de Dumbea to Havannah Pilot Station), resulted in the track and the starboard XTL virtually passing over the isolated danger symbol ⁹ (Figure 7) on ENC GB204637 (compilation scale 1:700,000). Cursor query of the isolated danger symbol provided the information in Table 1.

⁸ The ship's managers explained that "the agent can request the master to proceed to an alternative pilot station".

⁹ Isolated danger with depths less than the user selected safety contour.

Table 1: Information on the isolated danger

<i>UWTROC</i> (Underwater/awash rock)
<i>EXPOSU</i> (Exposition of sounding): shoaler than the range of the surrounding area symbol
<i>INFORM</i> (Information): Breaks at times
<i>NATSUR</i> (Nature of surface): rock
<i>OBJNAM</i> (Object name): Recif Durand
<i>QUASOU</i> (Quality of sounding measurement): depth unknown
<i>VALSOU</i> (Value of sounding): ***
<i>WATLEV</i> (Water level effect): always under water / submerged

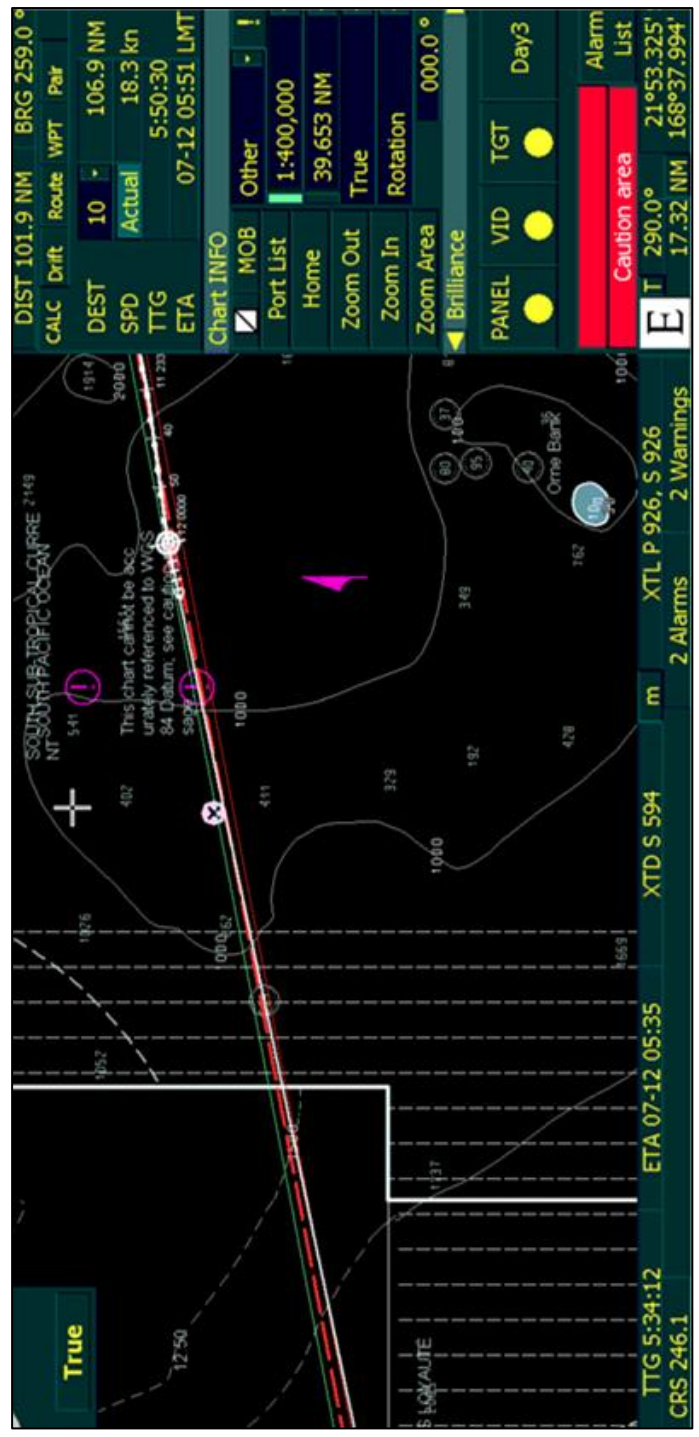


Figure 7: Reconstruction of ECDIS image (scale 1:400,000) showing the revised track, starboard XTL and isolated danger symbol

The second mate's observation of the isolated danger symbol appearing outside the starboard XTL due to zooming-in and possibly over-scaling the ECDIS display, led to the incorrect assumption of safe water within the XTL corridor (Figure 8).

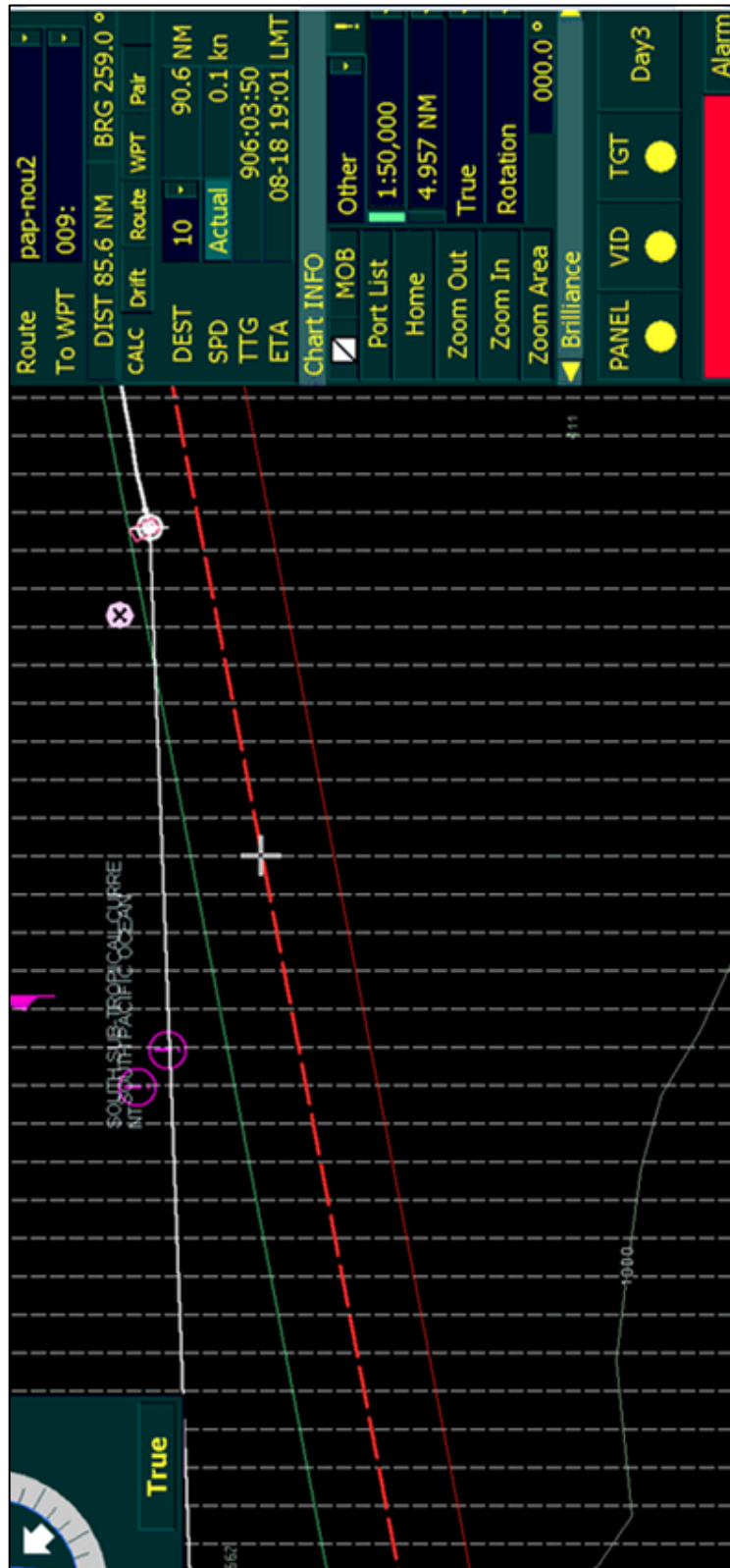


Figure 8: Reconstruction of ECDIS image - scale 1:50,000 after the grounding, showing the isolated danger symbol outside starboard XTL

An over-scale indication and vertical lines on the ECDIS, which indicate positional discrepancy of charted objects and loss of navigational information, may have been missed by the OOW. Consequently, no warnings or reference to the isolated danger was documented, whilst the ECDIS route check function had not been enabled. The passage plan was left on the chart table for the deck officers to take note of the changes made to the plan. The following morning, the master saw the plan contained no warnings. Assuming a course change in open waters, he approved the plan without briefing the bridge team. The master's confidence in the second mate's competency in the use of ECDIS, and application of planning procedures led him to believe that the route was safe and no independent route check was carried out. Thus, he remained unaware of the isolated danger marked on the ECDIS.

2.4 ECDIS Safety Alarm

The safety alarms in the ECDIS give an advance warning of navigational dangers. The procedures contained in BOPR 5.2 explained its importance to safe navigation and emphasised that safety settings on the ECDIS must be checked on departure and on taking over the watch at sea. When a safety alarm is triggered, an audible alarm is sounded, the alarm acknowledge button flashes red, and a description of the alarm is displayed in the alarm display area. On acknowledging the alarm, the audible alarm is silenced and the alarm acknowledge button stops flashing. However, the description of the alarm remains displayed on the ECDIS until the cause of the alarm is resolved. A record of alarm is displayed on clicking the alarm list button. The safety alarm included safety contour, safety depth and safety frame.

The checklists and forms completed by the navigational officer indicated that the ECDIS was set up in accordance with the bridge operating procedures and ECDIS Safety Card BOF-5.2. Accordingly, the safety depth and safety contour were set at 11 m and 13 m respectively. The look-ahead (detection vector) and width of the safety frame (in open waters) were 18 minutes and 0.2 nm.

A review of ECDIS data submitted to the MSIU, showed that the detection vector had a width of 0.1 nm and 1.9 nm ahead and the detection sector was set at 45° over the same distance (Figure 9), effectively giving the OOW just about six minutes to

respond to the safety alarm. These readings were measured using the scale in Figure 9. It is evident that the look-ahead settings are not in accordance with the parameters noted in the safety card.



Figure 9: Reconstruction ECDIS image showing safety frame detection vector and detection sector

Since the safety settings during the navigational watch hand over were neither checked nor logged in the deck logbook, none of the watchkeepers was aware of the actual safety settings on the ECDIS. The audible alarm, which was reportedly a distraction in coastal / pilotage waters, was set to zero and remained switched off

during the vessel's passage to Noumea. The evidence collected by the MSIU, did not establish by whom the safety frame settings were changed and / or whether the master was aware of the audible alarm being disabled.


2.5 Route Monitoring

At 0159 on 11 July 2017, roughly 23 hours before the grounding, an alarm displaying 'caution area' was activated (Figure 10). At that time, *Kea Trader* entered the chart display area of ENC GB204637. The object category of zone of confidence of the ENC was two stars and the alarm was a forewarning to the bridge team to exercise caution using or navigating on this chart.

A table of categorization of hydrographic data quality from The Mariner's Handbook, Eighth Edition, 2004 is reproduced in **Annex 4**.



Figure 10: Reconstruction of ECDIS image showing caution area alarm

ENC GB204637 also displayed the  symbol with the following message, “*This chart cannot be accurately referred to WGS 84 datum; see caution message.*”

Detailed information of the chart and caution message are given in **Annex 5**.

However, no evidence was found of the associated symbol being either interrogated or the navigational significance of the caution area alarm understood. The ‘caution area’ message repeatedly displayed in the subsequent navigational watches was largely overlooked by the bridge team.

On 12 July, the second mate, along with the lookout, arrived on the bridge. He signed the master’s night orders which stated: “*follow [the] passage plan.*” The vessel was within the XTL corridor of 0.50 nm. There was no significant cross track deviation and no off-course alarm. During the watch, the OOW remained unconcerned by the vessel passing so close to the isolated danger. The ‘caution area’ alarm on the ECDIS was not queried and the master was not called. The OOW earnestly believed that the vessel’s position displayed within the XTL was safe and required no action other than of adjusting the heading to regain the track.

During the course of analysing ECDIS replay, the safety investigation noted the ECDIS system had logged ‘approaching rock’ at 0050 and again at 0053 (Figure 11). However, no evidence of the safety alarm - crossing safety contour, approaching underwater rock / obstruction / wreck or dangerous symbol – was found displayed on the ECDIS to either alert or indicate to the OOW / lookout of imminent danger of grounding.

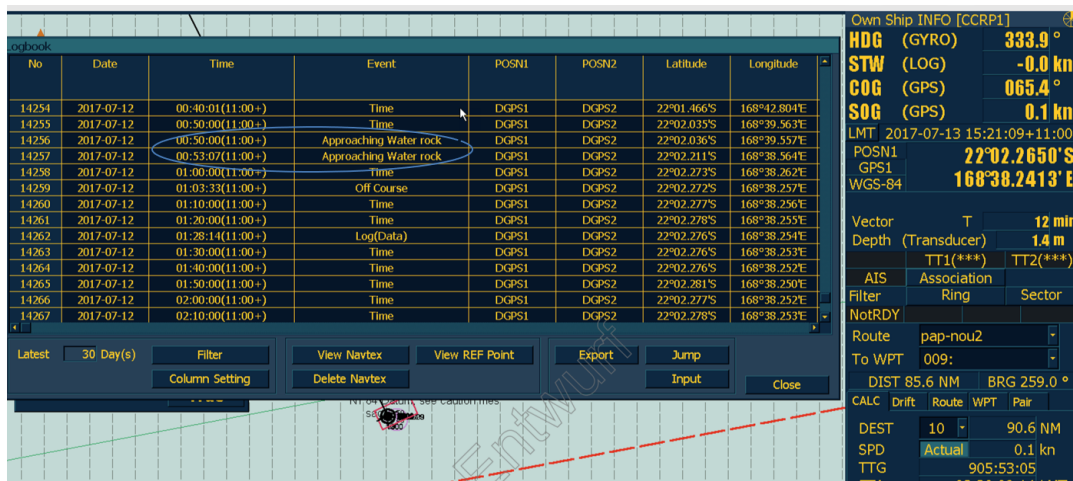


Figure 11: ECDIS log file showing ‘Approaching Water Rock’ at 0050 and 0053/07 s

The safety investigation believes that the isolated danger symbol on the chart and the caution area message in the alarm panel may have not necessarily gone unnoticed by the crew members. Although it is not clear as to whether or not the OOWs had ever

come across this symbol before, the fact that it remained displayed during successive navigational watches, may have suggested that there was no immediate and / or perceivable effects on the vessel or the voyage *per se*. This may have even been influential enough for the crew members not to be concerned with the actual equipment status. The implications of all this were therefore unclear to the crew members.

2.6 Safety Management

During the course of this safety investigation, the MSIU identified other factors which are of relevance to this accident in varying degrees.

Documents and certificates submitted to the MSIU showed that the master and deck officers had successfully completed type specific training, the IMO model course on ECDIS, and on-board bridge equipment familiarisation. Nonetheless, the Company superintendent identified and recommended further familiarisation with priority be given to ECDIS operation.

Analysis of past voyages a few months later identified partial implementation of ECDIS procedures and recommended the master to exercise control over planning of passage. Checklists, written passage plans, and other completed forms gave the impression of compliance with the ship's SMS, although no verification had been done and the bridge team's proficiency in the use ECDIS and ECDIS planning procedures had not yet been ascertained by the Company at the time of the accident.

Furthermore, the Company's revised bridge operating procedures, covering extensive guidance on navigation and planning of passage where ECDIS is the primary means of navigation, were being promulgated to the fleet but had not yet been received on board *Kea Trader*. While the navigational practice on board fulfilled the vessel's itinerary satisfactorily, once the plan needed to be changed at short notice, the weaknesses in the bridge team's navigational practice and ECDIS operation became apparent. Moreover, the master's approval of the revised plan and subsequent night orders inadvertently signalled to the bridge team that the route was safe.

2.7 Barrier Systems and Barrier Functions

The MSIU has analysed a number of accidents where one of the contributing factors was identified to be the failure of preventive barrier systems. The ECDIS is considered to be a preventive barrier system, intended to prevent the accident from happening¹⁰. Taking into consideration the evidence on how the ECDIS was operated, it would not appear that there were any particular issues with the barrier system itself. Rather, the main issue was the barrier function, *i.e.*, the specific manner by which the barrier achieves its purpose.

As already indicated elsewhere, the actual status of the ECDIS alarm prevented the barrier system to achieve its purpose in forewarning the OOW of the potential dangers ahead. As for any other symbolic barriers, the effectiveness of the function depends on the OOW and the rest of the bridge team.

The safety investigation believes that *a prima facie*, available evidence suggested that the barrier function on the bridge was not necessarily high on the bridge team's priority and this has been the case from one navigational watch to the other.

However, crew members found the ECDIS audible alarm to be a distraction in coastal / pilotage waters. In terms of equipment design, an audible alarm may be considered to be a source of information, generated by the equipment when a set of criteria would have been met.

Applying the same school of thought, additional information would have been generated when the workload on the bridge would have peaked (*i.e.*, in coastal waters). Under these conditions, the generated information in the form of alarms would have been considered as an (imposed) additional burden – creating additional tasks and an increased demand on the OOW, including the need to intervene. The main issue was therefore the re-activation of the alarm, once the vessel would have cleared the high traffic areas.

A situation had therefore resulted where the benefits of the technology became a burden, hindering the skilful use of equipment, and only mitigated by the de-

¹⁰ ECDIS is a symbolic barrier system, complemented by other symbolic barriers (procedures) and incorporeal barrier systems (rules). In actual fact, this resulted in a composite barrier system, which nonetheless was ineffective.

activation of the safety barrier system. Several scholars would term this as mis-coordination between human and machine – an adaptation by the crew members, which would have ‘distorted’ the perception of the crew members.

**THE FOLLOWING CONCLUSIONS AND
RECOMMENDATIONS SHALL IN NO CASE CREATE
A PRESUMPTION OF BLAME OR LIABILITY.
NEITHER ARE THEY BINDING NOR LISTED IN ANY
ORDER OF PRIORITY.**

3 CONCLUSIONS

Findings and safety factors are not listed in any order of priority.

3.1 Immediate Safety Factor

- .1 The vessel navigated into shallow waters and remained stranded over *Recif Durand*.

3.2 Latent Conditions and other Safety Factors

- .1 The revised route resulted in the track virtually passing over the isolated danger;
- .2 The second mate's observation of the isolated danger symbol appearing outside the starboard XTL due to an over-scaled ECDIS display, led to the incorrect assumption of safe water within the XTL corridor;
- .3 An over-scale indication and vertical lines on the ECDIS indicating positional discrepancy of charted objects and loss of navigational information was missed by the OOW;
- .3 No warnings or reference to the isolated danger was documented;
- .4 The ECDIS route check function had not been enabled;
- .5 The master's confidence in the second mate's competency in the use of ECDIS, and application of planning procedures led him to believe that the route was safe and no independent route check was carried out;
- .6 The detection vector had a width of 0.1 nm and 1.9 nm ahead and the detection sector was set at 45° over the same distance, effectively giving the OOW just about six minutes to respond to the safety alarm;
- .7 Since the safety settings during the navigational watch hand over were neither checked nor logged in the deck logbook, none of the watchkeepers was aware of the actual safety settings on the ECDIS;
- .8 The audible alarm was set to zero and remained switched off during the vessel's passage to Noumea;
- .9 The displayed symbol had not been interrogated;

- .10 The 'caution area' message repeatedly displayed in the subsequent navigational watches was largely overlooked by the bridge team;
- .11 The OOW earnestly believed that the vessel's position displayed within the XTL was safe and required no action other than of adjusting the heading to regain the track;
- .12 No evidence of the safety alarm - crossing safety contour, approaching underwater rock / obstruction / wreck or dangerous symbol – was found triggered on the ECDIS to alert or indicate to the OOW or lookout of imminent danger of grounding;
- .13 The fact that the isolated danger symbol on the chart and the caution area message in the alarm panel remained displayed during successive navigational watches, may have suggested that there was no immediate and / or perceivable effects on the vessel or the voyage *per se*;
- .14 The benefits of technology became a burden, hindering the skilful use of equipment and only mitigated by the de-activation of the safety barrier system.

3.3 Other Findings

- .1 The bridge equipment familiarization forms were completed even though the deck officers needed further familiarization of on-board navigational equipment including ECDIS.

4 RECOMMENDATIONS

Columbia Shipmanagement GmbH is recommended to:

14/2018_R1 Disseminate this safety investigation report on board its fleet and ensure that it is discussed during on board safety management meetings;

14/2018_R2 Conduct a thorough navigational assessment of deck officers and assess the effectiveness of ECDIS training programme, on board familiarisation of bridge equipment, implementation of ECDIS planning procedures and monitoring of passage;

14/2018_R3 Examine ECDIS anomaly with respect to non-activation of safety alarms.

ANNEXES

Annex 1 - Passage Plan BOF-2.1b

BOF-2.1b: Passage Planning

A. Particulars of the Voyage

Vessel: KEA TRADER Voyage No. 17022 Date Completed: 05 JUL 2017
 Departure Port: Papeete Name of Berth: PILOT 43 Draft Fwd: 6.55 (m)/r Draft Aft: 7.90 (m)/r
 Arrival Port: Noumea Name of Berth: _____ Draft Fwd: _____ m/r/r Draft Aft: _____ m/r/r
 Distance Berth to Berth: 2582 Distance Pilot to Pilot: 2564.8 Steaming Time: 5d 19h 50m
 Yes _____
 Yes _____

BOCL-2.1a: Completion of Passage Plan was completed and recorded in the Deck Log Book:

BOF-2.2b: Passage Plan - UKC Calculation was completed and attached to this Passage Plan:

B. Course Card / Action Points

WP No.	WP Description	AP No.	AP Description	Chart	Position		Co (T°)	Distance		Position Monitoring System			Air Draft	UKC	Speed	Watch Level	
					Lat	Long		This Course	Total Made	Primary	Second	Fix Int					PI
Passage Berth To Pilot Station - outward pilotage																	
0	Berth	0	15 mins before leaving berth call Papeete Port Control obtain permission leaving berth on VHF ch 16/12. Pre Departure checklist considered. Pilot onboard Master and Pilot exchange info. Made Fast tugs as master command. Cast off all lines. Report to Papeete Port Control time of leaving berth and destination.	FR206980 FR309550 FR466580 FR574610 FR674602	17° 32.3' S	149° 34.5' W											
1	Approach	1	A/c 286° T. Monitor turning clearances at all times. Master in command and Pilot on advice. Prepare pilot ladder accordingly.	FR206980 FR309550 FR466580 FR574610 FR674602	17° 32.5' S	149° 34.5' W	186°	0.20	1.80	RADAR/ VISUAL	GPS	6 mins		46.1	2.57		II
2	Beacon A1	2	A/c 328° T. Monitor turning clearances at all times. Master in command and Pilot on advice. Let go tug.	FR206980 FR309550 FR466580 FR574610 FR674602	17° 32.5' S	149° 34.9' W	286°	0.40	1.40	RADAR/ VISUAL	GPS	6 mins		46.1	5.73		II
3	Papeete Pilot Station	3	Pilot off, secure pilot ladder. Call Papeete Port Control report time and position pilot disembarked. A/c 270° T. Marine Environmental Protection to be observed as per Sotias, Marpol and Company Policy.	FR206980 FR309550 FR466580 FR574610 FR674602	17° 31.3' S	149° 35.7' W	328°	1.40	2.00	RADAR/ VISUAL	GPS	6 mins		46.1	4.03		II
								2.00									

WP No.	WP Description	AP No.	AP Description	Chart	Position		Co (°)	Distance Total Made	Position Monitoring System		Air Draft	UKC	Speed	Watch Level	
					Lat	Long			Primary	Secondary					Fix Int
Passage Pilot Station To Pilot Station - Sea Passage															
3	Papeete Pilot Station	3	Pilot off, secure pilot ladder. Call Papeete Port Control report time and position pilot disembarked. A/c 270°T. Marine Environmental Protection to be observed as per SOLAS, MARPOL and Company Policy.	FR266980 FR369550 FR466580 FR574610 FR674602	17° 31.3' S	149° 35.7' W									
4	Chenal de Moorea	4	A/c 218°T Abide with Colreg. Monitor traffic situation. Increase fixing position intervals to 1 hr. Food waste disposal as per Marpol.	FR166070 FR266980 FR369550 FR466580 FR574610 FR674602	17° 31.3' S	149° 39.0' W	270°	3.20	RADAR/ VISUAL	GPS	15 mins		8.0	II	
5	Pointe Nuapere	5	A/c 265°T Keep monitor traffic situation. Food waste disposal as per Marpol.	FR166070 FR266980 FR369550 FR466580 FR574610 FR674602	17° 41.0' S	149° 47.0' W	218°	15.60	GPS	Radar	1 hr		15.0	I	
6	Alofi Nue	6	A/c 269°T Keep monitor traffic situation. Food waste disposal as per Marpol.	NZ146090 NZ214631 NZ300902 NZ714631 OED702691	19° 20.0' S	169° 49.0' W	265°	1150.9	GPS	Radar	1 hr		15.0	I	
7	Boat Passage	7	A/c 255°T Keep monitor traffic situation. Food waste disposal as per Marpol.	NZ180700 GR000900 GR000410 GR000410 NZ263380 NZ146090 GR263380 GR263380	19° 25.0' S	177° 31.0' W	269°	436.0	GPS	Radar	1 hr		15.0	I	
8	Ile Waipole	8	A/c 261°T Keep monitor traffic situation. Food waste disposal as per Marpol.	AU130150 GE0504637 FR273210 FR370520	22° 48.0' S	169° 01.0' E	255°	784.8	GPS	Radar	1 hr		15.0	I	
9	Banc de la Torche	9	A/c 312°T Keep monitor traffic situation. Food waste disposal as per Marpol. Call Noumea Pilot and Port whenever in VHF range vhf ch 16/12.	AU130150 FR273210 FR370520 FR466270 FR466970 FR307060	23° 06.0' S	166° 58.0' E	261°	115.3	GPS	Radar	1 hr		15.0	I	
10	Buoy Fad	10	A/c 360°T Keep monitor traffic situation. Food waste disposal as per Marpol. Prepare pilot ladder accordingly. Unlash both anchors. Switch off water evaporator.	AU130150 FR273210 FR466270 FR466970 FR307060	22° 29.0' S	166° 13.0' E	312°	55.8	GPS	Radar	1 hr		15.0	I II	
11	Pilot Station Tanker	11	A/c 044°T Keep contact with pilot. Reduce for pilot boarding speed. Hand steering.	AU130150 FR273210 FR466270 FR466970 FR307060	22° 23.5' S	166° 13.0' E	360°	5.5	RADAR/ VISUAL	GPS	30 mins		15.0	II	

WP No.	WP Description	AP No.	AP Description	Chart	Position		Co (T°)	Distance			Position Monitoring System			UKC	Speed	Watch Level
					Lat	Long		This Course	Total Made	Total To Go	Primary	Second	Fix Int			
12	Noumea Pilot Station	12	Pilot onboard, master pilot exchange info. Secure pilot ladder. A/c 044°T. Point of No Return. For emergency anchorage pls liaise with the port control.	AU130150 FR273210 FR367680 FR466870 FR576440	22° 22.8'	S 166° 13.7'	E 044°	0.9	2564.80	0.0	RADAR/ VISUAL	GPS	5 mins		6.0	II
Passage Pilot Station To Berth - inward pilotage																
12	Noumea Pilot Station	12	Pilot onboard, master pilot exchange info. Secure pilot ladder. A/c 044°T. Point of No Return. For emergency anchorage pls liaise with the port control.	AU130150 FR273210 FR367680 FR466870 FR576440	22° 22.8'	S 166° 13.7'	E			15.2	RADAR/ VISUAL	GPS	6 mins		6.0	II
13	Beacon no. 4	13	A/c 056°T Keep monitoring pilot command and order to the helmsman, crew on stand by for maneuvering.	AU130150 FR273210 FR367680 FR466870 FR576440 FR676430	22° 16.5'	S 166° 20.3'	E 044°	8.8	8.8	6.4	RADAR/ VISUAL	GPS	6 mins		8.0	II
14	Pointe Kongou	14	A/c 115°T Keep monitoring pilot command and order to the helmsman. Made fast tug upon master's request.	AU130150 FR273210 FR367680 FR466870 FR576440 FR676430	22° 14.5'	S 166° 23.4'	E 056°	3.5	12.3	2.9	RADAR/ VISUAL	GPS	6 mins		8.0	II
15	Approach	15	A/c 143°T Keep monitoring pilot command and order to the helmsman. Keep monitoring clearances to berth and other vessel alongside.	AU130150 FR273210 FR367680 FR466870 FR576440 FR676430	22° 15.6'	S 166° 25.9'	E 115°	2.6	14.9	0.3	RADAR/ VISUAL	GPS	6 mins		6.0	II
16	Berth	16	Ship's alongside, made fast all lines, let go tug. Report to Noumea Port time all fast and location. Prepare the gangway, pilot disembark. Mansec Level as per advice.	AU130150 FR273210 FR367680 FR466870 FR576440 FR676430	22° 15.9'	S 166° 26.1'	E 143°	0.3	15.2	0	RADAR/ VISUAL	GPS			0.0	II
										15.2						

Annex 2- ECDIS Setting Card BOF-5.2

BOF-5.2: ECDIS Setting Card

The card is to be completed by the Navigation Officer, signed by the Master and posted on the bridge near the ECDIS. The Card can be amended with equipment specific information, as required.

No.	Setting	Value
1	Safety Depth	Pilotage: 10 m Coastal: 11 m
2	Safety Contour	Pilotage: 11 m Coastal: 13 m
3	Safety Frame	<u>LOOK AHEAD SETTING</u> 3mins pilotage 12 mins coastal 18 mins Open sea <u>CROSS TRACK</u> Coastal 0.1 nm Open Sea 0.2 nm
4	Display Setting	Other
5	Primary ECDIS Scale	SCAMIN ON

ECDIS Equipment – Manufacturer and model: **JRC - JAN 901B**

Navigation Officer: [Redacted] Signature: [Redacted] Date: 05 Jul 17

Master: [Redacted] Signature: [Redacted] Date: 05 Jul 17

Annex 3 - Revised Passage Plan BOF-2.1b

A. Particulars of the Voyage

Vessel: KEA TRADER Voyage No. 17022 Date Completed: _____
 Departure Port: Papeete Name of Berth: _____ Draft Fwd: 06.5 m / 18' Draft Aft: 7.50 m / 18'
 Arrival Port: Noumea Name of Berth: _____ Draft Fwd: 06.15 m / 18' Draft Aft: 8.00 m / 18'
 Distance Berth to Berth: 2543.6 Distance Pilot to Pilot: 2495 Steaming Time: _____
 Yes _____
 Yes _____

BOCL-2.1a: Completion of Passage Plan was completed and recorded in the Deck Log Book:

BOF-2.2b: Passage Plan - UKC Calculation was completed and attached to this Passage Plan:

B. Course Card / Action Points

WP No.	WP Description	AP No.	AP Description	Chart	Position		Co (T°)	Distance		Position Monitoring System			Air Draft	UKC	Speed	Watch Level
					Lat	Long		This Course	Total Made	Total To Go	Primary	Second				
Passage Berth To Pilot Station - outward pilotage																
0	Berth	0	15 mins before leaving berth call Papeete Port Control obtain permission leaving berth on VHF ch 18/12. Pre Departure checklist considered. Pilot onboard Master and Pilot exchange info. Made Fast lugs as master command. Cast off all lines. Report to Papeete Port Control time of leaving berth and destination.	FR269880 FR369550 FR465580 FR574610 FR674602	17° 32.3' S	149° 34.5' W			2.00							II
1	Approach	1	A/c 285° T. Monitor turning clearances at all times. Master in command and Pilot on advice. Prepare pilot ladder accordingly.	FR269880 FR369550 FR465580 FR574610 FR674602	17° 32.5' S	149° 34.5' W	186°	0.20	1.80		RADAR/ VISUAL	GPS	6 mins		5.0	II
2	Beacon A1	2	A/c 328° T. Monitor turning clearances at all times. Master in command and Pilot on advice. Let go lug	FR269880 FR369550 FR465580 FR574610 FR674602	17° 32.5' S	149° 34.9' W	286°	0.40	1.40		RADAR/ VISUAL	GPS	6 mins		8.0	II
3	Papeete Pilot Station	3	Pilot off, secure pilot ladder. Call Papeete Port Control report time and position pilot disembarked. A/c 270° T. Marine Environmental Protection to be observed as per Solas, Marpol and Company Policy	FR269880 FR369550 FR465580 FR574610 FR674602	17° 31.3' S	149° 35.7' W	328°	1.40	2.00	0.00	RADAR/ VISUAL	GPS	6 mins		6.0	II
								2.00								
Passage Pilot Station To Pilot Station - Sea Passage																

WP No.	WP Description	AP No.	AP Description	Chart	Position		Co (T°)	Distance		Position Monitoring System			UKC	Speed	Watch Level
					Lat	Long		This Course	Total Made	Total To Go	Primary	Secondary			
3	Papeete Pilot Station	3	Pilot off, secure pilot ladder. Call Papeete Port Control report time and position pilot disembarked. A/c 270°T. Marine Environmental Protection to be observed as per Solas, Marpol and Company Policy.	FR268880 FR309550 FR466580 FR574610 FR674602	17° 31.3' S 149° 35.7' W			2495		RADAR/ VISUAL	GPS	15 mins		8.0	II
4	Chenal de Moorea	4	A/c 218°T Abide with Coireg. Monitor traffic situation. Increase fixing position intervals to 1 hr. Food waste disposal as per Marpol.	FR166070 FR266880 FR369550 FR466580 FR574610 FR674602	17° 31.3' S 149° 39.0' W	270°	3.2	2492	RADAR/ VISUAL	GPS	15 mins		15.0	II I	
5	Pointe Nuupere	5	A/c 265°T Keep monitor traffic situation. Food waste disposal as per Marpol.	FR166070 FR266880 FR369550 FR466580 FR574610 FR674602	17° 41.0' S 149° 47.0' W	218°	12.4	15.60	GPS	Radar	1 hr		15.0	I	
6	Alofi Nue	6	A/c 269°T Keep monitor traffic situation. Food waste disposal as per Marpol.	NC14605W NC214631 NC300582 NC214631 GB2V020511	19° 20.0' S 169° 49.0' W	265°	1150.9	1166.50	GPS	Radar	1 hr		15.0	I	
7	Boat Passage	7	A/c 255°T Keep monitor traffic situation. Food waste disposal as per Marpol.	NC14605W GB2V020511 GB2V020511 NC14605W GB2V020511 GB2V020511 GB2V020511	19° 25.0' S 177° 31.0' W	269°	436.0	1602.50	GPS	Radar	1 hr		15.0	I	
8	Ono	8	A/c 259°T Keep monitor traffic situation. Food waste disposal as per Marpol. 34' off to WP 9. Call Noumea Pilot and Port whenever in VHF range vhf ch 16/12.	GB2V020511 GB2V020511 NC214631 GB2V020511 GB2V020511 GB2V020511 GB2V020511	19° 55.2' S 179° 30.4' W	255°	117.0	1719.50	GPS	Radar	1 hr		15.0	I	
9	Pilot Station Tanker	9	A/c 247°T Keep contact with pilot. Reduce for pilot boarding speed. Hand steering. Prepare pilot ladder accordingly.	AU130150 FR273210 FR370520 FR466580 FR469330 FR578450	22° 18.8' S 167° 07.5' E	259°	766.2	2485.70	RADAR/ VISUAL	GPS	30 mins		15.0	II	
10	Noumea Pilot Station	10	Pilot onboard, master pilot exchange info. Secure pilot ladder. A/c 247°T. Point of No Return. For emergency anchorage pls liaise with the port control or SW of P/Str 2.0' Off.	AU130150 FR273210 FR469330 FR578450	22° 20.6' S 167° 02.8' E	247°	9.3	2495.00	RADAR/ VISUAL	GPS	6 mins		6.0	II	
								2495							

Passage Pilot Station To Berth - inward pilotage

WP No.	WP Description	AP No.	AP Description	Chart	Position		Co (T ^o)	Distance		Position Monitoring System			UKC	Speed	Watch Level		
					Lat	Long		This Course	Total Made	Total To Go	Primary	Secondary				Fix Int	PI
10	Nourmea Pilot Station	10	Pilot onboard, master pilot exchange info. Secure pilot ladder. A/c 247 T. Point of No Return. For emergency anchorage pls liaise with the port control or SW of P/Stn 2 0' Off.	AU130150 FR273210 FR466930 FR576450	22 ° 20.6'	S 167 ° 02.8'	E										
11	Pointe Puka	11	A/c 223 T Keep monitoring pilot command and order to the helmsman.	AU130150 FR273210 FR466930 FR576450	22 ° 21.8'	S 166 ° 59.7'	E 247 °	3.2	3.2	43.4	RADAR/ VISUAL	GPS	6 mins			8.0	II
12	Ilot Ugo	12	A/c 290 T Keep monitoring pilot command and order to the helmsman.	AU130150 FR273210 FR376450	22 ° 25.5'	S 166 ° 56.0'	E 223 °	5.0	8.2	38.4	RADAR/ VISUAL	GPS	6 mins			8.0	II
13	Recif Mczman	13	A/c 295 T Keep monitoring pilot command and order to the helmsman. P.I. to Ile Ouen 0.22'.	AU130150 FR273210 FR576450	22 ° 23.8'	S 166 ° 51.1'	E 290 °	4.9	13.1	33.5	RADAR/ VISUAL	GPS	6 mins			8.0	II
14	Beacon Woodin	14	A/c 252 T Keep monitoring pilot command and order to the helmsman. P.I. to Woodin 0.37'.	AU130150 FR273210 FR576450	22 ° 23.2'	S 166 ° 48.7'	E 285 °	2.3	15.4	31.2	RADAR/ VISUAL	GPS	6 mins	0.22		8.0	II
15	Pointe Noukouma	15	A/c 268 T Keep monitoring pilot command and order to the helmsman.	AU130150 FR273210 FR576450	22 ° 23.7'	S 166 ° 47.1'	E 252 °	1.5	16.9	29.7	RADAR/ VISUAL	GPS	6 mins	0.37		8.0	II
16	PIC IA	16	A/c 293 T Keep monitoring pilot command and order to the helmsman.	AU130150 FR273210 FR576450	22 ° 23.8'	S 166 ° 44.7'	E 268 °	2.2	19.1	27.5	RADAR/ VISUAL	GPS	6 mins			8.0	II
17	Basse Oliver	17	A/c 281 T Keep monitoring pilot command and order to the helmsman. P.I. to Bn Ilot Porc-Epic 0.4'.	AU130150 FR273210 FR370520 FR466930 FR466970 FR466970 FR576440	22 ° 20.5'	S 166 ° 36.4'	E 293 °	8.5	27.6	19	RADAR/ VISUAL	GPS	6 mins			8.0	II
18	Basse Prevoiyante	18	A/c 267 T Keep monitoring pilot command and order to the helmsman.	AU130150 FR273210 FR370520 FR466970 FR576440	22 ° 19.7'	S 166 ° 32.1'	E 281 °	4.0	31.6	15	RADAR/ VISUAL	GPS	6 mins	0.4		8.0	II
19	Ilot NDO	19	A/c 289 T Keep monitoring pilot command and order to the helmsman.	AU130150 FR273210 FR370520 FR466970 FR576440 FR576440	22 ° 19.9'	S 166 ° 27.7'	E 267 °	4.1	35.7	10.9	RADAR/ VISUAL	GPS	6 mins			8.0	II
20	Ile Aux Canards	20	A/c 320 T Keep monitoring pilot command and order to the helmsman.	AU130150 FR273210 FR370520 FR466970 FR576440 FR576440	22 ° 19.3'	S 166 ° 25.9'	E 289 °	1.9	37.6	9	RADAR/ VISUAL	GPS	6 mins			8.0	II
21	Mount Oumbo	21	A/c 340 T Keep monitoring pilot command and order to the helmsman.	AU130150 FR273210 FR370520 FR466970 FR576440 FR576440	22 ° 16.4'	S 166 ° 23.2'	E 320 °	3.8	41.4	5.2	RADAR/ VISUAL	GPS	6 mins			8.0	II

WP No.	WP Description	AP No.	AP Description	Chart	Position		Co (T°)	Distance		Position Monitoring System			Air Draft	UNC	Speed	Watch Level
					Lat	Long		This Course	Total Made	Total To Go	Primar	Second				
22	Ponile Kueudu	22	A/c 360°T Keep monitoring pilot command and order to the helmsman. Crew Stand by for Maneuvering.	AU130150 FR273210 FR367680 FR466870 FR576440 FR676430	22° 15' 3"	S 166° 22' 8"	E 340°	1.2	42.6	4	RADAR/ VISUAL	GPS	6 mins		8.0	II
23	Ponile Lacombe	23	A/c 055°T Keep monitoring pilot command and order to the helmsman.	AU130150 FR273210 FR367680 FR466870 FR576440 FR676430	22° 14' 9"	S 166° 22' 8"	E 360°	0.4	43.0	3.6	RADAR/ VISUAL	GPS	6 mins		8.0	II
24	Ponile Kongou	24	A/c 115°T Keep monitoring pilot command and order to the helmsman. Keep well clear of anchored vessel's. Made fast tug upon master's request.	AU130150 FR273210 FR367680 FR466870 FR576440 FR676430	22° 14' 5"	S 166° 23' 4"	E 055°	0.7	43.7	2.9	RADAR/ VISUAL	GPS	6 mins		8.0	II
25	Approach	25	A/c 143°T Keep monitoring pilot command and order to the helmsman. Keep monitoring clearances to berth and other vessel alongside.	AU130150 FR273210 FR367680 FR466870 FR576440 FR676430	22° 15' 6"	S 166° 25' 9"	E 115°	2.6	46.3	0.3	RADAR/ VISUAL	GPS	6 mins		6.0	II
26	Berth	26	Ship's alongside, made fast all lines, let go tug. Report to Noumea Port time all fast and location. Prepare the gangway, pilot disembark. Marsec Level as per advice.	AU130150 FR273210 FR367680 FR466870 FR576440 FR676430	22° 15' 9"	S 166° 26' 1"	E 143°	0.3	46.6	0.0	RADAR/ VISUAL	GPS			0.0	II
								46.6								

C. Charts and Publications

All Voyage Charts and Paper Publications corrected / updated up to the latest Notice To Mariners including Temporary & Preliminary Notice: 25/17 week

Prefix & No.	Prefix & No.	Prefix & No.	Prefix & No.	Prefix & No.	Prefix & No.	Prefix & No.	Prefix & No.	Prefix & No.	Prefix & No.	Prefix & No.	Prefix & No.	Prefix & No.	Prefix & No.	Prefix & No.	Prefix & No.	Prefix & No.	Prefix & No.	Prefix & No.	Prefix & No.			
FR266	FR369	FR466	FR574	FR674	FR166	NZ144	NZ200	NZ146	FR273	NZ214	NZ214	NZ300	NZ214	GB2W	GB204	NZ246	NZ146	GB2E2	GB204	AU130	FR273	FR370
880	550	580	610	602	070	606	093	05W	690	630	631	082	631	2691	41W	38E	05E	691	637	150	210	520
FR468	FR466	FR367	FR576	FR676																		
270	870	680	440	430																		

Thematic Charts:

Maritime Security Charts	NP:	Meteorological Charts and Diagrams	NP:
Admiralty Routing Charts	NP:		NP:
Admiralty Routing Guides	NP:		NP:
Planning Charts	NP:		NP:

Admiralty Digital Publications:

- ADDL Admiralty Digital List of Lights area 8 Updated up to: 13/17 week
- ADRS Admiralty Digital Radio Signals 6 area 8 Updated up to: 13/17 week
- ATT Admiralty Total Tide area 8 Updated up to: 01/2017 week

Relevant sections of the Admiralty Digital Publication pertaining to the vessel's planned voyage are printed off and attached to this passage plan: Yes

Nautical Publications and Maritime Safety Information:

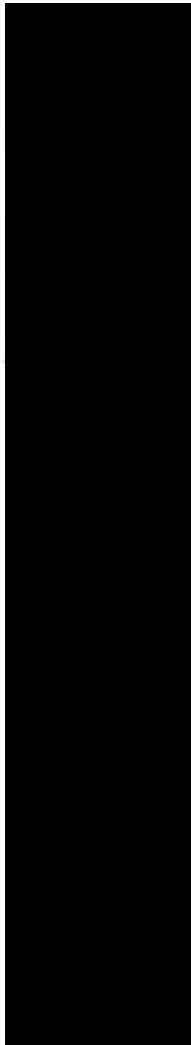
Sailing Directions	NP:	62	61	MI Marine Notice	No.
Admiralty Digital Radio Signals 2 / 1,3,4,5	NP:	area 2 / area 2		DNV Navigator	Update: 28/17
Tidal Stream Atlases	NP:			Local Marine Notice	No.
Ocean Passages for the World	NP:	136		Weather Routing Service	Swedish Institute

Prepared by:

Approved by:

Acknowledged by:

Acknowledged by:



Signature
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Annex 4 – Categorization of hydrographic data

**CATEGORY OF ZONES OF CONFIDENCE
(ZOC TABLE)**

1	2	3		4
<i>ZOC</i>	<i>Position Accuracy</i>	<i>Depth Accuracy</i>		<i>Seafloor Coverage</i>
A1	± 5m	= 0.5m + 1%depth		Full seafloor coverage. All significant features detected and depths measured.
		Depth (m)	Accuracy (m)	
		10	± 0.6	
		30	± 0.8	
A2	± 20m	= 1.0m + 2%depth		Full seafloor coverage. All significant features detected and depths measured.
		Depth (m)	Accuracy (m)	
		10	± 1.2	
		30	± 1.6	
B	± 50m	= 1.0m + 2%depth		Full seafloor coverage not achieved; uncharted features, hazardous to surface navigation are not expected, but may exist.
		Depth (m)	Accuracy (m)	
		10	± 1.2	
		30	± 1.6	
C	± 500m	= 2.0m + 5%depth		Full seafloor coverage not achieved; depth anomalies may be expected.
		Depth (m)	Accuracy (m)	
		10	± 2.5	
		30	± 3.5	
D	Worse than ZOC C.			Full seafloor coverage not achieved; large depth anomalies may be expected.
	Full seafloor coverage not achieved; large depth anomalies may be expected.			
U	Unassessed			

Annex 5 - Detailed information of the chart and caution message

When the symbol is interrogated, the following information about the chart is displayed:

CTNARE (Caution area)

INFORM (Information): Positions in this region lie within $\pm 1710\text{m}$ of WGS84 datum

CTNARE (Caution area): INFOR (Information): CHART ACCURACY

Notes on the safe use of the chart are displayed as follows:

Note 1 (GBUNSDAT.TXT):

S-57 DATASETS ON UNSPECIFIED DATUM

Positions obtained from Global Navigation Satellite Systems, such as GPS, are normally referred to WGS-84 Datum. The differences between satellite-derived positions and positions on this cell cannot be accurately determined; the estimated value of the difference for this region of the chart is shown in the INFORM attribute. Mariners are warned that these differences MAY BE SIGNIFICANT TO NAVIGATION and are therefore advised to confirm GPS positions shown in the chart display using alternative navigational techniques particularly when closing the shore or navigating in the vicinity of dangers.

Note 2 (GBCELA18.TXT):

Owing to the age and quality of the source information, some of the charted detail may not be positioned accurately. Particular caution is advised when navigating in the vicinity of dangers, even when using an electronic positioning system such as GPS.