

# **Part VII – Technical Specifications**

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## CHAPTER 1 – GENERAL PROVISIONS

### 1.1. Introduction

- 1.1.1. This document (or “Technical Specifications” or “TS” or “Part VII”) sets out the requirements of the Government of the Hong Kong Special Administrative Region (“HKSAR”) of the People’s Republic of China (hereinafter referred to as the “Government”) in relation to Twelve (12) Divisional Fast Patrol Craft (“Vessel”) for use by the Hong Kong Police Force (“HKPF” or “user department”).
- 1.1.2. The primary and overriding aim of this procurement exercise is to provide the HKPF with twelve (12) Divisional Fast Patrol Craft, which are with aluminium alloy hull and powered by two outboard engines. Robustness of construction, ergonomics, seakeeping, high-speed control response, stable and predictable manoeuvrability at high and low speeds, stability in adverse sea states and directional stability are of fundamental importance.
- 1.1.3. The offered Vessel shall be a commercially available aluminium alloy-hulled craft.
- 1.1.4. Unless otherwise specified in the TS, all the specifications stated in this Part VII of the Tender Documents are classified and labelled as follows:
  - (a) Essential Requirements [E];
  - (b) Those specifications which are without any label (viz., [E] or [D]) (“Specifications without Label”); and
  - (c) Desirable Specifications [D].
- 1.1.5. As part of the tender evaluation during the tendering stage (viz., completeness check), the Tenderer shall submit all the information sufficiently detailed to substantiate that the product and the services offered meet the Essential Requirements as stipulated in Annex C to Part II - the Conditions of Tender, failing which its tender will not be considered further.
- 1.1.6. All (a) Essential Requirements [E], (b) if and to the extent the Contractor has indicated compliance, Specifications without Label, and (c) if and to the extent the Contractor has indicated compliance, Desirable Specifications labelled with [D], shall also form part of the Contract and be of equal materiality and importance upon the award of the Contract. Where the Tenderer has indicated non-compliance with any Specification without Label, it shall have proposed Counter-Proposals to such Specifications without Label in accordance with Clause 17.3 of Part II - Conditions of Tender for the Government's evaluation.
- 1.1.7. The Vessel shall be Ready for Use before the Delivery Date and delivered by the Delivery Date as per the schedule stipulated under Schedule 2 – Delivery Schedule of Part V.
- 1.1.8. Unless otherwise expressly defined in the Contract, all technical terms and expressions used in this Part VII shall be interpreted in accordance with the professional or common usage in naval architecture, marine engineering, nautical navigation and the shipbuilding industry.
- 1.1.9. Where design specifications of the Vessel are required to be approved by the Recognised Organisation (“RO”) as specified in Part V, Schedule 9, they must be approved by the specified RO as well as by the Government New Construction Section (“GNC”) and HKPF prior to the manufacture of the Vessel (collectively, “GNC/HKPF”). Where design details are not required to be approved by the specified RO, they must be approved by GNC/HKPF prior to manufacture.
- 1.1.10. For the avoidance of doubt, references to “tests” throughout the Tender Documents and the Contract shall include all inspections, surveys, assessments, trials and experiments.
- 1.1.11. Without prejudice and in addition to the interpretation principles set out in Clause 1.2 of the Part IV – Conditions of Contract, the following interpretation principles shall apply when interpreting the Tender Documents and the Contract including this Part VII and all its Annexes:
  - (a) references to “Chapter” or “Paragraph” or “Annex” refer to the chapter of or the paragraph of or the Annex to this Part VII;

- (b) quotation marks may or may not be added for each defined term whether with or without brackets; a defined term may be identified with quotation marks and brackets, or just quotation marks, or just brackets;
- (c) the use of the article “the” may or may not appear before a defined term or an abbreviated term; there shall be no difference whether the term is preceded with or without the article;
- (d) a defined term may have two or more versions (typically a longer version and an abbreviated version) (e.g. “Factory Acceptance Tests” or “FAT”); or may still be referred to by the original description of the subject matter based on which the term is defined; the original description; or the longer version of the defined term; or the shorter version of the defined term may be used interchangeably. For the sake of clarity, the original description, or the longer version may be used for more self-explanatory purpose; however, there shall be no difference;
- (e) where a subject matter has been defined with two or more alternative terms of reference, any one of these terms of reference may be used interchangeably;
- (f) a defined term may appear earlier than the provision in which it is defined; a term defined will have the same meaning throughout the document;
- (g) there shall be no difference between a term with a hyphen and the same term without a hyphen (e.g., “sub-system” or “subsystem”);
- (h) titles and headings may appear in lower case or upper case throughout or only in upper case with the first word at the beginning; there shall be no difference in meaning;
- (i) headings and titles do not affect the construction of the Tender Documents and the Contract;
- (j) a sub-Section of this Part VII (at whichever sub-level and regardless of the numbering system adopted) may begin in upper or lower case and may be ended with a semi-colon or full stop; these differences do not have any interpretation significance on their own;
- (k) figures may be expressed in Arabic numerals or in words; or both; there shall be no difference; three zeros in a figure may or may not be separated by any space or comma; there shall be no difference; and
- (l) where more than one unit of a subject matter is to be supplied as part of the Work, all requirements stated to be applicable to that subject matter shall apply to each such unit of that subject matter. This is regardless of whether the term “each of” or other cognate expression is used preceding that subject matter. This principle shall apply including without limitation where the subject matter is the Vessel, and the Equipment on each Vessel.

## **1.2. Statement of Purposes of the Vessel**

- 1.2.1. The Vessel shall be safe, fit and suitable for the operational purposes for which it is intended, namely to be navigated by the HKPF anywhere within Hong Kong Waters, for the following purposes:
- (a) Maritime law enforcement
  - (b) Immigration, excise and conservancy law enforcement
  - (c) Responding to emergency calls for policing services
  - (d) Policing support provision to outlying islands and remote areas
  - (e) Emergency response capability to enable the HKSAR Government to fulfil their ISPS Code obligations
  - (f) Search and Rescue (“SAR”) operations
  - (g) IPP/VIP escort duties at sea
  - (h) Warship escort duties
  - (i) Other maritime emergency response and security duties as required

- (j) Vessel cordon and control duties pre-planned maritime events
- (k) Sea safety policing

1.2.2. When configured in accordance with these TS, the Vessel shall meet or exceed the following key performance parameters (“KPP”) under load conditions, if any, described in Paragraph 1.8.2(f) in this Part VII:

(a) KPP 1: Sea Keeping

The Vessel shall be designed, engineered and constructed to conduct missions without substantial damage through sea states up to World Meteorological Organisation (“WMO”) Sea State 5. For these purposes, substantial damage is defined as any damage or structural failure that adversely affects the structural strength, performance, or integrity of the Vessel, thereby rendering it inoperable for HKPF missions. The Vessel shall also be able to survive at WMO Sea State 6 if so required. For details of the WMO Sea State Code, please see Annex 8 to this Part VII.

(b) KPP 2: Contract Speed - Light

The Vessel shall be capable of performing patrol duties to a contract speed of at least fifty five (55) knots under Light Operational Load Condition (as per Paragraph 1.8.2(f) of this Part VII) in WMO Sea State 0 to 2.

(c) KPP 3: Contract Speed - Full

The Vessel shall be capable of performing patrol duties to a contract speed of at least fifty (50) knots under Full Operational Load Condition (as per Paragraph 1.8.2(f) of this Part VII) in WMO Sea State 0 to 2.

(d) KPP 4: Manoeuvrability

The Vessel shall be capable of safe, stable and predictable high-speed manoeuvrability whilst fulfilling the purposes listed at Paragraph 1.2.1 of this Part VII.

1.2.3. The Contractor acknowledges and agrees that the Government relies on the professional judgment and skill of the Contractor to ensure that the Vessel is compliant with all of the requirements of this Part VII and warrants that it will alter, modify or otherwise change aspects of the Vessel’s fittings, fixtures, user interface as required by the Government in order to ensure the ultimate fitness for purpose of the Vessel before the unqualified Acceptance Certificate is issued.

### **1.3. Authorities**

1.3.1. The GNC of the Marine Department (“MD”) is the section responsible for the procurement of the Vessel for the Government. GNC may delegate the supervision work including plan reviewing work during the construction stage to private consultancy firms to act on behalf of the Government.

1.3.2. Communications Branch (“COMMS”) is the technical section within the HKPF, which will oversee the Work to be provided by the Contractor in connection with the Communication Equipment and Electronic Navigational Equipment (“ENE”) and carry out technical acceptance of the Communication Equipment and ENE.

1.3.3. The HKPF is the end user of the Vessel and will participate in tests, inspections and trials together with GNC viz., the Technical and Delivery Acceptance of the Vessel on behalf of the Government.

## **1.4. Tenderer and Contractor**

1.4.1. In addition to the drawings and information included in the Technical Proposal for the Vessel offered in its tender submission, the Contractor is obliged to prepare and submit comprehensive and detailed technical specifications of the Vessel, together with all necessary drawings and information, as required in this Part VII within the specified period of time and to the satisfactory acceptance by the RO, GNC and HKPF. If no period is specified, they shall be submitted and approved by the RO, GNC and HKPF (as the case may be) before the construction of the relevant part of the Vessel. Without prejudice to the Contractor's obligations for compliance with all contract requirements set out in this Part VII (viz all essential requirements, all requirements not marked as essential, and all desirable specifications committed by the Contractor) and any rights of the Government under the Contract or otherwise, the Contractor shall submit to GNC and HKPF supplementary drawings, information and deliverables that may be deemed necessary for the design and construction of the Vessel as required in Items 1 to 13 (Essential Requirements in Part VII) of Schedule 5 and other relevant parts of the Contract where applicable. Any intended technical solutions to be proposed by the Contractor to ensure the Vessel's compliance with each individual paragraph of the Technical Specifications shall be at least equivalent to or no less favourable than the respective contract requirements set out in this Part VII or otherwise, and shall be subject to the prior acceptance by GNC and HKPF before implementation of such intended technical solutions. In case of any discrepancies on interpretation of the technical specifications stipulated in this Part VII between the Contractor and the Government, the final decision on such intended technical solutions in fulfilling the fit-for-purpose standards and requirements shall be vested in GNC and the HKPF.

## **1.5. Shipyard**

1.5.1. The Contractor's nominated shipyard for building the Vessel must have the essential shipbuilding and workshop facilities such as lifting gear, hull construction and calibration equipment, machinery installation and calibration equipment, and vessel launching or slipping facilities.

1.5.2. The Contractor shall employ a team of professional staff to carry out the design of the Vessel and also carry out supervision and quality control work in the course of Vessel construction.

## **1.6. Design and Construction Responsibility**

1.6.1. The Vessel shall be designed and constructed for a service life of not less than fifteen (15) years under normal maintenance.

1.6.2. It is the sole responsibility of the Contractor to supply the Vessel which is safe, fit and suitable for the intended operational purposes of the HKPF as set out in Paragraphs 1.2.1 and 1.2.2 of this Part VII and which meets all relevant regulations and all specifications in this Part VII, which include without limitation requirements for safety, health, environmental protection, hull form design features, structure, method and materials for construction and fitting out, stability, sub-division and operational efficiency.



- 1.6.3. The Vessel shall be designed and constructed in accordance with the rules and regulations of the RO as specified in Schedule 9 of Part V in the version as at the Contract Date unless the rules and regulations of RO specify that version of such rules and regulations as at the keel laying date of the Vessel shall apply in relation to the relevant requirements specified therein. Unless otherwise expressly stipulated in this Part VII, (a) references to “the RO” in this Part VII shall mean the RO as specified in Part V, Schedule 9; and (b) references to “the RO Requirements” shall mean the requirement of the rules and regulations of the RO as specified in Part V Schedule 9. Notwithstanding the foregoing, where it is expressly permitted in this Part VII that in relation to any particular requirement (instead of the RO specified in Part V, Schedule 9) another RO which is any one of the RO’s listed in Paragraph 2.3.4 of this Part VII may be designated for confirmation of compliance with the relevant requirement, references to “RO” shall mean any such other RO. References to “IMO requirements” shall mean the latest and as amended requirements published by the International Maritime Organization (“IMO”) and available on its website and applicable to the relevant subject matter in the relevant paragraph where it is required that IMO requirement shall be complied with provided that where the IMO requirements are of any convention or resolution or other multilateral treaty of the IMO (including any amendment thereto), Hong Kong has joined in as a party to such IMO requirements.
- 1.6.4. The Vessel shall be issued with a class certificate with notation by the RO as specified in Part V, Schedule 9, as one of the conditions, before the Acceptance Certificate (qualified or unqualified) for the Vessel may be issued. All plans, particulars and documentations which are required for the issuance of a class certificate, by the RO, in addition to those listed in Annex 3 to this Part VII shall be approved by the RO before submission to GNC for endorsement and final approval prior to the commencement of manufacturing work of the vessel. Any subsequent modifications or additions shall be treated in the same manner. Those drawings, which are not required for facilitating the issuance of a class certificate, shall still be submitted to GNC for approval before work is carried out.
- 1.6.5. The Contractor shall design, build and supply the Vessel in full compliance with all requirements of the Contract including without limitation the Warranties, this Part VII and the Schedules; which may be over and above what is normally required by any statutory and/or RO’s rules and/or regulations. Should there be any contradiction between the rules and regulations of the RO and this Part VII, this Part VII shall prevail unless GNC stipulates or agrees otherwise.
- 1.6.6. Notwithstanding the submission of the preliminary plans and drawings by the Contractor then as part of its tender for the Contract, all plans and drawings of the Vessel except the design stresses and scantling, shall be submitted to GNC for approval before completion of the Vessel design.
- 1.6.7. Even if the Contractor may appoint a Sub-contractor to design the Vessel with the prior written consent of the Government, the Contractor shall not be relieved of its obligations under the Contract through such appointment, and the Contractor shall be responsible for all acts, defaults and omissions of the sub-contractor as if they were its own.

## **1.7. Survey and Inspection**

- 1.7.1. Tenderers shall note that the unit price per Vessel as quoted in Part V, Schedule 1, shall be deemed to have included the cost of surveys to be carried out by the relevant RO in respect of that Vessel (if required to be arranged by the Contractor under the Contract).
- 1.7.2. All electronic items and their installation shall be approved and inspected by COMMS or COMMS representatives as part of Stage 2, 3 and 4 of the Technical Acceptance.
- 1.7.3. Subject to Paragraph 1.7.8 of this Part VII, an advance written notice of not less than thirty (30) working days, must be given to GNC before the representatives of GNC and other Government officers are invited to conduct a survey visit of the Vessel. The Contractor shall be fully responsible for any delay if the Contractor fails to give adequate notice of the aforesaid.

1.7.4. The Contractor shall provide:

- (a) An Implementation Timetable, in the form set out in Annex 2 to Part VII, setting out the major milestones and their scheduled completion dates and incorporating the Delivery Dates specified in Schedule 2 of Part V;
- (b) The Drawing Submissions Timetable in the form set out in Annex 3 to Part VII; and
- (c) The Main Items Inspection Timetable in the form set out in Annex 4 to Part VII.

Each one of the above shall be submitted to GNC for approval within fourteen (14) days after the commencement of the Contract Period.

The Delivery Date(s) for the Vessel(s) as stated in the Implementation Timetable shall be no later than those set out in Schedule 2 of Part V.

- 1.7.5. Notwithstanding anything in the Contract to the contrary, the Government may suspend payment of any of the instalment specified in Schedule 3 of Part V of the Contract if any of the timetables required herein has not been submitted for GNC's approval or GNC does not approve any of them or if the progress of work does not comply with any of them as approved by GNC.
- 1.7.6. A weekly work progress report with photos evidencing the progress and material/equipment procurement status is required to be submitted to GNC during the construction of the Vessel. The weekly report shall be submitted before noon of every Monday. The Contractor shall provide supporting evidence, including but not limited to photos and videos, to demonstrate that the milestones have been completed according to the completion dates stated in the submitted Implementation Timetable in Annex 2 to Part VII.
- 1.7.7. GNC may designate consultant(s) from the private sector who will be authorized to represent GNC in all technical matters including plan approval related to the construction of the Vessel. The Contractor shall cooperate with the consultant(s) and afford unhindered access to the Vessel at all times during working hours and shall furnish current copies of all drawings, sketches, correspondence, change notices, change orders, test agendas, schedules and other necessary documents where applicable. Under any circumstances shall GNC officers, HKPF officers or the consultant(s) be prevented from witnessing any test or inspection or from accessing any records related to the Vessel.
- 1.7.8. After arriving at site for a survey visit, if GNC officers or consultants consider that it is unsafe to carry out the test or inspection, the test / inspection will not be carried out. The Contractor shall arrange for another additional survey visit at the Contractor's expense. The Government shall not be responsible for any delay arising from any postponement in conducting the survey visit due to any safety issue as specified in this paragraph.
- 1.7.9. Where any fee charge and associated expenses are payable for the services of the RO, which are necessary in order to fulfil any obligation of the Contractor under the Contract, the Contractor is responsible for paying the RO all such fees, charges and associated expenses. Such fees shall include charges for drawing approval, surveys (if deemed necessary), issue of certificates, and any other expenses payable to the RO.
- 1.7.10. The Contractor shall provide office space for GNC officers, HKPF officers and consultants during their survey visits and construction progress visits to the Vessel at the shipyard where the Vessel is being constructed. The office space shall include, but not be limited to, two (2) desks, four (4) chairs, one (1) telephone, one (1) conference table, drinking facilities, power supply and one (1) cupboard for storage of documents and working clothes. The space provided by the Contractor shall also be fitted with air conditioning/heating, have internet access with WiFi connection, and a copying and printer machine. Cleaning of the space shall be carried out on each working day.
- 1.7.11. The hours of work of the GNC officers, HKPF officers or consultants will be arranged to coincide with those of the shipyard, insofar as is practicable to do so. It is intended that all reasonable steps are taken so that the duties of the GNC officers and consultants can be carried out with maximum efficiency and minimum interference with the Contractor's work.

1.7.12. The final survey and inspection visit will be the Pre-Shipment Construction and Handling Inspection as specified in Paragraph 1.8.2 of this Part VII, the purpose of which will be for the Government to satisfy itself that the Vessel is, in all respects, ready for shipment to Hong Kong (if constructed in a place outside the HKSAR) to undergo the Official Sea Trial. This inspection visit may have been preceded by one or more similar visits following which necessary modification work, if required, has been completed. The Contractor shall provide GNC with one (1) month's advanced written notice of its readiness to invite the Government to conduct the Pre-Shipment Construction and Handling Inspection or, otherwise, as agreed by the Government.

## **1.8. Procedures for Vessel Acceptance**

1.8.1. Stage 1 – 1<sup>st</sup> stage of the Technical Acceptance – testing and inspections during the construction period

- (a) There shall be a process of continuous inspection and testing during the construction period of the Vessel. The list in Annex 4 is a general but not comprehensive list of the items to be tested and inspected during the construction period. Without prejudice to the requirements for the Handling Assessment by the representatives of GNC and the user department as part of Stage 2, GNC officers or GNC consultant shall be the owner representative to monitor the quality throughout the construction period in the shipyard based on the on-site supervision programme (“Programme”), which will include a comprehensive and detailed list of the inspection items which shall be deemed to form part of the Contract and superseding Annex 4 in the event of any inconsistency where the Programme is more detailed than Annex 4. The Vessel shall have undergone successfully and to the satisfaction of the Government all the inspections (to be conducted by the GNC officers or GNC consultant) and testing (to be conducted by the Contractor in the presence of the GNC officers or GNC consultant) in order to proceed the RO certification and the next stage of the Technical Acceptance by the deadline date as stated in the Implementation Plan.
- (b) Should the Contractor fail to ensure the passing of all of the aforesaid inspections and testing, the options available to the Government are set out in Clause 12 of Part IV - the Conditions of Contract and all other applicable provisions of the Contract.

1.8.2. Stage 2 – 2<sup>nd</sup> stage of Technical Acceptance - Pre-shipment Construction and Handling Inspection

- (a) Safety of Vessel for Pre-shipment Construction and Handling Inspection

Prior to conducting the Pre-shipment Construction and Handling Inspection, an Inclining Experiment as specified in Paragraph 3.2.3 of this Part VII shall have been carried out and the final lightship weight and centre of gravity shall have been determined and approved by the RO and GNC. All loading conditions used during the Pre-shipment Construction and Handling Inspection shall be compiled using the approved final lightship weight and centre of gravity and shall meet the intact and damage stability criteria as specified in Paragraphs 3.2.5 and 3.2.6 of this Part VII respectively. Other documentary evidence acceptable to the Government showing that the Vessel is safe to proceed to sea for the intended tests and trials specified in the Contract shall be submitted.

- (b) Handling Assessment of Vessel

On completion of construction, and prior to shipping to Hong Kong if the building location is outside of Hong Kong, a Handling Assessment for the Vessel shall be carried out as per requirements and procedures as given in Annex 7 to this Part VII at or near the site where the Vessel is constructed.

- (c) Pre-shipment speed trial

Pre-shipment speed trial (separate from the handling assessment as mentioned in paragraph 1.8.2(b) above) shall be carried out at or near the site where the Vessel is constructed, and

shall be carried out in the presence of GNC officers and HKPF representatives or the GNC consultant. The pre-shipment speed trial shall be conducted and assessed in the same manner as the official sea trials specified in paragraph 1.8.3(f) below.

(d) ENE items

ENE items to be tested as per Chapter 7 of this Part VII relevant to Pre-shipment Construction and Handling Inspection.

(e) Hull bottom inspection

Upon successful completion of the pre-shipment speed trial and Handling Assessment, the Contractor shall arrange for GNC officers to carry out a hull bottom inspection on the Vessel to check for any hull damage before shipping to Hong Kong. Any hull damage found, if any, shall be rectified at or near the site where the Vessel is constructed.

(f) Loading conditions for tests and trials

The loading conditions to be used during tests and trials for all stages of the Technical Acceptance are specified below:

	Operational Load Conditions	
	Light*	Full
Fuel (minimum)	25%	90%
Crew	2	4
Passenger	0	0
Kit	0 kg	20 kg
Equipment	0 kg	100 kg

\*All detachable passenger seats are removed during the test.

All loading conditions being used during all tests and trials shall be compiled by using the approved final lightship weight and centre of gravity, and all such loading conditions shall meet the intact and damaged stability criteria as specified in Paragraphs 3.2.5 and 3.2.6 respectively. Other documentary evidence acceptable to the Government showing that the Vessel is safe to go to sea for the intended tests and trials specified in the Contract shall be submitted.

(g) Condition for proceeding to Stage 3

After meeting all the requirements of this Stage 2 - Pre-shipment Construction and Handling Inspection, the Vessel shall be measured for the draught at the Full Operational Load Condition and the air draught at the Light Operational Load Condition as specified in Paragraph of 1.8.2(f) of this Part VII respectively. If the Vessel complies with the Part (A)(II)(b) and (c) of the submitted Schedule 11 - Excess Proposal, it shall then be shipped to Hong Kong and to proceed to Stage 3 - Official Sea Trial.

(h) If the Vessel cannot pass all of the tests, trials and inspections comprising the second (2<sup>nd</sup>) stage of the Technical Acceptance as specified above by the deadline specified in the Implementation Plan, the options available to the Government are set out in Clause 12 of Part IV - the Conditions of Contract and other applicable provisions of the Contract.

1.8.3. Stage 3 – 3<sup>rd</sup> stage of Technical Acceptance - Official Sea Trial

(a) Condition and location of carrying out Official Sea Trial

The Official Sea Trial shall be carried out in Hong Kong in the presence of GNC's officers or consultant and HKPF representatives.

(b) Official Sea Trial programme

The Contractor shall submit an Official Sea Trial programme for GNC's approval not less than ten (10) working days in advance of the Official Sea Trial, which shall include details of proposed procedures for carrying out the official speed trial, endurance test, manoeuvring test, crash stop test, astern running test, emergency steering test, ENE items, and other tests as stated in this Paragraph 1.8.3 and required by GNC and HKPF. This submission shall include the RO approved inclining experiment report as mentioned in Paragraph 3.2.3 of this Part VII and other documentary evidence acceptable to the Government showing that the Vessel is safe to go to sea for the intended tests and trials specified in the Contract.

(c) Cost and expenses for carrying out tests and trial

As in all other tests and trials to be conducted for Vessel acceptance, the Contractor is required to carry out the Official Sea Trial in Hong Kong at its own expense (including the expense of fuel, lubrication oil, crew and other necessary expenses). The Contractor shall invite the local agent appointed by the manufacturer of the outboard engines to attend the sea trial in Hong Kong to evaluate the outboard engine performance and parameters and verify the suitability of the outboard engine with the propeller and the Vessel as a whole at its own expense. Before the Official Sea Trial, the Contractor shall observe the certificate of competency and third party insurance requirements under the Laws of Hong Kong and those as required in the Contract and provide the relevant insurance policies and certificates to the Government for checking.

(d) Contractor's staff onboard the Vessel during trial

To ensure that the Official Sea Trial can be conducted safely and in accordance with the Laws of Hong Kong, the Contractor shall provide the GNC with appropriate details about each one of the Contractor's staff who will be onboard. These details shall include the name, post, duty, experience and certificate(s) of competency and are to be submitted at the same time as the Official Sea Trial programme specified at Paragraph 1.8.3(b) of this Part VII. The number of persons onboard during a particular test or trial shall be agreed by the GNC officers and HKPF representative. The location of each person onboard (which can affect the centre of gravity of the Vessel under trial) shall also be first agreed by the GNC officers and HKPF representative.

(e) Loading conditions for tests and trials

The loading conditions to be used during tests and trials of the Vessel shall be as per Paragraph 1.8.2(f) of this Part VII.

All Load Conditions used for the Contract Speed assessment is subject to confirmation by GNC and HKPF.

(f) Official speed trials

As part of the Official Sea Trials, the Contractor shall carry out the official speed trials in accordance with ISO 19019 "Sea-going vessels and marine technology – Instructions for planning, carrying out and reporting sea trials" to determine whether the Contract Speeds as specified in Paragraph 2.4.1 of Part VII can be achieved in Hong Kong:

- (i) The actual mean speed of the Vessel (i.e. NOT theoretical) shall be measured during the official speed trial runs to determine if the Contract Speed can be achieved. The speed calculations must NOT be corrected by wind, wave, tidal current, shallow water effects and weather condition.

- (ii) The actual mean speed shall be calculated as the arithmetic mean of not less than FOUR continuous runs, i.e. TWO runs in each direction, and each run shall not be less than 1 nautical mile. The speed for each run shall be measured by the instruments provided either by:
  - 1. the Contractor on the conditions that the instrument has been calibrated by a certified body acceptable to GNC and the HKPF; or
  - 2. the GPS supplied by the Government; or
  - 3. the GPS or DGPS which is properly calibrated (with supporting calibration documents) and installed onboard the Vessel is acceptable to GNC and the HKPF; or
  - 4. other speed measuring methods acceptable to GNC and the HKPF.
- (iii) The Contract Speeds are considered not achieved if the Contract Speeds cannot be attained during the official speed trial after a total of FIVE runs in each direction.
- (iv) The Contract Speeds (Light & Full) stated in Paragraph 2.4.1 of this Part VII shall be achieved by the Vessel in the official speed trial with the engine power at the declared maximum (rated) power specified by the manufacturer under the Light & Full Operational Load Conditions as specified in Paragraph 1.8.2(f) of this Part VII respectively. If the Vessel fails to achieve the minimum Contract Speed of the Vessel stated in Paragraph 2.4.1 of this Part VII, or exhibits undesirable handling characteristics specified in Paragraph 2.10.4 at any speed, the Government will deem that the Vessel has failed to pass the Official Sea Trial.
- (v) All Equipment shall also be in operation during the Official Sea Trial unless explicitly exempted by MD or the HKPF. This Equipment shall have passed the Pre-shipment Construction and Handling Inspection.
- (vi) The information including but not limited to the speed, time of the day, engine running conditions and sea state shall be properly recorded by the Contractor, and signed as witnessed by the GNC surveyor (or the GNC representatives) and the HKPF during the Official Sea Trial and shall form part of the Official Sea Trial Report. The Official Sea Trial Report shall be submitted to GNC before Delivery Acceptance.
- (g) Endurance test

The Endurance Test shall be carried out for different engine loading and speeds to obtain the speed/fuel consumption curves (or tabulated data) for the Vessel, with the engines operating within the manufacturer's recommended engine operating conditions. The test results shall be recorded in accordance with the requirements stipulated in Annex 5 to this Part VII. The report submitted shall include a curve or curves showing ship speed versus propulsion engines' rpm and power, with particulars of the vessel loading and displacement in the test(s).
- (h) Manoeuvrability test

The Manoeuvrability test shall include:

  - (i) Forward turning circle tests to port side, and to be repeated for starboard side, shall be carried out with:
    - 1. all engines running;
    - 2. port engine running; and
    - 3. starboard engine running.

The minimum time for turning to port side, and to be repeated for starboard side, at 15°, 90°, 180°, 270° and 360° shall be recorded.

(i) Crash stop test

The minimum stopping time and stopping distance achievable by the Vessel shall be determined at the crash stop test. The Contractor shall advise a crash stop test method that can be safely applied to the Vessel without posing any damage to the engines and any risks to the crew. The results shall be recorded together with the following data:

- (i) Engine rpm against time
- (ii) Travel distance against time
- (iii) Position against time
- (iv) Heading against time
- (v) Ahead/Astern power changes

(j) Astern running test

The maximum astern running speed achievable by the Vessel shall be determined by the test. The results shall be recorded.

(k) Emergency steering test

An emergency steering test shall be carried out to ascertain that the Vessel can still be steered satisfactorily when the electrical power supply to the steering system has been disabled. The results shall be recorded.

(l) ENE items

ENE items to be tested as per Chapter 7 of this Part VII relevant to the on-site commissioning tests.

(m) Hull bottom inspection

Upon successful completion of the Official Speed Trial in Hong Kong, the Contractor shall arrange GNC officers to carry out a hull bottom inspection on the Vessel to check for any hull damage before delivery.

(n) Submission of Official Sea Trial Report

The Contractor shall submit an Official Sea Trial Report to GNC after completion of the tests and trial specified in Paragraph 1.8.3 of this Part VII, the content of which shall include the results of all tests and trials as stated in Paragraph 1.8.3 of this Part VII. The report shall contain information regarding the method of test, engines' running condition, sea state, weather and wind conditions, Vessel loading condition, the heeling angles (steady or varying as the case may be) during each forward turning manoeuvre, and any other relevant information as required by GNC or GNC appointed consultant during the tests stated in Paragraph 1.8.3 of this Part VII. Such information shall be prepared in a format to be agreed by GNC.

- (o) If the Vessel cannot pass all of the tests, trials and inspections comprising the third (3<sup>rd</sup>) stage of the Technical Acceptance as specified above by the deadline specified in the Implementation Plan, the options available to the Government are set out in Clause 12 of Part IV - the Conditions of Contract and other applicable provisions of the Contract.

#### 1.8.4. Stage 4 – 4<sup>th</sup> stage of Technical Acceptance – Technical and Operational Acceptance

- (a) All tests, trials and the experiment as required in this Part VII not already performed as part of Stage 1 to Stage 3 of the Technical Acceptance as mentioned above shall all have been conducted as part of the Stage 4 Technical Acceptance including the bench acceptance test and on-site commissioning test for ENE as mentioned in Chapter 7 of this Part VII, and all other verification tests to determine whether or not the Vessel including the Equipment has been supplied in accordance with all the specifications set out in these Technical Specifications.

- (b) All electronic items and their installations shall be approved and inspected by COMMS as part of the Technical and Operation Acceptance.
- (c) The Contractor shall supply all necessary equipment and labour at its own cost for conducting the tests and trials stated in Paragraphs 1.8.4(a) and 1.8.4(b) of this Part VII.
- (d) If the Vessel cannot pass all of the tests, trials and inspections comprising the fourth (4<sup>th</sup>) stage of the Technical Acceptance as specified above by the deadline specified in the Contract, the options available to the Government are set out in Clause 12 of Part IV - the Conditions of Contract and other applicable provisions of the Contract.

1.8.5. Stage 5 – Delivery Acceptance

- (a) The Vessel, after its successful completion of (i) all four stages of the Technical Acceptance including Stage 1 – testing and inspection during the construction period, Stage 2 - Pre-shipment Construction and Handling Inspection, Stage 3 – Official Sea Trial, and Stage 4 - Technical and Operation Acceptance, and (ii) in the case of the first Vessel to be delivered, the satisfactory completion of all training as specified in Chapter 9 of this Part VII, all as confirmed by the Government in writing, shall be delivered at the Contractor's expense to the Government Dockyard but not earlier.
- (b) The RO's class certificate for the Vessel (viz., the RO as specified in Schedule 9 of Part V) shall be required as one of the requirements to be fulfilled before the Acceptance Certificate can be issued by the Government (qualified or unqualified).
- (c) The Contractor must demonstrate to GNC that all hull construction, outfitting, stability, machinery, electrical and electronic equipment are in good working order; and must hand over the Vessel, its fixtures and Equipment to GNC in good and complete condition.
- (d) All Deliverables including all Documentation, all Spare Parts and all Warranty Spare Parts required prior to and at Delivery Acceptance shall all be delivered in accordance with Paragraphs 8.2.1, 8.2.2, 8.2.3 and 8.2.6 of this Part VII and Annex 6 to this Part as part of the Delivery Acceptance.
- (e) The Contractor must provide fourteen (14) days advance notice in writing for Vessel delivery when the Vessel is considered to be completed in accordance with the Contract and Ready for Use and to be delivered for the Delivery Acceptance. The Government will not accept delivery if after undergoing the tests and trials in all four stages of the Technical Acceptance, the Government does not consider that the Vessel is in Ready to Use condition.
- (f) On delivery, the Vessel must be in a clean, tidy and fully fitted and operational condition.
- (g) The Delivery Acceptance of the Vessel shall be carried out by GNC in accordance with the terms stipulated in the Contract. The Delivery Acceptance is only considered completed if and when the Director of Marine has issued the Acceptance Certificate (qualified or unqualified).
- (h) Upon completion of the Pre-shipment speed trial and Official Sea Trial, a full set of information captured by the Vessel Data Recorder (“VDR”) shall be submitted to GNC and the HKPF.
- (i) If the Vessel cannot pass all of the inspections, demonstrations and all other requirements as above-mentioned by the Delivery Date applicable to such Vessel, the options available to the Government are set out in Clause 12 of Part IV - the Conditions of Contract and other applicable provisions of the Contract



## **1.9. Warranty Services During the Warranty Period**

1.9.1. The full scope of the Warranty Services is set out in Annex 1 to Part VII.

1.9.2. The Contractor is responsible for arranging the Vessel for Guarantee Slipping at the end of the Warranty Period. In addition to any defects which the Contractor may be required to fix as part of the Warranty Services as stated in Annex 1 to this Part VII, the Contractor shall also be responsible for the rectification of any defects found in the course of Guarantee Slipping. The full scope of the Services to be provided as part of the Guarantee Slipping is set out in Annex 1 to this Part VII.

## **1.10. Support Services**

1.10.1. The Vessel must be designed for through life support and easy maintenance in Hong Kong based on the operational profile and minimum life expectancy as mentioned in this Part VII.

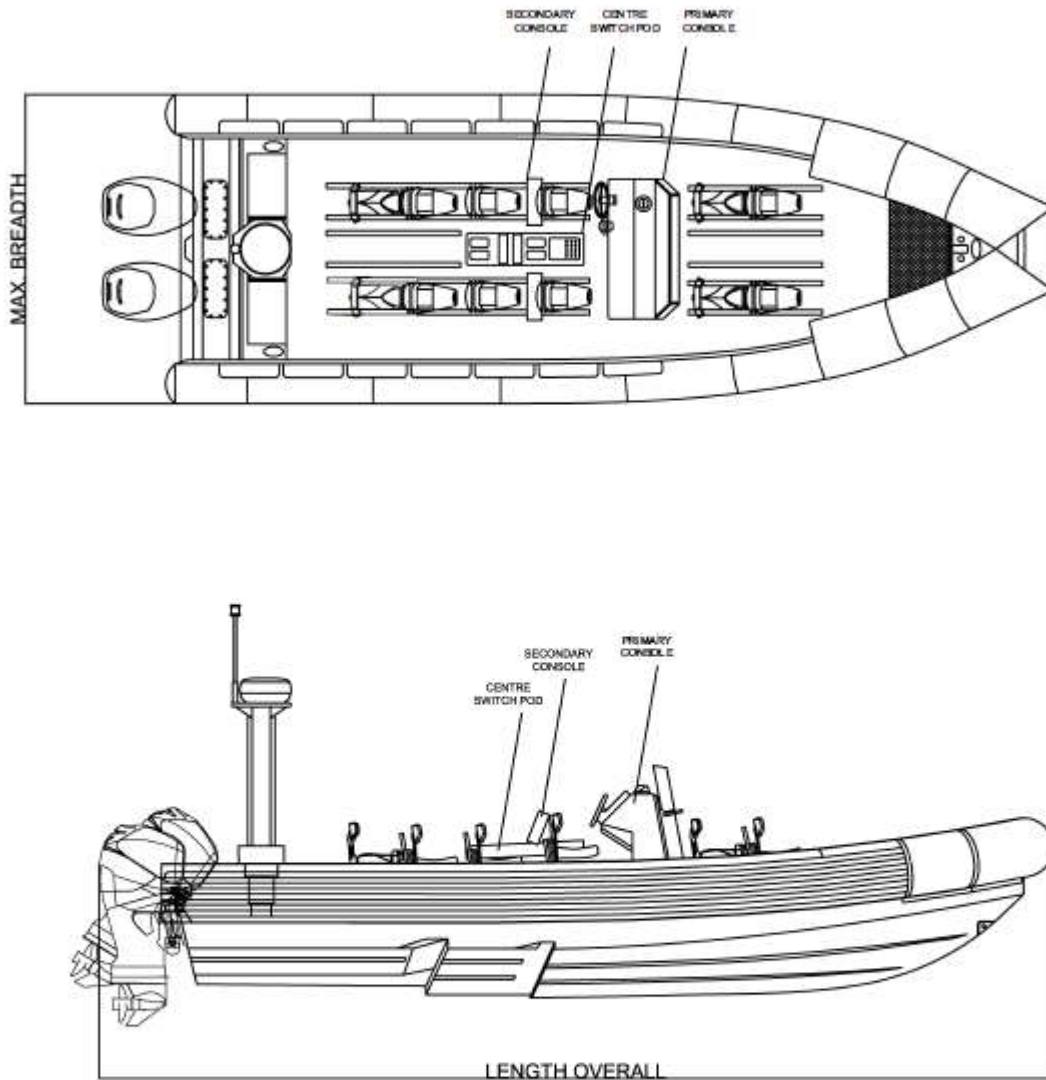
1.10.2. Support and maintenance services must be available (i.e. serviceable) in Hong Kong in respect of all Equipment installed in the Vessel and return of the whole or part of the Equipment to the original place of the manufacturer or the supplier shall not be necessary in order to carry out any repair work.

## **1.11. Asbestos Free**

1.11.1. The Vessel must not contain any asbestos or asbestos containing materials. The Contractor must comply with Hong Kong Air Pollution Control Ordinance (Cap. 311), Part X. The Contractor shall engage a service provider approved by one of the RO's or other entities acceptable by GNC to verify that there is no asbestos on the Vessel. An asbestos free certificate or statement of compliance issued by the service provider to this effect shall be provided upon delivery of the Vessel.

## CHAPTER 2 – GENERAL TECHNICAL REQUIREMENTS

### 2.1. Conceptual General Arrangement Plan



Remark:  
The conceptual drawing above shows a stepped hull design for reference only. It is NOT a contractual requirement.

MAIN DATA		
LENGTH OVERALL (fenders, engine guard and bar included)		10.5-12.0 m
MAX. BREADTH (collar included)		2.8 - 4.0 m
CONTRACT SPEED :	LIGHT OPERATIONAL LOAD	At least 55 knots
	FULL OPERATIONAL LOAD	At least 50 knots

MARINE DEPARTMENT HKSAR GOVERNMENT NEW CONSTRUCTION SECTION			
PROJECT	DIVISIONAL FAST PATROL CRAFT HONG KONG POLICE FORCE		
TITLE	CONCEPTUAL GENERAL ARRANGEMENT		
DRAWING NO.	-	REV.	-
DATE	-	SCALE	NTS

## **2.2. General Provisions**

- 2.2.1. Without prejudice to the generality of Chapter 1 of this Part, this Chapter contains the more particular technical specification for the Vessels. The significance of Essential Requirements is explained in Paragraph 1.1 of Chapter 1 of this Part VII.
- 2.2.2. The work to be done under this Contract consists of the design, construction, outfitting, testing and delivery of the Vessel for the HKPF. Workmanship, functions, characteristics and performance shall be in accordance with this Part VII, best marine construction practices, and the regulatory standards herein specified or otherwise applicable.
- 2.2.3. The Contractor shall exercise its professional expertise and knowledge to come up with an appropriate design for the Vessel which can comply with all requirements of the Contract. The Conceptual General Arrangement Plan shown in Paragraph 2.1 of this Part VII serves only as a guidance and reference drawing to help explain the requirements stated in this Part VII.
- 2.2.4. ALL the machinery, equipment and facilities, furniture (if applicable), fixtures and fittings, including outfitting of the Vessel that are described in this Part VII, together with their requirements for design and installation standards that are stipulated in this Chapter 2 of Part VII and in any other parts of this Part VII, are the items that must be included in the complete “As-built” Vessel delivered to the Government.

## **2.3. Rules and Regulations**

- 2.3.1. The Vessels shall be designed and constructed in accordance with the rules and regulations of the RO with notation acceptable to GNC in the version as at the Contract Date unless the rules and regulations of RO specify that version of such rules and regulations as at the keel laying date of the Vessel shall apply in relation to the relevant requirements specified therein. For each and every Vessel, design approval and survey during construction shall be carried out by the RO, and examinations and tests shall be witnessed by the RO in accordance with the rules and regulations of the RO. A class certificate with the notation issued by the RO shall be provided for each Vessel before delivery. The notation shall cover hull and vessel type, service area restriction and type, and machinery as follows:
- (a) ✕ 100A1 SSC Patrol Mono LDC G2 MCH of Lloyd’s Register; or
  - (b) ✕ 100A1 HSC Special Government Services, Coastal Service less than 20 miles or A1 HSC Riverine Craft of American Bureau of Shipping; or
  - (c) ✕ 1A HSLC Patrol LC R4 of DNV AS; or
  - (d) Equivalent notations. [E]
- 2.3.2. The Vessels shall meet all the applicable requirements of the RO where possible, where not possible this shall be justified and a design basis describing the rules and regulations used in the design provided for GNC approval. Details of areas of the design not conforming to the RO requirements shall be discussed at the kick-off meeting.
- 2.3.3. With reference to machinery, systems and fire protection, the Contractor shall request a RO to provide specific requirements for the management of risks due to the presence onboard of fuel having a low flash point (petrol). See Paragraph 2.3.5 of this Part VII.

2.3.4. Without prejudice to the general requirement that the Contractor shall perform all Work in full compliance with all applicable laws and regulations, and in full compliance with the requirements of the Contract including this Part VII, the construction of the Vessel must comply with the requirements of the RO specified in Schedule 9 of Part V or the requirements of any of the RO listed below (where it is expressly specified in this Part VII). In relation to a particular requirement specified in this Part VII, that of another RO, other than the RO specified in Schedule 9 of Part V and which is any one of the RO's listed in sub-paragraphs (a) to (i) below may be designated as applicable. There may also be other requirements further specified in sub-paragraphs (j) to (n) below which are also applicable. In each of the aforesaid cases, the version as at the Contract Date shall be applicable unless any of these requirements specifies that version of requirements as at the keel laying date of the vessel shall apply:

- (a) American Bureau of Shipping (“ABS”)
- (b) Bureau Veritas SA (“BV”)
- (c) China Classification Society (“CCS”)
- (d) DNV AS (“DNV AS”)
- (e) Korean Register (“KR”)
- (f) Lloyd's Register Group Limited (“LR”)
- (g) Nippon Kaiji Kyokai (“NK”)
- (h) RINA Services S.p.A. (“RINA”)
- (i) Russian Maritime Register of Shipping (“RS”)

and other entities and regulations as specified below:

- (j) International Electrotechnical Commission (“IEC”) Regulations for the Electrical and Electronic Equipment.
- (k) International Telecommunications Union recommendations in the International Radio Regulations (“ITU-R”).
- (l) Quality and standards of the welding shall comply with the rules of one of the ROs listed in sub-Paragraphs (a) to (i) above or the American Welding Society (“AWS”) or other applicable international standards or rules.
- (m) International Regulations for Preventing Collisions at Sea 1972.
- (n) ISO 12215-4 “Small craft – Hull construction and scantlings – Part 4 Workshop and manufacturing”.

All equipment/fittings shall be designed and manufactured to at least the standards as specified in these Technical Specifications. If none of the rules and regulations in sub-Paragraphs (j) to (n) above are applicable, then the applicable standards specified by the applicable organisations below shall be complied with:

BSI	British Standards Institute
GB (or SAC)	Standardization Administration of the People’s Republic of China
IEEE	Institute of Electrical and Electronic Engineers
ISO	International Organization for Standardization
JIS	Japanese Industrial Standards

In the event of any inconsistency between the above requirements, rules and standards, those mentioned in sub-Paragraphs (j) to (n) shall prevail over the requirements of the relevant RO as listed in sub-Paragraphs (a) to (i) above.

2.3.5. The Vessel machinery arrangement and systems shall be designed in accordance with the chosen RO’s latest rules and requirements.

## 2.4. Contract Speed

2.4.1. The Vessel will have two (2) Contract Speeds, which shall both be assessed as part of the acceptance trials as detailed in Section 1.8 of this Part VII. The Contract Speeds are to be as follows:

(a) Contract Speed – Full

When all of the engines are running at their declared maximum (rated) power, in WMO Sea State 0 to 2 under the Full Operational Load Condition specified in Paragraph 1.8.2(f) of this Part VII, the minimum achievable speed of the Vessel shall be 50 knots. [E]

(b) Contract Speed – Light

When all of the engines are running at their declared maximum (rated) power, in WMO Sea State 0 to 2 under the Light Operational Load Condition specified in Paragraph 1.8.2(f) of this Part VII, the minimum achievable speed of the Vessel shall be 55 knots. [E]

2.4.2. The Contract Speed prescribed in Paragraph 2.4.1 above shall be achieved without the undesirable phenomenon as stated in Paragraph 2.10.4 (a)-(f) of this Part VII. The design of the Vessel and the outboard engines so chosen shall minimise cavitation.

## 2.5. Principal Dimensions

2.5.1. The Vessel to be proposed by the Tenderer in Schedule 7 of Part V shall comply with the following requirements:

Length Overall (“LOA”): 10.5 to 12.0 metres (both figures inclusive) [E]

Breadth: 2.8 to 4.0 metres (both figures inclusive, measured from the widest point and collar included) [E]

Deadrise angle: Not less than **twenty-three (23)** degrees at midship and transom

Maximum Draught (at Full Operational Load): 1.1 metres (measured from waterline to deepest point on hull)

Maximum Allowable Air Draught (at Light Operational Load): 4.5 meters (measured from waterline to highest point on vessel including masts and aerials. If the masts and aerials can be retracted or lowered, air draught shall be measured to the highest point after the masts and aerials are retracted or lowered.)

LOA means the distance between the foreside of the foremost fixed permanent structure and the aft side of the aftermost fixed permanent structure of the Vessel including fenders, the outboard engine system, the engine protection guard and bar. The Tenderer shall indicate the length overall of the Vessel in dimensional scale in the Preliminary General Arrangement Plan submitted according to Schedule 7 of Part V.

## 2.6. Material of the Structure

2.6.1. Material of hull structure of the Vessel shall be marine grade aluminium alloy. [E]

## 2.7. Vessel Operating Profile and Environment

- 2.7.1. The Vessel shall be designed for carrying at least four (4) crew and eight (8) other passengers in rough sea conditions up to and including WMO Sea State 5. Shock mitigating jockey seats for all persons shall be provided with the Vessel as per Paragraphs 3.7.1 to 3.7.4 of this Part VII. [E]
- 2.7.2. The Vessel shall be designed for deployment by the HKPF for at least 4 hours per day and 340 days per year including both day and night time operational deployment. The Vessel shall be designed and built to operate in Hong Kong Waters.

Summary of Operational Hours / Range shall be as follows:

Number of hours/day:	12 hours engine running time per day, broken down into: 1 to 35 knots – 9 hrs 35+ knots – 3 hrs
Number of days/year:	340 days/year
Endurance for fuel capacity:	The fuel tanks onboard vessel shall be able to carry sufficient fuel for 2.5 hours at Contract Speed – Full (50 knots) at the Full Operational Load Condition (as per Paragraph 1.8.2(f) of this Part VII) without refuelling. [E]

- 2.7.3. The Vessel shall be able to operate (fulfil its operational roles) safely within Hong Kong Waters, in rough sea conditions up to and including WMO Sea State 5, and to survive WMO Sea State 6 while returning to base.
- 2.7.4. The Vessel and all equipment onboard shall be suitable for operation without any degradation in performance or life in temperatures between 0°C and 50°C, and relative humidity of up to 95%, non-condensing.

## 2.8. Markings and Colour Scheme

- 2.8.1. The entire Vessel is to be painted in a marine grade dark grey paint on all external exposed surfaces including but not limited to the surfaces of the bulwark, gunwale and console. Exact colour to be confirmed by GNC in kick-off meeting post Tender award. The fender shall be black in colour.
- 2.8.2. The Contractor shall provide the markings and colour scheme for the Vessel. All paints and the colour scheme for the Vessel and fittings shall be approved by GNC before application.
- 2.8.3. Draft marks, names, insignia and other colour markings shall be in a colour contrasting with the hull and console's colour. This colour is also to be confirmed with GNC and the HKPF at the kick-off meeting post tender award.
- 2.8.4. All labelling shall be in both traditional Chinese and English and as per applicable rules and regulations.
- 2.8.5. The Vessel's name shall be marked permanently on both sides of the console of the Vessel. Details of the size, calligraphy and application method shall be confirmed by the HKPF in the kick-off meeting post Tender award.
- 2.8.6. Draft marks shall be permanently provided at the port and starboard stem and stern. A draft mark plan shall be produced by the Contractor and agreed by GNC before the draft marks are permanently marked onto the hull surface.

- 2.8.7. All other labelling, stencilling and marking (not limited to the hull but including all aspects of the Vessel) shall be made on separate plaques, boards or labels attached to the structure. By default, all displays, control actuators, electric switches, valves, and other equipment shall be labelled to indicate their type and function as appropriate.
- 2.8.8. Safety markings designed to prevent persons from tripping onboard the Vessel shall be provided where necessary. Details to be discussed at the kick-off meeting.

## **2.9. Tally Plates**

- 2.9.1. The following information shall be displayed on the builder's plate:
- (a) Builder's name;
  - (b) Vessel's name;
  - (c) Year of build; and
  - (d) Maximum number of persons including the crew that the Vessel is designed to carry.
- 2.9.2. Tally plates in both English and traditional Chinese characters shall be fitted for all spaces and all equipment as required by GNC including but not limited to:
- (a) Equipment in the console;
  - (b) Electrical and communication equipment;
  - (c) Air vents and filling pipes for the fuel tanks;
  - (d) All valves, equipment on deck;
  - (e) Control panels, switchboards, distribution boxes and electrical circuits; and
  - (f) Any other equipment/fitting as required.
- Information engraved on the tally plates shall include: service, function, mode of operation, source of power, fuse rating, voltage, warning and other information as required by GNC.
- 2.9.3. Tally plates exposed to the external environment weather shall be made of durable and weatherproof material and be fastened securely.
- 2.9.4. All cable terminations shall be identified clearly for disconnection and reconnection.

## **2.10. Other Design Features**

- 2.10.1. The berthing requirements of the Vessel shall match the designated points of berth at the Government Dockyard and the Marine Police operational bases. Details to be discussed at the kick-off meeting.
- 2.10.2. Permanent ballast can only be used as agreed by GNC.
- 2.10.3. The Vessel's deck shall be of a flush design free of tripping and snag hazards for both seated positions and areas where officers may be required to move around. Where seats and other fixtures and fittings are removable, the requirement for a design which is free of tripping and snag hazards shall apply whether the seats and other items are fitted to the Vessel or not.
- 2.10.4. The Vessel shall perform at all speeds in WMO Sea States 0 to 2 without any of the following characteristics:
- (a) Dynamic instability including chine walking;
  - (b) Porpoising;
  - (c) Loss of horizon (meaning that the view of the horizon forward of the bow of both crew both in the seated and standing positions at the console shall not be obstructed by the bow of the Vessel at any time);
  - (d) Loss of directional control;

- (e) Permanent list; and
  - (f) Engine strain and/or cavitation manifested by engine overspeeding.
- 2.10.5. The Vessel shall be highly manoeuvrable across all operating speeds to facilitate its use in the operating roles presented in Paragraph 1.2.2 of this Part VII.

## CHAPTER 3 – HULL

### 3.1. Hull Construction and Scantlings

- 3.1.1. The hull shall be a deep “V” with minimum deadrise angles of twenty-three (23) degrees at midship and transom, with suitable appendages or other design features to minimise potential “side-kick”, “skidding” or “sliding” effects during high-speed manoeuvring.
- 3.1.2. The hull configuration specified at Paragraph 3.1.1 of this Part VII shall not incorporate a horizontal flat area at the keel unless the design also incorporates additional appropriate features to prevent “side-kick”, “skidding” or “sliding” during high speed manoeuvres.
- 3.1.3. The strength of the hull structure shall be calculated based on reference acceleration at the longitudinal centre of gravity (LCG). This shall be not less than  $6g$  where  $g$  is the acceleration due to gravity. [E]
- 3.1.4. The Vessel structure shall be designed to meet the RO's requirements, while fulfilling the Contract Speed - Full (50 knots) in WMO Sea States 0 to 2 under Full Operational Load Condition and the Contract Speed – Light (55 knots) in WMO Sea States 0 to 2 under Light Operational Load Condition, as specified in Paragraph 2.4.1 (a) and (b) of Part VII respectively. [E]
- 3.1.5. The design stresses and scantling including internal structural members shall be determined according to the RO Requirements for the Vessel's intended operations as specified in Paragraphs 1.2.1 and 1.2.2 of this Part VII, including being safely lifted using the methods stated in Paragraph 3.12.7.
- 3.1.6. The Contractor's quality control personnel shall carry out quality control throughout the construction of the Vessel. Inspections shall be conducted by the RO's surveyors and GNC assigned personnel or consultants.
- 3.1.7. Any openings in the hull and the deck shall comply with the applicable RO's rules for watertight integrity if not otherwise specified by GNC or the HKPF at or prior to the kick-off meeting. All hatches and doors shall meet the strength and watertightness requirements in accordance with ISO 12216 “Small craft — Windows, portlights, hatches, deadlights and doors — Strength and watertightness requirements” or the applicable RO's rules.
- 3.1.8. There shall be no penetrations in the hull below the design water line unless agreed with GNC.
- 3.1.9. The hull design shall incorporate a self-bailing deck with scuppers capable of draining the cockpit in accordance with ISO 11812 “Small Craft – Watertight Cockpits and Quick-Draining Cockpits” requirements for Design Category B or as per the RO Requirements.
- 3.1.10. The hull shall be fitted with appropriate sacrificial anodes.
- 3.1.11. The hull construction material shall be new and of a type which has been certificated by the RO in accordance with the RO Requirements. Mill certificates shall be obtained and the records shall be strictly maintained to match with the various sections produced during the Vessel's construction.
- 3.1.12. Welding and Fabrication
  - (a) All welding and fabrication shall be implemented according to the applicable requirements of any one of the RO listed in Paragraph 2.3.4 (a) to (i) of this Part VII.



- (b) Welded joints shall be designed and constructed carefully to conform to the latest established standards as at the Contract Date to prevent fatigue failure. Cutting for edge preparation shall be performed by qualified persons to achieve the correct angle, shape and smooth finish of the edges. Only qualified welders shall perform the welding work.
- (c) The Contractor shall submit certification of the qualifications of each individual welder and inspector and the RO approved welding procedure specifications to GNC before commencement of construction work. Welds installed using unqualified procedures or welding performed by non-certified welders shall be subject to removal by the Contractor at the Contractor's own expense.
- (d) The structure fabrication and quality control regime shall include but not be limited to the following:
  - (i) Inventory of incoming materials, consumables, components and machinery;
  - (ii) Traceability procedures for materials together with traceability identification codes which shall be serial numbered and indexed to the controlled manufacturing procedures;
  - (iii) Lofting, cutting, fitting, welding, forming and dimensions of structural components;
  - (iv) The Contractor shall produce a welding and inspection plan clearly identifying the procedures to be used as well as the type and extent of the inspection to be carried out on the Vessels' structure and this plan shall be approved by the RO. The plan shall include:

(1) A full length visual inspection of every weld. Additionally, radiographic testing (RT) is to be carried out on butt welds with the number of radiographs taken being not less than the length of the vessel's hull structure in metres (e.g. for a hull length measuring 11.5 metres, 12 radiographs will be taken). The location of these radiographs shall be determined by the RO with the agreement from the Government's officers or representatives. Alternatively, suitable Ultrasonic Test (UT) can be proposed by the Contractor subject to the agreement of RO and the Government's officers or representatives; **or**

(2) A full length visual inspection of every weld. Additionally, if RT/UT is not conducted in accordance with paragraph 3.1.12(d)(iv)(1) above, liquid dye penetrant testing will be carried out on butt welds with the number of welds tested being not less than the length of the vessel's hull structure in metres e.g. for a hull measuring 11.5 metres, 12 welds will be tested. The location of these tests shall be determined by the RO and the Government's officers or representatives. If RT/UT is not conducted in accordance with paragraph 3.1.12(d)(iv)(1), the Contractor shall provide a warranty of 3 years on the hull structure and watertight boundaries.

Additionally, personnel conducting the NDT testing, interpreting and evaluating the results of the tests shall be certified to at least Level II of ASNT or an equivalent recognized by the RO. The NDT reports shall be submitted to GNC for record. The details shall be discussed in the kick-off meeting.

- (v) Machining, measuring and inspection equipment maintenance and calibration;
- (vi) Finish surfaces and bolting;
- (vii) Procedures for non-conformance reporting and rectification of defects; and
- (viii) Design and manufacturing drawing control and procedures for revisions, updates and reissue of drawings.

3.1.13. Any through-bolt arrangement is not allowed at all the watertight boundaries in the ship structures, in order to ensure the watertight integrity.

### 3.2. Stability

- 3.2.1. The Vessel shall comply with the intact and damaged stability requirements stated in this Paragraph 3.2.5 and Paragraph 3.2.6 of this Part VII. [E]
- 3.2.2. Final stability calculations of the sea trial loading condition using final lightship data shall be delivered to GNC prior to conducting all tests and trials stated in Chapter 1 of this Part VII. All calculations and drawings must be in metric units.
- 3.2.3. Inclining Experiment, Air Inclining Experiment or Equivalent Means in Determining Final Lightship Data:
- (a) A lightship survey shall be carried out to determine the final lightship weight. The First Vessel and the Sixth Vessel shall be inclined to determine the position of centre of gravity by carrying out the inclining experiment, or air inclining experiment or by equivalent means, as agreed by the RO and by GNC.
  - (b) At least 14 working days in advance of the inclining experiment, the Contractor shall submit a “Scheme of Inclining Experiment” which includes:
    - (i) The Vessel’s intended condition during the inclining experiment with intact stability results, including surplus and missing weights, and their centre of gravity;
    - (ii) The proposed locations and movements of inclining weights;
    - (iii) The calculation of estimated metacentric height, heel and trim of the Vessel before and during the inclining experiment;
    - (iv) The proposed number, location and lengths of pendulum to be used;
    - (v) Hydrostatic table and tank capacity tables. The increment of draft shall be every 5 mm in the hydrostatic table, and the increment of sounding shall be every 5 mm in the capacity tables; and
    - (vi) The list of data to be measured (i.e. drafts, specific gravity of floating water).
  - (c) The inclining experiment shall only be conducted:
    - (i) After the “Scheme of Inclining Experiment” has been approved by the RO surveyors and the GNC officers; and
    - (ii) In the presence of the RO surveyors and GNC officer(s) and/or appointed consultant.

A request for attendance shall be made at least five (5) working days in advance. The lightship weight and centre of gravity shall be calculated and presented in the inclining experiment report. The GM of the Vessel after each and every shift of inclining weights shall be determined. All spaces and tanks shall be kept dry, or tanks pressed up with the intended liquid. Free surface of liquids remaining onboard shall be taken into account.
  - (d) The air inclining experiment shall be conducted in accordance with the ASTM F3052 - Standard Guide for Conducting Small Boat Stability Test (Deadweight Survey and Air Inclining Experiment) to Determine Lightcraft Weight and Centers of Gravity of a Small Craft.
  - (e) If the equivalent means are agreed by the RO and GNC in lieu of an inclining experiment, details in carrying out the equivalent means shall be submitted in advance at least 14 working days prior to carrying out such equivalent means.
  - (f) This inclining experiment report, or the report showing how the lightship data are determined by using equivalent means, shall be submitted to and approved by the RO and GNC. The report shall be signed by the witnessing RO surveyors and include a statement from the Contractor stating that the Vessel shall be safe to go to sea for the intended sea trials specified in the Contract. No sea trials shall be conducted until GNC, based on the information given in the inclining experiment report determining final lightship data, agrees that it is safe to carry out sea trials.
- 3.2.4. Stability Information Booklet
- (a) The Contractor shall supply to GNC three (3) copies of the Stability Information Booklet approved by RO. The final version of the Stability Information Booklet must be submitted to GNC at the time of Delivery Acceptance.

- (b) The final version of the Stability Information Booklet shall include:
- (i) The Vessel's particulars, a sketch of the general arrangement drawing showing different compartments and tank positions, hydrostatic curves and cross curves;
  - (ii) Tank calibration/sounding tables, including but not limited to the fuel tanks. These tables shall consist of the locations of tanks (in terms of frame numbers), the levels from tank bottom, the capacities, the Vertical Centre of Gravity ("VCG") / Longitudinal Centre of Gravity ("LCG") / Transverse Centre of Gravity ("TCG") and free surface moments, and the location of sounding points. The trim and heel of the Vessel where these tables are applicable shall be stated;
  - (iii) A stability calculation for each loading condition (as stated in Paragraph 3.2.4(c) of this Part VII) which shall include but not be limited to a profile drawing of the Vessel and items of deadweight, lightship, displacement, drafts, trim, VCG, GM (solid & fluid), LCG, down-flooding angle and stability righting lever ("GZ") curve, wind and other heeling levers etc.;
  - (iv) Any other information as reasonably required by the RO and/or GNC; and
  - (v) The report in determining the final lightship data approved by GNC and the RO.
- (c) Loading Conditions in the Stability Information Booklet
- (i) The maximum free surface moments shall be used for calculating the stability of the Vessel in all of the following conditions:

Loading conditions		Fuel oil	Supplies & Equipment	Persons and Effects
(1)	Lightship	Nil	Nil	Nil
(2)	Full Load Departure	98%	160 kg	1110 kg (4 crew, 8 passengers)
(3)	Full Load Arrival	10%	160 kg	1110 kg (4 crew, 8 passengers)
(4)	Light Load Departure	98%	0 kg	185 kg (2 crew)
(5)	Light Load Arrival	10%	0 kg	185 kg (2 crew)
(6)	Intermediate Load Departure	98%	120 kg	370 kg (4 crew)
(7)	Intermediate Load Arrival	10%	120 kg	370 kg (4 crew)

- (ii) The weight of each person shall be assumed to be 82.5 kg, and effects per person to be 10kg.
- (iii) The VCG of each person and their effects shall be assumed to be 300 mm above the seat when seated, and 1,000 mm above the deck when standing. The seated or standing position, and LCG of each person, shall be in their most likely position onboard.
- (iv) The weight of the supplies and equipment as stipulated in Paragraph 3.2.4(c)(i) of this Part VII shall be evenly distributed along the deck, and the VCG of the additional payload will be assumed to be 500 mm above deck.
- (v) In addition to Paragraph 3.2.4(c)(i) above, the Contractor shall provide a pair of departure and arrival loading conditions for reference purposes in the Stability Information Booklet. This pair of loading conditions shall demonstrate the maximum possible number of persons that the Vessel is capable of carrying in WMO Sea State 0 to 2 while maintaining the structural integrity of the hull of the Vessel and complying with the intact and damaged stability criteria as given in Paragraphs 3.2.5 and 3.2.6, respectively, of this Part VII. The pair of loading conditions shall have two (2) police officers operating the vessel, no additional payload and the maximum number of passengers (each assumed to be weighing 82.5 kg), with 98% fuel at departure, and 10% fuel at arrival.

### 3.2.5. Intact Stability Criteria

Stability of the Vessel will be considered satisfactory for the loading conditions set out in Paragraph 3.2.4(c)(i), if after taking into account free surface effects, the following criteria shall be complied with:

- (a) The intact stability criteria stated in Part A Chapter 2 of the Intact Stability Code, as amended; or
- (b) The criteria specified in ISO 12217-1 “Small craft – Stability and buoyancy assessment and categorization – Part 1: Non-sailing boats of hull length greater than or equal to 6m” Operational Limit Category B and the applicable criteria specified in ISO 6185-4 “Inflatable boats – Part 4: Boats with a hull length of between 8m and 24m with a motor power rating of 15kW and greater”; or
- (c) As per the stability requirements of the RO.

### 3.2.6. Damaged Stability Criteria

Transverse bulkheads shall be arranged to contain flooding of any one watertight compartment between the adjacent watertight transverse bulkheads/ transom, and asymmetric flooding due to damage of any smaller watertight spaces located within the compartment between the adjacent watertight transverse bulkheads/ transom. The residual stability shall be sufficient to keep the Vessel afloat with the pre-damage payload onboard in case of damage. The worst damage scenario shall be considered for each case.

N.B. Irrespective of whether the RO has requirements for damage stability or not, the Contractor shall obtain the agreement of the RO and GNC on the opening(s) to be used to determine the down flooding angle.

## 3.3. Painting

- 3.3.1. Paints shall be of a marine quality and be applied in accordance with the manufacturer’s specification and normally available from paint suppliers in Hong Kong.
- 3.3.2. The volatile organic compound (“VOC”) content limits of the paints shall comply with the Hong Kong Air Pollution Control (Volatile Organic Compounds) Regulations CAP 311W.
- 3.3.3. The Painting Schedule shall be submitted to GNC for approval before commencement of work. The proposal shall contain a list including the detailed specifications of the paint intended to be used. The thickness of each coating shall be specified.
- 3.3.4. The Contractor shall guarantee all painting work for one (1) year against defects in materials and workmanship. At Delivery Acceptance, the Contractor shall provide GNC with a letter of certification from the paint manufacturer signed by qualified coating inspectors to certify that the paint has been applied in accordance with the paint manufacturer’s quality control and requirements including but not limited to the surface preparation (blasting profile and water soluble salt content), surface temperature of the metal surfaces above dew point, atmospheric conditions, (temperature and relative humidity), dry film thickness and method of application.
- 3.3.5. Fouling-release/anti-fouling paint in compliance with the International Convention on the Control of Harmful Anti-fouling Systems on Ships, as amended shall be applied on the exterior of the hull below the water line. A TBT-free certificate and a Cybutryne-free certificate issued by the paint manufacturer shall be submitted before the Delivery Acceptance. The Contractor shall propose the suitable fouling-release/anti-fouling paint which shall be able to provide at least two years’ protection against marine growth on the exterior of the hull below the water line in the Hong Kong waters. The proposed fouling-release/anti-fouling paint shall be submitted to GNC and HKPF for approval.
- 3.3.6. All deck areas shall be covered with hard wearing and anti-slip epoxy paint or a covering acceptable to GNC and HKPF. This is to be discussed at the kick-off meeting.

- 3.3.7. Surfaces that require painting shall be fully prepared and pre-drilled prior to painting.
- 3.3.8. All fastening preparation and other penetrations shall be completed before painting of any surface.
- 3.3.9. All surfaces and any parts of the hull, deck or machinery, fittings that may cause glare or reflection must be matt coated.
- 3.3.10. A painting report shall be submitted to GNC upon completion of work.

### **3.4. Operational Consoles & Centre Switch Pod**

3.4.1. The Vessel shall have two operational consoles (the primary and secondary consoles) and one centre switch pod, each constructed using marine grade aluminium. The layout of the consoles and centre switch pod shall be submitted for GNC's approval before any construction work on the console or switch pod commences. To facilitate the efficient visualisation and inspection of the design of the consoles and centre switch pod, a full size mock-up complete with deckplate, seats, mounting systems and any other fixtures that may influence the final design of the console, is to be manufactured for inspection, modification (if necessary) and confirmation by GNC and the HKPF. The mock-up consoles and centre switch pod may also be used for the purposes specified in Paragraph 7.1.4 of this Part VII. The console of an existing craft may be used as the basis for initial discussions.

#### **3.4.2. The Primary Console**

- (a) The console shall be designed to deflect wind up and spray over the heads of the coxswain and the commander in both the seated and standing position and to house the equipment required by the coxswain and the commander to control/monitor the Vessel.
- (b) The console shall be ergonomically designed to fit a coxswain of Asian stature (approximately 1.64 metres in height), with the controls and displays in immediate reach or view from both a seated and standing position and the craft can be operated for extended periods. The crew shall also be provided with an unobstructed view over the console and bow from a seated as well as a standing position. The maximum height of the console body measured from the deck will be no greater than 125cm. The height of the console body will not include the detachable windshield mentioned in paragraph 3.4.2(c) of this Part VII.
- (c) A transparent detachable windshield is to be fitted to the upper side of the primary console. The height and design of the windshield shall be discussed and approved by GNC and HKPF at the kick-off meeting.
- (d) The coxswain position shall be on the port side of the commander position;
- (e) When the vessel is stationary (i.e. not underway) in any of the load conditions mentioned in paragraph 3.2.4(c) of this Part VII, a 1.64m tall Coxswain of Asian stature's sight line in seated and standing positions, should intersect the waterline within 2 boat lengths of the Vessel's bow. **[D]**
- (f) The controls or displays of the following equipment shall be installed in the console and located in front of the coxswain in natural positions, with the highest priority devices being located in prime positions. All controls and displays shall be operable when wearing normal Marine Police uniform with foul weather gear, bullet resistant vest and lifejacket.
  - (i) Helm;
  - (ii) Engine throttle control located on the right hand side of the wheel;
  - (iii) Trim control selector panel;
  - (iv) Engine start/stop control;
  - (v) Deadman's switch with lanyard;
  - (vi) A magnetic/fluxgate compass fitted with an independent dimmer switch, installed on the top of the console in line with the coxswain's line of sight dead ahead;
  - (vii) Digital repeater for satellite compass readout and speed over the ground (exact requirements will be confirmed in kick-off meeting);

- (viii) Electric horn;
  - (ix) Ammunition storage box in front of the commander, to be fitted with a lid that may be locked open or closed and as large as reasonably possible, exact size and layout will be confirmed at kick-off meeting;
  - (x) Gauges showing engine rpm and trim;
  - (xi) Two (2) Fixed Communication Unit (“FCU”) plug in points; and
  - (xii) Other display items to be included, and the integration of those items will be discussed at the kick-off meeting.
- (g) A rugged, secure and detachable ball mount for a computer tablet at the starboard side of the primary console shall be provided. The design, dimensions and location of the ball mount shall be discussed and approved by GNC and HKPF at the kick-off Meeting.

#### 3.4.3. The Secondary Console

- (a) The console shall be positioned aft of the coxswain and commander.
- (b) The console shall be ergonomically designed to fit crew members of Asian stature (approximately 1.64 metres in height), with the controls and displays in immediate reach or view from both a seated and standing position and the craft can be operated for extended periods.
- (c) The controls or displays of the following equipment shall be installed in the console and located in front of the navigator/engineer in natural positions, with the highest priority devices being located in prime positions. All controls and displays shall be operable when wearing normal Marine Police uniform with foul weather gear, bullet resistant vest and lifejacket.
  - (i) An electronic Multi Functional Display (“MFD”) with a size of at least 15” capable of displaying information from the satellite compass, DGPS, radar, chart plotter, and any other equipment as appropriate;
  - (ii) Engine monitoring display panel (see Paragraph 4.2.13 of this Part VII); and
  - (iii) Other display items to be included, and the integration of those items will be discussed at the kick-off meeting.

#### 3.4.4. The Centre Switch Pod

- (a) A centre switch pod shall be positioned between the seats of the coxswain and the commander at the primary console and extended aft to the secondary console along the centreline of the vessel. Reference can be made to the “Conceptual General Arrangement Plan” at Paragraph 2.1 of this Part VII. The location shall be indicated in the mock-up inspection.
- (b) The switch pod shall be slim and strongly built with length, width and height suitably installed in the space between the seats, and sufficiently sized to house the required equipment, controls, switches, and other equipment.
- (c) The wiring and cables serving the centre switch pod shall run through a conduit under deck/cockpit.
- (d) The controls, switches, and equipment listed below shall be strategically positioned for the efficient use of the coxswain and commander who are wearing normal Marine Police uniform with foul weather gear, bullet resistant vest and lifejacket, with the highest priority devices being located in prime positions:
  - (i) Hand-held searchlight;
  - (ii) Microphones of radios;
  - (iii) Intercommunication fixed communication unit;
  - (iv) Intercommunication jacks;
  - (v) Radio communication controls and microphone as appropriate;
  - (vi) Navigation lights and other lights switches;
  - (vii) PA/Loudhailer control unit and microphone;
  - (viii) Two (2) units of contemporary Marine Police radio sets with hand microphones and speakers;
  - (ix) One (1) unit of IMM VHF radio set, with hand microphone and speaker;
  - (x) AIS transponder;

- (xi) Fuel tanks level gauge;
- (xii) Fuel tank selection switch;
- (xiii) Siren and flashing beacon control panel; and
- (xiv) Other switches, storage space/lockers, and equipment gauges to be discussed at the kick-off meeting.

#### 3.4.5. Controls, displays and equipment in and on the consoles and switch pod

- (a) All controls, displays and equipment shall be waterproof, shockproof and suitable for external marine use. All openings on the consoles and centre switch pod shall be watertight. If water ingress to the consoles or centre switch pod occur and cause any damage to equipment within the warranty period, the Contractor shall be responsible for the repair and/or replacement for such affected equipment.
- (b) All indication lights, illumination of instrumentation gauges and panel lighting shall be fitted with dimmers for day and night operation. At the dimmers lowest level, no light shall be emitted from any indication light, illumination gauge or panel light.
- (c) The flat surfaces between controls, displays and equipment shall be coated in a rubberised, matt black coating suitable for the marine environment. Details of the rubberised coating required will be discussed at the kick-off meeting.
- (d) Lockers shall be provided as far as possible, if space permits, to allow for the watertight storage of items of police equipment. The consoles and locker(s) shall be designed to ensure easy access for the maintenance and repair of equipment mounted, installed or stored therein. Details to be discussed at the kick-off meeting.
- (e) The arrangement shall be designed to protect the crew and persons on board from injury inflicted by the consoles and the equipment installed in it.
- (f) Sufficient legroom shall be provided to obviate the risk of impact injury during rough weather or violent manoeuvres in both the seated and standing positions.
- (g) Each console shall be provided with a waterproof and ultraviolet radiation resistant black/grey cover for covering the console down to deck level when the Vessel is not in use.
- (h) Switches shall be separate from each other with guards to aid in preventing multiple switches being operated accidentally.
- (i) Creative use of space is encouraged and shall be discussed with GNC and HKPF in the kick-off meeting.
- (j) The detail arrangement of all controls, displays, equipment on the primary console, secondary console and centre switch pod shall be discussed in the kick-off meeting. The design shall be confirmed by GNC & HKPF during the console mock-up inspection. The fabrications of consoles & switch pod shall not be commenced without the approval by GNC & HKPF.

### 3.5. **Foldable and Removable Bimini**

- 3.5.1. The bimini shall be designed to minimise wind resistance.
- 3.5.2. The bimini shall be easily removable, foldable, and able to withstand a speed of 35 knots when deployed.
- 3.5.3. The frame of the bimini shall be constructed from marine grade aluminium.
- 3.5.4. All hardware such as screws, hooks, hasps, hinges, handles and sliding bolts shall be made of stainless steel or corrosion resistant material with galvanic protection as required at contact points with the deck/hull. The hardware shall be covered with matt non-shiny or reflective coating.
- 3.5.5. The bimini shall not be attached to the console and shall not obstruct operations at the coxswain or navigator positions. Details to be discussed at the kick-off meeting.

### **3.6. Mast**

- 3.6.1. The mast shall be of marine grade aluminium and designed to minimise wind resistance. This will be reviewed at the kick-off meeting.
- 3.6.2. The mast shall be a strong and rigid structure to support the lightning arrestor / dissipater, navigation lights, searchlight and other electronic and navigation equipment as appropriate under the dynamic responses at the design operating sea state in Paragraph 2.7.3 of this Part VII and shall be free of fatigue damage throughout its life span.
- 3.6.3. The mast shall be provided with all necessary fittings including but not limited to brackets for all navigation lights and the lightning arrestor/dissipater as per the Conceptual General Arrangement Plan shown in Paragraph 2.1 of this Part VII.
- 3.6.4. All hardware such as screws, hooks, hasps, hinges, handles and sliding bolts shall be made of stainless steel or corrosion resistant material with galvanic protection between contacts with the aluminium hull.
- 3.6.5. The mast shall be positioned at the centreline of the vessel as close as practicably possible to the transom and will not cover or be attached to the consoles and shall not obstruct operations at both of the crew's operational positions.
- 3.6.6. The design of the mast shall be discussed at the kick-off meeting, and shall be submitted to GNC and the HKPF for approval.

### **3.7. Lockers/Void Spaces**

- 3.7.1. Lockers / Void Spaces
  - (a) Other watertight lockers and storage designed for installation on a deck track railing system, shall be provided if space permits. This storage shall be designed to be installed on the deck track railing attachment system specified at Paragraph 3.8.5 of this Part VII.
  - (b) The location and dimensions of lockers shall be discussed at the kick-off meeting and agreed by the HKPF.
- 3.7.2. Air pipes shall be fitted to all tanks, cofferdams, void spaces, tunnels and other compartments which are not fitted with alternative ventilation arrangements.
- 3.7.3. The design of lockers or other storage acceptable to the HKPF, or void spaces and their mounting facilities, shall be discussed during the kick-off meeting, and subsequently approved by GNC and the HKPF. Lockers or other storage shall be ready in the mock-up for inspection before finalisation.

### **3.8. Deck, Seating and Attachment Systems**

- 3.8.1. High quality shock-mitigating jockey seats, anti-vibration deck covering, and handrails shall be provided to reduce the risk of impact injury and long-term health damage to both crew and persons onboard resulting from the harsh maritime environment in which the Vessel will operate.
- 3.8.2. The seats shall be designed to optimise body posture and to prevent occupants from injuries, including the following:
  - (a) falling or being thrown onto the deck or overboard;
  - (b) spinal injuries; and
  - (c) other injuries which may be caused by potentially harmful forces to which the Vessel and crew conducting the type of operations specified in Paragraph 1.2.1 of this Part VII according to the operational profile specified in Paragraph 2.7 of this Part VII may be subjected.



3.8.3. Basic requirements of the seats shall be:

- (a) Specifically designed for use aboard small, high-speed marine craft at 55 knots or above;
- (b) Material of the structure: Titanium, stainless steel and/or aluminium alloy;
- (c) Materials of upholstery: Water and fire resistance materials such as fire retardant foam/reinforced nylon laminated neoprene/heavy duty Cordura laminate;
- (d) Adjustable height and tailorable to different crew weights without tools;
- (e) Suitable for those of Asian stature (1.64 m tall);
- (f) Provided with grip handles at the aft of the back support, for extra passengers to hold on to in standing positions; and
- (g) Protective covers: Covers shall be supplied to protect all of the seats from rain and ultraviolet radiation when not in use.

3.8.4. Seating for four (4) crew, and at least eight (8) passengers, shall be provided. The seats shall be designed with progressive damping and adjustable shock absorbers for light/heavy personnel. The position of seats shall be adjustable to move fore and aft for personnel with different heights to ergonomically reach the console. Further specifications shall be discussed at the kick-off meeting and agreed by the HKPF.

3.8.5. A recessed track railing attachment system consisting of flush fitting seat mounting rails shall be fitted on the deck immediately aft of the console and, if space permits, in front of the console to allow for the temporary installation of seating and stores tie-down points if required.

3.8.6. Notwithstanding the requirement for all deck areas to be covered with anti-slip paint or a covering as specified in Paragraph 3.3.6 of Part VII, all areas of the deck shall be covered by shock/vibration mitigating material or equivalent in such a manner that the removal of any of the shock-mitigating seating specified at Paragraph 3.8.4 above will result in a flush surface free of tripping or snag hazards.

3.8.7. Suitable handrails and grips, coated with appropriate anti-slip material, shall be provided at the consoles and at other locations around the Vessel to enable operators to move safely around the Vessel at all times. The exact arrangement of these handrails is to be confirmed with HKPF at the kick-off meeting.

3.8.8. All flat, horizontal surfaces above deck level where personnel may step such as gunwales and bow boarding platform shall, if practicable, be coated with an appropriate anti-slip material. The specification of which is to be agreed with HKPF at the kick-off meeting.

3.8.9. The designs of the fixtures, fittings and finishing specified at Paragraph 3.7 of this Part VII shall be discussed during the kick-off meeting and drawings shall be submitted to GNC and HKPF within one month from the date of the kick-off meeting for approval.

### **3.9. Foam Collar**

3.9.1. A closed cell polyethylene foam collar such as Ethafoam 220E or equivalent shall be fitted to cover the bow, and the full length of the port and starboard sides for hull protection. The foam collar shall be protected by a reinforced cover.

3.9.2. An inflatable only collar is not acceptable, but an air-cored foam collar may be accepted, and shall be approved by HKPF prior to installation on the Vessel.

3.9.3. The collar shall be detachable but tightly affixed to the hull and flush with the sheerline. The method of attachment may be by adhesive recess belts, a track system, bolting or other non-adhesive mechanical means agreed by GNC and the HKPF. The design shall ensure that the collar cannot become detached or slide aft as a result of wave action or other intended or unintended external influences.

- 3.9.4. The collar shall be clear of the water when planing in Full Operational Load Condition as per Paragraph 1.8.2(f) of this Part VII.
- 3.9.5. The collar shall be resistant to impact, abrasion, tearing, outdoor temperature extremes, degradation caused by ultraviolet radiation, ozone and contact with seawater, oil, petrol, diesel, lubricating oil or chemicals. The testing of the foam material shall comply with IMO MSC 81(70), as amended and ISO 6185-4 or other international standards or rules acceptable to the GNC and the RO.
- 3.9.6. The bow section of the Vessel shall be fitted with additional protection consisting of a tied down sacrificial covering with recessed tie-down points on the bow deck and stem.
- 3.9.7. Detachable swimmer grab strips/lines shall be provided along the sides of the Vessel at intervals of approximately one metre. These shall be attached either at dedicated points or to grab/safety rails of sufficient strength. Stowage for these lines shall be provided when not attached to the Vessel.
- 3.9.8. The collar shall incorporate a survivor recovery cut-out (or diver door) abaft the beam on both the port and starboard sides to facilitate the safe and efficient recovery of a person in the water by onboard crew members, which, when closed, shall provide a continuous collar without any recessed sections, along both the port and starboard sides of the Vessel.
- 3.9.9. Mounting points shall be provided at the survivor recovery cut-out (or diver door) to which the 710mm wide Fast Rescue Craft (“FRC”) Jason’s Cradles shall be affixed to assist in the recovery of unresponsive persons from the water. The mounting points shall be painted in a distinctive colour for easy identification.
- 3.9.10. Stowage space shall be provided at an appropriate location along both of the Vessel’s sides to assist in the recovery of unresponsive persons from the water.
- 3.9.11. Details of the design shall be discussed at the kick-off meeting and submitted to GNC for approval before the completion date stipulated in Annex 2 to this Part VII.

### **3.10. Bow**

- 3.10.1. A bow sheer deck boarding platform or step at a height flush with the top of the side sheet and collar system, with intermediate steps for safe access if necessary, leading up to it, shall be provided at the bow to facilitate embarkation and disembarkation. The void cuddy space under this platform shall be enclosed and designed for watertight storage. Details of the design shall be discussed at the kick-off meeting and submitted to the GNC for approval before the completion date stipulated in Annex 2 to this Part VII.
- 3.10.2. The platform shall extend at least one metre aft from the bow, but its length over this shall be minimised so as to maximise deck space in front of the primary console. The void cuddy space under this platform shall be enclosed and designed for watertight storage, primarily for the anchor and mooring equipment. If space permits the compartment shall be separated to allow one compartment for mooring and other equipment and a second for the anchor system. The division between the compartments does not need to be full height or watertight, and both areas shall be accessible through the single deck hatch. Details of the design shall be discussed at the kick-off meeting and submitted to the MD for approval before the completion date stipulated in Annex 2 to this Part VII.
- 3.10.3. All gunwale fittings such as cleats and bollards shall be designed to minimise the risks of line tangling or snagging through being, recessed/foldable and flush fitting. All deck level tie-down points shall be flush fitting or removable to minimise tripping hazards.

### **3.11. Transom and Stern**

- 3.11.1. The transom and the propulsion systems and their respective attachments to the Vessel shall be designed to comply with the rules of the RO and be capable of operating in WMO Sea State 6.
- 3.11.2. A tray with drains shall be attached to the fore part of the transom to accommodate the petrol filters, fuel supply water separator drain, control wires and hydraulic steering pipes. This can take the form of an 'outboard well' so long as the well is of such a construction as to prevent oily fluid entering the surrounding water under normal operation, i.e. not capsized.
- 3.11.3. The transom shall be designed to provide safe and easy access to the outboard engines for routine checking and troubleshooting even while underway at sea.
- 3.11.4. The outboard engines will be protected by a crash guard. The crash guard shall be of sturdy but detachable construction (e.g. secured by bolts and nuts) and protect the engines from rear and side impacts.
- 3.11.5. A towing bitt shall be provided near the stern. Details of the design shall be discussed at the kick-off meeting and submitted to GNC for approval before the completion date stipulated in Annex 2 to this Part VII. The bitt shall be tested under the design load to prove the strength.

### **3.12. Anchor, Chains and Strong Points**

- 3.12.1. The Vessel shall be equipped with one stainless steel anchor with certificate issued by the RO and suitable swivel, shackles and secured stowage shall be provided by the Contractor.
- 3.12.2. One (1) anchor cable made up of chain and synthetic fibre shall be supplied by the Contractor either to meet RO requirements and to allow the Vessel to anchor in 25m of water depth. The length of chain shall be the minimum required to meet the RO requirements, with the remainder of the length of cable to use a suitable synthetic fibre construction.
- 3.12.3. The anchor and cable will be deployed by hand from the bow compartment and the bitter end of the cable shall be securely connected to a suitable hard point in the compartment. A securing arrangement inside the compartment to prevent the anchor from moving inside the compartment during heavy seas shall be provided. The cable shall be capable of being secured to one of the forward mooring/towing bitts for normal anchoring operations.
- 3.12.4. Two (2) 50m long tow ropes with a minimum breaking load such that when towing a sister vessel at 10 knots in WMO Sea State 2 the line tension is below 50% of the minimum breaking load shall be provided by the Contractor in a suitable stowage.
- 3.12.5. Four (4) heavy duty double braid mooring lines each of which having a minimum length of 8m, with strength exceeding the RO strength requirements and are at least 20mm diameter to provide a reasonable handling diameter shall be provided by the Contractor in a suitable stowage.
- 3.12.6. The mooring/towing strong points shall be designed and installed with sufficient safety factor to prevent material yield in a welded condition or first ply failure of the strong points or surrounding structures to which they are attached. Calculation of the horizontal load shall be in accordance with the RO requirements or other equivalent international standards, and the bow and stern strong points shall also be rated to the tow loads associated with towing a sister vessel in WMO Sea State 2 at 10 knots. The strong points shall be tested under the design load to prove the strength. The following strong points shall be provided with details to be discussed at the kick-off meeting:
  - (a) Mooring/towing cleats at four (4) locations along the vessel's length and both port and starboard, giving eight (8) total;

- (b) The forward and aft pairs are to be suitable for towing and capable of withstanding the forces involved when towing or being towed by a sister vessel or other craft of similar size at 10 knots in WMO sea state 2;
- (c) The forward pair shall be suitable for use in making off the anchor cable;
- (d) Lifting strong points for a four-point lift; and
- (e) Three (3) specialist equipment mounting points shall be provided, one at the centreline forward and two on each side aft of the Secondary Console. Each point shall be detachable and secured by at least four bolts and be designed for an applied pull-tested load of at least 280 kg at the installed height. Details of the mounting to be discussed at the kick-off meeting.

Details of the design shall be discussed at the kick-off meeting and submitted to the MD for approval before the completion date stipulated in Annex 2 to this Part VII.

#### 3.12.7. Devices for Lifting the Vessel

- (a) The Vessel shall be provided with two (2) means of lifting for docking, storage, inspection and maintenance purposes, designed for use with fixed jib cranes, telescopic cranes, travel hoists and truck mounted cranes:

- (i) 4-Points Lifting Method

The Vessel shall be designed with strong point lifting attachments permanently fitted to the hull. A spreader shall be provided if the bending stress induced during lifting exceeds the Vessel's permissible tolerance or if the lifting slings/wires/strops would otherwise foul the radar frame or equipment fitted thereto. The design of lifting strong point shall avoid any water accumulation. The design of the lifting attachments, slings/wires/strops and spreader, if any, shall be approved by the RO and shall match, where practical, the lifting facilities at the HKPF's operational bases.

- (ii) Lifting Slings Method

The Vessel shall be designed to allow the Vessel to be hoisted ashore by means of lifting slings around the hull. The hull structure shall, if it is necessary, be strengthened appropriately and the locations at which the slings are to be positioned shall be marked clearly. Attention shall be paid to appendages being in the way of the lifting slings, and if unavoidable, suitable arrangement and measures shall be provided for protecting such appendages.

- (b) The lifting points and locations shall be designed and installed with sufficient safety factor to prevent material yield or first ply failure of the strong point or surrounding structure. For aluminium aspects this aspect shall take the welded yield stress into account. Detail drawings of lifting attachments and related equipment shall be approved by the RO.
    - (c) One (1) set of lifting equipment for 4-Points Lifting Method shall be provided for each Vessel.

3.12.8. All the lifting devices/accessories shall be designed to withstand at least six (6) times the mass of the Vessel with all the equipment. All devices and accessories shall be certified by the RO and in accordance with the Schedule 1 of CAP 548I MERCHANT SHIPPING (LOCAL VESSELS) (WORKS) REGULATION prior to delivery. The lifting designs shall be discussed at the kick-off meeting and agreed by GNC and the HKPF. To avoid the need for costly and unnecessary alteration or modification of existing equipment, the Contractor shall, prior to any construction, submit detailed drawings of the above lifting methods to GNC and the HKPF for compatibility checking with existing lifting facilities.

3.12.9. All lifting or strong points shall be provided with a tally denoting their Working Load Limit ("WLL"), date of last load test and date of next required load test. All lifting points shall be load tested to two times of their WLL and all strong points to 120% of their WLL prior to Vessel shipment to HKSAR.

### **3.13. Trailers**

3.13.1. The Contractor shall supply the Vessel with one suitably designed metal slipping trailer for each Vessel, i.e. twelve (12) in total, with appropriate safety features on which the Vessel can be slipped ashore and tied down during tropical cyclones. The trailer shall have four stoppered double wheel units equipped with durable rubber tires or nylon wheels suitable for prolonged exposure to the outdoor environment including ultraviolet radiation. It shall be designed with a towing bar to facilitate towing by plant within the HKPF's operational base compounds and be steerable for manual positioning, with the front set of wheels capable of rotating through 360° about a hinge on the trailer. This trailer is not required for use on public roads. The design shall be submitted to GNC for review.

## CHAPTER 4 – MACHINERY

### 4.1. General Requirements

- 4.1.1. The Vessel is for use in Hong Kong and it is desirable that the outboard engines and any other machinery offered are similar to those at present commonly used on the Hong Kong Government fleet, and shall have good availability of spare parts. Good technical support and maintenance services shall be available locally in Hong Kong.
- 4.1.2. The Vessel shall be equipped and fitted with machinery that complies with the specifications set out in this Chapter. The critical spare parts to be provided shall be of the same model as supplied for the Vessel and shall equally comply with all specifications set out in this Chapter.
- 4.1.3. The machinery, associated piping systems and fittings relating to the outboard engines shall be of a design and construction adequate for the service for which they are intended and shall be so installed and protected as to reduce to a minimum any danger to persons onboard. The design shall have regard to materials used in construction, the purpose for which the equipment is intended, the working conditions to which it will be subjected and the environmental conditions onboard.

### 4.2. Outboard Engines

- 4.2.1. The Vessel shall be powered by two (2) or three (3) identical horse power of marine four-stroke outboard petrol spark ignition engines with adequate power to deliver the Contract Speeds as stated in Paragraph 2.4.1 of this Part VII. The engines shall drive stainless steel fixed pitch propellers through integral gearboxes. The propellers driven by the engines (port and starboard) shall rotate in opposite directions. [E]
- 4.2.2. The declared (rated) power of each engine shall not be greater than 425 horse power. [E]
- 4.2.3. The Contractor shall be responsible for ensuring the correct installation and setting up of the engines including the choice of propellers in accordance with the manufacturer's recommendations so as to avoid ventilation and cavitation, unless the propellers are designed to ventilate and/or cavitate.
- 4.2.4. The declared (rated) power of an engine model or propulsion system shall be the full throttle power at the declared (rated) speed at the final output shaft of the engine or propulsion system as offered for sale by the manufacturer. The power measurements and declarations for the engines and the propulsion system shall comply with the International Council of Marine Industry Associations ("ICOMIA") 28/83 requirements.
- 4.2.5. The engines of the Vessel shall have a three-star rating (ultra-low emission) or higher as per the California Air Resources Board star system ("CARB star system") that sets out the standards of exhaust emissions of four-stroke outboard engines or standards equivalent to the CARB star system. [E]
- 4.2.6. The Vessel shall be capable of navigating on one (1) engine at lower speed.
- 4.2.7. All engines shall be controlled using two throttles/levers. The two throttles/levers will be placed conveniently for one handed simultaneous operation by the coxswain. The engine throttle/levers shall be designed/approved by the engine manufacturers.
- 4.2.8. If the engines are to be electronically controlled (fly by wire) then the throttle levers shall be provided with adequate friction for use in high speed operations. The acceptable level of friction shall be agreed by HKPF at the kick-off meeting, reviewed during console mock up as described in Paragraph 3.4.1 of this Part VII and finally accepted as part of the acceptance trials as described in Paragraph 1.8 of this Part VII.

- 4.2.9. The engines shall be equipped with power trim with switches on the throttle controls/levers that enable the operator to adjust the trim angles on all engines from a single switch whilst making way. If the engines are connected by a tie bar they shall be able to be trimmed independently. The engines shall be designed to trim fully down to start and be trimmed up as the Vessel gains momentum, until reaching the point just before ventilation begin. [E]
- 4.2.10. The engines located at the transom shall be able to tilt up above the water level and be easily accessible for maintenance, routine checking and troubleshooting even when underway as specified in Paragraph 3.11.3 of this Part VII.
- 4.2.11. The electrical cables, piping for petrol and hydraulic oil lines shall run beneath the deck in order to minimise potential trip hazards on the deck. The runs shall also be easily accessible through deck hatches and designed for ease of maintenance. They shall be supported properly to prevent chafing and unnecessary tension.
- 4.2.12. Each engine system shall include the following accessories:
- (a) One 12V or 24V electrical alternator and remote starting control;
  - (b) Dead-man switch and emergency cut-off;
  - (c) Power trim and tilt system with trim gauge at the console;
  - (d) Engine protection system as required by engine manufacturer, with audio and visual warnings at the console. These audio warnings shall also be broadcasted to the Vessel's operators via the Intercommunication system as specified at Paragraph 7.7 of this Part VII; and
  - (e) Engine tie bar linking outboard engines, as appropriate to achieve required steering system redundancy as discussed in Paragraph 4.4 of this Part VII.
- 4.2.13. The Contractor shall supply the Vessel with a comprehensive vessel information system which shall be integrated with the Vessel's GPS and other systems, generate recorded data in NMEA 2000 format, and display on an engine monitoring display panel located on the secondary console, this display panel can be the MFD, or an additional display. The information to be displayed is to include but not be limited to the following:
- (a) Engine rpm;
  - (b) Engine running hours;
  - (c) Shift position of gearcases;
  - (d) Oil temperature and pressure;
  - (e) Fuel level and range until the fuel tank is empty;
  - (f) Specific fuel consumption;
  - (g) Battery voltage;
  - (h) Steering and trim data;
  - (i) Course and speed;
  - (j) Engine faults and notification alarms;
  - (k) Trip history; and
  - (l) Any other data which the supplied system and outboard engines are capable of generating.
- 4.2.14. The Contractor shall ensure that the following engine information, as a minimum, shall be viewable from the Coxswain's position using analogue or digital gauges, which is to be confirmed with HKPF in the kick-off meeting:
- (a) Engine rpm;
  - (b) Shift position of gearcases;
  - (c) Fuel level; and
  - (d) Trim data.

- 4.2.15. The vessel information system specified at Paragraph 4.2.13 above shall generate an audible notification alarm over the Vessel's Intercommunication system as specified at Paragraph 7.7 of this Part VII in respect of the notification alarms specified at Paragraph 4.2.124.2.13(j) above.
- 4.2.16. The data captured by the vessel information system specified at Paragraph 4.2.13 above shall be stored for at least seven hundred and twenty (720) hours locally on the Vessel in the VDR system provided by the Contractor and be transmittable to government land based systems via a removable storage medium such as a USB memory stick or SD card. Such storage medium shall be protected with lockable security anti-tempering device. Details to be discussed at the kick-off meeting.

### **4.3. Propellers**

- 4.3.1. All propellers shall be made of stainless steel with a fixed pitch.
- 4.3.2. The Contractor shall consult the outboard engine manufacturer regarding the draft of propellers taking into account the full operating profiles of the Vessel as specified at Paragraph 2.7 above.

### **4.4. Steering System**

- 4.4.1. The electro-hydraulic steering system shall be designed and approved by the engine manufacturer and approved by the RO. The arrangement of the steering system shall be accepted by GNC and the HKPF before installation.
- 4.4.2. If the normal electrical power supply of the hydraulic steering system fails, an Uninterrupted Power Supply ("UPS") shall be immediately available to ensure that the steering system shall continue to function.
- 4.4.3. Manual steering capability shall be provided. In the event of complete loss of electrical power supply onboard, the crew shall be able to manually operate the Vessel at a reduced speed.
- 4.4.4. The hydraulic fluid tank shall be easily accessible for routine level checking and refilling.
- 4.4.5. The outboard engines shall be installed in such a way that, with any combination of engine turn and tilt, the engines shall not interfere with each other or any other part of the Vessel.
- 4.4.6. Connections, fittings, oil fill openings and air bleeders shall be accessible with all engines and systems fitted and installed.
- 4.4.7. Components in the system shall be protected externally against corrosion. The complete hydraulic steering system shall be designed to withstand, without failure or leakage, the conditions of pressure, vibration, shock and movement expected in a Vessel conducting the type of operations specified in Paragraph 1.2.1 of this Part VII.
- 4.4.8. Materials used in the hydraulic steering systems shall be resistant to deterioration caused by contamination by liquids or compounds with which the material may come into contact under normal marine service, e.g. grease, lubricating oil, hydraulic fluid, petroleum, common bilge solvents, salt and fresh water.
- 4.4.9. The type of hydraulic fluid used in the hydraulic steering system shall be specified by the steering system's manufacturer and shall be stated in the owner's manual. The hydraulic fluid shall be non-flammable which means its flash point shall be higher than 150 degrees Celsius.
- 4.4.10. Hydraulic lines shall be supported by clips, straps or other means to prevent chafing or vibration damage. The clips, straps or other devices shall be corrosion resistant and shall be designed to prevent cutting, abrading or damage to the lines and shall be compatible with hydraulic line materials.



- 4.4.11. The position of the helm shall be optimised ergonomically so that a coxswain of an Asian stature (approximately 1.64 metres in height) can use it for extended periods from both the seated and standing positions without incurring unnecessary physical strain. The helm shall be fitted with an anti-slip covering and be of a size acceptable to GNC and HKPF. Operation of the throttle levers and other controls by gloved hands shall not be impeded by the size or position of the helm. The helm shall be user-adjustable for rake.
- 4.4.12. The design strength of the hydraulic steering systems shall be tested in accordance with the requirements of the RO. All the fittings (hoses and piping) shall withstand the system test pressure without leakage.
- 4.4.13. The steering system shall incorporate a function enabling the number of revolutions of the helm from lock to lock to be pre-set according to the HKPF's requirements. The number of revolutions from lock to lock shall be between four (4) and five (5), and the details shall be discussed at the kick-off meeting.

## **4.5. Fuel Tanks**

### **4.5.1. Petrol Tanks**

- (a) At least two (2) separate petrol tanks shall be fitted under the deck, with combined sufficient capacity to fulfil the endurance requirements specified at Paragraph 2.7.2 of this Part VII, shall be provided. If a twin tank configuration is used, electronic switch(es) shall be provided at the console for the crew to select the supply of fuel from any desirable fuel tanks. The design and tests shall comply with the RO's rules.
- (b) The tank arrangement shall be such that if fuel in one of the tanks is contaminated, the other engine shall remain unaffected and operational.
- (c) The tanks shall not be integral with the hull and shall be installed so that the loads due to the mass of the full tank are safely induced into the structure, with due consideration given to the effects of vertical acceleration due to the Vessel's movements at maximum speed at sea.
- (d) In respect of Paragraph 4.5.1(c) above, continuous flexible supports which spread the loads are preferable to rigid supports.
- (e) Petrol tanks shall be filled with suitable open cell foam for explosion suppression and to minimise free surface effects which fulfil the requirements of the RO's rules. The foam must be removable through hand-holes(s) in the top of the fuel tank for inspection purposes.
- (f) All seals such as gaskets, O-rings and joint-rings shall be of a non-wicking, i.e. non-fuel absorbent, material. All materials used shall be resistant to deterioration caused by the fuel for which the system is designed and other liquids or compounds with which the material may come into contact as installed under normal operating conditions, e.g. grease, lubricating oil, bilge solvents, fresh water and sea water.
- (g) Internal surfaces of the petrol tanks shall be unpainted and cleaned thoroughly to the satisfaction of GNC.
- (h) Provisions in respect to the Petrol Tanks
  - (i) A tank contents gauge and low level alarm shall be fitted on the console for each tank;
  - (ii) The fuel tanks shall be constructed from marine grade aluminium alloy. The thickness of the construction material shall be sufficient to sustain the inertial loads due to the mass of the full tanks without damaging the integrity of the petrol tanks with due consideration given to the effects of vertical acceleration due to the Vessel's movements at maximum speed at sea;
  - (iii) Metallic fill pipes shall be connected to the sides or ends of metal petrol fuel tanks, provided that they are welded to the tank and reach above the top of the tank. All other fittings and openings shall be on the top of the fuel tanks;

- (iv) Rigid fuel suction tubes and fill pipes which extend to near the tank bottom shall have sufficient clearance to prevent contact with the bottom during normal operation of the Vessel;
  - (v) For each petrol tank, an inspection manhole, air vent with flame trap on deck and petrol tank outlet valve with a quick closing device shall be provided. The quick closing devices shall be positioned between the petrol tanks and the outboard engines. The triggers for these quick closing devices shall be installed on the console in an easily accessible location for both the coxswain and the commander;
  - (vi) The tanks' supports, chocks or hangers shall either be separated from the surface of the metal tanks by non-metallic, non-hygroscopic, non-abrasive material or be welded to the tanks;
  - (vii) An easily removable filter with water detector, which comes with audible and visible alarms, shall be built into the filling line;
  - (viii) The tanks shall be designed and installed to prevent water from being trapped on the exterior surface;
  - (ix) Tank drains are not permitted on the petrol fuel tanks; and
  - (x) A water separator incorporating a drain valve shall be installed between the tanks outlet valves and the outboard engines. It shall be easily accessible for inspection and operation.
- (i) The arrangement of the petrol tank compartment shall avoid any risk of spark or electrostatic formation (e.g. proper bonding).

#### 4.5.2. Petrol Fuel Tank Tests - Leakage Test

- (a) The tank shall be pressure tested in accordance with ISO 21487 "Small craft – Permanently installed petrol and diesel fuel tanks".

## 4.6. Bilge System

- 4.6.1. Electric bilge pump(s) with manual back up shall be provided by the Contractor. Details of the design shall be discussed at the kick-off meeting and submitted to GNC for approval before the commence of construction work.
- 4.6.2. The Vessel shall be designed and constructed to minimise the potential for the accidental overboard discharge of pollutants (oil, fuel, etc.).

## **CHAPTER 5 – ELECTRICAL SYSTEM**

### **5.1. General Requirements**

- 5.1.1. All the electrical equipment and installations on the Vessel shall comply with RO requirements.
- 5.1.2. All electrical equipment, fittings, instruments, switches, cables, insulation, sheathing, circuit breakers, rating standards and their installations shall comply with the Regulations of the International Electro-technical Commission (hereinafter referred to as “IEC”) Electrical Installations in Ships in the version as at the Contract Date unless the regulations specify that version of such rules and regulations as at the keel laying date of the Vessel shall apply in relation to the relevant requirements specified therein. The electrical system shall be an insulated two-wire Direct Current (“DC”) system. The hull shall not be used as a current-carrying conductor.
- 5.1.3. Protective devices such as circuit breakers or fuses shall be provided at the source of power, e.g. the switchboard, to interrupt any overload current in the circuit conductors before heat can damage the conductor insulation, connections or wiring-system terminals.
- 5.1.4. All 12V DC equipment shall function over a voltage range of 10.5V to 15.5V at the battery terminals.
- 5.1.5. The length and cross-sectional area of conductors in each circuit shall be such that the calculated voltage drop shall not exceed 10% of the nominal battery voltage for any appliance when every appliance in the circuit is switched on at full load.
- 5.1.6. Switches and controls shall be marked to indicate their purpose. Each cable shall be labelled clearly and bear its own unique identification code.
- 5.1.7. The Contractor shall submit a layout plan showing the exact locations of the Equipment. All Equipment shall be easily and safely accessible for inspection and maintenance.
- 5.1.8. Essential drawings and detailed particulars (such as the rating and capacity, type of all electrical equipment as well as the wiring, circuit breakers, lighting and sockets) shall be submitted to GNC for approval before the commence of construction work.
- 5.1.9. Detailed wiring diagrams of the complete supply and distribution network, including wire size, insulation and sheathing shall be approved by the RO when required by the rules and submitted for GNC’s approval before the completion date stipulated in Annex 2 to this Part VII.
- 5.1.10. The Equipment installation standards shall serve to enhance safety and not present hazards to the operators, e.g. all metal panels exposed to the operator shall be grounded properly. Warnings of any potential hazards shall be displayed in both English and Traditional Chinese, or with universally recognisable labels.
- 5.1.11. All Equipment installed shall be accompanied by operation and maintenance manuals, provided in both English and traditional Chinese.

### **5.2. Batteries**

- 5.2.1. Two (2) groups of 12V maintenance-free batteries shall be provided and labelled, one (1) for starting the outboard engines and the other for shipboard services. These two (2) groups of batteries shall be connected to two (2) independent DC circuits with a crossover network. They shall be interchangeable to back up each other, and be capable of being charged individually by any of the engine-driven alternators. Clear instructions shall be provided onboard next to the switch for the interchange operation. Batteries connected in parallel shall not be allowed.
- 5.2.2. The capacities of the two (2) groups of batteries shall be sufficient to provide at least six (6) consecutive starts of the engines from cold without recharging and maintain an uninterrupted power supply to the shipboard services (e.g. navigation lights, general lights, alarm).

- 5.2.3. A separate battery shall be dedicated to the emergency services (e.g. radio communications and signalling, emergency and navigation lights) and shall conform to the RO requirements.
- 5.2.4. The engine-driven alternators shall be able to charge the batteries and to provide 12V DC power to the shipboard services.
- 5.2.5. Batteries shall be permanently installed in either a watertight compartment or IP67 rated enclosure. The watertight compartment could be the console if designed to be IP67 rated. The compartment where batteries are located shall be ventilated to prevent accumulation of flammable gases released by batteries. The batteries shall be located above the anticipated bilge water level.
- 5.2.6. In consideration of the intended operational role of the Vessel, the batteries shall be installed securely in a manner that restricts their movement in all directions.
- 5.2.7. Batteries shall be installed, designed or protected so that metallic objects cannot come into unintentional contact with any battery terminal.
- 5.2.8. Batteries, as installed, shall be protected against mechanical damage at their location or within their enclosure and be readily accessible and removable for ease of maintenance and renewal of batteries.
- 5.2.9. Batteries shall be partitioned from the fuel system as far as is practicable.
- 5.2.10. Any metallic component of the fuel system within 300 mm above the battery top, as installed, shall be insulated electrically.
- 5.2.11. Battery cable terminals shall not depend upon spring tension for mechanical connection.
- 5.2.12. All circuits will be connected to the battery via a master battery disconnecting switch, which shall be in a readily accessible location and installed as close as possible to the positive pole of the battery.

### **5.3. Distribution Network**

- 5.3.1. 12V services shall be supplied from the switchboard in the console through a 2-wire insulated system to the following items:
  - (a) Navigation light control panel and navigation lights;
  - (b) Horn;
  - (c) General lighting;
  - (d) Compass light;
  - (e) Instrument panel in the console;
  - (f) Content gauges for the petrol tanks;
  - (g) Three (3) hand-held searchlights;
  - (h) Siren;
  - (i) Blue flashing light;
  - (j) Electric bilge pumps; and
  - (k) All other navigation and electronic equipment (as applicable).

### **5.4. Cables**

- 5.4.1. No electrical equipment, components or cables shall run through or be installed inside the petrol tank compartments.
- 5.4.2. Cables that are not sheathed shall be supported throughout their length in conduits, cable trunking, or trays, or by individual supports at maximum intervals of 300 mm.

- 5.4.3. Sheathed cables and battery cables to the battery disconnection switch shall be supported at maximum intervals of 300 mm, with the first support not more than one metre from the terminal. Other sheathed cables shall be supported at maximum intervals of 450 mm.
- 5.4.4. Conductors which may be exposed to physical damage shall be protected by sheaths (armoured cables), conduits or other equivalent means. Cables passing through bulkheads or structural members shall be protected against damage to insulation by chafing.
- 5.4.5. The metallic sheathing, armour or braid of cable shall be earthed properly at both ends. All bare terminals shall be insulated properly with approved cable insulators.
- 5.4.6. Wiring shall run along conduits with watertight openings and be secured in such a manner as to allow easy maintenance. Type approved cable penetrations shall be provided at the openings of watertight compartments or deck penetrations.
- 5.4.7. Cables for outboard engines shall be sheathed independently with a dedicated black rigging tube to protecting against UV deterioration and damage. The black rigging tube shall be securely mounted at both ends of the rigging flange.

## **5.5. Overcurrent Protection**

- 5.5.1. A manually reset trip-free circuit-breaker, or a fuse, shall be installed within 200 mm of the source of power for each circuit or conductor in the system or, if impractical, each conductor shall be contained within a protective covering, such as a sheathing conduit or cable trunking, for its entire length from the source of power to the circuit-breaker or fuse.
- 5.5.2. The voltage rating of each fuse or circuit-breaker shall not be less than the nominal circuit voltage. The current rating shall not exceed the value for the conductor of smallest diameter in the circuit.

## **5.6. Switchboard (Panel Board)**

- 5.6.1. Switchboards or panel boards shall be installed in such a way that the control elements, indicating instruments, circuit-breakers and fuses are readily accessible. The terminal side shall be accessible.
- 5.6.2. Connections and components on panel-boards shall be in locations protected from the expected conditions in conformity with IEC 60529.
- 5.6.3. Panel-boards (switchboards) shall be marked permanently with the nominal system voltage.

## **5.7. Receptacles/Sockets**

- 5.7.1. Receptacles/sockets installed in locations subjected to sunlight, rain, spray or splashing shall be UV stabilized, chemically and impact resistant with a minimum protection of IP 66, in accordance with IEC 60529 when not in use, e.g. protected by a cover with an effective weatherproof seal.

## **5.8. Lighting**

- 5.8.1. All lighting, including the navigation lights, shall be equipped with LED bulbs and be operated by means of manual switches.
- 5.8.2. A blue flashing light shall be provided on top of the mast, controlled from the centre switch pod.
- 5.8.3. Self-activating capsized lights shall be provided that automatically activate if the boat inverts and these will provide sufficient light to illuminate the crew and passenger areas of the vessel.

- 5.8.4. Independently controlled high-powered white floodlight(s) shall be supplied to cover the fore and aft decks and Vessel sides.
- 5.8.5. The arrangement and positioning of the lighting and light switches shall be discussed at the kick-off meeting and shall be agreed by the HKPF.

## **5.9. Ignition Protection**

- 5.9.1. Electrical components installed in compartments which may contain explosive vapour and gases, or in spaces which have open connections with compartments containing such items (e.g. fuel tank, joints or fittings in fuel lines connecting spark-ignition engines with their fuel tanks) shall be ignition-protected or intrinsic safe in accordance with IEC 60079 or other equivalent international standard acceptable to GNC and the RO. The product certificates shall be provided to GNC before installation.

## **5.10. Navigation and Signalling Equipment**

### **5.10.1. Navigation Lights**

- (a) Navigation lights that comply with the requirement specified in the International Regulations for Preventing Collisions at Sea 1972, as amended shall be provided, together with double-pole circuit breaker.
- (b) The lights shall be controlled from the control and alarm panel at the centre switch pod. Each navigation light circuit shall be provided with a switch, protection fuse, indicating lamp and alarm.
- (c) A dimmer(s) for the panel indication lights, buzzer stop and lamp test buttons shall be fitted.
- (d) Navigation light circuits shall be independent of any other electrical circuits. There shall be two separate power supply systems to the distribution board.
- (e) The following navigation lights shall be provided together with double-pole circuit-breaker:
  - (i) Port side light;
  - (ii) Starboard side light;
  - (iii) Stern light;
  - (iv) Masthead light;
  - (v) Anchor light; and
  - (vi) Towing light.

5.10.2. Type Approval Certificates for all navigation lights shall be submitted prior to Delivery Acceptance.

5.10.3. The Contractor shall provide the following signalling equipment approved by the HKPF:

- (a) One all-round blue flashing light;
- (b) One siren; and
- (c) One horn.

## **5.11. Lightning Protection**

- 5.11.1. The Vessel shall be fitted with a proven lightning protection system (lightning arrestor/dissipater) to protect the personnel onboard and the electronic equipment installed onboard. The system shall be robustly attached to the Vessel, taking into account of the dynamic inertia load caused by ship motions induced by severe shocks experienced by the Vessel in rough weather. The method and working principle of this protection shall be approved by the RO before submission to GNC by the completion date stipulated in Annex 3 of this Part VII for endorsement.

## **5.12. Searchlights**

- 5.12.1. The Contractor shall supply three (3) high-powered hand-held white LED searchlights. They shall be connected to sockets onboard with coiled extension cables of an appropriate length. Sockets shall be installed at the starboard side of the primary console and on both the port and starboard sides of the secondary console. Facilities for storing the three (3) hand-held searchlights shall be provided. The type of searchlight, the length of the extension cables, the positioning of the sockets and the stowage shall be discussed at the kick-off meeting and shall be agreed by the HKPF.

## **CHAPTER 6 - LIFESAVING APPLIANCES (“LSA”) AND FIRE-FIGHTING EQUIPMENT**

### **6.1. General Provisions**

- 6.1.1. The lifesaving appliances and fire-fighting equipment shall comply with the RO Requirements.
- 6.1.2. The lifesaving appliances shall include a life ring buoy with marker light and a rescue quoit with line attached.
- 6.1.3. A total capacity of 6kg dry powder fire extinguishers shall be provided with holding rack, utilising two (2) separate portable extinguishers. The stowage locations are to be confirmed with HKPF at the kick-off meeting. All such fire extinguishers shall have approval certificate issued by a competent body recognised by MD, such as one of the RO as stated in Paragraph 2.3.4 of this Part VII, or by the registered fire services installation contractors recognised by the Hong Kong Fire Services Department.
- 6.1.4. The fuel tank compartment(s) shall be fitted with gas detectors suitable for detecting petrol gas. The gas detectors shall be certified in accordance with IEC 60079, ATEX, IECEX or to an equivalent international standard acceptable to GNC.



## **CHAPTER 7 – ELECTRONIC NAVIGATIONAL EQUIPMENT**

### **7.1. Description of Electronic Equipment System**

- 7.1.1. Except for the equipment which is listed in Paragraph 7.8 of this Part VII, the Contractor shall supply, deliver, install, commission, conduct trial test and provide warranty services for all of the Electronic Navigational Equipment and systems, intercommunication system, public address system, siren and external broadcasting system, international VHF radio, lightning protection, antennae and instruments and controls specified in this Chapter 7 on the Vessel's consoles (collectively, "Electronic Navigational Equipment" or "ENE") and in accordance with all requirements specified in this Chapter 7.
- 7.1.2. Some existing police equipment/systems (the "EQ-HKPF") will be supplied separately or redeployed from within the HKPF and are listed in Paragraph 7.8 of this Part VII. The Contractor shall reserve equipment space, carry out installation, supply and install cables and connectors, undertake power point provision/connection and assist the HKPF in the testing.
- 7.1.3. Main units of the ENE and the EQ-HKPF shall be installed inside an equipment compartment(s) suitably protected from the weather, environment and sea spray while the associated control panels and displays will be flush mounted and/or recessed in console panels with appropriate watertight sealing. All designs and installation/mounting proposals shall be approved by the HKPF prior to the commencement of any such work.
- 7.1.4. In addition to the submission of a layout plan to the MD and COMMS, to facilitate the optimal ergonomic design, user-friendliness, effectiveness and easy accessibility for inspection and maintenance of the Primary, Secondary and centre switch pod, the Contractor shall build full size mock-up consoles and switch pod as specified at Paragraph 3.4.1 of this Part VII for approval and comments from the MD and COMMS. These mock-up consoles and switch pod shall show the positions and arrangement of the actual ENE components, EQ-HKPF and other equipment and controls on the console panels before construction and installation. The dimensions of EQ-HKPF equipment will be provided at the kick-off meeting.
- 7.1.5. The Contractor shall provide drawings of all ENEs to be installed at the consoles, switch pod and mast to COMMS for discussion at the kick-off meeting. The Contractor shall, upon COMMS's request, submit a block diagram showing the conceptual connections between the ENE and EQ-HKPF as specified at Paragraph 7.8.1 of this Part VII for evaluation.
- 7.1.6. In addition to all the ENE that the Contractor is required to provide for each Vessel under Chapter 7 of this Part VII, the Contractor shall also provide one (1) complete Vessel set of this equipment upon the delivery of the Vessel as Contract Spare Parts, including cabling, control panels, gauges etc. Please also see Schedule 1 of Part V. In the event that any equipment is substituted during the Contract Period, the Contractor shall also supply one (1) set of the substituted equipment, as spare parts.
- 7.1.7. All the ENE onboard the Vessel and spare parts shall be serviceable and, have technical support and maintenance services available locally in the HKSAR upon the completion of the Warranty Period.
- 7.1.8. The Contractor shall submit design description, schematic diagrams, hardware and software specifications, installation drawings and integration design including but not limited to the Electronic Equipment specified in Chapter 7 of this Part VII to HKPF for approval within the time specified by the HKPF and prior to the commencement of any such work during design stage.
- 7.1.9. Upon receipt of a request from the HKPF, the Contractor shall alter or adjust or modify any of the deliverables as specified in Paragraphs 7.1.1 and 7.1.2 of this Part VII to the satisfaction of the HKPF without causing any delay to the Implementation Plan or such other time requirements set out in the Contract, at no additional cost to the Government.

## 7.2. General Requirements

- 7.2.1. All the ENE shall be marine type and comply with the relevant regulations of the Safety of Life at Sea Convention (“SOLAS”), International Electrotechnical Commission (“IEC”) and the International Telecommunications Union recommendations in the International Radio Regulations (“ITU-R”), unless explicitly stated otherwise. The Electronic Equipment shall comply with all relevant International Maritime Organization (“IMO”) recommendations on performance standards and operational features. The Electronic Equipment shall perform effectively even under the most adverse weather conditions. All radio communications equipment, including radars and radios, shall also comply with the requirements of the Office of the Communications Authority (“OFCA”) of the HKSAR.
- 7.2.2. All of the ENE shall be suitable for marine use on the Vessel in the operating conditions specified in Paragraphs 2.7.3 and 2.7.4 of this Part VII and shall maintain the manufacturer stated performance under such conditions, operating without blacking out or suffering a reduction in performance. All ENE equipment shall also either:
- (a) Have demonstrable track record for use on craft of similar size and speed to the Vessel; or
  - (b) Be of a ruggedised type and shock rated to 40g in line with a suitable UK or USA Defence or Military Standard or equivalent.
- 7.2.3. The Contractor shall observe and adopt the International Commission on Non-Ionizing Radiation Protection (“ICNIRP”) Guidelines (formerly International Radiological Protection Association (“IRPA”) Guidelines) and the Code of Practice issued by OFCA of the HKSAR on the limits of exposure to radio frequency electromagnetic fields in the frequency range from 100 kHz to 300 GHz for the protection of operators, workers and the public against Non-Ionizing Radiation (“NIR”) hazards, so as to provide a safe and healthy working environment under all normal conditions. In case of multiple simultaneous exposures, the combined effect of such exposure shall also be assessed in accordance with the ICNIRP Guidelines.
- 7.2.4. The Contractor shall warrant that all the ENE and materials used, irrespective of whether they are in operation or not, shall comply with the health and safety standards adopted by the World Health Organization in particular in relation to all harmful radiation. The Contractor shall also disclose in writing the existence of any radio frequency radiation hazard emitted from the Equipment, which is harmful to human beings under normal operating conditions, by the safety standards adopted by ICNIRP, American National Standards Institution (“ANSI”), or other equivalent national or international standards.
- 7.2.5. All ENE shall be suitable for round-the-clock operation on the Vessel. Equipment displays shall have adjustable brightness levels and be suitable for viewing under different brightness conditions at sea, including under direct sunlight, day time, dusk, dawn and night time, without causing eye-strain, glare and / or discomfort. Equipment control keys and buttons shall be suitably back-lit with adjustable brightness levels to aid operation in the dark without causing eye-strain, glare and / or discomfort.
- 7.2.6. Design Standards
- (a) Environmental Conditions:
    - (i) All ENE shall be capable of operating continuously to the specifications throughout its normal life span in the HKSAR climate and environment. The following parameters shall apply unless otherwise stated:
      1. Ambient temperature between 0° C and 40° C; and between -5° C and +50° C if the equipment (including display units and antennae) is exposed to the open air;
      2. Relative humidity up to 95%, non-condensing;
      3. Salt and chemical corrosion as found in a tropical coastal environment; and
      4. Materials that promote mould growth shall not be used.
    - (ii) ENE shall be capable of withstanding the knocks and jolts likely to occur during repair work or in operating environment as specified in Paragraph 2.7.3 in this Part VII.

(b) Power Supplies:

- (i) The power supply for all ENE shall be protected by appropriate circuit-breakers;
- (ii) All the ENE shall be capable of working normally when powered by the Vessel's battery-backed D.C. supply system. A converter shall be provided if required;
- (iii) Two (2) spare power supply connections shall be required with a negative earth and be connected to a designated 12 Volt D.C. (nominal) battery-backed power supply. The battery shall be charged up when an engine generator is working;
- (iv) There is a possibility of D.C. leakage through the negative grounding to the D.C. battery power bank on the supplied Equipment if it is not connected properly. The Contractor shall take precautions to prevent this type of leakage, e.g. by using an isolation converter;
- (v) The ENE's power supply shall be compatible with the Vessel's electrical system. If necessary, a voltage stabiliser or regulator shall be provided and installed to maintain the ENE in proper working condition when connected to the unsteady D.C. voltage from the generator to protect the ENE from the adverse effects of excessive voltage, current spikes and surges;
- (vi) Suitable lightning protection devices (e.g. lightning surge arrestors / dissipaters) shall be incorporated for protecting the ENE and its accessories against damage due to lightning; and
- (vii) Selected ENE equipment shall be connected to individual external switches for controlling the power on or off status of the individual ENE equipment and the illuminated device on the control panel. The location of external switches shall be easily accessible. The actual devices to be connected to the external switches shall be subjected to approval by HKPF.

(c) Safety:

- (i) All ENE supplied shall be of a safe design and shall be installed in a safe manner as approved by the GNC and COMMS. The standard of installation shall enhance the Equipment's safety features and not present any hazards to the user;
- (ii) All ENE shall be properly grounded to an electrical earth. The installation shall not present hazards to the user in any way, e.g. grounding of all metal parts exposed to the user;
- (iii) Electrical contacts and PCBs shall also be protected in an appropriate manner that does not impair their electrical characteristics;
- (iv) Lightning protection device(s) (e.g. lightning surge arrestor(s) / dissipater(s)) are required, particularly for antennae installed outside the protection zone of the Vessel's own lightning protection device(s);
- (v) The lightning surge arrestor(s) / dissipater(s) of each feeder cable shall be grouped and concentrated in a "lightning arrestor / dissipater panel" to be located inside the console for ease of maintenance; and
- (vi) Warnings of any potential hazards associated with the ENE shall be displayed in Traditional Chinese characters, English and universally recognised labels, in visibly prominent positions.

(d) Design Practice:

- (i) All systems shall be designed for prolonged, continuous and reliable operation, i.e. twenty-four (24) hours per day and 365 days per year;
- (ii) The normal serviceable life of the ENE shall be a minimum of five (5) years operation onboard the Vessel. During the serviceable lifetime of the ENE, it shall be possible to maintain the ENE performance with reasonable repair and set up as defined in this Part VII;
- (iii) The design and construction shall be performed to a standard of engineering acceptable to COMMS and the ENE shall withstand handling and transportation without degradation of performance;
- (iv) The display digits in the ENE control panel shall be easily legible;
- (v) To facilitate night time operations, ENE control panels shall have a dimming function enabling the light emitted from the ENE display to be regulated progressively;

- (vi) All units, sub-assemblies, components and adjustable controls of the same type shall be both mechanically and electrically interchangeable without the need for changing connections or wiring. They shall be readily accessible for maintenance purposes;
- (vii) Correct impedance matching shall be maintained at all interfaces between any items of any equipment (e.g. audio at 600 ohms or RF at 50 ohms);
- (viii) Adequate testing points and other testing facilities, e.g. extension boards, testing probes, shall be provided to permit ease of maintenance; and
- (ix) Any equipment installed in an external position and exposed to the maritime environment shall have the level of IP protection appropriate to its function and position.

7.2.7. Appearance and Protective Finish:

- (a) Metal surfaces shall be either corrosion resistant or protected against corrosion for a period of at least three (3) years by high grade enamel painting, plating, galvanising, anodising, or any other suitable surface treatment; and
- (b) Any such protective layer shall be smooth, continuous, and free from blemishes and scratches.

7.2.8. Installation Standards:

- (a) All ENE, except portable ENE, shall be fixed firmly in place. Fastenings and supports shall support their loads with a safety factor of at least three (3);
- (b) The ENE shall be supplied with all auxiliary items required including but not limited to the following for normal operation:
  - (i) Connectors;
  - (ii) Circuit-breakers;
  - (iii) Lightning arrestors / dissipaters;
  - (iv) Power sockets;
  - (v) Plugs; and
  - (vi) Cables.
- (c) RF connectors (of suitable impedance) shall be provided and used for connections for the RF cables, antennae and radio equipment;
- (d) All exposed connectors shall be protected by weatherproof material (e.g. 3M self-adhesive tape or equivalent) to prevent water ingress;
- (e) Special attention shall be paid to the compass safe distance (Marine Guidance Note MGN 57 (M+F), Maritime and Coastguard Agency, and IMO Resolution A.694 (17)) of the ENE and the Radiation Hazard Zone of the radar scanner in the Vessel's design. Positioning of the ENE and the associated accessories shall be planned carefully in respect to their relative distances to eliminate any chance of radio interference that might occur during operational use;
- (f) Installation shall be to the highest standard to ensure:
  - (i) The relevant Merchant Shipping Notices ('M' Notices) published by the Department of Transport (London), in the version as at the Contract Date unless the rules and regulations of RO specify that version of such rules and regulations as at the keel laying date of the Vessel shall apply in relation to the relevant requirements specified therein;
  - (ii) Satisfactory performance of the ENE;
  - (iii) Protection from mechanical and water damage;
  - (iv) Ease of accessibility for maintenance and repair;
  - (v) Manufacturers' recommendations are followed strictly;
  - (vi) Precautions and measures shall be taken and adopted in the installation of the ENE to ensure that the g-forces and vibration encountered by the Vessel travelling at high speed in rough seas will not affect the operation of the ENE; and
  - (vii) The installation in the external environment shall withstand the conditions stated in Paragraph 7.2.6(a)(i) of this Part VII.

- (g) Adequate measures to prevent interference between the ENE shall also be provided, which for receiving apparatus and other ENE that may be affected by frequency induced voltage shall include being earthed, screened and protected efficiently according to the rules, regulations and recommended practices regarding screening of electric wiring;
- (h) All precautions and provisions shall be taken and made to minimise the effect of sea spray and exposure to weather on the console panels, equipment controls and display units and, to protect the Equipment in such conditions. Suitable weather protection covers, which do not obstruct users from operating the equipment, shall be provided as necessary; and
- (i) All the equipment cables shall be covered properly so that they will not be destroyed or loosened by people and water.

#### 7.2.9. Cable Laying

- (a) General Cable Requirements:
  - (i) All cables shall be rated and sized properly;
  - (ii) The signal cables shall be screened properly to reduce the cross-talk level as necessary; and
  - (iii) All feeder cables shall be of one length, without joints, from antennae to the Equipment and from equipment to equipment, unless such joints are necessary under the specific installation conditions encountered or for ease of maintenance. All joints if provided shall be reliable and durable.
- (b) Cables shall be laid in concealed cable trunks and trays inside consoles or other compartments or under the deck unless approved otherwise by the GNC and COMMS, with due consideration given to the ease of maintenance of the Vessel as a whole. Solutions adopted shall not pose occupational safety and health risks such as tripping, snagging or impact hazards to the Vessel's crew during operations.
- (c) Watertight rubber grommets, insulated bushes or cable glands shall be used to protect the cables when passing through the metal covers of distribution boards, boxes, or any other metal work or exposed structure.
- (d) The Contractor shall be responsible for the supply, installation and inter-connection of all cables and all related installation materials within the system, as well as the final connection between the power supply and the ENE.
- (e) Wires and cables shall be as short as practicable with sufficient slack:
  - (i) To enable parts to be removed and replaced during servicing without disconnecting other parts;
  - (ii) To facilitate field repair of broken or cut wires; and
  - (iii) To facilitate movement of the Equipment for maintenance purposes.
- (f) All wiring terminations shall be finished in a neat and approved manner and shall be identified separately by a unique identification wiring code number.

#### 7.2.10. Labelling and Marking

- (a) All ENE supplied shall carry the name, trademark or other means of identifying the manufacturer;
- (b) Major ENE units and sub-units shall carry a permanent label with serial numbers for identification purposes;
- (c) All panels, ENE sub-assemblies and internal and external cables shall be marked or labelled clearly with their own unique identification codes in English, in a permanent manner, so as to identify each individual function. Such labels shall be recorded and organised properly in a document and handed over to COMMS through GNC prior to Delivery Acceptance;
- (d) All switches, connectors, jacks or receptacles shall be marked clearly, logically and permanently during installation. All wires and cables shall be identified at every termination and connection point with permanent type markers; and

- (e) The DC circuit-breakers controlling the Equipment shall be labelled clearly.

#### 7.2.11. Acceptance Test

- (a) The acceptance tests for the ENE shall consist of three (3) parts: bench tests, Factory Acceptance Trials (“FAT”) and on-site commissioning tests as follows:
- (i) Upon the request of the Government, ENE bench tests shall be performed to demonstrate their technical compliance with the published specifications. The bench test, if not carried out in the HKSAR in the presence of COMMS representatives, may be accepted in the form of a test report from the original equipment manufacturers certifying that the tests have been conducted and passed satisfactorily before the Equipment left the factory;
  - (ii) The Contractor shall carry out the FAT in the presence of GNC and COMMS representatives to demonstrate that each ENE item individually and that all ENE as a whole were installed and implemented properly. If the Vessel is not constructed in the HKSAR, the Equipment FAT shall be conducted at the manufacturer’s shipyard before the shipping of the Vessel to the HKSAR in accordance with the procedures specified at Paragraph 1.8.2(d) of Part VII;
  - (iii) The on-site commissioning tests shall be carried out by the Contractor as part of the Technical Acceptance in the presence of GNC and COMMS officers after completion of installation of all ENE. This includes any additional Operational Systems provided to the Contractor by the HKPF for installation as specified in Paragraph 7.8 of this Part VII; and
  - (iv) The on-site commissioning tests shall include an inventory check, an NIR hazard test, ENE installation inspection and thorough technical, functional and integration tests of individual ENE items and all ENE together as a whole and, a sea trial, to verify that the ENE has been commissioned properly and is ready to be put into service on the Vessel.
- (b) The Contractor shall ensure and demonstrate, as part of the on-site commissioning tests, that the electrical and magnetic fields as well as the power density radiated from all installed ENE do not expose occupational personnel and members of the general public to radiation in excess of the limits contained in the ICNIRP Guidelines specified in Paragraph 7.2.3 of this Part VII. Prior to the issuance of the Acceptance Certificate (qualified or unqualified), the Contractor shall provide a full written report stating that the installation of the ENE complies with the stated NIR safety standards; and
- (c) At least two (2) months prior to the bench tests, the FAT and the on-site commissioning tests, the Contractor shall submit details of the schedules and test procedures of all ENE for COMMS approval. Once all of the test procedures have been established and agreed by the HKPF, these shall be followed during the relevant tests. Any delay in the submission of these procedures may lead to a corresponding delay in their agreement and, hence, in the commissioning of the Equipment for which the Contractor will assume the financial liability.

#### 7.2.12. Documentation

- (a) At least six (6) weeks prior to Delivery Acceptance, for each individual item of Equipment, the Contractor shall supply to COMMS, through GNC, three (3) paper copies of the operational manuals and maintenance manuals in English (at least one (1) original) and two (2) soft copies in USB or equivalent device. For the avoidance of doubt, these three (3) sets of operation and maintenance manuals are in addition to those required as part of the documentation for each Vessel set out in Paragraph 8.2.2(g) of this Part VII. The manuals shall provide the information listed below:
- (i) Description of the principle of operation;
  - (ii) Details of installation and setting up procedures;
  - (iii) Maintenance instructions including mechanical assembling and disassembling procedures;
  - (iv) Schematic diagrams and block diagrams with their respective descriptions; and
  - (v) Fault finding and calibration procedures.
- (b) Drawings showing the proposed design of conduit / trunking routes for the Equipment installed onboard, including future maintenance considerations shall be submitted to GNC and COMMS for approval before installation.

- (c) At Delivery Acceptance, the Contractor shall supply:
  - (i) Operational manuals and maintenance manuals specified in Paragraph 7.2.12(a) of this Part VII (to have been supplied at least six (6) weeks prior to Delivery Acceptance);
  - (ii) Properly organised individual Equipment testing results including details of test and calibration procedures;
  - (iii) On-site commissioning and sea trial reports of all Equipment as witnessed by COMMS;
  - (iv) The initial parameter settings and readings of all Equipment at the time of the on-site commissioning;
  - (v) "As installed" drawings showing the positions of all individual items of the Equipment installed and the routing of the interconnecting cables between equipment;
  - (vi) A block diagram showing the interconnections between all equipment units complete with their technical protocols and the wiring schedule;
  - (vii) "As fitted" diagram showing the locations and positions of all circuit-breakers controlling the power to the Equipment; and
  - (viii) The completed NIR Report as required by Paragraph 7.2.11(b) of this Part VII.
- (d) The documents specified at Paragraphs 7.2.12(a) to (c) of this Part VII and the training materials specified in Paragraph 9.1.5 of this Part VII shall be supplied in both paper copy and in soft copies in USB or equivalent device; and
- (e) The Contractor shall not use confidentiality as a reason for withholding the supply of relevant documentation as required by the GNC and HKPF.

#### 7.2.13. Electronic Components / Spares Parts / Spare Units / Maintenance

The Contractor shall commit to provide spare parts for the Equipment for a period not less than five (5) years from the date of the successful commissioning of the last Vessel.

#### 7.2.14. Warranty Services

- (a) The Contractor shall provide a one (1) year free Warranty Period without any qualification for all ENE with effect from the date that the unqualified Acceptance Certificate in respect of that Vessel was issued;
- (b) The Contractor shall rectify any fault in accordance with the requirements as specified in Annex 1 Paragraph 1.7 of this Part VII. The Contractor shall extend the Warranty Period for any item of ENE which has broken down and required repair for a period equal to the period between the date of breakdown and the resumption of operation and service;
- (c) The Contractor shall keep sufficient spare parts for the ENE in Hong Kong with no extra cost to Government for fulfilling the warranty services requirement as specified in Paragraph 7.2.14(b) of this Part VII;
- (d) The Contractor shall provide and install sea chart update service when the updates version of the sea charts is released; and
- (e) The Contractor shall indemnify the Government in respect of any damages to all the HKPF equipment as specified in Paragraph 7.8 of this Part VII if the damages were caused by defects or malfunctions of the Vessel or its equipment onboard. Paragraph 1.4 of Annex 1 of this Part VII shall also apply to all HKPF equipment as specified in Paragraph 7.8 of this Part VII.

### 7.3. Electronic Navigational Equipment Specifications

#### 7.3.1. Integrated multi-functional display unit incorporating radar, secure AIS, satellite compass and electronic chart system information

- (a) The radar shall be used as the primary radar and shall have a minimum specification equal to Simrad HALO24. Its operational range shall be equal to or better than 0.125 to 36 nautical miles (minimum). It shall be a frequency modulated continuous wave solid state X-band radar.
- (b) The radar shall provide a clear display even with severe sea and rain clutter at all ranges without missing small, elusive targets.

- (c) The radar images shall remain at a constant brightness during each Point Position Indicator (“PPI”) sweep.
- (d) The radar shall be fitted with an auto-track function which provides acquisition and tracking of at least six targets in a way similar to Automatic Radar Plotting Aid (“ARPA”). The radar shall provide data on any chosen target. Such ARPA-like auto-track function shall support CPA and TCPA features for the tracked targets.
- (e) The radar shall be suitable for use on a high-speed vessel with a maximum rotational frequency of 60rpm or above.
- (f) The other information shall communicate with the “MARSAS” with the data network equipment.
- (g) The display unit shall incorporate control keys and processor equipment to integrate, control, operate and display all radar, AIS and chart plotter functions. The electronic chart system shall support both the connection to and being accessed remotely from the Government router through an Ethernet interface.
- (h) The radar shall have at least the following operational controls/features:
  - (i) Operator selection of north up, head up, course up;
  - (ii) True Motion (“TM”) and Relative Motion (“RM”) modes;
  - (iii) At least three (3) different brightness levels;
  - (iv) Information displaying Vessel’s own latitude/longitude, position and speed;
  - (v) Trails;
  - (vi) Fixed and variable range ring;
  - (vii) Variable Range Marker (“VRM”);
  - (viii) Electronic Range and Bearing Line (“ERBL”);
  - (ix) Manual rain and sea clutter suppression;
  - (x) Gain control;
  - (xi) Auto-clutter sea control;
  - (xii) Range up;
  - (xiii) Range down;
  - (xiv) Vectors;
  - (xv) Centre picture;
  - (xvi) Acknowledge alarm; and
  - (xvii) Panel brilliance.
- (i) The integrated Multi-Functional Display (“MFD”) unit shall comprise a at least 15-inch flush-mounted Liquid Crystal Display (“LCD”) colour display of a type suitable for use on an open deck vessel, with performance to be equivalent to or greater than Simrad - NSS16 evo3S. The display unit shall provide a clear and clutter free picture in all weather conditions and be suitable for viewing in direct sunlight without the need for a viewing hood or the like. The display shall indicate clearly the important parameters such as radar targets, range marker, bearing line, heading marker and range rings.
- (j) The radar transceiver will be a low radiation emission broadband type and shall be housed in a marine type radome antenna/scanner unit. It shall be designed for mounting aloft and be capable of operating satisfactorily when subjected to the g-forces, vibration and high relative wind speeds of not less than 100 knots encountered when the Vessel is operating at high speeds in the maritime environment.
- (k) The antenna/scanner shall, as far as practicable, be installed well clear of any obstruction to minimise undue interference and NIR hazards.
- (l) The radar shall be aligned with the heading of the Vessel.



- (m) The Contractor shall ensure at the design stage that unnecessary radar blind zones are not created. The Contractor shall, in particular, ensure that equipment installed before the radar scanner such as navigation lights, floodlights, horn speakers and the like do not obstruct the radar scanner's emissions if at all possible. Where such obstruction is unavoidable it shall be discussed with the HKPF at the kick-off meeting and mock up meeting post Tender award. If such obstruction becomes apparent after installation, the Contractor shall rectify it.
- (n) The radar shall have NMEA 0183 and NMEA 2000 interface ports capable of accepting navigational data from a wide selection of D/GNSS receivers and satellite compasses, and of providing comprehensive data on all tracked targets in the form of a track table to a wide selection of electronic chartplotters.
- (o) 10 Hz GPS/GLONASS-WAAS, EGNOS, SBAS antenna (integrated).
- (p) The radar performance to be equivalent to or greater than Simrad Halo24:
  - (i) Reference: Magnetic and True North
  - (ii) Warm-up Time: Instant on
  - (iii) Distance Accuracy: <1% of the range
  - (iv) Bearing Accuracy: <1°
  - (v) Operational Maximum Wind Speed: At least 100 knots
  - (vi) Scanner Size: ≥24 inches nominal
  - (vii) Scanner Rotation: 60 rpm or greater rotation speed
  - (viii) Beam Width H/V: < 3.9°/22°
  - (ix) Max/min range, scale: 48 nautical miles / 100 metres
  - (x) Transceiver Output Power: At least 25W with 0.04-60 µs pulse
  - (xi) Integrated MFD: 15-inch or above LCD touchscreen colour display;  
Resolution 1280 x 800 pixels or better;  
Brightness of 1200 cd/m<sup>2</sup> or greater.
  - (xii) Operating Temperatures: Better than -5°C to +55°C for the antenna/scanner unit;  
Better than -5°C to +45°C for the display unit.
  - (xiii) Waterproofing: Radome antenna: IPX6;  
Display unit: IPX6
- (q) The integrated MFD shall incorporate control keys and processor equipment to integrate, control, operate and display data of radar, secure AIS, satellite compass and chartplotter functions.
- (r) The crew operator shall be able to select the following modes of presentation at the integrated MFD:
  - (i) Radar image only;
  - (ii) Plotter image only; and
  - (iii) Plotter image overlaid with radar image.
- (s) The radar system's in-built chartplotter shall support the following functions:
  - (i) Operator selectable North Up or Course Up presentation;
  - (ii) Operator selectable TM or RM presentation;
  - (iii) Waypoints and routes;

- (iv) Seamless and smooth zoom in and zoom out;
  - (v) Seamless and smooth chart panning;
  - (vi) Layers of chart details;
  - (vii) Monitor own vessel position and heading;
  - (viii) View information of charted objects;
  - (ix) Own vessel vector;
  - (x) Man-Over-Board (“MOB”);
  - (xi) Provide detailed navigational sea charts covering the entirety of Hong Kong Waters and future updates into a format readable by the chartplotter; and
  - (xii) The sea chart can be updated using the chart card with the sea chart update file.
- (t) The radar system shall be interconnected with the D/GNSS and satellite compass so that real-time data from these three (3) systems shall be available at adequate data update rates to support the smooth and seamless operation of the radar system’s various functions (including its in-built chartplotter functions). The satellite compass’ connection to the radar shall have a data update rate of at least ten (10) times per second.
  - (u) The system at the integrated MFD shall be able to display the own vessel’s heading (in degrees north) and position (in latitude and longitude).
  - (v) The radar radome antenna/scanner unit shall comply with relevant requirements of the European Parliament and Council Directive 1999/5/EC and IEC 60945:2002.
  - (w) The integrated MFD shall comply with relevant requirements of the IEC 60945:2002 Damp heat 66°C at 95% relative humidity.
  - (x) The radar shall be capable of providing external (land-based) radar extractors and trackers with information which as a minimum includes, but is not limited to, analogue video signal, trigger, azimuth count pulse and azimuth reset pulse through the Government data network. COMMS will provide the Contractor with a full list of the information which the radar shall be required to provide.
  - (y) The IP address of the radar and other units shall be set by setting the IP address directly on the equipment or using Dynamic Host Configuration Protocol (“DHCP”).
  - (z) The radar shall provide with interface for controlling and retrieving radar information using an external software with the following requirements:
    - (i) Turn on and off the radar units;
    - (ii) Turn on and off the transmission of the radar;
    - (iii) Setting the gain of the radar;
    - (iv) Setting the range of the radar;
    - (v) Setting the sea clutter of the radar;
    - (vi) Setting the rain clutter of the radar; and
    - (vii) Setting the interference level of the radar.

#### 7.3.2. Satellite Compass

- (a) The Contractor shall supply and install one (1) satellite compass set. The installation location of satellite compass shall submit to HKPF for approval during mock up meeting before installation.
- (b) The satellite compass data shall be displayed in integrated MFD.
- (c) The sensor unit shall incorporate two (2) or more satellite receivers from at least two (2) types of satellite positioning system.
- (d) The satellite compass shall incorporate integrated 3-axis rate gyro and acceleration sensors to deliver fast start-up times and provide heading updates even during temporary loss of satellite signals (i.e. during navigation under bridges).
- (e) The satellite compass shall support GPS, GLONASS, BeiDou, Galileo and QZSS for pinpoint global positing and heading accuracy.

- (f) The maximum heading update rate for ARPA targets shall be 20 Hz for ARPA targets as specified in Paragraph 7.3.1 of this Part VII.
- (g) The satellite compass shall provide the GPS source for the GMDSS function used by the fixed IMM VHF radio specified at Paragraph 7.4 of this Part VII.
- (h) Satellite compass performance shall be equivalent to or greater than Simrad HS 75:
  - (i) Reference: Either Magnetic North or True North
  - (ii) Warm-up Time: Less than one second
  - (iii) Accuracy: +1.0° typical
  - (iv) Resolution: 0.1°
  - (v) Deviation Compensation: Automatic
  - (vi) Operating Temperatures: Sensor unit: 0°C to 50°C;  
Display unit: 0°C to 55°C
  - (vii) Waterproofing: Sensor unit: IPX5, Display unit: IPX6

7.3.3. Differential Global Navigation Satellite System (“D/GNSS”) integrated with Radar/ D/GNSS and Electronic Chart System

- (a) The Contractor shall supply and install a D/GNSS which fulfils the following general requirements:
  - (i) The D/GNSS shall support at least GPS and GLONASS;
  - (ii) The D/GNSS shall consist of a GPS receiver integrated with the GPS antenna and be suitable for mounting in the open air;
  - (iii) The D/GNSS antenna/receiver shall be connected to the radar for the provision of GPS related data, such as position fix, time, speed over ground and course over ground;
  - (iv) The D/GNSS shall be fully compatible with the radar;
  - (v) The D/GNSS shall support Serial NMEA 0183, Serial 26-pin D-sub, Serial 9-wire RS232, Serial 3-wire RS232 and Ethernet (NMEA 2000);
  - (vi) The D/GNSS shall support at least the following data displayed either at the D/GNSS display unit or the radar display;
    - (vii) Position (latitude/longitude): to at least four (4) decimal points;
    - (viii) Horizontal Position accuracy (at speed of 15kt): less than or equal to 10m;
    - (ix) Course: 1° resolution;
    - (x) Speed: 0.1 knot or 0.1 km/hour resolutions with at least three (3) digits;
    - (xi) Date and time: selectable as GMT or local mode; and
    - (xii) Satellite status information.
- (b) The D/GNSS’s antenna/receiver shall fulfil the following technical requirements:
  - (i) Receiver Type: 8 or more channel parallel receiver;
  - (ii) Receiving Frequency and Code: 1,575.42 MHz (C/A code);
  - (iii) Position Accuracy: Within + or - 30 metres rms or better 95% of the time;
  - (iv) Warm Start Time: Less than 30 seconds;
  - (v) Ambient temperature: 0°C to 55°C or better;
  - (vi) Waterproofing: IPX7 or better; and
  - (vii) Correction: IALA compliant Beacon RTCM SC-104.

#### 7.3.4. Public Address (“PA”) / Siren, Loudhailer / External Broadcasting System

- (a) The PA / siren, loudhailer / external broadcasting system shall be an off-the-shelf product and no customization shall be required;
- (b) The system shall function as a siren and powerful loud hailing system designed especially for hailing and alerting other craft in the marine environment. It shall consist of a master control unit, a control panel, a fist microphone, amplifier, horn type loudspeaker(s) and related components and accessories;
- (c) In manual mode, the system shall be capable of generating both a "yelp" siren and a horn sound signal. In automatic mode, the system shall have a selection of at least six (6) warning signal sounds for general marine navigational use;
- (d) The system shall be fully integrated with the Vessel’s digital intercommunications system so that the crew may use it whilst wearing their helmets;
- (e) The master control unit shall be recessed into the console with the user control panel flush-mounted on the console. The user control panel shall incorporate "Power ON / OFF", "Hail Volume Control" and "Function Control";
- (f) The system shall be provided with a waterproof connector to enable a digital multimedia device to be attached to facilitate the transmission of pre-recorded messages;
- (g) Verbal messages shall be broadcast through a fist microphone mounted on the console;
- (h) The loudspeakers shall have an impedance which shall match the amplifier;
- (i) The loudspeakers shall have an acoustic power of at least 135dB, operate over a narrow beam (less than 35 degrees) and be safe for the crew and passengers to use;
- (j) The system shall be waterproofed to IPX5 standard or better;
- (k) The loudspeakers shall be equipped with a volume control system with which the volume can be adjusted to a minimum for night time operations and to a maximum level which will enable messages to be heard at least 0.2 km away;
- (l) The positions of all the system's main components shall be discussed at the kick-off meeting; and
- (m) The PA shall be integrated with the Intercommunication System.

#### 7.4. International Maritime Mobile (“IMM”) VHF Radio

7.4.1. The Contractor shall supply one (1) IMM VHF fixed radio per Vessel, details of which shall be discussed at kick-off meeting. It shall be:

- (a) An off-the-shelf product for marine application and have Type Approval from The Office of the Communications Authority (“OFCA”);
- (b) In compliance with relevant requirements of the European Parliament and Council Directive 1999/5/EC;
- (c) Fully compatible with the GMDSS;
- (d) Equipped with the full range of IMM VHF voice channels, all of which shall be selectable;
- (e) Delivered complete with all components, features and functions necessary for full functionality;
- (f) Capable of operating in temperatures ranging from -5°C to +55°C and be protected to IPX7 or better;
- (g) The microphone for the fixed VHF radio shall be IPX7 submersible rating and a remote-control microphone which is capable of providing total control of all communications;

(h) Specific Features and Requirements:

- (i) Power ON / OFF;
- (ii) "Transmit" indicator, volume and squelch controls;
- (iii) Channel number indicator;
- (iv) Quick selection of Channel 16 (156.8 MHz);
- (v) Dual watch and triple watch on Channel 16 and selected channel(s);
- (vi) Channel scanning between Channel 16 and selected channels; and
- (vii) The spacing between the channels shall be 25 kHz or better.

7.4.2. Transmitter

The performance shall be:

- (a) Frequency Range: 156.025 MHz to 157.425 MHz, or better.
- (b) Frequency Deviation: Frequency modulation with maximum frequency deviation of +5 kHz.
- (c) Spurious Emission: -60 dB or better.
- (d) RF Output Power: Transmission power selector for: (a) High at twenty five (25) watts nominal and (b) Low at one (1) watt nominal, or better.

7.4.3. Receiver

The performance shall be:

- (a) Frequency Range: 156.050 MHz to 162.000 MHz or better.
- (b) Sensitivity: Less than 1 $\mu$ V for 20dB SINAD.
- (c) Inter-modulation Rejection: 65 dB or better.
- (d) Adjacent Channel Selectivity: 65 dB or better.
- (e) Squelch: Adjustable squelch control.
- (f) Spurious Rejection: 65 dB or better.
- (g) Audio Output Distortion: At least 0.2 watt at rated output with less than 10%.

7.4.4. The Contractor shall supply and install a VHF antenna with surge arrestor connecting to the lightning ground of the Vessel, and connect to the VHF radio.

7.4.5. The installation location of the VHF radio control shall be easily accessible for the officer to switch communication channel.

## 7.5. Government Data Network

7.5.1. The Government data network consists of Government Mobile Data Equipment and Antennae that shall include the following equipment:

- (a) Encryption mobile router;
- (b) Antennae; and
- (c) Ethernet switch(es).

7.5.2. The encryption mobile router shall meet the following specifications:

- (a) Wide Area Network ("WAN") Interface:
  - (i) 1 x Embedded 5G Modem with Multi-input Multi-output ("MIMO") antennae. (5G SA (standalone) mode with band: 1, 28, 78 and 79);
  - (ii) 1 x Embedded 4G Frequency Division – Long Term Evolution (FD-LTE) Modem with MIMO antennae. (FD-LTE Band: 2, 4, 5, 14, 17 and 27);

- (iii) 1 x Embedded 4G Time Division – Long Term Evolution (TD-LTE) Modem with MIMO antennae. (TD-LTE Band: 38, 39, 40 and 41);
  - (iv) 1 x Embedded 4G Time Division – Long Term Evolution (TD-LTE) Modem with MIMO antennae. (TD-LTE with operating frequency band between 1.785 GHz to 1.805GHz);
  - (v) 1 x 10/100BaseTX Gigabit Ethernet; and
  - (vi) 1 x 802.11a/b/g/n WAN interface with MIMO antennae.
- (b) Ethernet interface:
- (i) 8 x 10/100BaseTX Fixed port with Power over Ethernet capabilities compliance with Institute of Electrical and Electronics Engineers (“IEEE”) 802.3at class 4 standard; and
  - (ii) 1 x 802.11a/b/g/n interface with MIMO antennae.
- (c) Requirement:
- (i) Load Balancing;
  - (ii) IPv4 and IPv6 support;
  - (iii) USB LTE/3G Modem support (3G Band: 1, 2, 4, 5 and 8);
  - (iv) WAN / Mobile Bandwidth Bonding which is compatible with Multi-Wan Bonding router;
  - (v) IPsec VPN;
  - (vi) 256-bit AES Encryption;
  - (vii) PPTP VPN Server;
  - (viii) QoS for VoIP; and
  - (ix) Speed Fusion connections to existing HKPF router (Peplink380).
- (d) Environment:
- (i) The mobile router specified at Paragraph 7.5.1(a) above shall be contained within a housing protected to IP67 and securely locked to the Vessel. The whole housing shall be easily detachable for maintenance purpose;
  - (ii) Operation temperature at least between -20°C and +65°C; and
  - (iii) Humidity: 15% – 95% (non-condensing).
- 7.5.3. The Contractor shall provide the six (6) pairs of weatherproof, 5G ready, MIMO antennae specified in Paragraphs 7.5.2(a) and 7.5.2(b) above. The MIMO antenna and feeder cables shall also support the 5G frequency band.
- 7.5.4. The Vessel’s electronic equipment including the radar/ D/GNSS and electronic chart system specified at Paragraph 7.3 above and/or other systems shall be connected to the Government data network by means of the encryption mobile router specified at Paragraph 7.5.1(a) above.

7.5.5. The encryption mobile router and the associated equipment shall be housed in an IPx7 cabinet and mounted in a mounting frame with shock-absorbing cushions for securely mounting the device onto the Vessel. The device installation location shall be easy to access, and the mounting design of the device means it shall be easy to conduct maintenance work and remove the device. The Contractor shall provide one (1) Ethernet switch port to the console specified at Paragraph 3.4.3 of this Part VII. It shall be connected by IP67 protected plugs, jacks and cables. If, owing to the requirement to connect the Vessel's electronic systems to the Government data network specified at Paragraph 7.5.4 above, the number of Ethernet connections to the system exceeds the eight (8) Ethernet interface connections available as specified at Paragraph 7.5.2(a) above, the Contractor shall provide additional waterproof Ethernet switches as specified at Paragraph 7.5.1(c) above to meet the requirement.

## **7.6. Secure Automatic Identification System ("S-AIS")**

7.6.1. The S-AIS shall comply with SOLAS Class A and it shall include transponder, onboard AIS display, VHF antenna, GNSS antenna, secure mode switch for Police Vessels which shall operate with AIS Base Stations in the hilltops as normal AIS and secure AIS via the global maritime AIS channels and/or a third VHF frequency carrier in the range of 156-163 MHz to automatically transmit and receive AIS messages including but not limited to ship name, Maritime Mobile Service Identity ("MMSI"), call sign, dimensions, position and other sensor information as selected by secure mode switch.

7.6.2. The Contractor shall supply one (1) set of S-AIS transponder to be installed on the Vessel.

7.6.3. The S-AIS shall be fully Class A type approved secure AIS transponder. The version of the secure AIS shall allow to export to Hong Kong.

7.6.4. The S-AIS shall support cipher Data Encryption Standard ("DES"), Advanced Encryption Standard ("AES") and support cipher keys:

- (a) up to 128-bit or above time limited keys;
- (b) manual keys input;
- (c) imported from portable USB memory; and
- (d) external application input.

7.6.5. The S-AIS shall be equipped with internal GPS receiver and BeiDou receiver for time synchronisation and be connected to the GPS system and Satellite Compass.

7.6.6. Each S-AIS shall be supplied with one (1) VHF Antenna:

- (a) Frequency: 149-162.5MHz;
- (b) VSWR: 1.5:1;
- (c) Polarization: Vertical;
- (d) Max Power: 100W;
- (e) Impedance: 50 ohms; and
- (f) Surge arrestor connecting to the lightning ground of the Vessel.

7.6.7. Each S-AIS shall be provided with one (1) combined VHF / GNSS antenna dedicated for the secure AIS equipment. The Contractor shall provide and install suitable co-axial cable surge suppressors for the VHF and GNSS antennae to protect the secure AIS equipment from lightning surges.

7.6.8. The VHF antenna, GNSS antenna and Combined VHF / GNSS antenna shall fulfil the following requirements:

- (a) VHF band Frequency: 156.0 - 162.5 MHz;
- (b) GPS band Frequency: 1575.42 MHz;

- (c) BeiDou band Frequency: 1561.098MHz;
- (d) VHF band VSWR: <1.5:1; and
- (e) Nominal impedance: 50 ohms.

7.6.9. The S-AIS shall be able to select, operate and display in at least three (3) modes of operations including but not limited to:

- (a) Normal mode - function as a normal SOLAS Class A AIS broadcasting and receiving without encryption;
- (b) Secure mode - only encrypted AIS data will be broadcast, both encrypted and non-encrypted AIS messages will be received; and
- (c) Passive mode - no AIS will be broadcast, both encrypted and non-encrypted AIS messages will be received.

7.6.10. The S-AIS shall equip a display unit for showing the S-AIS information and S-AIS equipment configuration. The S-AIS information shall also be able to display in integrated MFD as specified in Paragraph 7.3.1(i) of this Part VII.

7.6.11. The Contractor shall provide and install an external secure mode switch on the console, which shall meet IP rating of 65 as defined in IEC 60529 to enable the officer to change the operational modes as specified in Paragraph 7.6.9 of this Part VII.

## **7.7. Intercommunication (“IC”) System**

7.7.1. The Contractor shall supply and install a robust IP-based digital IC voice communication and data distribution system (such as SAVOX ImP system or equivalent) with an Ethernet backbone of at least 100Mb designed for use on open deck powerboats being used as specified in Paragraph 1.2.1 of this Part VII.

7.7.2. The IC system shall be compliant with the CE Electrical and Mil Std 461 EMC and Mil Std 810E standards in the version as at the Contract Date.

7.7.3. The IC system shall provide the Vessel’s crew with a modular and expandable platform on which they can communicate with each other within their own Vessel via IC and with others elsewhere via radio, and mobile telephone networks and the Government data network.

7.7.4. The IC system shall also be capable of integrating with the radar or other data systems so that the vessel operators may receive audio notification alarms as required. The IC system shall also be capable of receiving both remote voice communications and remote digital system configuration, and programming instructions via the Government data network.

7.7.5. The IC system shall consist of a number of main equipment units forming an Ethernet network in ring topology. When any one of the Ethernet network paths or main equipment units fails, the IC system shall re-route to use an unaffected path.

7.7.6. One of the main equipment units of the IC system shall be powered by the Vessel's DC supply and then distribute power to the other main equipment and associated equipment of the IC system via the Ethernet network.

7.7.7. The main equipment of the IC system shall be equipped with interface modules that include Ethernet Backbone Interface Units (“EBIUs”), the Radio Interface Units (“RIUs”) and Audio Gear Interface Units (“AIUs”).

7.7.8. The EBIU shall:

- (a) Form an Ethernet network on the Vessel;
- (b) Be connected to three (3) radio transceivers, including one (1) unit of HKPF Marine Radio Communications System as specified in Paragraph 7.8.1(a) of this Part VII, one (1) unit of International Maritime Mobile VHF radio as specified in Paragraph 7.4.1 of the Part VII and one (1) HKPF 3G / LTE mobile telephone;



- (c) Be connected to the Vessel's radar, navigation and engine notification alarms if these equipment alarm interfaces are available;
- (d) Be connected to the Vessel's PA system as specified at Paragraph 7.3.3 of this Part VII; and
- (e) Be capable of routing system software configurations to each AIU, RIU, and Personal Communications Units ("PCUs") / Fixed Communications Units ("FCUs") as appropriate.

7.7.9. The RIUs shall be:

- (a) Fixed nodes, the purpose of which shall be to integrate onboard radio systems as specified in Paragraph 7.7.8(b) of this Part VII;
- (b) Able to form individual communication channels within fixed nodes into groups by the operators as specified in Paragraph 7.7.9(a) of this Part VII; and
- (c) Connected to the Vessel's D.C. power supply and the AIUs via the Ethernet network.

7.7.10. The AIUs shall:

- (a) Be fixed nodes connected to the Ethernet network as specified in Paragraph 7.7.5 of this Part VII and which, together, form the basic infrastructure of the IC system;
- (b) Integrate the operator(s) with the IC system via extension cables;
- (c) Connect to the PCUs / FCUs via waterproof plugs and sockets;
- (d) Receive and distribute voice communications; and
- (e) Have a full duplex intercom capability.

7.7.11. The main equipment forming the IC system shall connect to PCUs / FCUs. The PCUs / FCUs shall:

- (a) Be the operator's primary gateway to connect to both the operators' audio head gear and the main equipment as specified in Paragraph 7.7.7 of this Part VII;
- (b) Be installed in designated crew locations to be discussed at the kick-off meeting;
- (c) Incorporate a voice-prompted menu selection control, a PTT for the intercom system and PTTs for at least two (2) assigned radios;
- (d) Enable the operator to select whether to mute the communications systems or to transmit on the IC system using PTT, VOX or live microphone; and
- (e) Be protected to IP67 standard.

7.7.12. For each Vessel delivered under this Contract, the Contractor shall supply:

- (a) Sufficient channels from RIUs for the devices listed at Paragraph 7.7.8(b) of this Part VII and other systems as provided for in this Technical Specifications;
- (b) Sufficient AIUs with plug-in points for two (2) crew locations as specified in Paragraph 7.7.10 of this Part VII;
- (c) Two (2) PCUs / FCUs including cables as specified in Paragraph 7.7.11 of this Part VII. The use of PCUs / FCUs will be decided by the HKPF at the kick-off meeting. The corresponding cost shall be included in the Total Purchase Price in Schedule 1 of Part V, which shall not depend on the decision at kick-off meeting;
- (d) Two (2) waterproof connection cables to be capable of connecting to the HKPF's existing Safety Helmet audio headgear (details to be provided at the kick-off meeting) with the PCU / FCU; and
- (e) All other components required that have not specified in this Technical Specifications to enable the IC system to operate.

7.7.13. The system administrator shall be able to configure the IC system by laptop computer on site in the Vessel to permit or deny individual operators, or groups of operators to listen to or transmit on any of the communications to which the IC system is capable of being connected.

- 7.7.14. The Contractor shall, in respect of all of the Vessels delivered under this Contract, supply two (2) sets of laptop computers including system administrator software and Symantec Endpoint Protection software and their perpetual software and virus definition update licenses with which the IC system can be configured, programmed and troubleshot.
- 7.7.15. The IC system shall be suitable for continuous operation in the Hong Kong climate and maritime environment throughout its life span in accordance with the specifications in this Chapter. It shall be:
- (a) Capable of operation in temperatures ranging from -5°C to 50°C;
  - (b) Capable of withstanding the knocks and jolts likely to occur during repair work or rough handling on a workbench; and
  - (c) Protected to IP67 standard or be enclosed in an IP67 watertight box.
- 7.7.16. Three (3) remote press-to-talk (“PTT”) buttons connected to the IC system shall be provided at the locations of (i) starboard side of the primary console; (ii) port side of the secondary console; & (iii) starboard side of the secondary console respectively. Detailed locations of the PTT buttons shall be discussed and approved by GNC & HKPF during the kick-off meeting.

## **7.8. Installation / Space / Cabling for the Existing HKPF Equipment**

- 7.8.1. The Contractor shall, at no extra cost to the Government, install onto each Vessel the following equipment (“EQ-HKPF”), which shall be provided by the HKPF, and supply and install the associated accessories and cables for EQ-HKPF. Details of location, space, cable, and power requirements of EQ-HKPF shall be provided at the kick-off meeting:
- (a) HKPF Marine Radio Communications System (“MRCS”) TERrestrial Trunked RAdio (“TETRA”) mobile radio. The present equipment is TETRA mobile radio with separate control panel and speaker box. The MRCS radio terminal is a wide-band version with a frequency range of 380 MHz to 430 MHz and is powered by a +12V DC nominal supply. HKPF will provide the exact model of the MRCS radio terminal, at least three months in advance of the on-site installation of the MRCS radio terminal. No additional costs associated with the installation of a radio of a different type shall be chargeable to the Government; and
  - (b) Stowage for a toughpad. The exact model of the toughpad will be provided during kick-off meeting.
- 7.8.2. The Contractor shall:
- (a) Coordinate and finalize the positions of all the radios, radar equipment and antennae systems during the detailed system design stage;
  - (b) Reserve sufficient space for the installation of the MRCS TETRA radio, including for flush mounted panels;
  - (c) Note that the MRCS radio terminal and its accessories are not intended to be mounted in a position exposed to the elements. Consequently, the Contractor shall provide suitable protection from the elements for the control panel, speaker box and microphone;
  - (d) Supply and install all RF signal, power and grounding cables and wires. COMMS will provide the specifications of all the RF cables and connectors to the Contractor;
  - (e) Supply and install all power converters and power supply terminals necessary for the MRCS TETRA Radio's installation;
  - (f) Supply and install one UHF antenna for MRCS TETRA radio a frequency range of 380 MHz to 430 MHz at a VSWR of 1.5 or less. The Contractor shall provide and install suitable co-axial cable surge suppressors to the UHF antenna to protect the radio equipment from lightning surges. The Contractor shall provide technical service in Hong Kong with no extra cost to the Government if the VSWR value does not meet 1.5 or less;

- (g) Design, rig and suitably mount the antennae to ensure EMC and avoid interference;
- (h) Fit and install the MRCS TETRA Radio in the HKSAR in the positions that were finalised during the detailed design stage, subject to any subsequent EMC-necessitated alteration;
- (i) Design and provide mounting bracket for the MRCS TETRA radio;
- (j) Provide all necessary cables, materials, labour and transportation for the equipment installation; and
- (k) Provide stowage for the tough-pad as specified in Paragraph 7.8.1(b) of this Part VII.

7.8.3. COMMS shall:

- (a) Connect up the MRCS TETRA radio using the connectors, cables and wires installed by the Contractor;
- (b) Test the VSWR of the RF cables and UHF antennae to confirm that neither exceeds 1.5; and
- (c) Commission the MRCS TETRA radio.

## **CHAPTER 8 - SERVICES SUPPORT**

### **8.1. General Philosophy**

8.1.1. In determining the appropriate design for the Vessel, all of the following factors shall be taken equally into account:

- (a) Vessel performance (e.g. engine rating, size);
- (b) Initial cost;
- (c) Recurrent cost (e.g. maintenance cost, petrol consumption, spare parts);
- (d) Reliability (frequency and time to repair breakdown);
- (e) Time interval between maintenance periods;
- (f) Time to undertake scheduled maintenance (downtime); and
- (g) All machinery and Equipment installed in the Vessel shall be serviceable locally in the HKSAR.

8.1.2. Maintainability – The Vessel shall be easy to maintain by ensuring that there shall be:

- (a) Good access to all installed items for monitoring, service and overhaul; and
- (b) Ease of access for in-situ servicing and maintenance locally in the HKSAR.

### **8.2. Information to be Provided Prior to and at Delivery Acceptance**

8.2.1. Not later than six (6) weeks prior to the Delivery Acceptance of the applicable Vessel, the Contractor shall supply inventory lists to GNC for approval. At the Delivery Acceptance of the applicable Vessel, the approved inventory lists will be used to check that all the items as stated in the inventory lists, have been delivered to GNC and in the case of the Warranty Spare Parts, have been delivered to the Contractor's local agent in a satisfactory state. The three detailed inventory lists for (i) the whole Vessel (including all bought-in machinery and electrical equipment installed on the Vessel), (ii) the Spare Parts and (iii) the Warranty Spare Parts respectively covering all discrete items down to major component and its unit level (for the Vessel) and each item of the Spare Parts and the Warranty Spare Parts (collectively "Inventory Lists") shall each include the following for each of the items that it covers:

- (a) Item number on the inventory list;
- (b) Description;
- (c) Type or model (if applicable);
- (d) Serial number(s);
- (e) Quantity;
- (f) Manufacturer;
- (g) Place of manufacturer;
- (h) Manufacturer's reference number;
- (i) Authorised agent of manufacturer in Hong Kong or the Asia Pacific Region and its contact details;
- (j) Location in Vessel;
- (k) Local agent/supplier address, telephone and facsimile numbers and email address;
- (l) The curriculum vitae of the local agent's engineers involved in providing the Warranty Services;
- (m) Order lead time;
- (n) Shelf life;
- (o) Unit cost; and

- (p) Makers part number or equivalent (if applicable).

References to “applicable Vessel” shall mean each Vessel for the Inventory List mentioned in paragraph 8.2.1(a) above; the first Vessel for each the Inventory Lists mentioned in paragraph 8.2.1(b) and (c) above.

8.2.2. At Delivery Acceptance, the Contractor shall provide GNC with the following:

- (a) Four (4) paper copies and two (2) soft copies in USBs of the approved inventory lists;
- (b) “As fitted” drawings according to Annex 6 of this Part VII;
- (c) Four (4) complete sets of paper printed “as fitted” electrical schematic, cabling, wiring and single line diagrams for electrical equipment installed onboard and conduit / trunk route diagrams with two (2) soft copies in USBs for the Vessel delivered;
- (d) Four (4) copies and two (2) soft copies in USBs (and at least one (1) original) of the manufacturers’ operation, maintenance and workshop manuals in English for all machinery and Equipment, including spares and stores, special tools and test equipment;
- (e) Four (4) paper copies and two (2) soft copies in USBs of the Contractor’s “Docking Plan”, which shall include the profile, plan and sections as per the Vessel delivered;
- (f) Four (4) paper copies and two (2) soft copies in USBs of the onboard operator’s manual (English and traditional Chinese) for the Vessel delivered covering:
  - (i) Daily user pre-start checks and operation procedures;
  - (ii) Operating details for each system; and
  - (iii) Emergency operation procedures.

(The precise format and details required shall be subject to the Government’s approval when the configuration of the Vessel and outfitting is decided.); and

- (g) One (1) set in paper format of the operational manuals and maintenance manuals in English as specified in Paragraph 7.2.12 of this Part VII for each individual item of ENE. For the avoidance of doubt, this set of operation and maintenance manuals is in addition to the sets which are required to be supplied in accordance with Paragraph 7.2.12 of this Part VII.

8.2.3. The first draft of the onboard operator’s manual (in both English and Traditional Chinese) mentioned in Paragraph 8.2.2(g) of this Part VII shall be submitted to GNC for approval not less than one (1) month before Delivery Acceptance.

8.2.4. Test Equipment and Tools for Electronics

All test equipment and tools for the Vessel’s electronic equipment shall be delivered directly to COMMS upon Delivery Acceptance of each Vessel. All items shall be documented, preserved and packed properly.

8.2.5. Photographs

The Contractor shall at Delivery Acceptance of the first Vessel provide the following:

- (a) As-Fitted Photographs
  - (i) Two (2) sets of colour prints (130 mm x 90 mm) from different aspects to give an overall picture of the various parts/areas of the Vessel; and
  - (ii) Each set of prints shall be presented in a suitable album, indexed and labelled appropriately to ensure that the position from which the picture was taken and the position of the subject in the picture are clearly identifiable.
- (b) Official Photographs
  - (i) Four (4) framed colour photographs of picture size not less than 350 mm x 270 mm and a frame size not less than 510 mm x 400 mm showing the profile of the Vessel in Hong Kong Waters;
  - (ii) Four (4) 200 mm x 150 mm colour photographs showing the profile of the Vessel in Hong Kong Waters; and

- (iii) Four (4) 150 mm x 100 mm colour photographs showing the profile of the Vessel in Hong Kong Waters.
- (c) Softcopy of Photographs
  - (i) All of the photographs specified at Paragraphs 8.2.5(a) and (b) of this Part VII shall be taken using a digital camera with a resolution of at least 12 megapixels and be forwarded to the HKPF on an USB in RAW and JPEG formats at Delivery Acceptance.

#### 8.2.6. Certificates and Reports

Copies of the following documents (one (1) original with two (2) copies and one (1) softcopy stored in USB), filed in clear folders, shall be forwarded to GNC one month before the Delivery Acceptance of each Vessel by the Contractor (“Relevant Vessel”):

- (a) Associated test certificates issued by an appropriate organization;
- (b) Class Certificate for the Relevant Vessel issued by the RO;
- (c) Test performance certificates of all Equipment (including electronics, switchboards) for the Relevant Vessel issued by the Contractor;
- (d) Outboard engine performance test certificates for the Relevant Vessel issued by the manufacturer of the outboard engine or its authorized services agents;
- (e) Complete record of the Official Sea Trial commissioning tests for the Relevant Vessel issued by the Contractor;
- (f) Warranty certificates covering Equipment of the Relevant Vessel (valid for twelve (12) months from the date of unqualified Acceptance Certificate of that Vessel) issued by the manufacturers of these Equipment;
- (g) Certificates of light and sound signalling Equipment for the Relevant Vessel issued by the manufacturers;
- (h) Builder certificate for the Relevant Vessel issued by the Contractor;
- (i) Deviation card for the compass (after adjustment in the HKSAR) for the Relevant Vessel issued by an authorized agent;
- (j) Hull construction material certificates for the Relevant Vessel issued by the RO;
- (k) A confirmation signed by the Contractor’s (or its sub-contractor’s) shipyard to confirm its undertaking (which has been submitted earlier) to provide Warranty Services in relation to all aspects of the Vessel during the Warranty Period in the HKSAR as stipulated in Annex 1 of this Part VII. The sub-contractor who will sign this shall be the same sub-contractor which has signed the sub-contractor’s undertaking upon contract award;
- (l) Asbestos free certificate or statement of compliance for the Relevant Vessel issued by one of the authorized organizations; and
- (m) Any other certificates as appropriate.

#### 8.2.7. Spare Parts and Warranty Spare Parts

- (a) In accordance with the delivery time specified in Schedule 2, the Contractor shall deliver all quantities of all items of Spare Parts in Ready for Use condition and delivered to the Government Dockyard. All these Spare Parts must have undergone all parts of the Technical Acceptance and Delivery Acceptance.
- (b) In respect of the first Vessel to be delivered, the Contractor shall deliver the Warranty Spare Parts in Ready for Use Condition to the shipyard or storage facility of the Contractor’s local agent for Delivery Acceptance by GNC and HKPF. The delivery shall be delivered together with the first Vessel as part of the Delivery Acceptance for that Vessel. All these Warranty Spare Parts must have undergone all parts of the Technical Acceptance and Delivery Acceptance before passing the same to the local agent for the Warranty Services as mentioned in paragraph 1.11 of Annex 1 to this Part.

#### 8.2.8. Ship Model

In accordance with the delivery time specified in Schedule 2, the Contractor shall provide the Government with two (2) ship models suitably scaled so that the model length overall is between 400 mm to 500 mm. The model shall include all major external fittings above and below the waterline such as the collar, console, hull-steps, skeg, appendages, propulsion system, mast, mast fittings and navigation lights, lifesaving equipment, fire-fighting equipment, bollards and cleats as agreed by the Government. The ship model and fittings shall be made to an overall exact scale standard relevant to model making.

## **CHAPTER 9 – TRAINING**

### **9.1. General**

- 9.1.1. This chapter stipulates the training requirements to be provided by the Contractor on:
- (a) Operator Training;
  - (b) Electronic Navigations Equipment (“ENE”) Maintenance Training; and
  - (c) Engineering Maintenance of the Vessel.
- 9.1.2. Each training course is to provide the participants, all of who are experienced navigation and/or engineering professionals, with the level of knowledge to undertake the role of instructor to train operational crew to operate and/or maintain the Vessel and its systems.
- 9.1.3. The Contractor shall provide both classroom-based and vessel-based training in person as specified in Paragraph 9.1.1 as appropriate before Delivery Acceptance of the first (1st) batch of Vessels to the MD in Hong Kong. All training courses shall be held in the venue to be provided by GNC in HKSAR. The training shall be conducted in Cantonese and/or English with relevant training materials in both Traditional Chinese and English supplied by the Contractor. Any engineering/operational systems upgrades that have been implemented during the construction of the second batch of Vessels shall be supplemented to and reflected in the training notes/ operator’s manual.
- 9.1.4. The training shall be delivered by the Contractor’s own qualified and experienced trainers. If any of the training instructor(s), trainer(s), and any other personnel providing the training are travelling from outside Hong Kong, all the training shall be provided by such personnel in one visit.
- 9.1.5. The Contractor shall submit copies of the Training Plan, training syllabus and training materials to the HKPF and GNC for acceptance six (6) weeks prior to Delivery Acceptance of the first (1st) batch of Vessels to the MD, which shall cover all corresponding aspects of boat handling, and onboard ENE, machinery and electrical systems. This shall include “hands on” demonstrations of the operation, daily routines and first level troubleshooting and maintenance. The training syllabus shall include details of the scope, duration and scheduling of the proposed training course and the qualifications possessed by the proposed training instructor(s).
- 9.1.6. The Contractor shall supply each trainee attending the courses specified in Paragraphs 9.2, 9.3 and 9.4 below with one (1) copy of the comprehensive training materials in the version approved the Government in both paper and USB format. The HKPF and MD shall have the right to reproduce and distribute all training materials for internal use.
- 9.1.7. The Contractor shall, upon successful completion of the entire course specified in Paragraphs 9.2, 9.3 and 9.4, issue each training course participant with a certificate as evidence of his/her attendance and the standard of competence achieved.

### **9.2. Operator Training**

- 9.2.1. The purpose of the operator training course is to provide each trainee, who will already be an experienced coxswain or ship engineer, with the knowledge and competence to operate the Vessel and the ENEs onboard the Vessel during normal routine operations, anchoring, routine cleansing, first level troubleshooting and maintenance, and emergency situations including fire-fighting and damage control. On completion of the training course, the trainees will be responsible for delivering further trainings to other HKPF officers.
- 9.2.2. The Contractor shall deliver the vessel operator’s training course according to the approved syllabus to twenty (20) HKPF operational staff.
- 9.2.3. The exact content of the training package is to be confirmed with GNC and HKPF in the kick-off meeting.



### **9.3. ENE Maintenance Training**

- 9.3.1. The purpose of the ENE maintenance training course is to provide the COMMS technical and maintenance staff with a detailed knowledge of all aspects of the design considerations, operation, interconnected system operation, fault diagnosis, routine maintenance, trouble shooting and repair or replacement procedures of the Equipment and it shall include both practical demonstrations and tests.
- 9.3.2. This course shall provide the COMMS technical and maintenance staff with sufficient expertise to enable them to effectively maintain the Equipment after the expiry of the Warranty Period.
- 9.3.3. The Contractor shall deliver the ENE maintenance training course according to the approved syllabus to fifteen (15) COMMS engineers and technicians.

### **9.4. Engineering Maintenance Training**

- 9.4.1. The purpose of the engineering maintenance training course is to provide HKPF and Government Dockyard maintenance staff with a detailed knowledge of all aspects of the design philosophy, integrated system operation, fault diagnosis, trouble shooting, routine maintenance, repair or replacement procedures of the engine/electrical distribution systems and hull structural repair, and it shall include both practical demonstrations and tests.
- 9.4.2. This course shall provide the technical and maintenance staff with sufficient expertise to enable them to effectively maintain the Vessel. On completion of the training course, the participants shall also be capable to deliver further training courses to other HKPF officers.
- 9.4.3. The Contractor shall then deliver the engine and onboard equipment maintenance training course according to the approved syllabus to ten (10) HKPF and ten (10) Government Dockyard Maintenance and Support Section technical and maintenance staff in the HKSAR.

**CHAPTER 10 – ABBREVIATIONS**

3G	3 <sup>rd</sup> Generation
4G	4 <sup>th</sup> Generation
5G	5 <sup>th</sup> Generation
A/C	Alternating Current
ABS	American Bureau of Shipping
AIS	Automatic Identification System
AES	Advanced Encryption Standard
AIU	Audio Gear Interface Unit
ANSI	American National Standards Institute
ARPA	Automatic Radar Plotting Aid
ATEX	Appareils destinés à être utilisés en ATmosphères EXplosives
AWS	American Welding Society
C/A	Course/Acquisition
cd/m <sup>2</sup>	Candela per metre squared
cm	Centimetre
CO <sub>2</sub>	Carbon Dioxide
COMMS	Communications Branch of HKPF
CPA	Closest Point of Approach
dB	Decibel
DC	Direct Current
D/GNSS	Differential Global Navigation Satellite System
DGPS	Differential Global Positioning System
DHCP	Dynamic Host Configuration Protocol
DNV	DNV AS
EBIU	Ethernet Backbone Interface Unit
EGNOS	European Geostationary Navigation Overlay Service
EMC	Electromagnetic Compatibility
ENE	Electronic Navigational Equipment
ERBL	Electronic Range and Bearing Lines
FAT	Factory Acceptance Trials
FCU	Fixed Communications Unit
FD	Frequency Division
GHz	Gigahertz
GLONASS	Global Navigation Satellite System
GM	Metacentric Height
GMDSS	Global Maritime Distress and Safety System
GMT	Greenwich Mean Time
GPS	Global Positioning System
HPEAFS	High Performance Energy Absorbing Flooring System
H/V	Horizontal/Vertical
Hz	Hertz

IC	Intercommunications
ICNIRP	International Commission on Non-Ionizing Radiation Protection
ICOMIA	The International Council of Marine Industry Associations
IECEX	International Electrotechnical Commission Explosive
IMM	International Maritime Mobile
IMO	International Maritime Organisation
IEC	International Electrotechnical Commission
IP	Internet Protocol
IPsec	Internet Protocol Security
LR	Lloyd's Register
IRPA	International Radiological Protection Association
ISO	International Organization for Standardization
ITU-R	International Telecommunication Union – Radiocommunication Sector
JPEG	Joint Photographic Experts Group
kg	Kilogram
kHz	Kilohertz
km	Kilometre
kPa	kilo Pascal
kW	Kilowatt
LCD	Liquid Crystal Display
LCG	Longitudinal Centre of Gravity
LED	Light-emitting Diode
LSA	Lifesaving Appliance
LTE	Long Term Evolution
MCR	Maximum Continuous Rating
MOB	Man Overboard
MHz	Megahertz
MIMO	Multi Input Multi Output
mm	Millimetre
NDT	Non-Destructive Test
NIR	Non-Ionizing Radiation
NMEA	National Marine Electronics Association
NORSOK	Norsk Sokkels Konkuranseposisjon
ohm	Unit of Electrical Resistance
OFCA	Office of the Communications Authority
PA	Public Address System
PCB	Printed Circuit Board
PCU	Personal Communications Unit
PPI	Plan Position Indicator
PPTP	Point-to-Point Tunnelling Protocol
PTT	Press To Talk

PVC	Polyvinyl Chloride
QoS	Quality of Service
QZSS	Quasi-Zenith Satellite System
RAW	A file format that captures all image data recorded by the sensor when a photograph is taken
RF	Radio Frequency
RIU	Radio Interface Unit
rms	Root mean square
rpm	Revolutions per minute
RM	Relative Motion
RT	Radiographic Test
SBAS	Satellite -based Augmentation System
SINAD	Signal-to-noise and Distortion Ratio
SOLAS	Safety of Life at Sea
SQEP	Suitably Qualified and Experienced Personnel
TBT	Tributyltin
TCG	Transverse Centre of Gravity
TCPA	Time-based Closest Point of Approach
TD	Time Division
TM	True Motion
TS	Technical Specifications
UHF	Ultra High Frequency
USB	Universal Serial Bus
UT	Ultrasonic Test
V	Volt
VCG	Vertical Centre of Gravity
VHF	Very High Frequency
VOC	Volatile Organic Compounds
VoIP	Voice Over Internet Protocol
VOX	Voice Operated Switch
VPN	Virtual Private Network
VRM	Variable Range Marker
VSWR	Voltage Standing Wave Ratio
WAAS	Wide Area Augmentation System
WAN	Wide Area Network
$\mu$ s	Microsecond
$\mu$ V	Microvolt

## **Part VII - Annex 1 - Warranty Services and Guarantee Slipping**

### **1. Warranty Services**

- 1.1. The Contractor shall provide Warranty Services in relation to all aspects of the Vessel during the Warranty Period, including Guarantee Slipping as stipulated in this Annex. Both the Warranty Services and Guarantee Slipping shall be carried out locally in Hong Kong. If the Contractor appoints a local sub-contractor to perform the Warranty Services (hereinafter “local agent”), the Contractor shall ensure that the local agent appointed will perform the Warranty Services and Guarantee Slipping in full compliance with the requirements of the Contract including those as set out in this Annex 1. It must be emphasized that it is the Contractor’s responsibility to ensure the Warranty Services and Guarantee Slipping are performed in full compliance with the terms of the Contract. The Contractor shall arrange their own technical staff with all the necessary skills, qualifications and experiences to conduct the services. Unless the technical staff from the local agent meet all these requirements, the technical staff from the local agent shall not provide the required Warranty Services but those technical staff from the Contractor to travel to Hong Kong for providing the Warranty Services. The Contractor shall provide the curriculum vitae of the local agent’s engineers involved in providing the Warranty Services as part of the Deliverables to be provided as part of the Delivery Acceptance. The Government reserve the rights to reject any engineer whose qualification and experience are not acceptable to GNC and the Government reserves the right not to accept the Vessel.
- 1.2. The Government reserves all rights and claims against the Contractor in the event that any warranty claim has not been handled in accordance with the terms of the Contract including this Annex and the Detailed Procedures as mentioned in Paragraph 1.6 below. Furthermore, even it is agreed between the Government and the Contractor after the necessary joint inspection and investigation that certain damage to the Vessel or any part thereof falls outside the scope of the Warranty Services, if so requested by the Government, the Contractor and its local agent shall still be responsible for the repair of such damage on the same terms as set out in this Annex 1 except that it shall be at the cost of the Government. Should the Contractor and its local agent refuse to do so or provide an unreasonable quotation of the repair cost, without prejudice to the rights and claims against them, the Government shall have the full right to appoint another contractor for the repair, and the Contractor agrees that the Warranty Period and the Warranty Services for the relevant Warranty Item(s) shall not be violated or affected notwithstanding such appointment.
- 1.3. For the Equipment in respect of which the manufacturer/supplier does not offer a one-year free warranty on such equipment, the Contractor shall provide the Warranty Services throughout the Warranty Period at the Contractor’s own cost. For other loose equipment and installations, such as life-saving and firefighting equipment, etc., which are required to be serviced, inspected or renewed annually, the Contractor shall provide the servicing, inspection and renewal as per the manufacturer’s requirements of that equipment or installation throughout the Warranty Period applicable to such items.
- 1.4. During the Warranty Period, when the Vessel or any part thereof is handed over for the Warranty Services and/or Guarantee Slipping, the Contractor shall be responsible for the collection and due return of the Vessel in good order (including all freight from and to the Government Dockyard and insurance (as further mentioned below)). Should there be any loss or damage of the Vessel or any Warranty Item (as defined in Paragraph 1.5 below) caused by any reason whatsoever while the Vessel is in the possession or control of the Contractor (including even when the Vessel is at the Government Dockyard or a maintenance base of the user department) or at the shipyard of the Contractor or an authorised agent appointed by it, the Contractor shall pay for the cost for the loss or damage plus 20% as and for liquidated damages but not as a penalty. Throughout the Warranty Period, notwithstanding anything to the contrary in the Contract, the Vessel and all Warranty Items are deemed to be at the Contractor’s risks, and the Contractor shall insure and keep insured, at his own expense, a property insurance with the Government to be named as the sole payee, for an indemnity amount of not less than the purchase price of the Vessel plus 20% to protect the Government property against all risks. The Certificate of Insurance and evidence showing that the premium has been paid shall be available for inspection in advance. The Contractor shall provide this insurance policy before the commencement of the Warranty Services and/or Guarantee Slipping. Any excess payable under the insurance policy shall be borne by the Contractor.
- 1.5. Total Vessel Warranty

It is required that the Vessel is covered by the free of charge Warranty Services for one year after the date of the issue of the unqualified Acceptance Certificate in respect of the Vessel. If there is more than one (1) Vessel, each such Vessel shall be covered in the aforesaid manner. The Warranty Services shall cover the entire Vessel and all its Equipment (including without limitation all Equipment specified in Schedules 6 and 7 in Part V and all Electronic Navigational Equipment as defined in Chapter 7 of Part VII), fittings and outfit and all Spare Parts (collectively, “Warranty Items”) against defects in design, construction, workmanship or materials and against any non-compliance with any of the Product Warranties. The Warranty Services may be backed up by the Contractor using individual equipment suppliers/manufacturers’ warranties but the Contractor shall remain solely liable to MD as a primary obligor to provide the Warranty Services regardless of the terms of the warranty including duration provided by such suppliers or manufacturers. Notwithstanding and without prejudice to the Contract on warranty obligations for the total Vessel, any individual equipment supplier/manufacturer’s warranty extending beyond the one-year total Vessel warranty must be assigned to the Government as appropriate. In order not to violate the warranty of the outboard engine(s) and gearbox(es), the Contractor shall also provide the corresponding periodic maintenance services based on the manufacturer(s)’ manuals and recommendations within the Warranty Period at no extra cost to the Government.

1.6. Procedures for Warranty Claim

Without prejudice to the provisions of the Contract, detailed procedures for dealing with warranty claims must be proposed by the Contractor and agreed by MD before the issuance of the unqualified Acceptance Certificate of the Vessel (“Detailed Procedures”). These Detailed Procedures shall be agreed based on the following principles:

- 1.6.1. Any notification of claimed defect shall be sent from MD to the Contractor through a defined route.
- 1.6.2. There shall be a joint inspection and investigation to examine the defect and the Contractor shall propose the appropriate and necessary remedial action to the satisfaction of the Director.
- 1.6.3. The Contractor shall undertake on-site Warranty Services (including provision of all replacement Warranty Items, spare parts, labour, materials, test equipment, lifting, docking, and transportation) whether, at the option of the Government, the Vessel is berthed at the local agent’s shipyard or in the Government Dockyard or maintenance bases of the user department. Taking the Vessel back to the shipyard of the Contractor (place of construction) should be avoided unless absolutely necessary.
- 1.6.4. Rectification of defects must have a minimum effect on the operation of the Vessel by the provision of on loan equipment if the anticipated repair time exceeds the time frame as specified in Paragraph 1.7.1 below. The proposed manner of the rectification must first be approved by the Government.

1.7. Throughout the Warranty Period, the Contractor shall be responsible for the provision of free of charge corrective maintenance and rectification of all defects in all and any of the Warranty Items including repair and replacement as necessary. This shall, at no cost to the Government, include Warranty Services to be performed by the Contractor described in the following sub-paragraphs:

- 1.7.1. To attend to the Vessel for inspection and repair within 24 hours (excluding Hong Kong public holidays) of receiving the report of a fault (“fault report”) and to take immediate action to rectify the defect after inspection. Unless otherwise agreed by the Government, all corrective maintenance and rectification must be effected within 48 hours after the fault report is first issued. The MD must be informed of what corrective maintenance and rectification actions have been taken within 72 hours of receiving the relevant fault report.
- 1.7.2. To provide all necessary transport, replacement Equipment, spare parts, labour and materials, tools and testing instruments required for the corrective maintenance and rectification.
- 1.7.3. Any replacement item or part to be deployed shall originate from the Warranty Spare Parts or otherwise from the manufacturer of the original Warranty Item to be repaired of the same model and with the same or better specifications and must be able to be found in the latest spare parts list issued by such manufacturer. Alternative components shall not be used without the prior approval in writing of the MD.

1.7.4. If the Contractor fails to respond to any reported warranty claims within 48 hours, the MD may arrange corrective maintenance and rectification of the defect either on its own or by deploying a third-party contractor as deemed appropriate with a view to minimising any downtime incurred. In such case, the Contractor shall compensate the Government for the full cost of such repairs plus 10% as and for liquidated damages but not as a penalty no later than 10 working days after a written demand has been served on the Contractor by MD. **Any such corrective maintenance and rectification of the defect completed by MD on its own or by another third-party contractor shall not relieve the Contractor from its obligations under the Contract including those in respect of the remainder part of the Warranty Period (including all extensions). The Warranty Period shall not be affected or broken due to such course of action.**

#### 1.8. Extension of Warranty

1.8.1. The Warranty Period for any Warranty Item shall be extended for such duration whilst the Contractor has failed to repair and correct satisfactorily the defects in such Warranty Item exceeding seven working days counting from the date when the relevant fault report was first issued (or otherwise exceeding such longer permissible repair duration of more than 7 working days as the Government considers appropriate depending on the warranty claim) (and depending whichever is applicable, this is the “permissible repair time”).

1.8.2. Warranty Items which are replaced during the Warranty Period shall have a new warranty period of one year commencing from the date of replacement including the replacement as mentioned in Paragraph 1.9 below.

1.8.3. Equipment which is found to be defective during the trials at the Guarantee Slipping as mentioned in Paragraph 2.2.5 below shall have an extension of warranty of one year.

1.8.4. The Warranty Period of the Vessel shall be extended if the entire Vessel is out of service for more than 24 hours in excess of the permissible repair time as mentioned in paragraph 1.8.1 above due to any failure in any Warranty Item and this extension will count from the date when the relevant fault report was first issued until the rectification of such fault. For the avoidance of doubt, this paragraph 1.8.4 shall apply if due to any failure the Vessel has to be put out of service. It is only if the Vessel would not be put out of service notwithstanding any failure that there shall only be extension of the relevant Warranty Item but not the entire Vessel under paragraph 1.8.1.

1.8.5. In relation to a Warranty Item with extended Warranty Period as mentioned in Paragraph 1.8.1 and/or 1.8.2 and/or 1.8.3 and/or 1.8.4 above, depending on whichever is applicable, all references to Warranty Period in the Contract shall be construed to include such extended Warranty Period. For the avoidance of doubt, in the case of paragraph 1.8.4, the entire Vessel and all Warranty Items installed therein shall be given an extended Warranty Period in accordance with that paragraph.

#### 1.9. Recurrent Defects

During the Warranty Period, should a second and similar defect arise in relation to a Warranty Item, this shall be construed as conclusive evidence of the Warranty Item’s unsuitability for the purpose intended, and the Contractor shall take immediate steps to conduct a thorough investigation jointly with MD at the Contractor's expense, to ascertain the reasons for any such defect and shall forthwith at the MD's option and the Contractor's expense, procure and deliver another replacement Warranty Item with a new design suitable for the purpose intended to replace the original defective Warranty Item.

1.10. In the event that the Contractor proposes to modify any Warranty Item or any part of the Vessel in order to repair or replace the same or another Warranty Item, the Contractor shall obtain the Government’s advance written consent to the proposed modification.

1.11. Throughout the Warranty Period, the Contractor shall in respect of the first Vessel to be delivered maintain an inventory of spare parts, which shall be brand new items fresh from the factory serving as spare parts of the items as listed in Schedules 6 and 7 in Part V (and complying with the same Overall Specifications as applicable to these items) and in the quantity as found in one Vessel with its local agent in Hong Kong which the Contractor shall use for performing the Warranty Services (viz., Warranty Spare Parts). The Government will not provide its own inventory of the Spare Parts to the Contractor for the provision of the Warranty Services.

1.12. Updated/Upgraded Information

It is expected that during the Warranty Period certain Warranty Items may be modified or changed. All documentation affected by this change must be updated to reflect the new situation. All the support documentation such as the Vessel inventory list, job information and maintenance scheduling in relation to these modifications and changes shall be provided at the expiry of the Warranty Period.

1.13. Warranty of Electronic Navigational Equipment

On top of the Warranty Services described in this Annex 1, there are also service specifications of the Warranty Services set out in Chapter 7 of this Part VII for the Electronic Navigational Equipment. In the event of any inconsistency, the better service specifications shall prevail. Please refer to the Chapter 7 of this Part VII.



## 2. Guarantee Slipping

2.1. As stated in the section "Warranty" above, Guarantee Slipping shall be carried out at the end of the original Warranty Period regardless of any subsequent extension in relation to any Warranty Item under the terms of the Contract.

2.2. At the Guarantee Slipping, the Contractor shall carry out the following work and provide all necessary materials, spare parts, labour and equipment in order to carry out such work:

### 2.2.1. Pre-guarantee slipping inspection and trial

- (a) Joint inspection with trial to confirm the list of guarantee slipping items; and
- (b) Collect vessel performance information beforehand for comparing when guarantee slipping completion.

### 2.2.2. Engines and Gearboxes

- (a) Renew the lubricating oil and replace the filters for the outboard engines and gearboxes and top up the engine coolant (if applicable) as per the manufacturer's recommendations;
- (b) Clean all the engine air filters and change the filter elements;
- (c) Change all fuel/water separators elements and fuel filters for all engines;
- (d) Flush through the cooling system of the outboard engines and gearboxes and renew all zinc anodes if provided;
- (e) Check all the engines' belts and adjust or renew if necessary;
- (f) Check tappet clearances for the inlet and exhaust valves, ignition timing and idle speed and adjust if necessary;
- (g) Conduct function tests for the engines' protection system and their associated sensors, gauges and other measuring devices;
- (h) Repair all damages and leakages in the pipelines; and
- (i) Any other work required or recommended by the engine manufacturer.

All of the work listed at Paragraphs 2.2.2(a) to (i) shall be carried out by the manufacturer's authorised agent/dealer. All the work procedures and the spare parts used shall comply with the manufacturer's specifications and requirements.

### 2.2.3. Hull and Deck Items (where applicable):

#### (a) Paint Under the Water Line

- (i) Paint under the water line shall be checked by the paint manufacturer's representative for the effectiveness of one year's protection against marine growth;
- (ii) The hull shall be cleaned and ready for inspection of paint damage;
- (iii) Damaged paint shall be repaired according to the paint/gelcoat manufacturer's procedures;
- (iv) After the repair of the damaged paint as specified at Paragraph 2.2.3(a)(iii), two coats of touch up primer and one coat of touch up shall be applied; and
- (v) One touch up anti-fouling paint of finishing coat shall be applied to the damaged paint as specified at Paragraph 2.2.3(a)(iii).

#### (b) Paint Above the Water Line

- (i) Damaged paint on the hull above the water line and deckhouse shall be repaired properly. After repair, two coats of touch up primer and one coat of touch up (finishing) shall be applied;
- (ii) Two coats of paint shall be applied on the Vessel's name, draft marks and insignia; and
- (iii) One full coat of anti-slip paint shall be applied to the open and side deck.

- (c) Inspect, clean and polish propellers
- (d) Free, clean, grease and recondition all moving parts of the deck fittings, i.e. WT (water tight) hatches, vent covers, rollers and fairleads and anchor chain stoppers, etc
- (e) Renew all zinc anodes
- (f) Life-saving appliances (“LSA”) and Fire-fighting appliances (“FFA”) must be serviced and re-certified as required. (Free, clean, grease and recondition all fire control valves, hydrants and bilge suction and control valves)
- (g) Free, clean and repaint the anchor chain and swivel set
- (h) Remove the fuel tank(s) from the fuel tank compartment(s). all fuel tanks shall be pressure-tested free of leakage, while the hull structures in the fuel tank compartment should be inspected correct;
- (i) In order to facilitate GNC/HKPF officers carrying out any inspections (if any found necessary) inside the under-deck compartments (including but not limited to visual inspections, non-destructive tests to the welding beams, etc), open up all the compartment hatches & inspection doors and remove the fuel oil tank(s) from vessel. Prepare and obtain a gas free certificate issued by approved person according to local regulation. Restore the fuel system afterward.

2.2.4. Mechanical & Electrical

- (a) Each of the compartment bilge suction to be checked and free of rubbish;
- (b) Electric cables and pipes penetration inspection; and
- (c) Batteries condition check and switch over test.

2.2.5. The following shall be tested at the dock trial / sea trials as part of the Guarantee Slipping:

- (a) Engine control and steering system including emergency/alternative method;
- (b) Engine tilting/trimming devices;
- (c) Engine alarm and shut down function (including emergency stopping of engines);
- (d) Functional test of fuel supply emergency shutdown devices;
- (e) Navigational equipment, lights and sound signals;
- (f) Ahead and astern running and crash stop test;
- (g) Steering trial;
- (h) Speed measurement;
- (i) Bilge system function (including high level bilge alarm system);
- (j) Other trials or testing of equipment as required by the Government Representative;
- (k) Any item or component found defective shall be repaired or replaced;
- (l) The Dock Trial and Sea Trial Safety Checklist items, as listed below:

**Dock Trial Check List**

<i>General items will be checked during dock trial</i>	
1.	Engines start and stop testing
2.	Engines emergency stop check
3.	Engines speed and clutch unit testing
4.	Engines speed high and low idle speed testing
5.	Engines gauges and alarm check
6.	Propulsion system testing
7.	Anchor testing

8.	Navigation lights testing
9.	Vessel horn testing
10.	Fire protection system check
11.	Portable fire extinguishers inspection
12.	Life-saving equipment inspection
13.	Signal and light testing
14.	Bilge system in each compartment testing.
15.	Floor plate inspection
16.	Fuel tanks quick closing valves testing
17.	Bilge pumps testing
18.	Fuel oil pumps testing
19.	Waste water pumps testing
20.	Steering system power assisted and manual operation testing
21.	Emergency steering operation check

### Sea Trial Safety Check List

<i>General items will be checked during sea trial</i>	
1.	Engines start and stop testing
2.	Engines emergency stop check
3.	Engines speed and clutch unit testing
4.	Vessel horn testing
5.	Portable fire extinguishers are in place
6.	Life jackets and life buoys are in place
7.	Sea trial navigation flag hoisted
8.	Telecommunication system function check
9.	Approved coxswains are in control
10.	Sufficient fuel oil to perform the full course of sea trial

- (m) Other trials or testing of equipment as required by the Government Representative; and
- (n) Any item or component found defective shall be repaired or replaced.

2.3. After Guarantee Slipping, the Contractor shall submit the above works completion report (including engines trial/testing report completed with engines parameters) to the Government Representative.

**Part VII – Annex 2 – Implementation Timetable**

<b>Milestones</b>		<b>Completion Dates</b>
1	Issuance of "Notification of Conditional Acceptance"	To be advised after Tender Evaluation
2	Contract Date (the date of the last party signing the Articles of Agreement)	The date when the last party signs the Articles of Agreement. The Government will not sign the Articles of Agreement until and unless the Contractor fulfils all of the conditions precedent as specified in Clause 25.2 of Part II Conditions of Tender (save to the extent waived by the Government, if any).
3	Kick-Off Meeting	To be held within two (2) months after the Contract Date at the Government Dockyard or the Contractor's Shipyard
4	Completion of hull structures	The Contractor shall propose the completion dates of Milestones 4-13 for GNC's approval within two (2) months after the Contract Date.
5	Completion of installation of engines, propellers and steering gear	
6	Completion of installation of electronic navigation equipment	
7	1 <sup>st</sup> stage of the Technical Acceptance: All inspection and testing based on the Programme as mentioned in paragraph 1.8.1 of Part VII	
8	2 <sup>nd</sup> stage of the Technical Acceptance: Pre-shipment Construction and Handling Inspection as mentioned in paragraph 1.8.2 of Part VII	
9	Shipment to Hong Kong	

10	<b>3<sup>rd</sup> stage of the Technical Acceptance: Official Seal Trial as mentioned in paragraph 1.8.3 of Part VII</b>	
11	<b>4<sup>th</sup> stage of the Technical Acceptance: as mentioned in paragraph 1.8.4 of Part VII</b>	
12	<b>Delivery Acceptance as mentioned in paragraph 1.8.5 of Part VII</b>	
13	<b>Vessel Ready for Use (including without limitation the passing of all stages of Technical Acceptance and the Delivery Acceptance)</b>	<b>On or before the Delivery Date applicable to the same Vessel</b>
14	<b>Delivery Date</b>	<b>The Delivery Date for the Vessel shall be no later than the date set out in Schedule 2 (Delivery Schedule) of Part V</b>

**Part VII - Annex 3 - Drawings Submission Timetable**

Item No.	Drawings Approval	Completion Date
1	General Arrangement Plan	<i>All the drawings are required to be submitted within two (2) months after the signing of Articles of Agreement for GNC's approval / reference.</i>
2	Lines Plan	
3	Structural Construction Plan in Mid-Ship and Bulkhead Section	
4	Construction Profile and Deck Plan	
5	Shell Expansion Plan	
6	Tank Capacity Plan	
7	Engine Mounting Arrangement	
8	Power / Speed Estimation and Curve	
9	Intact and Damaged Stability Plan	
10	Details of Electronic Navigational / Communication Equipment	
11	Details of Deck Equipment, Outfitting, Furniture, etc.	
12	Details of Engines' Arrangement	
13	Consoles Arrangement and Schematic Diagram	
14	Instrumentation and Control System	
15	Calculation of Fuel Capacity	
16	Details of Electrical and Electronic Equipment	
17	Electrical Load Calculations	
18	Schematic Layout of Electrical Circuits	
19	Paint Schedule	
20	Lightning Protection Arrangement	
21	Equipment List	
22	Others as required	

Note: All information to be submitted shall show compliance of the relevant Equipment or the Vessel or any part thereof with all requirements of the Contract.

**Part VII - Annex 4 – Main Items Inspection Timetable**

VESSEL NAME: _____			Inspection date	Outstanding / Reinspection / Remarks
Item	Items to be Inspected			
<b>Hull Structure, Layout and Outfitting Inspection</b>				
H-1	Mould lofting			
H-2	Construction materials – Aluminium plate mark checking for hull and superstructure			
	a) Aluminium plate mark checking for hull and superstructure			
	b) Material certificates verification			
H-3	Welding procedure specification, welding consumables & welders certificates			
H-4	Keel laying for hull			
H-5	Fabrication of hull up to main deck in stages of work, including:			
	a) Alignment			
	b) Edge preparation			
	c) Welding			
	d) Workmanship			
	e) Compliance with approved plans			
	f) NDT of welds as per NDT plan			
	g) Hull internal work inspection			
	h) Plating thickness gauging			
H-6	Engine bearers fabrication / welding			
H-7	Console scantling & welding checking			
H-8	Welding construction and pressure tests of tanks			
	Fuel oil tank			
	a) Tank construction (internal/external/fitting)			
	b) Tank pressure test			
H-9	Hose test for hull & superstructure			
H-10	Mock up inspection			
H-11	Installation of various outfitting items			
	a) Anchor and chain/rope			
	b) Seating of heavy equipment and masts			
	c) Installations and function tests of shock-mitigating seats			
	d) Installation and leak tests of shipside valves			
	e) Inspection and load test of all lifting arrangement, including but not limited to:-			
	(i) lifting devices;			
	(ii) strong points;			
	(iii) mooring bitt; and			
(iv) accessories				
H-12	Function tests of various outfitting items			
H-13	Watertightness or weathertightness of openings			
	a) Manholes			

	b) Hatches			
	c) Air pipes			
H-14	Painting inspection of different layers			
H-15	Draught marks and vessel dimensions verifications			
H-16	Arrangement of consoles			
H-17	Sacrificial anodes and lightning protection system			
	a) Installation of zinc anodes			
	b) Installation of lightning protection system			
H-18	Inspection of fire, heat and sound insulation (if applicable)			
	a) Fire insulation			
	b) Heat insulation			
	c) Sound insulation			
H-19	Interior furnishings			
	a) Console area			
H-20	Lifesaving appliance			
H-21	Fire-fighting appliance			
H-22	Lightship weight measurement			
H-23	Inclining experiment test / in-air stability test			
H-24	Pre-shipment Handling assessment and Inspection			
H-25	Sea trials including operation test of outfitting equipment			
H-26	Site towing functioning test and demonstration trial of anchor			
H-27	Cleanliness inspection before acceptance			
H-28	Inventory check in the HKSAR			
H-29	Acceptance and delivery			



VESSEL NAME: _____			Inspection date	Outstanding / Reinspection / Remarks
Item	Items to be Inspected			
<b>Electrical and Machinery Installation</b>				
EM-1	General inspection on installation of machinery:			
	a) General inspection on installation of outboard engines			
EM-2	Outboard engines:			
	a) Test of engine safety devices and alarms			
	b) Break-in of the engines			
EM-3	Fuel oil system:			
	a) General inspection & dimension checking of fuel oil system			
	b) Fuel oil tank low level alarm test			
	c) Fuel oil tank final cleaning/internal inspection before filling			
	d) Fuel oil tank high level alarm test			
	e) Fuel oil tank content gauge calibration and test			
	f) Inspection of piping penetration of bulkhead and deck			
	g) Hydraulic test of fuel oil piping			
EM-4	Bilge system:			
	a) General inspection & dimension checking of bilge system			
	b) Inspection of piping penetration of bulkhead and deck			
	c) Hydraulic test of piping			
	d) Functional test of bilge system			
EM-5	Functional test of drainage system			
EM-6	Batteries:			
	a) Inspection of battery connectors and housing boxes			
	b) Inspection of battery charger			
	c) Operational test of battery charger Test of outboard engines and generator consecutive starting by each group of battery (start/stop at remote and local control)			
EM-7	Electrical installation:			
	a) Inspection of lightning conductor			
	b) General inspection of cable layout, insulation and cable sizes			
	c) Inspection of cable penetrations of bulkhead and deck			
	d) Inspection of transformers / circuit breaker			
	e) Inspection of tally plates			
EM-8	Main switchboard & panels (if applicable):			
	a) Main switchboard & panels - high voltage injection test			
	b) Cable size checking of electrical switchboard installations			
	c) Inspection of DC distribution panel			
	d) Megger test of the electrical system			
	e) Earthing test of the electrical system			
EM-9	Control console:			

	a) Inspection of control console including checking of weathertightness			
	b) Functional test of console controls			
	c) Inspection of navigation equipment control panel			
EM-10	Lighting:			
	a) Inspection and functional test of general lighting			
	b) Inspection and functional test of emergency lighting including capsized lights			
	c) Inspection and functional test of floodlight installation			
	d) Inspection and functional test of searchlight installation			
EM-11	Navigational lights and signals			
	a) Inspection and functional test of navigational lights			
	b) Test of horn/whistle/siren			
EM-12	Electronic equipment tested by COMMS			
EM-13	Test of noise level during sea trial			
EM-14	Test of safety equipment if applicable (e.g. gas detector)			

Note:

These inspection items are preliminary and not exhaustive. Any items found necessary to be included at a later stage will be added to this list.

**Part VII - Annex 5 – Endurance and Performance Tests**

Date of Test:		Place of Test:							
Vessel's Identification:		Vessel's Name:							
<b>Conditions at Endurance and Performance Test</b>									
Person On board	<b>4</b>		Dummy Weight <b>20 kg</b>						
Fuel (Petrol)	<b>90%</b>		Other Equipment <b>100 kg</b>						
Sea Conditions									
<b>Engines:</b>	<b>Port Side</b>	<b>Starboard Side</b>	<b>Propellers:</b>	<b>Port Side</b>	<b>Starboard Side</b>				
Maker			Maker						
Type			Type						
Serial Number			Diameter						
Rated Power			Pitch						
Rated Speed			Direction of Rotation						
<b>Engine Load</b>	<b>Engine Speed (rpm)</b>	<b>Vessel Speed (Knots)</b>	<b>Time (Start)</b>	<b>Time (Finish)</b>	<b>Fuel Consumption (litres/minutes)</b>	<b>Engine Oil Pressure (Bar)</b>	<b>Engine (in) CW Temp. (°C)</b>	<b>Others</b>	<b>Others</b>
___% of rated Power	At Minimum Crushing Speed		10 min						
50% of Rated Power/rpm			5 min						
60% of Rated Power/rpm			5 min						
70% of Rated Power/rpm			10 min						
80% of Rated Power/rpm			10 min						
90% of Rated Power/rpm			10 min						
100% of Rated Power (Endurance Test)			120 min						
Remarks:									
Witness by:			MD Representative			Shipyard Representative			

## **Part VII - Annex 6 –As Fitted Drawings and Documents**

As-fitted Drawings and Machinery/Equipment documents and information literature to be delivered to the Government at Delivery Acceptance

### **1. As-Fitted Drawings**

- 1.1. At not less than six (6) weeks before the delivery acceptance of each Vessel, the Contractor shall deliver to the Government four (4) hard copies and two (2) soft-copies in .pdf and .dwg (where applicable) files of the following plans and drawings that contain the technical information of that Vessel and its machinery and equipment as they are when the Vessel is on the day accepted by the MD. These are termed the final version of the “As-Fitted” Plans and Drawings, and they must consist of the following ones as well as any other additional ones that may be required by GNC/MD during the design and construction of the Vessel and before the Vessel is accepted by the Government.
- 1.2. The As-Fitted Plans and Drawings shall be prepared by professional ship draughtsmen and they shall be prepared in the professional manner, scale, size and style normally required of in the ship design and construction business sector. All plans and drawings shall show and be clearly marked with the profile, plan, and section views of the layout, arrangement details, and construction details in the manner required by GNC officer.
  - 1.2.1. General Arrangement Plan.
  - 1.2.2. Lines plan and offsets data and table.
  - 1.2.3. RO approved stability information booklet and the inclining experiment report.
  - 1.2.4. Hydrostatics, cross curves and intact and damage stability calculations for all ship loading conditions specified in the Technical Specifications.
  - 1.2.5. Vessel subdivision drawings and stability calculations.
  - 1.2.6. Painting scheme of the whole Vessel.
  - 1.2.7. Vessel draught marking diagram (if applicable).
  - 1.2.8. Detailed arrangement and layout plan showing the disposition of all the main equipment, fittings and fixtures, furniture, hatches, manholes and access openings. The down-flooding openings (points) shall be indicated clearly on the drawings.
  - 1.2.9. Equipment layout diagram.
  - 1.2.10. Hull structural construction and hull scantlings drawings.
  - 1.2.11. Hull shell and frames and the framings’ arrangement and construction plan.
  - 1.2.12. Hull shell expansion plan.
  - 1.2.13. Keel construction plan.
  - 1.2.14. Steering system and steering arrangement diagrams (if applicable).
  - 1.2.15. Superstructure or consoles and deck structural and construction plan (if applicable).
  - 1.2.16. Hull watertight bulkheads’ construction plan.
  - 1.2.17. Superstructure or consoles to deck connection – detail construction plan (if applicable)
  - 1.2.18. Engine casing to deck connection detailed construction plan (if applicable).
  - 1.2.19. Deck edge and bulwark (if any) details and construction plan, including detailed structural arrangement drawings of hull to deck connection.
  - 1.2.20. Detailed cathodic corrosion prevention and arrangement plans and drawings for the Vessel throughout.
  - 1.2.21. Mast structural and construction plan and mast equipment arrangement plan.
  - 1.2.22. Anchoring arrangement plan.

- 1.2.23. Piping diagrams for fuel oil, lubrication oil, bilge, firefighting, scuppers and drains system (as applicable).
- 1.2.24. Fire prevention, fire control and firefighting system drawings (if applicable).
- 1.2.25. Drawings of the main switchboard and all other switchboards and the electrical system (if applicable).
- 1.2.26. Main propulsion engines arrangement and setting plans and drawings of their fuel lines and arrangement (as applicable).
- 1.2.27. Main fuel oil tank drawing and its associated piping and manifold(s), and filling, overflow and ventilation system.
- 1.2.28. Drawings of the anchor, and the anchoring system.
- 1.2.29. Lifesaving appliance arrangement plan and fire safety plan (if applicable).
- 1.2.30. Distress signals, alarm systems, and internal/external communication arrangement and system plan (if applicable).
- 1.2.31. Navigation lights, sound and signal diagrams and any other external lighting arrangement plan.
- 1.2.32. Vessel overall lighting arrangement and light control plan.
- 1.2.33. Vessel alarm and signals, internal communication systems and public address systems plan.
- 1.2.34. Mooring arrangement.
- 1.2.35. Lifting and docking arrangement.

The lists are not exhaustive, additional as fitted drawings may be added if required.

## **Part VII – Annex 7 – Handling Assessment (“HA”) at Pre-shipment Construction and Handling Inspection**

### **1. General**

- 1.1 The purpose of the HA is to:
- (a) ensure that the offered Vessel’s performance characteristics are compatible with the HKPF’s operational role; and
  - (b) mitigate the risks to all parties associated with potential rejection of a constructed vessel at the Technical Acceptance and the Delivery Acceptance.
- 1.2 The Contractor shall arrange for a HA of the completed Vessel to be assessed by the Contractor, in the presence of MD’s and HKPF’s representatives, at or near the site where the Vessel is constructed. The HA shall be conducted and completed within two days. At least ten (10) working days in advance of the HA, the Contractor shall submit for MD’s approval a HA programme proposal which includes details of the procedures under which the HA is to be conducted and the formats in which the Contractor proposes to capture and present the data recorded by the device(s) in accordance with Paragraph 1.4 of this Annex 7 and the digital video footage recorded in accordance with Paragraphs 1.5 and 1.6 of this Annex 7 during the HA. For the avoidance of doubt, this data and video footage shall be able to be copied, moved, deleted and played using Microsoft Windows’ built-in software. Otherwise, the Contractor shall supply appropriate computer software that is compatible with Microsoft Windows for the reviewing of this data and the video footage at no extra cost to the Government. The HA shall be observed by the Government Representatives. At least one (1) of the HKPF’s representatives shall be aboard the Vessel to be assessed to monitor and verify the conduct and results of each attempt at an assessment.
- 1.3 The Vessel to be assessed shall be completed and ready for delivery.
- 1.4 The Contractor shall ensure that an objective record (which can be reviewed by the Government Representatives or, if necessary, an independent third party such as a RO) of the date, time, position, speed, course, roll, pitch, yaw, trim, running angle and three-dimensional acceleration data generated during the HA. The HA shall be conducted in accordance with the assessment protocols stipulated in Paragraphs 2.1 to 2.2 of this Annex 7 and captured using a suitable device(s) which has/have been properly calibrated and, if required by the Government, with supporting calibration documents issued by the manufacturer or calibration laboratory.
- 1.5 The Contractor shall, throughout the HA, record date and time stamped aerial digital video footage of the Vessel to be assessed and, using digital video recording equipment affixed at appropriate locations as agreed by the HKPF on the Vessel to be assessed, record digital video footage of the:
- (a) field of view from the control console forward over the bow to the horizon. For the avoidance of doubt, the camera shall be mounted on the longitudinal centre line at a height and distance from the bow which shall correspond with the eye position of a coxswain, 1.64 metres tall, seated at the helm;
  - (b) position of the helm and throttle controls at all times; and
  - (c) view facing astern with the field of vision centred on the longitudinal centre line of the Vessel to be assessed with the camera mounted as close as possible at the transom.
- 1.6 The Contractor shall provide a suitable logistics boat from which the Contractor shall record digital video footage of the Vessel to be assessed undergoing the HA. This logistics boat shall be capable of a comparable speed and be piloted at a distance and position from the Vessel to be assessed.

- 1.7 The Contractor shall, immediately after the HA, provide to the Government Representatives the following:
- (a) an electronic and printed record of the data recorded during the HA in a format(s) approved by MD in accordance with Paragraph 1.2 above by the device(s) stipulated at Paragraph 1.4 of this Annex which includes:
    - (i) the raw data captured in respect of each assessment protocol specified in Paragraphs 2.1 to 2.2 of this Annex;
    - (ii) a graphical depiction of each assessment showing the position and the track of the Vessel to be assessed throughout the assessment; and
    - (iii) on one chart the speed in knots and the roll and the pitch in degrees;
  - (b) the following copies of the digital video footage stipulated in Paragraphs 1.5 and 1.6 of this Annex stored on a digital storage medium in a format approved by MD in accordance with Paragraph 1.2 above, namely:
    - (i) aerial digital video footage;
    - (ii) fixed digital video footage captured from the Vessel;
    - (iii) digital video footage captured from the logistics boat; and
  - (c) a certificate, signed by both the Contractor and a Government Representative, which records accurately the actual Loading Condition of the Vessel as described in Paragraph 1.8.2(f) of this Part VII during each assessment of the HA.
- 1.8 The assessment protocols listed in Paragraphs 2.1 to 2.2 of this Annex shall be conducted in sea states conforming to WMO Sea States 0 to 2 as specified at Annex 8 of this Part VII, unless otherwise agreed with the Government Representative.
- 1.9 The Vessel to be assessed is required to complete and pass each of the assessments set out in Paragraphs 2.1 to 2.2 below. The Contractor shall have no more than five (5) attempts in total to complete and pass each of these assessments. If, at any time during an assessment, a Government Representative considers that it is unsafe to continue that assessment, the assessment shall be terminated immediately and that assessment shall be deemed to have been failed.

## **2. Assessment Protocols**

### **2.1 Handling Assessment – Light Operational Load Condition**

The following assessment shall be conducted at Light Operational Load Condition as specified at Paragraph 1.8.2(f) of this Part VII.

#### **2.1.1 Straight Line Assessment**

- (a) The coxswain shall accelerate from stationary to at least fifty-five (55) knots within thirty (30) seconds. At any time during this assessment, the bow of the Vessel should not rise above the horizon line with the automatic trim control system (if fitted) turned off. Should the bow rise above the horizon line with the automatic trim control system (if fitted) turned off, it shall not be for more than five (5) seconds as evidenced by the digital video footage. If the Vessel to be assessed does not achieve this, it shall be deemed to have failed the assessment.
- (b) If the Vessel, maintaining the same course and settings, does not maintain a mean speed of at least fifty-five (55) knots for a period of no less than one (1) minute, the Vessel shall be deemed to have failed this assessment.

## **2.2 Handling Assessment – Full Operational Load Condition**

The following assessments shall be conducted at Full Operational Load Condition as specified at Paragraph 1.8.2(f) of this Part VII.

### **2.2.1 Straight Line Assessment**

- (a) The coxswain shall accelerate from stationary to at least fifty (50) knots within thirty (30) seconds. At any time during this assessment, the bow of the Vessel should not rise above the horizon line with the automatic trim control system (if fitted) turned off. Should the bow rise above the horizon line with the automatic trim control system (if fitted) turned off, it shall not be for more than five (5) seconds as evidenced by the digital video footage. If the Vessel to be assessed does not achieve this, it shall be deemed to have failed the assessment.
- (b) If the Vessel, maintaining the same course and settings, does not maintain a mean speed of at least fifty (50) knots for a period of no less than one (1) minute, the Vessel shall be deemed to have failed this assessment.

### **2.2.2 Speed Transition Assessment**

- (a) The coxswain shall accelerate from stationary to five (5) knots and, once the Vessel reaches five (5) knots, maintain course and settings for a period of no less than one (1) minute.
- (b) The coxswain shall then accelerate from five (5) knots to ten (10) knots and, again, maintain course and settings for a period of no less than one (1) minute.
- (c) This assessment protocol shall be repeated incrementally at successive five (5) knot intervals until the maximum achievable speed has been reached.
- (d) At each successive speed increment, the Vessel shall hold that speed within a range of  $\pm 10\%$  for the full one (1) minute.
- (e) During this assessment protocol, the bow of the Vessel shall not rise above the horizon line. Should the bow rise above the horizon line, it shall not be for more than five (5) seconds as evidenced by the digital video footage. If the Vessel to be assessed does not achieve this requirement it shall be deemed to have failed the assessment.

### **2.2.3 Directional Control Assessment**

- (a) The coxswain shall bring the vessel to a speed of forty (40) knots with the ride control system (if fitted) turned off.
- (b) At this juncture and if safe to do so, the coxswain shall remove his hands from the controls. Without human interference in respect of helm, throttle or trim the vessel shall not deviate from its base heading by more than five (5) degrees within a period of twenty (20) seconds.

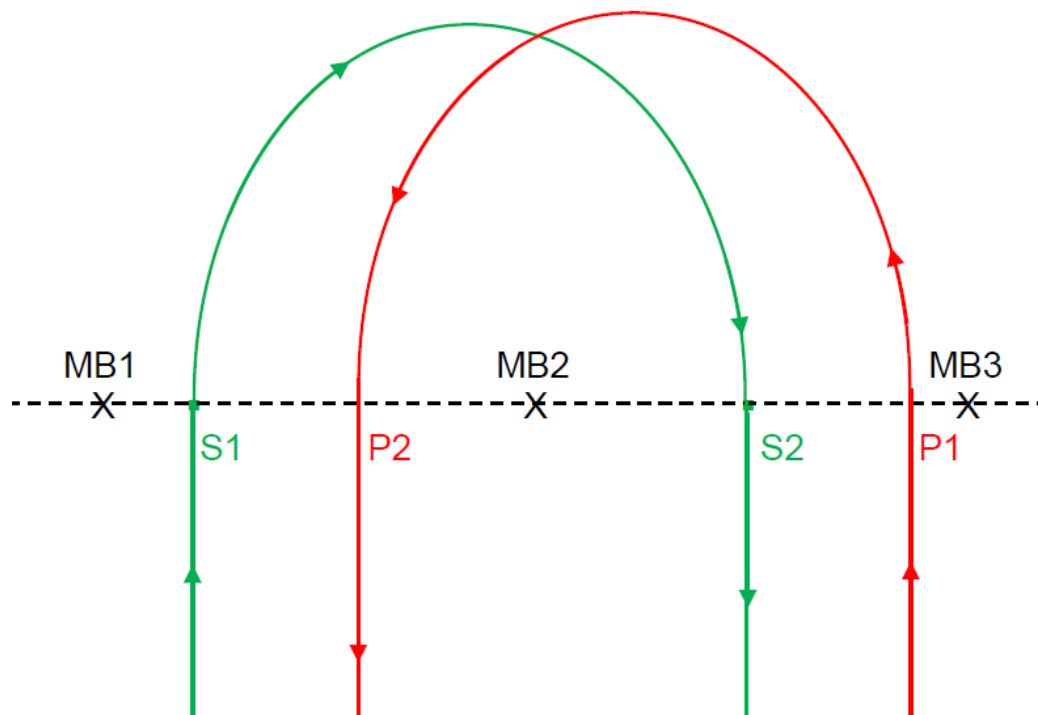
### **2.2.4 Avoidance Line Assessment**

An avoidance line test shall be conducted in accordance with the test procedures as in ISO 6185-4, except the loading condition and the distance from the point of start-to-turn to the imaginary line of maximum distance being seventy (70) metres. The vessel shall be required to demonstrate a maximal manoeuvring speed at no less than forty-five (45) knots.



### 2.2.5 U-Turn Test

- (a) The vessel to be assessed shall make a straight line course in a direction perpendicular to an imaginary line with three (3) collinear marker buoys on the imaginary line, as shown in the diagram below. MB1, MB2 and MB3 are the marking buoys each being twenty-five (25) metres apart.
- (b) When the vessel crosses the imaginary line at S1 which is anywhere between MB1 and MB2, the speed of the vessel shall be not less than forty-five (45) knots, turning to the starboard side (as indicated by the green line) with any speed that is safe to drive and making a U-turn with the vessel crossing the imaginary line again at S2 which is anywhere between MB2 and MB3. The speed of the vessel shall be not less than forty-five (45) knots at S2 or after crossing the imaginary line again. The time measured from S1 to the point at or after the vessel crosses the imaginary line and regains a speed of forty-five (45) knots shall not exceed twenty-five (25) seconds.
- (c) The vessel to be assessed shall then repeat the test described at Paragraph 2.2.5(a) and (b) of this Part VII (Annex 7) but this time crossing the imaginary line anywhere between MB2 and MB3 and turning to the portside (as indicated by the red line).



**Part VII - Annex 8 – Definition of Waves and Sea**

Beaufort scale number	Description	Wind speed	Wave height	Sea conditions	Land conditions
0	Calm	< 1 km/h (< 0.3 m/s)	0 m	Flat.	Calm. Smoke rises vertically.
		< 1 mph			
		< 1 knot	0 ft		
		< 0.3 m/s			
1	Light air	1.1–5.5 km/h (0.3–2 m/s)	0–0.2 m	Ripples without crests.	Smoke drift indicates wind direction. Leaves and wind vanes are stationary.
		1–3 mph			
		1–3 knot	0–1 ft		
		0.3–1.5 m/s			
2	Light breeze	5.6–11 km/h (2–3 m/s)	0.2–0.5 m	Small wavelets. Crests of glassy appearance, not breaking	Wind felt on exposed skin. Leaves rustle. Wind vanes begin to move.
		4–7 mph			
		4–6 knot	1–2 ft		
		1.6–3.4 m/s			
3	Gentle breeze	12–19 km/h (3–5 m/s)	0.5–1 m	Large wavelets. Crests begin to break; scattered whitecaps	Leaves and small twigs constantly moving, light flags extended.
		8–12 mph			
		7–10 knot	2–3.5 ft		
		3.5–5.4 m/s			
4	Moderate breeze	20–28 km/h (6–8 m/s)	1–2 m	Small waves with breaking crests. Fairly frequent whitecaps.	Dust and loose paper raised. Small branches begin to move.
		13–17 mph			
		11–16 knot	3.5–6 ft		
		5.5–7.9 m/s			
5	Fresh breeze	29–38 km/h (8.1–10.6 m/s)	2–3 m	Moderate waves of some length. Many whitecaps. Small amounts of spray.	Branches of a moderate size move. Small trees in leaf begin to sway.
		18–24 mph			
		17–21 knot	6–9 ft		
		8.0–10.7 m/s			
6	Strong breeze	39–49 km/h (10.8–13.6 m/s)	3–4 m	Long waves begin to form. White foam crests are very frequent. Some airborne spray is present.	Large branches in motion. Whistling heard in overhead wires. Umbrella use becomes difficult. Empty plastic bins tip over.
		25–30 mph			
		22–27 knot	9–13 ft		
		10.8–13.8 m/s			
7	High wind, moderate gale, near gale	50–61 km/h (13.9–16.9 m/s)	4–5.5 m	Sea heaps up. Some foam from breaking waves is blown into streaks along wind direction. Moderate amounts of airborne spray.	Whole trees in motion. Effort needed to walk against the wind.
		31–38 mph			
		28–33 knot	13–19 ft		
		13.9–17.1 m/s			
8	Gale, fresh gale	62–74 km/h (17.2–20.6 m/s)	5.5–7.5 m	Moderately high waves with breaking crests forming spindrift. Well-marked streaks of foam are blown along wind direction. Considerable airborne spray.	Some twigs broken from trees. Cars veer on road. Progress on foot is seriously impeded.
		39–46 mph			
		34–40 knot	18–25 ft		
		17.2–20.7 m/s			
9	Strong gale	75–88 km/h (20.8–24.4 m/s)	7–10 m	High waves whose crests sometimes roll over. Dense foam is blown along wind direction. Large amounts of airborne spray may begin to reduce visibility.	Some branches break off trees, and some small trees blow over. Construction/temporary signs and barricades blow over.
		47–54 mph			
		41–47 knot	23–32 ft		
		20.8–24.4 m/s			

10	Storm, whole gale	89–102 km/h (24.7-28.3 m/s)	9–12.5 m	Very high waves with overhanging crests. Large patches of foam from wave crests give the sea a white appearance. Considerable tumbling of waves with heavy impact. Large amounts of airborne spray reduce visibility.	Trees are broken off or uprooted, saplings bent and deformed. Poorly attached asphalt shingles and shingles in poor condition peel off roofs.
		55–63 mph			
		48–55 knot	29–41 ft		
		24.5–28.4 m/s			
11	Violent storm	103–117 km/h (28.6-32.5 m/s)	11.5–16 m	Exceptionally high waves. Very large patches of foam, driven before the wind, cover much of the sea surface. Very large amounts of airborne spray severely reduce visibility.	Widespread damage to vegetation. Many roofing surfaces are damaged; asphalt tiles that have curled up and/or fractured due to age may break away completely.
		64–73 mph			
		56–63 knot	37–52 ft		
		28.5–32.6 m/s			
12	Hurricane	$\geq 118$ km/h ( $\geq 32.8$ m/s)	$\geq 14$ m	Huge waves. Sea is completely white with foam and spray. Air is filled with driving spray, greatly reducing visibility.	Very widespread damage to vegetation. Some windows may break; mobile homes and poorly constructed sheds and barns are damaged. Debris and unsecured objects are hurled about.
		$\geq 74$ mph			
		$\geq 64$ knot	$\geq 46$ ft		
		$\geq 32.7$ m/s			

World Meteorological Organization (WMO) Sea State Code		
Sea State Code	Wave Height (meters)	Characteristics
0	0	Calm (glassy)
1	0 to 0.1	Calm (rippled)
2	0.1 to 0.5	Smooth (wavelets)
3	0.5 to 1.25	Slight
4	1.25 to 2.5	Moderate
5	2.5 to 4	Rough
6	4 to 6	Very rough
7	6 to 9	High
8	9 to 14	Very high
9	Over 14	Phenomenal
Character of the Sea Swell		
	0. None	
<b>Low</b>	1. Short or average 2. Long	
<b>Moderate</b>	3. Short 4. Average 5. Long	
<b>Heavy</b>	6. Short 7. Average 8. Long	
	9. Confused	

## **Part VII - Annex 9 – Tenderer’s Presentation**

### **1. General**

- 1.1 Those Tenderers, who passed the Stage 1 and 2 of the Tender Evaluation Procedures, are required, at the discretion of the Government and at their own costs and expenses, to make a verbal presentation of their proposals to the Government Representatives within twenty-one (21) calendar days upon notice. The presentation shall be conducted by a team of qualified persons who are authorized by the Tenderer. Face-to-face presentation in person is preferred, where should be held at Government premises as designated by the Government Representatives as far as practicable. Presentation by way of video conference may also be considered at the Government’s discretion.
- 1.2 The Tenderer shall introduce, explain and clarify their tender proposals during the presentation. In no circumstances should additional information or new/amended proposal not set out in their tender submissions be accepted. Tender assessment will be made solely based on the Technical Proposal submitted before the Tender Closing Date. The presentation will **not** be taken into account in marking under the Marking Scheme in Annex D to Part II – Conditions of Tender.
- 1.3 The Tenderer shall focus in presenting the Technical Proposal submitted in respect of its proposed design, philosophy and solutions to be adopted, Counter-Proposals as well as the Excess Proposals therein involving higher standard of specifications and proposed innovative suggestions, if applicable. The scope of presentation shall be strictly based on and within the contents of the Tenderer’s Technical Proposal submitted, without any disclosure, clarification or deliberation of the Price Proposal submitted. Organisation introduction and brief of the company profile should be kept to the minimum, which should not be more than five (5) minutes. The length of presentation shall not exceed three (3) hours.
- 1.4 The presentation shall be followed by a Question and Answer Section for the Government Representatives to make further enquiry about the Tenderer’s Technical Proposal and presentation. Such Question and Answer Section should not be construed as any commitment by the Government. Any requests from the Tenderer for the Government to provide additional information about the tender requirements laid down in the Tender Documents or other vessel project plans of the Government will **not** be accepted.

### **2. Scope of Presentation**

- 2.1 According to the requirements set out in Paragraphs 1.1 to 1.3 above, the presentation shall cover the following topics and follow the numbering sequence below.
  - (1) Organisation Introduction (not more than five minutes)
  - (2) Hull
  - (3) General Arrangement
  - (4) Fire Safety Equipment
  - (5) Lifesaving Appliances and Arrangements
  - (6) Machinery
  - (7) Electrical System
  - (8) Operational Systems
  - (9) Innovation Suggestions