Supply of Two (2) Hovercraft

for the Hong Kong Police Force

Part VII – Technical Specifications

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Chapter 1 General Provisions

1.1 Introduction

1.1.1 This document (or "Technical Specifications" (TS)) 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 **two (2) hovercraft** for the use of the Hong Kong Police Force (**HKPF**).

1.1.2 The primary and overriding aim of this TS is to provide the HKPF with two (2) Twin-engines, aluminium-hulled, diesel fuelled Vessels complying with "The Hovercraft Code" issued by the UK Maritime Coastguard Agency, or equivalent standard. The Vessel shall be a fully amphibious hovercraft riding on an air-cushion, and are fully capable of being effectively deployed in Hong Kong Waters. The Vessel shall be able to travel over open water and open land of hard and soft (mud) surfaces, including swamp areas, sand and rocky beaches, low lying bushy areas and on level or inclined landscape within the HKSAR territory. Robustness of construction, ergonomics, seakeeping, high-speed control response, stable and predictable manoeuvrability at high speeds in close proximity to both suspect and bystander craft, soft riding and directional stability are of fundamental importance.

1.1.3 The offered Vessel shall be a commercially available, military or law enforcement use, aluminium-hulled, diesel fuelled hovercraft, with twin engines for providing lift and propulsion. [E]

1.1.4 The offered Vessel shall be designed and built for safely operated in adverse weather conditions in WMO Sea State 2, and surviving at WMO Sea State 3. For details of the WMO Sea State Code, please see Annex 7 of this Part VII.

1.1.5 Unless otherwise specified in the Technical Specifications, all the specifications stated in this Part VII of the Tender Documents are classified and labelled as follows:

(a) Essential Requirements [E]; and

(b) Those specifications which are without any label (viz., [E] or [D]) shall equally form part of the Contract like the specifications labelled as [E], but the Government will not conduct checks at the tendering stage whether the products offered comply with those specifications not labelled with [E]; and

(c) Desirable Specifications [D].

1.1.6 All this Part VII shall form part of the Contract. As part of the tender evaluation during the tendering stage (viz., completeness check), the Tenderer shall submit all the information in sufficient detail to substantiate that the product and the services offered meet the Essential Requirements as stipulated in Annex C to the Conditions of Tender, failing which its tender will not be considered further.

1.1.7 All TS, including all Essential Requirements, those without any label (viz., [E] or [D]) and the Desirable Specifications labelled with [D] (if and to the extent the Contractor has indicated compliance in its tender), shall also form part of the Contract and be of equal materiality and importance upon the award of the Contract. The non-compliance with any specifications set out in these TS shall have the same consequences as specified in the Contract. Save during the tendering stage in the manner as mentioned in Paragraph 1.1.5(b) above, no differentiation shall be made based on the classification unless otherwise expressly specified.

1.1.8 The Vessels 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.

1.1.9 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.

1.2 Statement of Purposes of the Vessels

1.2.1 The Vessel shall be used by HKPF within Hong Kong Waters with its main responsibilities as follows:

(a) To be safe, fit and suitable for the operational purposes for which it is intended, namely to be navigated by the HKPF anywhere within the Hong Kong Waters, especially in Deep Bay and Starling Inlet, covering mudflats, mangrove swamps, rocky foreshores, open water and transitions between all these conditions.

(b) Preserving the integrity of the HKSAR Boundary of Administration, preventing and detecting crime, performing law enforcement and observation duties, including immigration and smuggling, supporting Excise and Conservancy Law Enforcement, providing policing support to Mai Po Marshes RAMSAR site and remote areas, undertaking police amphibious search-and-rescue operations, casualty evacuation, disaster relief, maritime security, counter terrorism and logistical support.

(c) Involving considerably more than mere navigation, and including manoeuvring at high speeds over shallow water and tidal zone access over flat clam water, beach landings and recovery of officers, and such other actions being required for enforcement purposes.

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 1.7.2(e) 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 WMO Sea State 2. For this purpose, 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 3.

(b) KPP 2: Patrol Speed

The Vessel shall be capable of performing patrol duties under Operational Load Condition Intermediate (as per Paragraph 1.7.2(e) of this Part VII), maintaining speeds of at least twenty (20) knots in WMO Sea State 3.

(c) KPP 3: Manoeuverability

The Vessel shall be capable of safe, stable, predictable high-speed manoeuvrability in interdiction missions.

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 Acceptance Certificate is issued.

1.3 Authorities

1.3.1 The Government New Construction Section (GNC) of the Marine Department (MD) is the section responsible for the procurement of the Vessels for 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 on behalf of the Government.

1.4 Shipyard

1.4.1 The Contractor's nominated shipyard building the Vessels must have the essential shipbuilding and workshop facilities such as lifting gears, hull construction and calibration equipment, machinery installation and calibration equipment and vessels launching or slipping facilities.

1.4.2 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.

1.5 Design and Construction Responsibility

1.5.1 The Vessel shall be designed and constructed for a service life of not less than 15 years under reasonable maintenance.

1.5.2 It is the SOLE responsibility of the Contractor to supply the Vessels which is safe, fit and suitable for the intended operational purposes of the HKPF as set out in Paragraph 1.2.1 above 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.

1.5.3 The Vessel shall be designed and constructed in accordance with The Hovercraft Code published by the Maritime Coastguard Agency UK on 8 December 2015 as amended (The Hovercraft Code), or equivalent. The Tenderer shall state in Schedule 9 of Part V which RO is to issue a Commercial Hovercraft Safety Certificate in the form of a Certificate of Compliance with The Hovercraft Code, or equivalent, to this effect. Although a Commercial Hovercraft Safety Certificate of Compliance is required instead of a full term Commercial Hovercraft Safety Certificate, this RO shall have received authorisation by a relevant government authority in issuing the full term Commercial Hovercraft Safety Certificate on that authority's behalf. Unless otherwise expressly stipulated in this Part VII, **(a) references to "RO" in this Part VII shall mean the RO as specified in Schedule 9; and (b) references to "RO Requirements" shall mean the requirement of the rules and regulations of the RO or The Hovercraft Code as specified in Schedule 9**. Notwithstanding the foregoing, where it is expressly permitted in this Part VII that in relation to a particular requirement, instead of the RO specified in Schedule 9, another RO which is any one of the ROs listed in Paragraph 2.4.5 (a) to (i) may be designated for compliance with the relevant requirement, references to "RO" shall mean such other RO.

1.5.4 The Vessel is required to be issued with a Certificate of Compliance as described in Paragraph 2.4.2 of this Part VII by the RO as specified in Schedule 9. Certification of the Vessels refers to the process in facilitating the issuance of this Certificate of Compliance. All plans, particulars and documentations which are required for the certification of the Vessels by the RO, in addition to those listed in Annex 3 to this Part shall be approved by the RO before submission to MD for endorsement and final approval prior to commencement of work. Any subsequent modifications or additions shall be treated in the same manner. Those drawings which are not required under vessel certification approval shall be submitted to MD for approval before work is carried out.

1.5.5 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 Vessels except the design stresses and scantling, shall be submitted to GNC for approval before completion of the Vessels design. The design stresses and scantling including internal structural members shall be determined according to the requirements of the RO.

1.5.6 The Contractor shall design, build and supply the Vessels in full compliance with the requirements given in this Part VII which, to that extent, may be over and above what is normally required by any statutory and RO requirements. Should there be any contradiction between the RO requirements and this Part VII, this Part VII shall prevail unless GNC stipulates or agrees otherwise.

1.5.7 Even if the Contractor may appoint a sub-contractor to design the Vessels 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.

1.6 Survey and Inspection

1.6.1 Tenderers shall note that the price of the Vessels quoted in Schedule 1 – Price Schedule in Part V shall be deemed to have included the cost of surveys to be carried out by the relevant RO in respect of that Vessels (if required to be arranged by the Contractor under the Contract).

1.6.2 All electronic items and their installations shall be approved and inspected by COMMS or COMMS representatives as part of the Technical and Operation Acceptance.

1.6.3 Subject to Paragraph 1.6.7 of this Chapter, an advance written notice of not less than ten (10) 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 Vessels. The Contractor shall be fully responsible for any delay if the Contractor fails to give adequate notice as aforesaid.

1.6.4 The Contactor shall provide

(a) an Implementation Timetable, in the form set out in Annex 2 to this 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 this Part VII; and

(c) the Main Items Inspection Timetable in the form set out in Annex 4 to this Part VII.

Each one of the above shall be submitted to GNC for approval upon commencement of the Contract Period.

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

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.

1.6.5 A weekly work progress report with photographs evidencing the progress with sufficient details and material/equipment procurement status is required to be submitted to MD during the construction of the Vessels. The weekly report shall be submitted before noon of every Monday.

1.6.6 MD may designate consultant(s) from private sector who will be authorised to represent the GNC in all technical matters including site supervision and plan approval related to the construction of the Vessels. The Contractor shall cooperate with the consultant(s) and afford unhindered access to the Vessels at all times during working hours, and shall furnish them with current copies of all approved drawings, sketches, correspondence, change notices, change orders, test agendas, schedules and other necessary documents where applicable.

1.6.7 After arriving at the site for a survey visit, if MD officers consider it is unsafe to carry out the test or inspection, the test/inspection will not be carried out. The Contractor shall arrange another additional survey visit at the Contractor's expenses. 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.

1.6.8 Where any fee charge and associated expense are payable for the services of an RO which are necessary in order to fulfil any obligation of the Contractor under the Contract, the Contractor is responsible to pay 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.

1.6.9 The Contractor shall provide office space for MD officers or consultants and representatives of the HKPF during their survey visits and construction progress visits to the Vessels at the shipyard where the Vessels are constructed. The office space shall include, but not be limited to, two (2) desks, four (4) chairs, power supply and one (1) cupboard for storage of documents and work clothes. The space provided by the Contractor shall also be fitted with air conditioning, and have Internet access. Cleaning of the space shall be carried out every working day.

1.6.10 The hours of work of MD officers or HKPF officers will be arranged to coincide with those of the shipyard, in so far as it is practicable to do so. It is intended that all reasonable steps be taken so that the duties of the MD officers and consultants and representatives of the HKPF can be carried out effectively.

1.6.11 The final survey and inspection visit will be the Pre-Shipment Construction and Handling Inspection as specified in Paragraph 1.6.12 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, was completed. The Contractor shall provide GNC with one 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.

1.6.12 A Pre-Shipment Construction and Handling Inspection of the Vessel, as detailed in Paragraph 1.7.1 of this Part VII, shall be conducted at sea in the country in which the Contractor has built the Vessel (if the Contractor has built the Vessel in a place outside the HKSAR) to confirm that the construction of the Vessel conforms with the requirements of Clause 2.5 of Part IV, that any outstanding modification work required to be performed under Clause 2.7 of Part IV, Paragraph 1.2.3 of this Part VII or under any provision of the Contract Documents has been completed satisfactorily. To mitigate the commercial risk which would result from shipment of the Vessel to Hong Kong and possible subsequent failure of the Official Sea Trial specified in Paragraph 1.7.2 of this Part VII, this Pre-Shipment Construction and Handling Inspection shall include but not be limited to a speed trial conducted by the Contractor under the same conditions as set for the official speed trial specified at Paragraph 1.7.2(f) of this Part VII and also the assessments stipulated in Paragraph 2 in Annex 8 of this Part VII. The purpose is to enable early identification and rectification of undesirable performance before shipment.

1.7 Procedures for Vessel Acceptance

1.7.1 Stage 1 - 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 or other means acceptable to GNC in determining the final lightship data shall have been carried out and approved by the RO and the 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. Stability tests as per Paragraphs 3.4 of this Part VII shall also be carried out before proceeding further. Documentary evidence as stipulated in Paragraph 3.4.6 of this Part VII showing that the Vessel is safe to go 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 8 to this Part VII at or near the site where the Vessel is constructed.

(c) Pre-shipment speed trial

Pre-shipment speed trial 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 their appointed agents.

(i) The actual mean speed shall be determined by taking arithmetic mean of four (4) runs, with two (2) runs in each direction. No corrections shall be made due to wind, wave and weather conditions.

(ii) The pre-shipment speed trial shall be carried out with the engine power at declared maximum (rated) power specified by the manufacturer under the Full Operational Load Condition as specified in Paragraph of 1.7.2(e) of this Part VII. If the Vessel fails to achieve the Contract Speed stated in Paragraph 2.5.1 of this Part VII, the Government will deem that the Vessel has failed to pass Stage 1 - Pre-Shipment Construction and Handling Inspection.

(iii) The instruments used in measuring the Contract Speed for the pre-shipment speed trial shall be provided either by:

- the Contractor on the conditions that the instrument has been calibrated by a certified body acceptable to GNC and the HKPF; or
- the Global Positioning System (GPS) supplied by the Government; or
- the GPS or Differential Global Positioning System (DGPS) which is properly calibrated (with supporting calibration documents) and installed on board the Vessel is acceptable to GNC and the HKPF; or
- other speed measuring methods acceptable to GNC and the HKPF.

(d) Electronic Navigation Equipment (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) Condition for proceeding to Stage 2

After meeting all the requirements of this Stage 1 - Pre-shipment Construction and Handling Inspection, the Vessel shall then be shipped to Hong Kong and to proceed to Stage 2 - Official Sea Trial.

1.7.2 **Stage 2 - Official Sea Trial**

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

The Official Sea Trail shall be carried out in Hong Kong in the presence of MD's officers or consultants, and HKPF representatives.

(b) Official Sea Trial programme

The Contractor shall submit an Official Sea Trial programme for MD'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 tests as specified in Paragraph 1.7.2 (f), (g), (h), (i), (j), (k), (l), (m), (n), (o), (p), (q) and (r) below. This submission shall include the RO approved inclining experiment (or equivalent means in determining the final lightship data) report 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). Before the Official Sea Trial, the Contractor shall observe the certificate of competency and third party insurance requirements under the laws of Hong Kong.

(d) Contractor's staff on board 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 MD with appropriate details about each one of the Contractor's staff who will be on board. 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 1.7.2(b) of this Part VII. The number of persons on board during a particular test or trial shall be agreed by the MD officers and HKPF representative. The location of each person on board (which can affect the centre of gravity of the Vessel under trial) shall also be first agreed by the MD officers and HKPF representative.

(e) Loading conditions for tests and trials

The loading conditions to be used during tests and trials are specified below:

	Operational Load Condition		
	Light	Intermediate	Full
Fuel (minimum)	90%	90%	90%
Crew	2	2	2
Officers	nil	2	6
Kit	16 kg	32 kg	64 kg
Equipment	20 kg	40 kg	80 kg

All loading conditions used during the test and trials shall be compiled using the approved final lightship weight and centre of gravity. Stability tests as per Paragraphs 3.4 of this Part VII shall also be carried out before proceeding further. Documentary evidence as stipulated in Paragraph 3.4.6 of this Part VII showing that the Vessel is safe to go to sea for the intended tests and trials specified in the Contract shall be submitted.

(f) Official speed trial

As part of the Official Sea Trial, the Contractor shall carry out the official speed trial to determine whether the Contract Speed 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, 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. The speed for each run shall be measured by the instruments provided either by:

- the Contractor on the conditions that the instrument has been calibrated by a certified body acceptable to GNC and the HKPF; or
- the Global Positioning System (GPS) supplied by the Government; or
- the GPS or Differential Global Positioning System (DGPS) which is properly calibrated (with supporting calibration documents) and installed on board the Vessel is acceptable to GNC and the HKPF; or
- other speed measuring methods acceptable to GNC and the HKPF.

(iii) The Contract Speed is considered not achieved if the Contract Speed cannot be attained during the official speed trial after a total of FIVE runs in each direction.

(iv) The Contract Speed stated in Paragraph 2.5.1 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 Full Operational Load Conditions as specified in Paragraph 1.7.2(e) of this Part VII. If the Vessel fails to achieve the minimum Contract Speed stated in Paragraph 2.5.1 of this Part VII, 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 condition 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 Vessel speed versus propulsion engines' rpm and power, with particulars of the vessel loading and displacement in the test(s).

(h) Manoeuvrability test

Forward turning circle tests to port and starboard sides shall be carried out. 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) Hover-on and Hover-off test

On an air-cushion moving on and off the landing site and the cradle as detailed in Paragraph 3.13 of this Part VII, under representative loading condition shall be carried out.

(j) Crash stop test

The minimum time and distance achievable by the Vessels when running from full ahead to stop.

(k) Astern running test

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

(l) 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.

(m) Anchoring Test

(n) Slow and fast turning to port and starboard.

(o) Towing test (at sea and over hard ground)

(p) Noise Measurement (onboard)

(q) All other tests and trials as required in The Hovercraft Code, including but not limited to Section 28 of The Hovercraft Code.

(r) Electronic Navigation Equipment (ENE) items

ENE items to be tested as per Chapter 7 of this Part VII relevant to Stage 2 - Official Sea Trial.

(s) 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.

(t) 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 1.7.2 of this Part VII, the content of which shall include the results of all tests and trials as stated in Paragraph 1.7.2 of this Part VII. The report shall contain information regarding the method of test, engines' running condition, sea, 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 1.7.2 of this Part VII. Such information shall be prepared in a format to be agreed by GNC.

1.7.3 **Stage 3 – Technical and Operation Acceptance**

(a) All tests, trials and the experiment as required in this Part VII should all have been conducted as part of the Technical and Operation Acceptance including Pre-Shipment Construction and Handling Inspection of the Vessel as stated in Paragraph 1.7.1 of this Part VII, the Official Sea Trial as stated in Paragraph 1.7.2 of this Part VII, the inclining experiment or other means in determining the lightship data acceptable to GNC, the stability tests as per Paragraph 3.4 of this Part VII, 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 carrying out the tests and trials stated in Paragraphs 1.7.3 (a) and 1.7.3(b) of this Part VII.

(d) If the Vessel cannot pass all of the tests comprising the Technical and Operation Acceptance by the deadline specified in the Contract, the options available to the Government are set out in Clause 12 of the Conditions of Contract and other applicable provisions of the Contract.

1.7.4 **Stage 4 – Delivery Acceptance**

(a) The Vessel, after its successful completion of Technical and Operation Acceptance shall be delivered at the Contractor's expense to the Government Dockyard.

(b) Certificate of Compliance as described in Paragraph 2.4.2 of this Part VII shall be issued by the relevant RO as specified in Schedule 9 before the Acceptance Certificate is issued by the Government.

(c) The Contractor must demonstrate to MD that all hull construction, outfitting, Vessel stability, machinery, electrical and electronic equipment are in good working order; and must hand over the Vessel, its fixtures and Equipment to MD in good and complete condition.

(d) Documentation required prior to and at Delivery Acceptance shall be in accordance with Paragraphs 8.2 of this Part VII.

(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 the Technical and Operation 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 completed once the Director of Marine has issued the Acceptance Certificate.

1.8 Warranty Services During the Warranty Period

1.8.1 Notwithstanding and without prejudice to the Contractor's obligation to provide the Warranty Services for the Vessel under the Conditions of Contract, the original copy of the manufacturer's warranty certificates and all related manuals and documents in respect of all the Equipment, valid for twelve (12) months from the date of Acceptance Certificate of the Vessel, shall be delivered to MD upon Delivery Acceptance.

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

1.8.3 The Contractor is responsible for arranging the Vessel for Guarantee Slipping commencing at the end of the 12-month Warranty Period. In addition to any defects which the Contractor may be required to fix under Clause 18 of Part IV (Conditions of Contract), 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.

1.9 Support Services

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

1.9.2 The through life support and maintenance programme for the expected life cycle of not less than 15 years shall be submitted by the contractor.

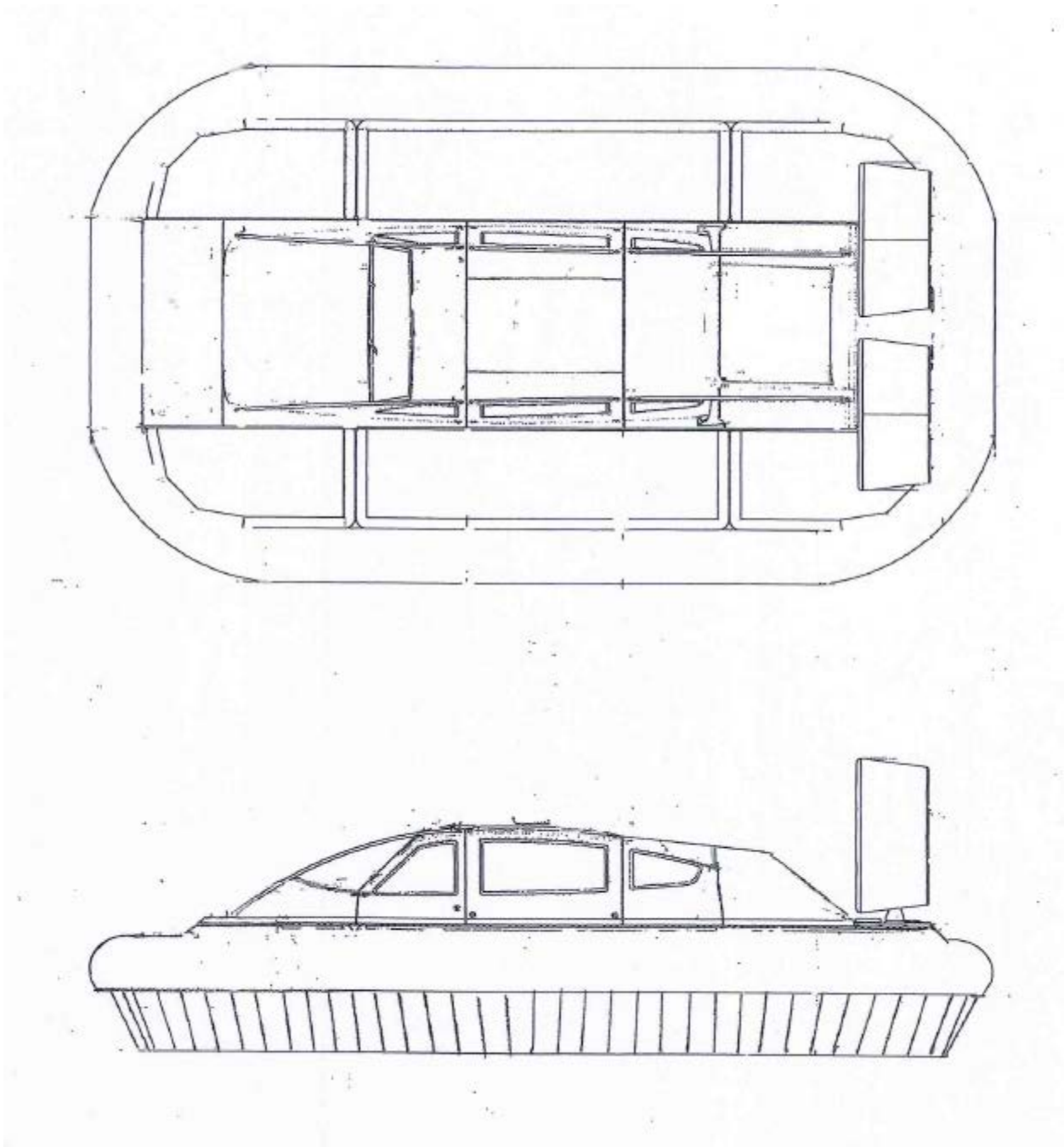
1.9.3 Support and maintenance services must be available (i.e. serviceable) in Hong Kong in respect of all Equipment installed in the Vessel and return of the whole or part of the Equipment to the original place of the manufacturer or supplier shall not be necessary in order to carry out any repair work.

1.10 Asbestos Free

1.10.1 The Vessel must not contain any asbestos or asbestos containing materials. The Contractor must comply with the Hong Kong Air Pollution Control Ordinance (Cap. 311), Part X. The Contractor shall engage a service supplier approved by one of the RO as listed in Paragraph 2.4.5 (a) to (i) of this Part VII to verify that there is no asbestos on the Vessel. An asbestos free certificate or a statement of compliance issued by the service supplier to this effect shall be provided upon delivery of the Vessel.

Chapter 2 General Technical Requirements

2.1 Conceptual General Arrangement Plan



2.2 General Provisions

2.2.1 Without prejudice to the generality of Chapter 1, this Chapter contains the more particular technical specifications for the Vessels. The significance of Essential Requirements are explained in Paragraph 1.1 of Chapter 1 above.

2.2.2 The work to be done under this Contract consists of the design, construction, outfit, testing and delivery of two (2) hovercraft for the Hong Kong Police Force (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 is required to exercise its professional expertise and knowledge to come up with an appropriate design for the Vessels which can comply with all requirements of the Contract. The conceptual General Arrangement Plan shown above only serves as guidance and reference drawing to help to explain the tender requirements stated in this Part VII.

2.2.4 During the design and construction of the Vessels, the Contractor is required to submit a detailed General Arrangement Plan (GA Plan) and all relevant construction drawings for GNC's approval and acceptance.

2.2.5 ALL the machinery, equipment and facilities, furniture, fixtures and fittings, including outfitting of the Vessels that are described in this Part VII, together with their requirements for design and installation standards that are stipulated in this Chapter and in any other parts of the TS, are the items that must be included in the complete "As-built" Vessels delivered to the Government.

2.2.6 The Tenderer should note that the Vessel required under this Contract is one that will be used for law enforcement duties in harsh seas and adverse weather environment. Therefore the Vessel is required to be designed and built to a standard OVER and ABOVE commercial and statutory safety standard. The Vessel will be required to take part in security, anti-terrorism, and other confidential operations involving specialist kit and equipment, details of which cannot be made public. Therefore, detailed information pertaining to the design requirements for certain storage, mounting and/or installation of such specialist equipment will only be made known to the Contractor at the kick-off meeting. Such specialist equipment would not influence ship lines, payload, hull form nor unduly alter centre of gravity.

2.3 General Description

2.3.1 The Vessel shall be built in marine grade aluminium alloy hull structure suitable for the use in marine environment with twin-engines as a hovercraft, and separate propeller/fan for propulsion and lift respectively. [E]

2.3.2 The Vessel shall have a partially covered cockpit for eight (8) persons, and has a payload of at least 950kg. [E]

2.3.3 The Vessel shall be designed for access to shallow water and intertidal mudflat for purpose as specified in Paragraph 1.2.1 of this Part VII. [E]

2.3.4 Details stated in Paragraph 2.3.2 above shall be discussed at the kick-off meeting.

2.4 Rules and Regulations

2.4.1 The Vessel shall be designed and constructed in accordance with the latest edition of The Hovercraft Code or equivalent. [E]

2.4.2 The Vessel shall be issued with a Commercial Hovercraft Safety Certificate (in the form of a Certificate of Compliance), the Record of Particulars and Record of Equipment report (or a Record of Compliance Examination Against the MCA Hovercraft Code), as per Section 28 and Appendix 2 of The Hovercraft Code by the relevant RO. This Certificate of Compliance shall not

be issued under any authority of any government, but shall be issued under the RO's own capacity in declaring full compliance with The Hovercraft Code. All plans, particulars and documentations which are required for facilitating the issuance of the Certificate of Compliance shall be approved by the RO before submission to GNC for endorsement and final approval prior to commencement of work. Any subsequent modifications or additions are to be treated in the same manner.

2.4.3 The Vessel shall be surveyed by the representatives of the RO during construction for compliance with the plans, particulars and documentations approved by the RO and by GNC, including relevant tests and trials. Records of survey shall be made available to GNC.

2.4.4 The Contractor shall design, build and supply the Vessels in full compliance with the requirements given in this Part VII which, to that extent, may be over and above what is normally required by any statutory and RO's requirements. Should there be any contradiction between the RO requirements and this Part VII, the final decision shall rest with GNC.

2.4.5 Without prejudice to the general requirements 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 Vessels must comply with the requirements of the RO specified in Schedule 9 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, another RO which is any one of the ROs listed in sub-Paragraphs (a) to (i) below may be designated for compliance with the relevant requirement), and also the requirements further specified in sub-Paragraphs (j) to (o) below:

(a)	American Bureau of Shipping	ABS
(b)	Bureau Veritas	BV
(c)	China Classification Society	CCS
(d)	Det Norske Veritas Germanischer Lloyd	DNVGL
(e)	Korean Register of Shipping	KR
(f)	Lloyd's Register	LR
(g)	Nippon Kaiji Kyokai	NK
(h)	Registro Italiano Navale	RINA
(i)	Russian Maritime Register of Shipping	RS

and other entities as specified below:

(j) International Electro-technical Commission (IEC) Regulations for the Electrical and Electronic Equipment.

(i) IEC 60092 – 350, Electrical Installations in Ships – part 350: Shipboard Power Cables – General Construction and Test Requirements.

(ii) IEC 600332-1 (all parts), Test on electrical and optical fibre cables under fire conditions – Part 1: Test for vertical flame propagation for a single insulated wire or cable.

(iii) IEC 600332-3-22, Test on electrical cables under fire conditions – Part -3-22: Test for vertical flame spread of vertically mounted bunched wires or cable – Category A.

(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-paragraph (a) to (i) above or American Welding Society (AWS) or other applicable international standards or rules acceptable by MD.

(m) International Regulations for Preventing Collisions at Sea 1972, and its latest amendments.

(n) International Organization for Standardization

(i) ISO 12215 – Small craft – Hull construction and scantlings

(ii) ISO 12216 – Small craft – Windows, portlights, hatches, deadlights and doors. Strength and watertightness requirements

(iii) ISO 10133 – Small craft – Electrical equipment – Extra low-voltage DC installations

(iv) ISO 7840 – Small craft – Fire resistant fuel hoses

(v) ISO 8846 – Small craft – Electrical devices – Protection against ignition of surrounding flammable gases

(vi) ISO 10088 – Small craft – Permanently installed fuel systems and fixed fuel tanks

(vii) ISO 13297 – Small craft – Electrical systems -- Alternating current installations

(viii) ISO 13929 – Small craft – Steering gear. Geared link systems

(ix) ISO 10592 – Small craft – Hydraulic steering systems

(x) ISO 9094-1 – Small craft – Fire protection

(o) All equipment/fittings shall be designed and manufactured to at least the standards as specified in these Technical Specifications. When none of the rules and regulations in Paragraphs 2.4.5 (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	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 amongst the above requirements, rules and standards, those mentioned in sub-Paragraphs (j) to (o) shall prevail over the requirements of the relevant RO as listed in sub-Paragraphs (a) to (i) above.

2.5 Contract Speed

2.5.1 In the Full Operational Load condition as specified in Paragraph 1.7.2(e) of Part VII, and with all engines running at their declared Maximum Continuous Rating (MCR), the guaranteed minimum highest achievable speed shall be as follows:

Forward speed in still air on water:	30 knots	[E]
Forward speed in still air on hard and soft ground:	15 knots	[E]

2.6 Principal Dimensions

Length Overall:	7.5 – 9 m	[E]
Extreme Breadth:	4.5 – 5.5 m	[E]
Maximum Height:	Design to suit	
Hover Height or Hard Structure Clearance:	As per Section 11.3 of The Hovercraft Code	

2.7 Material of the Construction

Hull structure:	Marine Grade Aluminium	[E]
Skirt:	Hypalon Loop and Natural Rubber Segments	[E]
Air propeller (and Impeller) blades:	Marine Grade Aluminium or Composite Material	[E]
Air propeller duct (shroud):	Marine Grade Aluminium or Composite Material	[E]
Console:	Marine Grade Aluminium or Composite Material	[E]

2.8 Vessels Operating Profile and Environment

2.8.1 Summary of Operational Hours / Range

Number of hours/day	6 hours/day	
Number of days/year	300 days/year	
Endurance for fuel capacity over ground and sea	4 hours at the patrol speed as specified in Paragraph 2.5 of Part VII plus 2 hours at the maximum speed as specified in 1.2.2(b) of Part VII, both are in still air on water, and both with Full Operational Load Condition as specified in Paragraph 1.7.2(e) of Part VII	[E]

2.8.2 The Vessels shall be able to operate (fulfil its operational roles) safely within Hong Kong Waters, including Deep Bay and Starling Inlet where the water depth depends on tide, prevailing wind direction and weather. Both areas are bordered with swamp and bushy ground where the Vessel may also operate occasionally to the outlying island within three (3) nautical miles of land in the HKSAR, in fair weather (calm sea state to not more than 0.6 metre significant wave height when running against a 25-knot wind from any direction) condition.

2.8.3 Surfaces that the Vessel shall encounter including mud, very shallow water areas, marshland, swamp areas, sand and rocky beaches, and slipways (for the Vessel to take to travel on land), in particular, the following areas in Hong Kong:

- Inner Deep Bay shallow and mudflat;
- Kam Tin River at Nam Sang Wai;
- Shan Pui River at Nam Sang Wai; and
- Starling Inlet.

2.9 Seakeeping and Manoeuvrability

2.9.1 The Vessels shall have good seakeeping performance in head wind of Beaufort Scale 6 and in head sea of 0.6m wave height. In the service operation condition, the Vessels shall be stable and of high resistant to capsize with sufficient stability.

2.9.2 The Vessels shall have good manoeuvrability and quick response throughout its speed range when carrying its full load and complement.

2.10 Markings and Colour Scheme

2.10.1 The Contractor shall provide the markings and colour scheme for the Vessels. All painting colour scheme for the Vessels and fittings shall be approved by GNC before application.

2.10.2 All marks, names, insignia and other colour markings should be in a colour contrasting with the hull and consoles' colour. [D]

2.10.3 All labelling shall be both in traditional Chinese and English and as per applicable rules and regulations. The HKPF logo shall also be displayed on both sides of the Vessels and at location as directed by the MD and HKPF.

2.10.4 The Vessels' name shall be marked permanently on both sides of the Vessels. The size and calligraphy shall be confirmed by the MD and HKPF.

2.10.5 All labelling, stencilling and marking (not limited to the hull but including all aspects of the Vessels) 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.

2.10.6 Safety markings for the prevention of person tripping in the Vessels shall be provided where necessary.

2.11 Tally Plates

2.11.1 The following information shall be displayed on the builder's plate.

(a) Builder's name;

(b) Vessels's name;

(c) Year of build;

(d) Maximum number of persons including the crew that the Vessels is designed to carry.

2.11.2 Tally plates in both English and Traditional Chinese characters shall be fitted for all spaces and all equipment as required by MD including but not limited to:

(a) Equipment in the console;

(b) Electrical and communication equipment;

(c) Air vents and filling pipes for the fuel oil tanks;

(d) All valves and 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 and warning and other information as required by MD.

2.11.3 Tally plates exposed to weather shall be made of durable and weatherproof material and be securely fastened.

2.11.4 List of tally plates shall be provided as directed by MD.

2.11.5 All cable termination shall be identified clearly for disconnection and reconnection.

2.12 Other Design Features

2.12.1 Berthing requirement of the Vessels shall match with the designated point of berth at Government Dockyard and HKPF operation base.

2.12.2 Permanent list is not allowed.

2.12.3 Permanent ballasts can only be used as agreed by GNC.

2.12.4 The Vessel shall perform at all speeds in WMO Sea States 0 to 2 without loss of directional control;

2.12.5 The Vessel’s deck shall be of a flush design free of trip and snag hazards.

2.12.6 The Vessels shall be designed and constructed so that there is no undue vibration in the hull structure or machinery.

Chapter 3 Hull

3.1 Structures of the Hull and Scantlings

3.1.1 The Vessel shall be designed and built as a rigid inflatable fully amphibious hovercraft, the total weight of which is supported by an air cushion generated by an engine(s). Surface effect ship with side walls immersed in water while the Vessel is on cushion is not acceptable. The Vessel shall provide seats for eight (8) persons. The hull structure shall be constructed with marine grade aluminium with inflatable sponsons surrounding the hull structure of the Vessel. The Vessel shall be fitted with replaceable landing pads or skids to facilitate parking. The Vessels shall be designed to support the maximum weight on three-quarters of the supports of the landing pad. The support areas shall be clearly marked by paint markings on the hull. The landing pads or skids are to be aligned with the hull supporting structure which shall be additionally stiffened where necessary.

3.1.2 The vessel's design stresses and load (wave height versus speed), maximum acceleration considered and scantlings calculation including internal structural members and skirt system shall be designed according to the RO requirements and The Hovercraft code or equivalent. It shall be capable of withstanding stress coming from wave impact and operation environment conditions. All material and build processes for aluminium construction shall comply with an approved standard acceptable to the RO as specified in Schedule 9. The selection of hull construction materials shall recognise the craft through life cycle and service conditions for ease of repair in the event of hull damage.

3.1.3 Any openings in hull and deck shall comply with the applicable RO's rules for watertight integrity if not otherwise specified by MD or the HKPF.

3.1.4 The hull design shall incorporate bilge system which is capable of draining the cockpit in accordance with the requirements of the RO and Section 10 of The Hovercraft Code, or equivalent.

3.1.5 The Vessel shall be constructed with watertight compartments which provide buoyancy when the Vessels is not on cushion. Watertight hatches shall be provided for the watertight compartments for ease of inspection.

3.1.6 The hull structure design loads shall be in accordance with the Vessels operational profile and other applicable requirements of the RO and The Hovercraft Code.

3.1.7 Hull construction materials shall be new and of a type which has been certified by an RO or other entities acceptable to GNC for shipbuilding purposes. All construction materials shall comply with the requirements of The Hovercraft Code.

3.1.8 The up-to-date records of the structural materials, with identification details, being used for vessel construction shall be provided to GNC before and/or during the construction stage of the Vessel.

3.1.9 The Contractor shall carry out quality control throughout the construction of the Vessels by their quality control personnel. Quality control records shall be made available when requested by GNC.

3.1.10 Strength shall be maintained by ensuring hull structural continuity of main members including bottom and deck girders and transverse web frames. Where the strength of a main structural member is impaired by cuts or interruptions in continuity, efficient means of compensation shall be fitted. Special care shall be taken in reinforcing the hull in way of the fenders and areas likely to experience slamming.

3.1.11 The hull shall be fitted where appropriate sacrificial anodes suitable for the hull materials.

3.2 Weld and Fabrication

3.2.1 All welding and fabrication shall be performed according to the applicable requirements of any one of the Classification Societies listed in Paragraph 2.4.5 (a) to (i) of this Part VII.

3.2.2 Welded joints shall be designed and constructed carefully to conform to the latest established standards and shipbuilding practice to prevent fatigue and other failures. Cutting for edge preparation shall be performed by qualified persons to achieve the correct angle, shape, profile and smooth finish of the edges. Only qualified welders acceptable to the RO shall perform the welding work. Welding procedure specification shall be submitted to RO for approval before construction.

3.2.3 The Contractor shall submit certification of the qualifications of each individual welder and inspector. Welds using unqualified procedures or welding performed by non-certified welders shall be subject to removal by the Contractor at its own expense.

3.2.4 The structure fabrication and quality control regime shall include but not limited to the following:

(a) Inventory of incoming material, consumables components and machinery;

(b) Traceability procedures for materials together with traceability identification codes which shall be serial and indexed to the controlled manufacturing procedures;

(c) Lofting, cutting, fit up, welding, forming and dimensions of structural components;

(d) Welding and inspection procedures identifying clearly the type and extent of NDT inspection carried out on the Vessel's structure. Normally, not less than 10% of the structure shall be subjected to Ultrasonic Test (UT) and Radioactive Test (RT); NDT Plan shall be submitted to RO for approval in advance.

(e) Machining, measuring and inspection equipment maintenance and calibration;

(f) Finish surfaces and bolting;

(g) Procedures for non-conformance reporting and rectification of defects; and

(h) Design and manufacturing drawing control and procedures for revisions, updates and reissue of drawings.

3.3 Skirt

3.3.1 The skirt shall be an open loop and segment type. The loop shall be made from rubber coated polyester weave. For ease of maintenance, the segments shall allow to be unbolted for replacement and the whole skirt system shall be accessible without having the Vessels lifted out of the parked position on hard surface.

3.3.2 The air cushion shall have sufficient depth to provide stable performance whilst going into wind and waves, also traverse over higher obstacles and mounds.

3.3.3 Details of the skirt system shall be submitted to the RO and MD for approval before construction, including but not limited to the following:

(a) The skirt is securely attached around its periphery and shall be suitably reinforced by the use of backing plates;

(b) Where the skirt is retained by bolting, the retaining bars are to be as long as practicable with a fastener spacing of not more than 50 mm; and

(c) Where the design of the skirt is such that the flexible edge is retained by the use of a pre-formed channel, only the bolted hull connection of the preform to the hull structure is considered.

3.3.4 The construction and materials of the skirt shall also comply with The Hovercraft Code, Section 4.8, or equivalent.

3.3.5 The skirt system shall be such as to ensure adequate stability when hovering on cushion under all operating conditions. The skirt shall be designed by taking Sections 11.1, 11.4 and 11.5 of The Hovercraft Code into account. Please refer to Paragraph 3.4.3 of this Part VII below.

3.4 Stability

3.4.1 The Vessels shall meet the stability requirements of the RO and Section 11 of The Hovercraft Code or equivalent. The stability test report of a previously built identical vessel, showing compliance with the stability requirements specified in The Hovercraft Code, shall be submitted with the tender. All calculations, drawings and measured data must be in metric units. [E]

3.4.2 The Vessels are required to comply with the intact stability requirements when the Vessels are in the displacement mode (off cushion stability – intact), on cushion stability, off cushion stability – open craft swamped, person recovery stability test and operational damage stability requirements of the RO and The Hovercraft Code or equivalent.

3.4.3 The skirt system shall be such as to ensure adequate stability as required in Section 11 of The Hovercraft Code.

3.4.4 When the Vessels are floating with the lift system not operating, the freeboard shall be more than 200 mm as determined in accordance with Section 12 of The Hovercraft Code.

3.4.5 Final stability assessment results shall be delivered to RO and MD prior to the Official Sea Trial mentioned in Paragraph 1.7 of this Part VII.

3.4.6 Stability Assessment Report

(a) The Vessel shall comply with the stability criteria as given in Section 11 of The Hovercraft Code, or as required by the RO.

(b) A Stability Assessment Report of the Vessel collecting evidence and records of the tests and trials as stipulated in The Hovercraft Code shall be provided by the Contractor to Government at Delivery Acceptance.

(c) The Stability Assessment Report shall include all the general information of the vessel (i.e. General Particulars of main dimensions, all up weight, maximum carrying capacity, etc.), trial or test procedures, and applicable stability assessment and trials results (slipway hover trials, plough-in trial, yaw speed trial, skirt draining trial, intact stability trail, damaged structure trial, man-overboard recovery trial, swamp test or calculations, etc.)

(d) The Stability Assessment Report shall be endorsed by the RO before submitted to MD.

3.5 Painting

3.5.1 Paints shall be of a fire-retardant marine quality and applied in accordance with the manufacturer's specification.

3.5.2 The volatile organic compounds (VOC) content limits of the paints shall comply with the Hong Kong Air Pollution Control (Volatile Organic Compounds) Regulations CAP 311W.

3.5.3 The Painting Schedule shall be submitted for MD's approval before commencement of work. The proposal shall contain a list and the detailed specification of the paint intended to be used. Thickness of each coating shall be specified and to be approved by GNC.

3.5.4 The Contractor shall guarantee all painting work for one (1) year against defects in material and workmanship. At Delivery Acceptance, the Contractor shall provide MD with a letter of certification from the paint manufacturer to certify that the paint was applied under the paint manufacturer's quality control and in accordance with the manufacturer's requirements including but not limited to the surface preparation, dry film thickness and method of application.

3.5.5 Surface treatment of hull structure shall satisfy the requirements of paint manufacturer. A paint sample shall be submitted to HKPF and MD for approval prior to painting.

3.5.6 A Tributyltin (TBT) free fouling-release/anti-fouling paint shall be applied on the exterior of the hull below the water line when in displacement mode. A TBT free certificate issued by the paint manufacturer shall be submitted before the Delivery Acceptance. The fluoropolymer foul release coating / antifouling paint shall comply with the International Convention on the Control of Harmful Anti-fouling Systems on Ships.

3.5.7 All deck areas shall be covered with hard wearing and anti-slip epoxy paint.

3.5.8 A painting report shall be submitted to MD upon completion of work.

3.6 Console

3.6.1 The offered Vessels shall have an operational console (the console). The layout of the console shall be submitted for MD's approval before any construction work on the consoles commences. To facilitate the efficient visualisation and inspection of the design of the console, a full size mock-up console complete with deckplate, seats, mounting systems and any other fixtures that may influence the final design of the console are to be manufactured for inspection, modification (if necessary) and confirmation by MD and the HKPF. The mock-up console 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.

3.6.2 The Console

(a) The console shall be integrated with the partly covered cockpit protecting the coxswain and the commander from wind and waves, and to house the equipment required by the coxswain and the commander to control/monitor the Vessel. Details to be discussed at the kick-off meeting.

(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.

(c) The layout of the controls and displays shall be designed to ensure that the coxswain has an unobstructed view from both seated and standing positions.

(d) 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) Steering wheel with engine throttle control;

(ii) Engine monitoring display panel;

(iii) Engine start control;

(iv) Loudhailer control unit and microphone;

(v) A magnetic 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;

(vi) Electric horn;

(vii) Siren and flashing beacon control panel;

(viii) Navigation lights, search lights and flood lights switch panel;

(ix) GPS receiver;

(x) Fuel tanks level gauge;

(xi) Demountable box for storing small amount of firearms, ammunition and pyrotechnics;

(xii) Multi-function radar and electronic chart display screen of at least 14 inches; and

(xiii) EQ-HKPF-related display.

3.6.3 The controls, displays and equipment

(a) All the controls, displays and equipment shall be waterproof, shockproof and suitable for external marine use.

(b) All indication lights, illumination of instrumentation gauges and panel lighting shall be fitted with dimmers for day and night operation.

(c) Lockers shall be provided, if space permits, to allow for the watertight storage of crew equipment. The console 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.

(d) The arrangement shall be designed to protect the crew and persons on board from injury inflicted by the console and the equipment installed in it.

(e) Sufficient legroom shall be provided to obviate the risk of impact injury during rough weather or hard manoeuvres in both the seated and standing positions.

(f) Vibration absorbing mats shall be provided on the deck.

3.7 Lockers/Void Spaces/Air Pipes

3.7.1 Lockers / Void Spaces

(a) Watertight lockers/storage acceptable to the HKPF shall be provided.

(b) Lockers or other storage acceptable to the HKPF shall be provided for one set of emergency repair tool kit.

(c) The location and dimensions of lockers or other storage acceptable to the HKPF shall be discussed at the kick-off meeting and shall be 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 at the kick-off meeting, and subsequently shall be approved by MD and the HKPF. Lockers or other storage shall be ready in the mock-up for inspection before being finalised.

3.8 Deck, Seating and Attachment Systems

3.8.1 High quality upholstered seating shall be provided to accommodate two (2) crew and six (6) passengers, with all of them wearing self-inflatable lifejackets and crash helmets. Anti-vibration deck covering and handrails shall be provided to reduce the risk of impact injury and long-term health damage to both the crew and passengers resulting from the harsh maritime environment in which the Vessels will operate. In particular, the protection of persons onboard against plough-in (expected and unexpected) shall be ascertained in the design and construction of the Vessel.

3.8.2 The seats shall be designed to optimise body posture and to prevent occupants from injuries, such as illustrated in 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 may be subjected.

3.8.3 Basic requirements of the seats:

(a) Materials of upholstery: Water resistant materials such as fire retardant foam/reinforced nylon laminated neoprene/heavy duty Cordura laminate or equivalent.

(b) Protective covers: Covers shall be supplied to protect all of the seats from rain and ultraviolet radiation.

3.8.4 Suitable handrails and grips, coated with appropriate anti-slip material, shall be provided at the console and at other locations around the Vessels to enable operators to move safely around the Vessels at all times.

3.8.5 All flat, horizontal surfaces above deck level where personnel may step shall be coated with an appropriate anti-slip material.

3.8.6 The internal layout of the seating position, control consoles, outfitting on deck, equipment and storage facilities shall provide effective operation of the Vessel to fulfill its duties, as well as for the safety of persons onboard.

3.8.7 There shall be arrangement onboard such that the crew and passengers are safely accommodated with due regards to their safety during the high speed manoeuver of the Vessel.

3.8.8 All moving machinery parts and hot parts shall be well insulated, well located, and be fitted with shroud or protective guards as necessary to avoid injury of the persons onboard.

3.8.9 Appropriate grabrails shall be provided for personnel safety for boarding and manueouvering. Details to be discussed at kick-off meeting.

3.8.10 The Vessel shall be free of excessive and unacceptable structural vibrations with respect to material fatigue as well as human health tolerance and safe.

3.8.11 The designs of the fixtures, fittings and finishing specified shall be discussed during the kick-off meeting and drawings shall be submitted to GNC of MD and HKPF within one month from the date of the kick-off meeting for approval.

3.9 Gunwale Fittings

3.9.1 All gunwale fittings such as cleats and bollards shall be designed to minimise the risks of line tangling or snagging. All deck level tie-down points shall be flush fitting or removable to minimise trip hazards.

3.10 Stern Area

3.10.1 The stern area shall be designed to provide safe and easy access to the machineries for routine checking and troubleshooting including while the Vessels underway at sea.

3.10.2 All machineries shall be protected by a suitable guard as per Section 7.4.2 and 7.5 of The Hovercraft Code. 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.

3.11 Anchor, Chains and Strong Points

3.11.1 The Vessels shall be equipped with one aluminium or stainless steel anchor with certificate issued by the RO and suitable swivel, shackles. Secured stowage shall be provided by the Contractor.

3.11.2 Two 30 m long of 16 mm diameter braided nylon warps for anchoring and towing shall be provided by the Contractor in a suitable stowage.

3.11.3 Two 30 m long of 16 mm diameter nylon warps for mooring shall be provided by the Contractor in a suitable stowage.

3.11.4 The strong points shall be designed and installed with sufficient safety factor to prevent material yield of the strong points or surrounding structures to which they are attached in a welded condition. Calculation of the horizontal load shall be in accordance with the requirements of ISO 15084 or other equivalent international standards. The following strong points shall be provided:

(a) Anchoring/towing point forward (port and starboard);

(b) Mooring point aft (port and starboard); and

(c) Lifting strong points for a four-point lift.

3.11.5 Devices for Lifting the Vessels

(a) The Vessels shall be provided with a 4-point lifting system for docking, storage, inspection and maintenance purposes, designed for use with fixed jib cranes, telescopic cranes, travel hoists and truck mounted cranes.

(i) The Vessels 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 wires/strops would otherwise foul the radar frame or equipment fitted thereto.

(ii) The design of the lifting attachments, 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.

(b) The lifting points and locations shall be designed and installed with sufficient safety factor to prevent material yield of the strong point or surrounding structure. Detailed drawings of the lifting arrangements shall be approved by the RO.

3.11.6 The lifting points shall be designed to withstand at least six times the mass of the Vessels with all the equipment. All devices and accessories shall be certified by the RO in accordance with the laws of Hong Kong prior to delivery. The 4-point lifting method design shall be discussed at the kick off meeting and agreed by MD and 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 method so that HKPF can check dimensional compatibility with its existing lifting facilities.

3.12 Cathodic Protection

3.12.1 Sacrificial Anodes

(a) Sacrificial anodes suitable for the hull materials shall be installed on the hull as appropriate.

(b) The hull shall be provided with adequate cathodic protection to protect the Vessels against corrosion for a minimum of one (1) year.

(c) Details to be discussed at the kick-off meeting.

3.13 Cradle

3.13.1 The Contractor shall supply the Vessel with one (1) suitably designed metal slipping cradle with appropriate safety features on which the Vessels can be slipped ashore and tied down during tropical cyclones. The cradle shall have stoppered wheels and shall be designed to be towed by plant within the HKPF's operational base compounds and be steerable for manual positioning. This cradle is not required for use on public roads. Details to be discussed at the kick-off meeting.

3.14 Radar Frame

3.14.1 A partially covered cockpit with radar, antennae and other equipment installed on top of it shall be provided. Details to be discussed at the kick-off meeting.

3.14.2 The radar frame shall be provided with all necessary fittings including but not limited to brackets for all navigation lights and lightning arrestor.

3.14.3 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 aluminium hull or corrosion resistant material.

Chapter 4 Machinery

4.1 General Requirements

4.1.1 The Vessel is for use in Hong Kong and it is desirable that the main engines, gearboxes, electric generator set and any other machinery offered are those at present commonly used on other craft operating in Hong Kong Waters and therefore good support for spare parts and after sale services locally are already in existence.

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 main 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 on board, due regard being paid to moving parts, hot surfaces and other hazards. 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 on board.

4.1.4 The Vessel shall be powered by two (2) diesel engines for providing the Vessel with power for propulsion and lift. Both engines shall be four-stroke electrically-started inboard diesel engines of adequate power to deliver the Contract Speed as stated in Paragraph 2.5 of this Part VII. [E]

4.1.5 If either engine is having an output power of 130 kW or more, such engine(s) shall have the Type Approval Certificate(s) issued by an RO or other entities acceptable by GNC in compliance to meet IMO Tier 2 emission requirements, and shall be provided to MD.

4.1.6 The design and installation of machineries shall comply with the requirements of the RO and Section 6 of The Hovercraft Code or equivalent.

4.1.7 The Contractor shall be responsible for ensuring the correct installation and setting up of the engines including the choice of air propellers and lifting fans in accordance with the manufacturer's recommendations

4.1.8 The Vessel shall be equipped and fitted with all machineries described each complying with the specifications set out in this Chapter for such machinery. The 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.

4.1.9 Sufficient space in the vicinity of the machinery for local operation, inspection and routine maintenance for all the machinery shall be provided. Procedures and sequences for complete removal of the major items such as the main engines, gearboxes, fuel oil tanks etc. shall be carefully designed to enable their removal from the Vessel for maintenance in a practicable manner so to avoid the need for the deck or shell plate to be cut.

4.1.10 The electrical cables, piping for diesel and hydraulic oil lines run between the console, fuel tanks and the stern shall be suitably designed for ease of maintenance. They shall be supported properly to prevent chafing and unnecessary tension.

4.1.11 Each engine system shall include the following accessories:

(a) 12V electrical alternator and remote starting control;

(b) Emergency cut-off;

(c) Engine protection system as required by engine manufacturer, with audio and visual warnings at the console; and

(d) Each engine shall incorporate one alternator for battery charging.

4.1.12 The Contractor shall supply the Vessels with a comprehensive vessel information display on the console including but not limited to the following:

(a) Engine rpm;

(b) Engine running hours;

(c) Oil temperature and pressure;

(d) Fuel level and range until the fuel tank is empty;

(e) Battery voltage;

(f) Course and speed;

(g) Engine faults and notification alarms (corresponding to real time instead of running hours);

(h) Trip history (corresponding to real time instead of running hours); and

(i) Any other data which the supplied system and outboard engines are capable of generating.

4.1.13 The Contractor shall provide the layout drawings and the mechanical arrangement of the lifting system, together with the voltage and power demand of the lifting fan(s) and thrust propellers.

4.1.14 The exhaust and exhaust pipes shall be insulated or located such that it will not cause injury to persons onboard.

4.2 Propulsion and Lift System

(a) Thrust and lift system:	Two (2) independent power modules using two (2) identical diesel engines provide lift through lift fans and supply two electrical thrust (propulsion) motors driving the propulsion propellers. In case of failure of one power module, the vessel shall be capable of being operated on the remaining power module with reduced performance.
(b) Engine	Two (2) identical diesel engines fulfilling all the requirements as set out in the Paragraph 4.1.1 to 4.1.12 of this chapter shall be provided. All cooling air for the engine (if air-cooled) shall be filtered via a knit mesh filter to ensure maximum protection to the engine.
(c) Engine power margin (in percentage) over MCR	10%
(d) Generator / alternator	i. Each engine shall be fitted with an alternator for the 12 volts DC shipboard system. ii. Each engine shall be able to charge the battery units onboard.

4.3 Steering System

4.3.1 The directional thrust and propulsion of the Vessel shall be provided by twin azimuth electric drive thrust modules. The electric motors shall be fully reversible and independently speed controlled from the navigation console. The twin ducts shall be tied together in normal operation and control from the steering wheel.

4.4 Engine Compartments

4.4.1 All engine compartments shall have weathertight hatches/covers/casings, which are made of GRP or Marine Grade Aluminium, so as to allow optimal reach for maintenance and to facilitate visual check of the engine and other main components of the Vessels.

4.4.2 Arrangements shall provide sufficient air to the engines and shall give adequate protection against damage, as distinct from deterioration, due to ingress of foreign matter.

4.5 Fuel Oil Tank

4.5.1 The fuel oil of the engines shall be supplied from two fuel oil tanks. The maximum capacity of the fuel tank(s) shall provide endurance of the Vessels as per Paragraph 2.8.1 of this Part VII. The Contractor shall design and locate the fuel oil tank in accordance with the RO and The Hovercraft Code or equivalent.

4.5.2 Fuel filters shall be provided on the suction side of the fuel pump. The system design and filtration systems shall be approved by the engine manufacturer.

4.5.3 The tanks shall be hydrostatically tested as required by an approved standard and connections shall be proven tight.

4.5.4 The Contractor shall provide the initial fills of fuel oil, lube oil, coolant, and hydraulic fluids using fluids and additives prescribed by engine manufacturer. The Contractor shall provide a summary listing of all fluids and quantities used.

4.5.5 All materials used in the fuel system shall be resistant to deterioration by its designated fuel and to other liquids or compounds with which it may come into contact under normal operating conditions, e.g. grease, lubricating oil, bilge solvents and sea water.

4.5.6 Requirement of Fuel Oil Tank(s)

(a) Fuel oil tank(s) shall be arranged to allow the Vessels to operate at acceptable trim in all operating conditions and with consideration for the requirements for good static and running trim, ensuring unobstructed visibility. The Vessels shall be designed and built with two fuel tanks to service the Vessel's engines. The fuel tanks shall be interconnected.

(b) The location of the fuel oil tank(s) shall not render the Vessels being non-compliance with the requirements given in this Part VII.

(c) The fuel oil tank(s) shall sustain the loads due to the mass of the fully filled and partially filled tank(s) with due consideration given to accelerated forces due to the Vessels's movements at all speeds at sea, without damaging the tank and ship structure.

(d) A quick closing valve or cock, which can be remotely controlled in emergency from the console or elsewhere to be decided by the HKPF at the kick-off meeting, shall be fitted in the fuel supply line pipe as close as possible to the fuel tank.

(e) Provisions to the fuel oil tank

(i) A tank content gauge shall be fitted in the console. A level gauge in litres shall be provided for each tank;

(ii) Suitable provision such as drip tray shall be made for collecting the oil discharge;

(iii) The tanks shall be designed and installed to prevent water from being trapped on the exterior surface;

(iv) Tank drain shall be provided;

(v) The fuel oil tank shall be fitted with ventilating device acceptable to GNC; and

(vi) Audible and visual low level alarm shall be fitted in the console.

4.6 Bilge System

4.6.1 The Vessels shall be fitted with a bilge system to the requirements of the RO and The Hovercraft Code or equivalent.

4.6.2 A bilge audible and visual high level alarm shall be fitted in the console.

4.6.3 Electric bilge pumps 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 the MD for approval before the completion date stipulated in Annex 2 to this Part.

4.6.4 The Vessels shall be designed and constructed to minimise the potential for the accidental overboard discharge of pollutants (oil, fuel).

Chapter 5 Electrical System

5.1 General Requirements

5.1.1 All the electrical equipment and installation shall meet the RO Requirements or The Hovercraft Code or equivalent.

5.1.2 Engine alternators, at idle conditions, shall provide sufficient power to maintain the battery charged.

5.1.3 All electrical equipment, fittings, instruments, switches, cables, insulation, sheathing, circuit breakers, rating standards and their installations shall comply with the latest Regulations of the International Electro-technical Commission (hereinafter referred to as IEC), Electrical Installations in Ships. The electrical system shall be an insulated two-wire Direct Current (DC) system. The hull shall not be used as a current-carrying conductor.

5.1.4 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.

5.1.5 The electrical equipment shall be capable of operating simultaneously without causing interference to any electronic equipment including the compass. The system shall provide sufficient power to operate all installed electrical systems using a 12-volt DC System.

5.1.6 The Vessels shall be supplied with a comprehensive wiring diagram schematic. 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.

5.1.7 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 for the MD's approval before the completion date stipulated in Annex 2 to this Part VII.

5.1.8 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 the MD's approval before the completion date stipulated in Annex 2 to this Part VII.

5.1.9 Adequate clearance shall be maintained around equipment to provide space for resiliently mounted equipment excursion, for ventilation and maintenance. Shields shall be installed as necessary to protect electrical equipment from drips or spray resulting from normal operation of or damage to, piping systems. Insofar as practical, equipment shall be located to reduce the possibility of damage or malfunction caused by partial flooding of the space in which the equipment is located and to protect the equipment from accidental physical damage.

5.1.10 All 12-volt DC equipment shall function over a voltage range of 10.5V to 15.5V at the battery terminals.

5.1.11 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.

5.1.12 Switches and controls shall be marked to indicate their purpose. Each cable shall be labelled clearly and bear its own unique identification code.

5.1.13 The Equipment's 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.

5.2 Batteries

5.2.1 At least two (2) groups of 12-volt maintenance-free batteries shall be provided for engines and shipboard services.

5.2.2 The capacities of the 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) is required and conform to the requirements of the RO specified in Schedule 9.

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 a dry, ventilated location above the anticipated bilge water level.

5.2.6 In consideration of the intended operational role of the Vessels, the batteries shall be installed in a manner that restricts their movement horizontally and vertically. A battery, as installed, shall not move in any direction when exposed to a force corresponding to twice the battery's weight.

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.

5.2.9 Batteries shall not be installed directly above or below a fuel tank or fuel filter.

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 (with the exception of those required for starting the engines and powering navigation lighting, electronic devices with protected memory and protective devices such as bilge pumps and alarms, which are to be protected individually with a circuit breaker or fuse as close as practical to the battery terminal) shall be connected to the supply system voltage in a readily accessible location through a master battery disconnection switch, installed at or as close as possible to the positive conductor from the battery, or group of batteries.

5.2.13 No oil piping and water piping are allowed to pass above the batteries.

5.3 Distribution Network

5.3.1 12V DC 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 consoles;

(f) Four (4) Hand-held searchlight;

(g) Siren;

(h) Electric bilge pumps; and

(i) Content gauges for the fuel oil tanks;

(j) Blue flashing light;

(k) All other navigational 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 tanks' 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 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.

5.5 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:

(a) IP 67 as a minimum, if exposed to short-term immersion; IP 55 as a minimum, if exposed to splashing water;

(b) IP 20 as a minimum, if located in protected locations inside the Vessels.

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 rain, spray or splashing shall have a minimum protection of IP 55, 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 digital switching.

5.8.2 Independently controlled dimmable walkway lights shall be supplied to cover the fore and aft decks and Vessels's sides.

5.8.3 The arrangements and positioning of the lighting shall be discussed at the kick-off meeting and shall be agreed by the HKPF.

5.9 Navigational and Signalling Equipment

5.9.1 Navigation Lights

(a) Navigation lights shall comply with the requirement specified in the International Regulations for Preventing Collisions at Sea 1972 (as amended by IMO Resolution A. 464 (XII) and A. 626 (XV)).

(b) The lights shall be controlled from the control and alarm panel at the console. 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; and

(v) Anchor light.

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

5.9.3 The Contractor shall provide the following signalling equipment of a type approved by the HKPF:

(a) Two all-round blue flashing lights;

(b) One siren (of a type and loudness requirement to be decided by HKPF at the kick-off meeting); and

(c) One horn.

5.10 Lightning Protection

5.10.1 The Vessel shall be fitted with a proven lightning protection system to protect the personnel on board and the electronic equipment installed. The method and working principle of protection shall be approved by the RO before submission to MD by the completion date stipulated in Annex 2 of this Part VII for endorsement.

5.11 Searchlight

5.11.1 The Contractor shall supply four (4) high-powered hand-held white searchlights. They shall be connected to sockets on board with coiled extension cables of appropriate lengths. Sockets shall be installed on both the port and starboard sides of the console. Facilities for storing the four (4) 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.

5.11.2 The Vessel to be provided with mounted “driving lights” (similar use as vehicle headlights) for illumination of obstructions when navigating at night over beaches/mudflats or uneven terrain. Details to be discussed at the kick-off meeting.

5.12 Floodlights

5.12.1 Independently controlled high-powered white floodlights shall be supplied to cover the fore and aft decks and Vessel’s sides. Details to be discussed at the kick-off meeting.

Chapter 6 Life-Saving Appliances (LSA) and Fire-fighting Equipment

6.1 General Provision

6.1.1 The life-saving appliances and fire-fighting equipment shall comply with the RO Requirements and Sections 13, 14 and 15 of The Hovercraft Code except lifejackets, liferaft and thermal protection aid.

6.1.2 LSA and FFE Arrangement Plan to be submitted to RO for approval.

6.2 Lifesaving Appliances

6.2.1 The lifesaving appliances shall include a life ring buoy with marker light and a rescue quoit with line attached.

6.3 Fire-fighting Equipment

6.3.1 Two (2) sets of 2-kg dry powder fire extinguishers shall be provided with holding rack.

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, helmet compatible headgear, 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 and Secondary Consoles, the Contractor shall build a full size mock-up console as specified at Paragraph 3.6.1 of this Part VII for approval and comments from the MD and COMMS. These mock-up consoles 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 shall be provided at the kick-off meeting.

7.1.5 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.

7.2 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. They shall comply with all relevant International Maritime Organization (IMO) recommendations on performance standards and operational features. The ENE 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. All headsets shall be with noise cancellation functions which shall provide ear protection and be approved by the Commissioner of Labour Department under Section 7 of the Factories and Industrial Undertakings (Noise at Work) Regulation, Chapter 59T of HKSAR.

7.2.2 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 or living 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.

7.2.3 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 Organisation 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.

7.2.4 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 dark night, without causing eye-stress, glaring 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-stress, glaring and/or discomfort.

7.2.5 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 atmosphere.

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 rough handling.

(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 DC supply system. A DC/DC converter shall be provided if the equipment cannot operate at this voltage.

(iii) All EQ-HKPF shall require a negative earth and be connected to a designated 12 Volt DC (nominal) battery-backed power supply to maintain communications. The battery shall be charged up when an engine generator is working.

(iv) There is a possibility of DC leakage through the negative grounding to the DC 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 DC voltage from the generator.

(vi) Adequate provision shall be made to protect the ENE from the adverse effects of excessive voltage, current spikes and surges.

(vii) Suitable devices shall be incorporated for protecting the ENE and its accessories against damage due to lightning and unregulated DC power supply on board.

(viii) All the displays of the ENE equipment shall be connected to an external switch for controlling the power on or off status of the displays of ENE and the illumined device on the control panel. The actual devices to be connected to this external switch 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 MD and HKPF. 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 devices (e.g. lightning surge arrestors) are required, particularly for antennae installed outside the protection zone of the Vessel's own lightning protection device.

(v) The lightning surge arrestors of each feeder cable shall be grouped and concentrated in a "lightning arrestor panel" to be located inside the console for ease of maintenance.

(vi) Warning of any potential hazards associated with the ENE shall be displayed in traditional Chinese characters, English and universally recognised labels in easily seen and prominent positions.

(d) Design Practice

(i) All systems shall be designed for prolonged, continuous and reliable operation, i.e. 24 hours per day and 365 days per year.

(ii) The normal serviceable life of the ENE shall be a minimum of five years operation on board the Vessel. During the lifetime of the ENE, it shall be possible with reasonable repair and setting up to maintain its performance 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.

(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.

7.2.6 Appearance and Protective Finish

(a) Metal surfaces shall be either corrosion resistant or protected against corrosion for a period of at least three years by high grade enamel painting, plating, galvanising, anodising, or any other suitable surface treatment.

(b) Any such protective layer shall be smooth, continuous, and free from blemishes and scratches.

7.2.7 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.

(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;

(iv) power sockets;

(v) plugs; and

(vi) cables.

(c) RF connectors (of suitable impedance) shall be provided and used for connections of the RF cables, antennae and radio equipment.

(d) All exposed connectors shall be protected by weatherproof material (e.g. 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) 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 of their relative distances to eliminate any chance of radio interference that might occur in service.

(f) Installation shall be to the highest standard to ensure:

(i) The latest version of the relevant Merchant Shipping Notices ('M' Notices) published by the Department of Transport (London) in respect of setting and installing the compass, VHF radio and sounding devices are observed.

(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 and the EQ-HKPF 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 the EQ-HKPF.

(vii) The installation in the external environment shall withstand the conditions stated in Paragraph 7.2.5(a) (i) above.

(g) Adequate measures to prevent interference between the electronic equipment shall also be provided, which for receiving apparatus and other electronic equipment which 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) The Vessel is an open deck vessel. 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 control 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.

7.2.8 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.

(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 floor unless approved otherwise by the MD and HKPF, 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 trip, snag 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, and the final connection between the power supply and the ENE and EQ-HKPF.

(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 on broken or cut wires.

(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 an unique identification wiring code number.

7.2.9 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, sub-assemblies of ENE 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 MD 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.

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

7.2.10 Acceptance Tests

(a) The acceptance tests for the ENE shall comprise of three parts: bench tests, factory acceptance trials (FAT) and on-site commissioning tests as follows:

(i) Bench tests shall be performed on the ENE 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 MD and HKPF 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 1.6.12 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 MD and HKPF officers after completion of installation of all ENE and EQ-HKPF.

(iv) The on-site commissioning tests shall include an inventory check, an NIR hazard test, an inspection of ENE and EQ-HKPF installation and thorough technical, functional and integration tests of individual ENE items and all ENE together with the EQ-HKPF as a whole and a sea trial to verify that the ENE and the EQ-HKPF have been commissioned properly and are 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 electric and magnetic fields as well as the power density radiated from all installed ENE and EQ-HKPF do not expose occupational personnel and members of the general public to radiation in excess of the limits contained in the 1988 IRPA Guidelines specified in Paragraph 7.2.2 of this Part VII. Prior to the issuance of the Acceptance Certificate, the Contractor shall provide a full written report stating that the installation of the ENE and EQ-HKPF complies with the stated NIR safety standards.

(c) At least two 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 and where applicable EQ-HKPF for COMMS' approval. When all of the test procedures have

been established and agreed by the HKPF, they 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.

7.2.11 Documentation

(a) At least six (6) weeks prior to Delivery Acceptance, for each individual item of Equipment, the Contractor shall supply to COMMS, through MD, three (3) paper copies of the operational manuals and maintenance manuals in English (at least one (1) original) and two (2) soft copies in DVD format. 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(h) 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.

(v) Fault finding and calibration procedures.

(b) Drawings showing the proposed design of conduit/trunking route for the Equipment and EQ-HKPF installed on board, including future maintenance considerations shall be submitted to MD and COMMS for approval before installation.

(c) At Delivery Acceptance, the Contractor shall supply:

(i) Operational manuals and maintenance manuals specified in Paragraph 7.2.11(a) above.

(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.

(viii) The completed NIR Report as required by Paragraph 7.2.10(b) above.

(d) The documents specified at Paragraphs 7.2.11(a) to (c) above and the training materials specified in Paragraph 9.2.5 of this Part shall be supplied in both paper copy and in DVD format or other format acceptable to COMMS.

(e) The Contractor shall not use confidentiality as a reason for withholding the supply of relevant documentation as required by the MD and HKPF.

7.2.12 Electronic Components/ Spares Parts/ Spare Units / Maintenance

(a) 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.

7.2.13 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 the Acceptance Certificate in respect of that Vessel was issued.

(b) The Contractor shall rectify any fault within seven (7) days of first being requested by COMMS in writing to do so. 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.

7.3 Electronic Navigational Equipment Specifications

7.3.1 Integrated multi-functional display unit incorporating Radar, Secure AIS, GPS/DGPS and Electronic Chart System information.

(a) The radar shall be used as the primary radar. 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 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 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 display unit shall incorporate control keys and processor equipment to integrate, control, operate and display all radar and chartplotter functions. The electronic chart system shall be capable of both connecting to and being accessed remotely from the Government router through an Ethernet interface.

(f) 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 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) Autoclutter Sea control;

(xii) Range Up;

(xiii) Range Down;

(xiv) Vectors;

(xv) Centre Picture;

(xvi) Acknowledge Alarm; and

(xvii) Panel Brilliance.

(g) The radar display unit shall comprise a flush-mounted Liquid Crystal Display (LCD)colour display of a type suitable for use on an open deck vessel. 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.

(h) 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 70 knots encountered when the Vessel is operating at high speeds in the maritime environment.

(i) The antenna/scanner shall, as far as practicable, be installed well clear of any obstruction to minimise undue interference and NIR hazards.

(j) The radar shall be aligned with the heading of the Vessel.

(k) 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 such obstruction becomes apparent after installation, the Contractor shall rectify it.

(l) The radar shall have NMEA 0183 and 2000 interface ports capable of accepting navigational data from a wide selection of GPS/DGPS receivers and electronic compasses, and of providing comprehensive data on all tracked targets in the form of a track table to a wide selection of electronic chartplotters.

(m) 10 Hz GPS/GLONASS-WAAS, EGNOS, SBAS antenna (integrated).

(n) Performance (radar):

(i)	Reference:	Magnetic and True North
(ii)	Warm-up Time:	< 120 seconds
(iii)	Distance Accuracy:	<1% of the range
(iv)	Bearing Accuracy:	<1°
(v)	Operational Maximum Wind Speed:	At least 70 knots
(vi)	Scanner Size:	≥18 inches nominal
(vii)	Scanner Rotation:	24 rpm and 48 rpm or greater rotation speed
(viii)	Beam Width H/V:	< 5.2°/25°

(ix)	Transceiver Output Power:	at least 165mW
(x)	Display:	9-inch or larger LCD colour display (for LP vessel) and 12-inch or larger LCD color display (for HP vessel); resolution 800 x 600 pixels or better for 4:3 aspect ratio. Other aspect ratios of equivalent size and resolution are acceptable. Brightness of 900 cd/m2 or Greater.
(xi)	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.
(xii)	Waterproofing	Radome antenna: IPX6, Display unit: IPX6

(o) The crew operator shall be able to select the following modes of presentation at the radar display:

(i) radar image only;

(ii) plotter image only; and

(iii) plotter image overlaid with radar image.

(p) 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) One plug-in chart card shall be used for providing detailed navigational sea charts covering the entirety of Hong Kong Waters using S-57 or equivalent format digital sea chart or with tools for converting S-57 format sea charts and future updates into a format readable by the chartplotter;

(xii) The chart card shall be supplied with the latest version of sea charts covering the entirety of Hong Kong Waters with perpetual licence for use and ownership. The purpose is to ensure that the HKPF shall not be required to pay any periodic fees and charges for using the chart card with its contents, as the HKPF will thereafter obtain S-57 format chart updates and install them into the chartplotter.

(q) The radar system shall be interconnected with the GPS and satellite compass systems so that real-time data from these two (2) 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. The satellite compass shall provide GPS location data to the radar system for resilience purposes.

(r) The system at the radar display shall be able to display the own Vessel's heading (in degrees north) and position (in latitude and longitude).

(s) 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.

(t) The radar display system/unit shall comply with relevant requirements of the European Parliament and Council Directive 2004/108/EC and IEC 60945:2002.

(u) 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. The radar shall provide interface port to integrate with external radar extractors and trackers for converting the above analogue radar information to digital format.

(v) 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).

(w) 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 satellite compass set. The satellite compass shall consist of at least a sensor unit and an electronic digital display unit, and be compact, recessed in the console and easy to operate.

(b) The satellite compass sensor unit shall be connected directly to the radar.

(c) The sensor unit shall incorporate two or more satellite receivers from at least two 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 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.

(f) The satellite compass shall provide the GPS source for the GMDSS function used by the IMM VHF radio specified at Paragraph 7.4 of this Part VII.

(g) Performance:

(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 Positioning System (GPS System) integrated with Radar/GPS/DGPS and Electronic Chart System

(a) The Contractor shall supply and install a GPS system which fulfils the following general requirements:

(i) The GPS system shall consist of a GPS receiver integrated with the GPS antenna and be suitable for mounting in the open air;

(ii) The GPS 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;

(iii) The GPS system shall be fully compatible with the radar;

(iv) The GPS system shall support Serial NMEA 0183, Serial 26-pin D-sub, Serial 9-wire RS232, Serial 3-wire RS232 and Ethernet (NMEA 2000); and

(v) The GPS system shall support at least the following data displayed either at the GPS display unit or the radar display:

(1) Position (latitude/longitude): to at least four decimal points

(2) Course: 1° resolution

(3) Speed: 0.1 knot or 0.1 km/hour resolutions with at least three digits

(4) Date and time: selectable as GMT or local mode

(5) Satellite status information

(b) The GPS system's antenna/receiver shall fulfill 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: IPX6 or better

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 loudhailing system designed especially for hailing other craft in the marine environment. It shall comprise of a master control unit, a control panel, a fist microphone, amplifier, horn type loudspeakers and related components and accessories.

(c) In manual mode, the system shall be capable of generating both a "yelp" siren and a horn signal sound. In automatic mode, the system shall have a selection of at least six (6) warning signal sounds for general marine navigational use.

(d) The master control unit shall be recessed into the Primary Console with the user control panel flush-mounted on the console and positioned within reach of the coxswain. The user control panel shall incorporate "Power ON/OFF", "Hail Volume Control" and "Function Control" controls.

(e) Verbal messages shall be broadcast through a fist microphone mounted on the Primary Console within easy reach of the coxswain.

(f) The loudspeakers shall have a power rating of twenty (20) watts minimum and an impedance which shall match the amplifier.

(g) The system shall be waterproofed to IPX5 standard or better.

(h) The loudspeakers shall be equipped with a volume control system with which the volume can be adjusted to a minimum for night operations and to a maximum level which will enable messages to be heard 0.2 km away.

(i) The positions of all the system's main components shall be discussed at the kick-off meeting.

7.4 International Maritime Mobile (IMM) VHF Radio

7.4.1 The Contractor shall supply one (1) IMM VHF fixed radio per Vessel. It shall:

(a) be an off-the-shelf product for marine application;

(b) comply with relevant requirements of the European Parliament and Council Directive 1999/5/EC;

(c) be fully compatible with the GMDSS;

(d) be equipped with the full range of IMM VHF voice channels, all of which shall be selectable;

(e) be delivered complete with all components, features and functions necessary for full functionality;

(f) be capable of operating in temperatures ranging from -5°C to +55°C and be protected to IPX7 or better;

(g) 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

(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:

(a)	Frequency Range:	156.050 MHz to 162.000 MHz or better
(b)	Sensitivity:	Less than 1 µV 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%

7.5 Connection to the Government Data Network

7.5.1 Connection to the Government data network is achieve through the following equipment that will be provided with the Vessel:

(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:	2 x Embedded 4G Frequency Division – Long Term Evolution (FD-LTE) Modem with Multi-input Multi-output (MIMO) antennae

		1 x Embedded 4G Time Division – Long Term Evolution (TD-LTE) Modem with MIMO antennae (FD-LTE Band: 2, 4, 5, 14, 17 and 27; TD-LTE Band: 38, 39, 40 and 41) 1 x Embedded 4G TD-LTE Modem with MIMO antennae (TD-LTE with operating frequency band between 1.785 GHz to 1.805 GHz) 1 x 10/100BaseTX Gigabit Ethernet 1 x 802.11a/b/g/n WAN interface with MIMO antennae
(b)	Ethernet interface:	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. 1 x 802.11a/b/g/n interface with MIMO antennae
(c)	Requirement:	Load Balancing IPv4 and IPv6 support USB LTE/3G Modem support (3G Band: 1, 2, 4, 5 and 8) WAN / Mobile Bandwidth Bonding which is compatible with the Multi-Wan Bonding router IPsec VPN 256-bit AES Encryption PPTP VPN Server QoS for VoIP Speed Fusion connections to existing HKPF router (Peplink380)
(d)	Environmental:	The encryption 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 purposes. Operation temperature at least between -20°C and +65°C Humidity: 15% – 95% (non-condensing)

7.5.3 The Contractor shall provide the six (6) pairs of weatherproof MIMO antennae specified in Paragraphs 7.5.2(a) and 7.5.2(b) above:

7.5.4 The Vessel's electronic equipment including the radar/GPS/DGPS 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 IPx7 cabinet and mounted in 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 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 3.6.2 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 Maritime Secure Automatic Identification System (AIS)

7.6.1 The Supplier shall supply one (1) set of AIS transponder to be installed on the Vessel.

7.6.2 The AIS shall be fully Class A type approved AIS transponder.

7.6.3 The AIS shall support cipher DES, AES and support cipher keys:

(a) up to 128 time limited keys;

(b) manual keys input and

(c) external application input.

7.6.4 The AIS shall be with internal GPS for time synchronisation and be connected the GPS system and Satellite Compass.

7.6.5 Each AIS shall be come with one (1) VHF Antenna of

(a) Frequency: 149-162.5MHz

(b) VSWR: 1.5:1

(c) Polarization: vertical

(d) Max Power: 100W

(e) Impedance: 50ohm

(f) Surge arrestor connecting to the lightning ground of the Vessel

7.6.6 Each AIS shall be come with one (1) GPS Antenna with Antenna Element:

(a) Center Frequency: 1575.42MHz

(b) Output VSWR: <1.5:1

(c) Polarization: Right Handed Circular Polarization

(d) Output Impedance: 50 ohm

7.6.7 The GPS antenna shall come with a low noise amplifier with:

(a) Center Frequency: 1575.42MHz

(b) Power Gain 28 +/- 4.5dB

(c) Band Width: at least 2MHz

(d) Supply Voltages support 5V DC

(e) Output Impedance: 50 ohm

7.6.8 The AIS shall be waterproof with IPX6 or better.

7.6.9 The AIS shall be able to select, operate and display in at least four (4) 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 broadcasted, both encrypted and non-encrypted AIS messages will be received;

(c) Passive mode - no AIS will be broadcasted, both encrypted and non-encrypted AIS messages will be received; and

(d) Pseudo mode – receives both encrypted and non-encrypted AIS messages, broadcasts correct encrypted AIS data and virtual unencrypted AIS data for AIS spoofing.

7.6.10 The AIS shall provide an output to the display unit specified in Paragraph 7.3.1.

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 this Vessel being used as specified in Paragraph 1.2.1 of this Part VII.

7.7.2 The IC system shall be compliant with the latest version of the CE Electrical and Mil Std 461 EMC and Mil Std 810E standards.

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, 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 be composed of a number of main equipment forming an Ethernet network in ring topology. When any one of the Ethernet network paths or main equipment fails, the IC system shall re-route to use an unaffected path. The Contractor shall propose adequate main equipment to fulfil the requirements stipulated in Paragraph 7.7.

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 a Ethernet network on the Vessel;

(b) connected to at least 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 portable radio as specified at Paragraph 7.4 of this Part VII, one (1) HKPF 3G/LTE commercial radio or mobile telephone and other HKPF data devices into the system;

(c) connect to the Vessel's radar, navigation and engine notification alarms;

(d) connected to the Vessel's PA system as specified at Paragraph 7.3.4 of this Part VII;

(e) be capable of routing system software configurations to each AIU, RIU, and PCU as appropriate.

7.7.9 The RIUs shall be:

(a) fixed nodes, the purpose of which shall be to integrate on board radio systems as specified in Paragraph 7.7.8(b) above;

(b) able to form individual communication channels within fixed nodes into groups by the operators as specified in Paragraph 7.7.9 (a) above;

(c) connected to the Vessel's DC 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 above 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 Personal Communications Units (PCUs) 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 of IC system shall connect to PCUs. The PCUs shall:

(a) be the operator's primary gateway to connect to both the operators' audio head gear and the major equipment as specified in Paragraph 7.7.7 above;

(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 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 The IC system shall be capable of providing wireless extension(s) that shall:

(a) comprise a wireless base station connected to the Ethernet backbone of IC system as specified in Paragraph 7.7.8(a), capable of interfacing with the small belt-mounted wireless radio specified at Paragraph 7.7.12(b) of this Part VII;

(b) enable the connection of small belt-mounted wireless radio operating on the 2.4 GHz or 5.8 GHz bands or other radio frequency band acceptable to both OFCA and the HKPF (current HKPF equipment, specifications to be provided at the kick off meeting), carried by the operator, to the wireless base station specified at Paragraph 7.7.12(a);

(c) enable an operator who is no longer connected to the IC system by a PCU and extension cable, such as a boarding officer who has left the Vessel, to carry out enforcement operations on another craft and have full duplex access to the IC system; and

(d) not require the operator to carry any additional equipment other than a small belt-mounted wireless radio.

7.7.13 The audio headgear shall:

(a) be compatible for use with both ballistic and impact protection helmets;

(b) consist of a microphone and two (2) speaker earmuffs connected by a comfortable and ergonomic strap system;

(c) incorporate noise cancellation technology designed to reduce environmental noise such as engine noise, wind noise and the noise of gunshots or explosions to a maximum of first action level as specified in the Factories and Industrial Undertakings (Noise at Work) Regulation, Chapter 59T or below;

(d) be one (1) meter submersible water protection without losing level dependent performance.

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

(a) Sufficient RIUs for the devices listed at Paragraph 7.7.8(b) of this Part VII and other systems as provided for in this Specification;

(b) Sufficient AIUs with plug-in points for eight (8) operators as specified at Paragraph 7.7.10 above if required;

(c) eight (8) PCUs;

(d) One (1) wireless basestation with capacity to connect to at least six (6) wireless extensions;

(e) Eight (8) sets of audio headgear as specified at Paragraph 7.7.13 of this Part VII;

(f) Eight (8) waterproof connection cables capable of connecting to the HKPF's existing Gecko Marine Safety Helmet Mk10 audio headgear to the PCU; and

(g) All other components required to enable the IC system to operate.

7.7.15 The system administrator shall be able to configure the IC system by laptop computer either on site in the Vessel or remotely via the Government data network and the Government Mobile Data Equipment as specified in Paragraph 7.5 above 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.

7.7.16 The Contractor shall, in respect of all of the Vessel(s) delivered under this Contract, supply two (2) sets of laptop computers including system administrator software and perpetual software licence with which the IC system can be configured, programmed and troubleshot.

7.7.17 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:

(a) be capable of operation in temperatures ranging from -5°C to 50°C;

(b) be capable of withstanding the knocks and jolts likely to occur during repair work or rough handling on a workbench; and

(c) be protected to IP67 standard or be enclosed in an IP67 watertight box;

7.7.18 The Contractor shall additionally provide eight (8) sets of audio headgear as specified at Paragraph 7.7.13 of this Part VII and eight (8) waterproof connection cables capable of connecting to the HKPF's existing Gecko Marine Safety Helmet Mk10 audio headgear to the PCU as spares.

7.8 Installation/Space/Cabling for the Existing HKPF Equipment

7.8.1 The Contractor shall, at no cost to Government, install onto each Vessel one (1) unit of each of the following equipment (EQ-HKPF), which shall be provided by the HKPF. Details of location, space, cable, and power requirements shall be provided at the kick-off meeting.

(a) HKPF Marine Radio Communications System (MRCS Radio "A") TETRA mobile radio. The present equipment type is the EADS TETRA TMR880i mobile radio with separate control panel and speaker box. The TMR880i is a wide-band version with a frequency range of 380 MHz to 430 MHz. The radio is powered by a +12V DC nominal supply. The HKPF reserves the right to use other radio types in place of the present TMR880i. Provided that the Government notifies the Contractor at least three months in advance of the on-site installation of the MRCS Radio "A", no additional costs associated with the installation of a radio of a different type shall be chargeable to the Government.

(b) A tablet or smartphone with a display of no more than 13 inches. The Contractor shall provide a mounting location at the console to be discussed at the kick-off meeting. The mounting shall include a mounting bracket / frame and shock-absorbing cushions for securely mounting the device onto the Vessel. The model of the tablet or smartphone shall be provided at the kick-off meeting. However, the HKPF reserves the right to change the model of the tablet or smartphone. Provided that the Government notifies the Contractor at least three months in advance of the on-site installation of the tablet or smartphone, no additional costs associated with the installation of the tablet or smartphone of a different type shall be chargeable to the Government.

7.8.2 The Contractor shall:

(a) coordinate and finalise the positions of all the radio, radar equipment and antennae systems during the detailed system design stage.

(b) reserve sufficient space for the installation of the EQ-HKPF, including for flush mounted panels.

(c) note that the TMR880i radio 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 EQ-HKPF's installation.

(f) supply and install one UHF antennae for the MRCS Radio "A". The UHF antennae shall have an impedance of 50 ohms, unity gain and 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 these UHF antennae to protect the radio equipment from lightning surges.

(g) design, rig and suitably mount the antennae to ensure EMC and avoid interference.

(h) fit and install the EQ-HKPF in the HKSAR in the positions that were finalised during the detailed design stage, subject to any subsequent EMC-necessitated alteration.

(i) provide all necessary cables, materials, labour and transportation for the equipment installation.

7.8.3 COMMS shall:

(a) connect up the EQ-HKPF 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 EQ-HKPF.

Chapter 8 Services Support

8.1 General Requirement

8.1.1 In determining the appropriate design for the Vessels, all of the following factors shall equally be taken into account without one outweighing another.

(a) Vessels performance (e.g. engine rating, size, etc.).

(b) Initial cost.

(c) On-going cost (e.g. maintenance cost, petrol consumption, spare parts, etc.).

(d) Reliability (frequency and time to repair breakdown).

(e) Time between maintenance periods.

(f) Time to undertake scheduled maintenance (downtime).

(g) All machineries and equipment installed in the Vessels shall be serviceable in the HKSAR.

8.1.2 Allowable Vessels downtime (including scheduled preventive maintenance and unscheduled repair and maintenance) shall not exceed 10% of the total hours of operation per month based on the operation profile as specified in Paragraph 2.8.1 of this Part VII.

8.1.3 Maintainability – The Vessels shall be easy to maintain by ensuring that there shall be:

(a) good access to all installed items for monitoring, service and overhaul.

(b) ease access to in-situ service and maintenance 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 Delivery Acceptance, the Contractor shall supply the Inventory List to the MD for approval. The detailed inventory list for the whole Vessel covering all discrete items down to major component/unit level shall include the following. At the Delivery Acceptance of the Vessel, the approved Inventory List will be used to check that all the items have been delivered to MD in a satisfactory state.

(a) Item number on the inventory list;

(b) Description;

(c) Type or model (if applicable);

(d) Serial number(s);

(e) Quantity;

(f) Manufacturer;

(g) Manufacturer’s reference number;

(h) Location in Vessel;

(i) Local agent/supplier address, telephone and facsimile numbers and email address;

(j) Order lead time;

(k) Shelf life; and

(l) Unit cost.

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

(a) Four (4) paper copies and two (2) soft copies on DVDs of the approved inventory list;

(b) Four (4) complete sets of paper print "as fitted" drawings of the Vessel and two (2) soft copies on DVDs;

(c) Four (4) complete sets of paper print "as fitted" electrical schematic, cabling, wiring and single line diagrams for electrical equipment installed on board and conduit / trunk route diagrams and two (2) soft copies in DVDs as per the Vessel delivered;

(d) Four (4) paper copies and two (2) soft copies in DVDs of a list of all bought-in machinery and electrical equipment installed on the Vessel, where the list shall include:

(i) Description,

(ii) Type or model (if applicable),

(iii) Makers part number or equivalent (if applicable),

(iv) Location,

(v) Quantity,

(vi) Supplier or agents name and contact details,

(vii) Order lead time,

(viii) Shelf life, and

(ix) Unit cost;

(e) Four (4) copies (at least one (1) original) of manufacturers' operation, maintenance and workshop manuals in English for all machinery and Equipment, including spares and stores, special tools and test equipment;

(f) Four (4) paper copies and two (2) soft copies in DVDs of the Contractor's "Docking Plan", which shall include the profile, plan and sections as per the Vessel delivered;

(g) Four (4) paper copies and two (2) soft copies in DVDs of the On Board Operator's Manual (English and traditional Chinese) for the Vessels delivered covering:

(i) Daily user check and operation procedure,

(ii) Operating detail of each system, and

(iii) Emergency operation procedure.

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

(h) One (1) set in paper format of the operational manuals and maintenance manuals in English as specified in Paragraph 7.2.11 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 7.2.11 of this Part VII.

8.2.3 The first draft of the On Board 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 Tools and Test Equipment for Electronics

All tools and testing equipment for the Vessel's electronic equipment shall be delivered directly to COMMS. All items shall be documented, preserved and packed properly.

8.2.5 Photographs

The Contractor shall at Delivery Acceptance 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 GNC on a DVD 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 DVDs), filed in clear folders, shall be forwarded to GNC at Delivery Acceptance:

(a) Associated test certificates;

(b) Commercial Hovercraft Safety Certificate of Compliance (in the format of Appendix 2 of The Hovercraft Code), Permit to Operate Commercial Hovercraft, and the associated Records of Compliance Examination Against The Hovercraft Code – all should be issued by the RO;

(c) Test performance certificates of Equipment (e.g. electronics, switchboards);

(d) Main engine performance test certificates;

(e) Complete record of the Official Sea Trial commissioning tests;

(f) Original warranty certificates of all machinery, Equipment and apparatus of the Vessel (valid for twelve (12) months from the date of Acceptance Certificate of the Vessel);

(g) Certificates of light and sound signalling equipment;

(h) Hovercraft Builder certificates (in the format of Appendix 3 of The Hovercraft Code);

(i) Certificates of building material;

(j) Deviation card for compass (after adjustment in the HKSAR);

(k) Hull construction material certificates issued by one of the Classification Societies listed in Paragraph 2.4.5 (a) to (i) of this Part VII;

(l) Undertaking duly signed and sealed by the Contractor's (or its sub-contractor's) shipyard 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;

(m) Asbestos free certificate or statement of compliance; and

(n) Any other certificates as appropriate.

Chapter 9 Training

9.1 General

9.1.1 This chapter stipulates the training requirements on Electronic Navigations Equipment and for the operation and maintenance of the Vessel, and shall be arranged by the Contractor.

9.1.2 All training courses shall be held in the venue to be provided by HKPF in HKSAR. The training shall be conducted in Cantonese and/or English with relevant training materials supplied by the Contractor.

9.1.3 If any of the training instructor(s), trainer(s), and any other personnel providing the training are travelling from outside Hong Kong, all the trainings shall be provided by such personnel in one visit in Hong Kong.

9.1.4 Unless otherwise specified, the Contractor shall provide all materials necessary for the training courses specified in Paragraphs 9.2 and 9.3 of this Part VII.

9.2 Training on Electronic Navigational Equipment

9.2.1 The Contractor shall provide the HKPF's operational and technical and maintenance staff with both classroom-based and vessel-based training to familiarise them with the operation and maintenance of the ENE.

9.2.2 It is anticipated that two (2) distinct types of training shall be required, namely:

(a) Operator training on ENE; and

(b) Equipment maintenance training on ENE.

9.2.3 The Contractor shall submit a course syllabus and a schedule for conducting the training courses for approval at least two (2) months prior to the commencement of training.

9.2.4 Operator Training Course on ENE

(a) This course shall be a train-the-trainer course;

(b) The course shall provide a detailed understanding of the day-to-day operation of all Equipment and shall include "hands on" demonstrations, the operation of all Equipment and routine cleansing requirements.

(c) The course shall cater for fifteen (15) trainees.

9.2.5 Equipment Maintenance Training Course on ENE

(a) The course shall provide the COMMS technical and maintenance staff with a detailed understanding of all aspects of the design considerations, day-to-day operation, interconnected system operation, fault breakdown, routine maintenance, fault-finding and repair procedures of the Equipment and it shall include both practical demonstrations and tests.

(b) This course shall equip the COMMS technical and maintenance staff with sufficient expertise to enable them to maintain the Equipment after the expiry of the Warranty Period effectively.

(c) This course shall cater for fifteen (15) trainees.

9.2.6 The Contractor shall supply a trainee attending either of the courses specified at Paragraphs 9.2.4 and 9.2.5 above with one (1) copy of the comprehensive training documents in both paper and

DVD format. The HKPF shall have the right to reproduce all training documents for internal use.

9.2.7 The Contractor shall, upon successful completion of the entire course, issue each training course participant with a certificate as evidence of his/her attendance.

9.3 Training on Operation and Maintenance of the Vessel

9.3.1 The Contractor shall provide the HKPF's operational and both the HKPF's and Government Dockyard Maintenance Section's technical and maintenance staff with both classroom-based and vessel-based training to familiarise them with the operation and maintenance of the Vessel.

9.3.2 In respect of the operation and maintenance of the Vessel, the Contractor shall provide the following training:

(a) Operator training on Vessel operations to the HKPF's operational staff; and

(b) Engine and on board Equipment maintenance training to the technical and maintenance staff of both the HKPF and the Government Dockyard Maintenance Section.

9.3.3 Operator training on Vessel operations

(a) In respect of the vessel operator's training course, the Contractor shall, not less than two (2) months prior to Delivery Acceptance, submit for the HKPF and MD's approval a draft vessel operator's training syllabus, which shall cover on board Equipment, systems, first level maintenance and troubleshooting as well as all aspects of boat handling which shall include, but not be limited to, trim, turning and operating in rough water. The draft shall include details of the depth, duration and scheduling of the proposed training course and the qualifications possessed by the proposed training instructor(s).

(b) Upon Delivery Acceptance, the Contractor shall then deliver the vessel operator's training course according to the approved syllabus to four (4) HKPF operational staff.

9.3.4 Engine and On Board Equipment Maintenance Training

(a) In respect of the engine and on board Equipment maintenance training course, the Contractor shall, not less than two (2) months prior to Delivery Acceptance, submit for the HKPF and MD's approval a draft engine and on board Equipment maintenance train-the-trainer training syllabus, which shall include, but not be limited to, all aspects of the designs, day-to-day operation, breakdown, routine maintenance and fault diagnosis of the engine/electrical distribution system and hull structural repair. The draft shall include details of the depth, duration and scheduling of the proposed training course and the qualifications possessed by the proposed training instructor(s).

(b) The Contractor shall then deliver the engine and on board Equipment maintenance training course according to the approved syllabus to six (6) HKPF and/or Government Dockyard Maintenance Section technical and maintenance staff in the HKSAR or overseas.

9.3.5 The Contractor shall supply a trainee attending either of the courses specified at Paragraphs 9.3.3 and 9.3.4 above with one (1) copy of the comprehensive training documents in both paper and DVD format. The HKPF shall have the right to reproduce all training documents for internal use.

9.3.6 The Contractor shall, upon successful completion of either of the courses specified at Paragraphs 9.3.3 and 9.3.4 above, issue each training course participant with a certificate as evidence of his/her attendance on the training course and the standards of competence achieved.

Chapter 10 Abbreviations

AC	Alternating Current
AIS	Automatic Identification System
AML	Additional Military Layers
ARCS	Admiralty Raster Chart Service
ARPA	Automatic Radar Plotting Aid
ASTM	American Society for Testing and Materials
ASWF	American Standard Window Film
AV	Audio Video
AWS	American Welding Society
BS	British Standards
BSB	data encoded in the BSB format
CCTV	Close Circuit Television
CD	compact disc
cd/m2	candela per square metre
CD-ROM	Compact Disc Read-Only Memory
CFC	Chlorofluorocarbon
CH	Channel
cm	centi metre
CO_2	Carbon Dioxide
COG	course over ground
CPA	Closest Point of Approach
CPU	Central Processing Unit
dB	Decibel
dBi	decibel isotropic
dBm	Decibel-milliwatts
DC	Direct Current
DDR	Double Data Rate
DGPS	Differential Global Positioning System
DNC	Digital Nautical Chart
DSC	Digital Selective Calling
DVD	Digital Versatile Disc
DVI	Digital Video Interface
DVR	digital video recorder
ECDIS	Electronic Chart Display and Information System
ECS	Electronic Chart System
ENC	Electronic Navigational Charts
ENE	Electronic Navigational Equipment
FTP	Fire Test Procedures
GB	Gigabyte
GeoTIFF	GeoTIFF Format File
GHz	Gigahertz
GM	Metacentric Height

GMDSS	Global Maritime Distress Safety System
GMT	Greenwich Mean Time
GPS	Global Positioning System
GRP	Glass Reinforced Plastic
GZ	Righting Lever
HCFC	Chlorodifluoromethane
HD	Hard Disk
HDD	Hard Disk Drive
HDMI	High Definition Multimedia Interface
HPS	Harbour Patrol Section
Hz	Hertz
ICR	Information Collection Request
IHO	International Hydrographic Organization
IMM	International Maritime Mobile
IMO	International Maritime Organisation
IEC	International Electro-technical Commission
IP	Ingress Protection
IPX	Internetwork Packet Exchange
IS	Intact Stability
ISO	International Organization for Standardization
ITU-R	International Telecommunication Union – Radiocommunication Sector
K	Kilo
kΩ	Kilo Ohm
kg	Kilogram
kHz	Kilohertz
km	Kilometer
kW	Kilowatt
LCD	Liquid Crystal Display
LCG	Longitudinal Centre of Gravity
LED	Light-emitting Diode
LSA	Lifesaving Appliance
m/s	Metre per Second
m^3	Cubic Metre
MARPA	Mini-automatic Radar Plotting Aid
MCR	Maximum Continuous Rating
MFD	Multi-function Display
MHz	Megahertz
MJ/m2	Megajoule per Square Metre
MKD	Minimum Keyboard Display
mm	Millimetre
MMC	Multi Media Card
MMSI	maritime mobile service identity
MS PRO	Memory Stick PRO
MS PRO Duo	Memory Stick PRO Duo

MSC	Maritime Safety Committee
mV	Milli Voltage
NAVSEA	Naval Sea Systems Command
NIR	Non-Ionizing Radiation
Nm	Nanometre
NMEA	National Marine Electronics Association
NTRIP	Networked Transport of RTCM via Internet Protocol
NUC	Not Under Command
OSHA	Occupational Safety and Health Administration
PVC	Polyvinyl Chloride
RAM	Random Access Memory
RF	Radio Frequency
RG58U	RG58U Type Coaxial Cable
RH	Relative Humidity
ROT	rate of turn
rpm	revolutions per minute
RT	Radioactive Test
RTCM	Radio Technical Commission for Maritime Services
SATA	Serial Advanced Technology Attachment
SINAD	Signal-to-noise and Distortion Ratio
SOG	speed over ground
SOLAS	Safety of Life at Sea
SPL	Sound Pressure Level
SSD	Solid-state Drive
STANAG	NATO Standardization Agreement
TCG	Transverse Centre of Gravity
TCPA	Time of Closest Point of Approach
TIFF	Tagged Image File Format
TS	Technical Specifications
UHF	Ultra High Frequency
UPS	Uninterruptible Power System
USB	Universal Serial Bus
UTC	coordinated universal time
uV	nano voltage
UV	Ultraviolet
VAC	Voltage of Alternating Current
VCG	Vertical Centre of Gravity
VDC	Voltage of Direct Current
VGA	Video Graphics Array
VHF	Very High Frequency
VMAP	Vector Map
V.S.W.R.	Voltage Standing Wave Ratio
VTC	Vessels Traffic Centre
VTS	Vessels Traffic Services
W	Watt
WMS	Web Map Service

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. If the Contractor appoints an authorised agent to perform the Warranty Services, the Contractor shall ensure that the authorised 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.

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.

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 in the Warranty Period applicable to such items.

1.4 During the Warranty Period, when the Vessel is handed over for the Warranty Services and/or Guarantee Slipping, the Contractor shall be responsible for the due return of the Vessel in good order. 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 free of charge Warranty Services for one year after the date of the issue of the Acceptance Certificate in respect of the Vessel. The Warranty Services shall cover the entire Vessel and all its Equipment (including all major Equipment specified in Schedule 6 in Part V and electronic navigational equipment), fittings and outfit (including spare parts, and documentation) (collectively, "Warranty Items") against defects of 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. 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.

1.6 Procedures for Warranty Claim

Without prejudice to the provisions of the Contract, a detailed procedure for dealing with warranty claims must be proposed by the Contractor and agreed by MD before the issuance of the Acceptance Certificate of the Vessel. This shall be 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 to examine the defect and the Contractor shall propose the

appropriate and necessary remedial action to the satisfaction of MD.

1.6.3 The Contractor shall undertake on-site Warranty Services (including provision of all replacement Warranty Items, spare parts, labour, materials, test equipment, and transportation) wherever, at the option of the Government, the Vessel is berthed in the Government Dockyard or maintenance bases of the user department. Taking the Vessel to the shipyard of the Contractor 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.

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 used shall originate from the manufacturer of the original Warranty Item to be repaired 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.

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.

1.8 Extension of Warranty

1.8.1 The Warranty Period for any Warranty Item shall be suspended whilst and if the Contractor fails to repair and correct satisfactorily the defects in such Warranty Item within seven working days counting from the date when the relevant fault report was first issued.

1.8.2 Warranty Items which are electronic equipment sub-assemblies, modules or components and which are replaced during the Warranty Period shall have a new warranty period of one year commencing from the date of replacement.

1.8.3 In relation to a Warranty Item, references to Warranty Period shall be construed to include such extended warranty period as mentioned in Paragraph 1.8.1 and/or 1.8.2 above, depending on whichever is applicable.

1.8.4 Equipment which is found to be defective during the trials at the Guarantee Slipping as mentioned in Paragraph 2.2.3 below shall have an extension of warranty of one year.

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 maintain an inventory of spare parts, which shall be the same items as listed in Schedule 6 in Part V and in the same quantity in the shipyard of the Contractor which the Contractor shall use for performing the Warranty Services. 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

Please refer to the Paragraphs 7.1.1 in Chapter 7 of the TS.

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 Engines and Gearboxes

(a) Renew the lubricating oil and replace the filters for the main engines and gearboxes as per the manufacturer's recommendations;

(b) Clean all the engine air filters and change the filter elements as necessary;

(c) Clean the coolers of the engines and renew all zinc anodes if provided;

(d) Check all the engines' belts and adjust if necessary;

(e) Check tappet clearances for the inlet and exhaust valves, ignition timing and idle speed and adjust if necessary;

(f) Conduct function tests for the engines' protection system and their associated sensors, gauges and other measuring devices; and

(g) Any other work required or recommended by the engine manufacturer.

All of the work listed at Paragraphs 2.2.1(a) to (g) shall be carried out by the manufacturer's authorised agent. All the work procedures and the spare parts used shall comply with the manufacturer's specifications and requirements.

2.2.2 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 two years' protection against marine growth;

(ii) The hull shall be cleaned;

(iii) Damaged paint shall be repaired according to the paint manufacturer's procedures;

(iv) After the repair of the damaged paint as specified at Paragraph 2.2.2(a)(iii) above, two coats of touch up primer and one coat of touch up shall be applied; and

(v) One full coat of finishing paint shall be applied to the hull below the water line.

(b) Paint Above the Water Line

(i) Damaged paint on the hull above the water line shall be repaired properly. After repair, two coats of touch up primer and one coat of touch up 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 air propeller and lift fan.

(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.

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

(a) Engine control and steering system;
(b) Engine alarm and shut down function (including emergency stopping of engines);
(c) Navigational equipment, lights and sound signals;
(d) Ahead and astern running and crash stop test;
(e) Steering trial;
(f) Other trials as required by the Government Representative; and
(g) Any item or component found defective shall be repaired or replaced.

Milestones		Completion Dates
1	Kick-Off Meeting	To be held within two (2) months after the Contract Date at the Government Dockyard or the Contractor's Shipyard
2	Completion of hull structures	The Contractor shall propose the completion dates of Milestones 2-6 for GNC's approval within two (2) months after the Contract Date.
3	Completion of installation of engines, propellers and steering gear	
4	Completion of installation of electronic navigation equipment	
5	Pre-shipment Construction and Handling Inspection	
6	Shipment to Hong Kong	
7	Delivery Date	The Delivery Date for the Vessel shall be no later than the date set out in Schedule 2 (Delivery Schedule) of Part V

Drawings Approval	Completion Date
General Arrangement Plan	***All the drawings are required to be submitted within two (2) months after the signing of Articles of Agreement for GNC's approval / reference.***
Lines Plan and Offset Table	
Capacity Plan	
Sounding Table of Tanks	
Life Saving Appliance & Fire Fighting Equipment Arrangement	
Preliminary Intact Stability Calculation Booklet	
Damage Stability Calculation Booklet	
Stability Calculation Booklet	
Midship Section Plan	
Construction Profile and Deck Plan	
Shell Expansion Plan	
Rudder/Thrust & Lift Nozzle Plan	
Seats Arrangement Plan	
Outfitting and Mooring Arrangement Plan	
Air Pipe and Ventilation Arrangement Plan	
Paint Specification	
Details drawing of Skirt	
Detail Plan of Console and Switchboard	
Bilge Piping Arrangement Plan	
Fuel System Diagram	
Coolant Systems Diagrams	
Electrical Single Line Diagrams	
Electrical Arrangement Plan	
Wiring Diagram of Distribution Boxes	
Signal Lights and Navigation Light Arrangement Plan	
Electrical Power Estimation Calculation	
Radio Communication Equipment Arrangement Plan	
Operational Manual	
Service Schedule	
Maintenance Manual	
Others as required	

Part VII Annex 4 - Main Items Inspection Timetable

Item No.	Items to be inspected			Completion Date
	Hull Structure, Layout and Outfitting Inspection			
H-1	Mould Lofting			
H-2	Construction Materials – Aluminium plate mark checking for hull & superstructure (if any)			
	(a)	Aluminium plate mark checking for hull & superstructure		
	(b)	Material certificates verification		
H-3	Welding consumables & welders certificates (if any)			
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 (or equivalent)		
	(d)	Workmanship		
	(e)	Compliance with approved plans		
	(f)	NDT (X-ray) of welds (or equivalent)		
	(g)	Hull internal work inspection		
	(h)	Plating thickness gauging		
H-6	Engine bearers fabrication / welding			
H-7	Scantling & welding checking			
H-8	Welding construction and pressure tests of tanks			
	(a)	Fuel oil tank		
		(i)	Tank construction (internal/external/fitting)	
		(ii)	Tank pressure test	
H-9	Hose test for hull			
H-10	Mock up inspection			
H-11	Installation of various outfitting items			
	(a)	Anchor and chain		
	(b)	Windlass		
	(c)	Hand pump		
	(d)	Hatches		
	(e)	Doors		
	(f)	Seating of heavy equipment and masts		
H-12	Function tests of various outfitting items			
H-13	Watertightness or weathertightness of openings			

	(a)	Manholes	
	(b)	Hatches	
	(e)	Ventilator & air pipes	
H-14	Painting inspection of different layers		
H-15	Draught marks and vessel dimensions verifications		
H-16	Arrangement of console		
H-17	Zinc anodes and lightning system		
	(a)	Installation of zinc anodes	
H-18	Inspection of fire, heat and sound insulation		
	(a)	Fire insulation	
	(b)	Heat insulation	
	(c)	Sound insulation	
H-19	Interior furnishings		
	(a)	Console area	
H-20	Lifesaving appliances and fire fighting appliances		
	(a)	Lifesaving appliance	
	(b)	Fire fighting appliance	
H-21	Sea trials including operation test of outfitting equipment		
H-22	Site towing demonstration trial		
H-23	Cleanliness inspection before acceptance		
H-24	Inventory check in the HKSAR		
H-25	Acceptance and delivery		
H-26	Acceptance of As-Fitted drawings and Engines/Equipment Manuals and documentations.		
	Electrical and Machinery Installation		
EM-1	General inspection on installation of machinery:		
	(a)	General inspection on installation of propulsion engine	
	(b)	General inspection on installation of lift engine	
EM-2	Propulsion engine:		
	(a)	Test of engine safety devices and alarms	
	(b)	Test of emergency stop	
	(c)	Inspection of exhaust pipe before lagging	

EM-3	Lift engine:		
	(a)	Test of engine safety devices and alarms	
	(b)	Test of emergency stop	
	(c)	Inspection of exhaust pipe before lagging	
EM-4	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-5	Bilge system:		
	(a)	General inspection & dimension checking of bilge system	
	(b)	Bilge tank high and low level alarms test	
	(c)	Inspection of piping penetration of bulkhead and deck	
	(d)	Hydraulic test of piping	
	(e)	Functional test of bilge system	
EM-6	Functional test of drainage system		
EM-7	Batteries:		
	(a)	Inspection of battery connectors and housing boxes	
	(b)	Inspection of battery charger	
	(c)	Operational test of battery charger Test of main engines and generator consecutive starting by each group of battery (start/stop at remote and local control)	
EM-8	Electrical installation:		
	(a)	Inspection of lightning conductor	
	(b)	General inspection of cable layout & checking of cable sizes	
	(c)	Inspection of cable penetrations of bulkhead and deck	
	(d)	Inspection of transformers	
	(e)	Inspection of tally plates	
EM-9	Main switchboard & panels:		
	(a)	Main switchboard & panels - high voltage injection test	
	(b)	Cable size checking of electrical switchboard installations	
	(c)	Inspection of AC distribution panel	
	(d)	Inspection of DC distribution panel	
	(e)	Megger test of the electrical system	
	(f)	Earthing test of the electrical system	
EM-10	Control console:		
	(a)	Inspection of control console	
	(b)	Functional test of console controls	
	(c)	Inspection of navigation equipment control panel	

EM-11	Lighting:		
	(a)	Inspection and functional test of general lighting	
	(b)	Inspection and functional test of emergency lighting	
	(c)	Inspection and functional test of floodlight installation	
	(d)	Inspection and functional test of searchlight installation	
EM-12	Navigational lights and signals		
	(a)	Inspection and functional test of navigational lights	
	(b)	Test of horn/whistle	
EM-13	Shafting (tailshaft and coupling) system:		
	(a)	Marking/Stamping and material check	
	(b)	Dimension check and taper bedding test	
	(c)	Shaft line checking of stern/shaft bracket and alignment of main engines and tailshafts	
EM-14	Test of window wipers		
EM-15	Electronic equipment tested by Communications Branch of HKPF		
EM-16	Inclining experiment (or equivalent)		
EM-17	(a) Pre-shipment Construction and Handling Inspection		
	(i)	Handling Assessment	
	(ii)	Pre-shipment speed trial	
	(iii)	Hull bottom inspection	
	(b) Official Sea Trial		
	(i)	Official Speed Trial	
	(ii)	Endurance test	
	(iii)	Manoeuvrability test	
	(iv)	Hover-on and Hover-off	
	(v)	Crash stop test	
	(vi)	Astern running test	
	(vii)	Emergency steering test	
	(viii)	anchoring test	
	(ix)	Slow and fast turning to port and starboard	
	(x)	Towing test	
	(xi)	Noise Measurement	
	(xii)	Other test and trials as required	
	(xiii)	Hull bottom inspection	

Note:
The 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:	

Conditions at Endurance and Performance Test			
Person On Board	**8**	Dummy Weight	
Fuel (Petrol)	**90% of Fuel Tanks Capacity**	Other Equipment	
Sea Conditions	**Maximum wave height of less than 0.3 m**		

Engines:	**Propulsion**	**Lift**	**Propellers (Fans):**	**Propulsion**	**Lift**
Maker			Maker		
Type			Type		
Serial Number			Diameter		
Rated Power			Pitch		
Rated Speed			Direction of Rotation		

Engine Load	**Engine Speed (rpm)**	**Vessel Speed (Knots)**	**Time (Start)**	**Time (Finish)**	Fuel Consumption (litres/minutes)	**Engine Oil Pressure (Bar)**	**Engine (in) CW Temp. (^{o}C)**	**Others**	**Others**
__% of rated Power	At Minimum Cruising Speed		Not less 15 minutes						
50% of Rated Power/rpm			Not less 15 minutes						
60% of Rated Power/rpm			Not less 15 minutes						
70% of Rated Power/rpm			Not less 15 minutes						
80% of Rated Power/rpm			Not less 15 minutes						
90% of Rated Power/rpm			Not less 15 minutes						
100% of Rated Power (Endurance Test)			Not less 120 minutes						

Remarks:

Witnessed by:	MD's Representative	Shipyard's Representative

Part VII - Annex 6 - As-fitted Drawings and Machinery/Equipment documents and information literature to be delivered to the Government after Delivery Acceptance

1. As-Fitted Drawings

1.1 Upon delivery of the Vessel, the Contractor shall deliver to the Government four (4) hard copies and two (2) soft-copies in pdf. and dwg. formats of the following plans and drawings that contain the technical information of the Vessel and its machinery and equipment as they are on the day when the Vessel is accepted by the MD. These are termed the final version of the "As-Fitted" Plans and Drawings, and they shall consist of the following plans and drawings as well as any other plans and drawings 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 in the professional manner, scale, size and style normally required 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.

1.2.1 General Arrangement Plan.
1.2.2 Stability Assessment Report.
1.2.3 Painting scheme of the Vessel.
1.2.4 Detailed arrangement and layout plan showing the disposition of all of the main equipment, fittings and fixtures, furniture, hatches, manholes and access openings. Down-flooding openings (points), if any, shall be indicated clearly on the drawings.
1.2.5 Equipment layout diagram.
1.2.6 Hull structural construction and hull scantlings drawings, including main longitudinal girders and beams, main transverse and diagonal girders, frames and beams, Watertight bulkheads and integral buoyancy tanks, machinery foundations.
1.2.7 Hull shell and frames and the framings' arrangement and construction plan.
1.2.8 Hull shell expansion plan.
1.2.9 Keel construction plan.
1.2.10 Propulsion system arrangement diagrams and details.
1.2.11 Lifting system arrangement diagrams and details, together with the voltage and power demand of the lifting fan(s) and thrust propellers.
1.2.12 Steering system and steering arrangement diagrams.
1.2.13 General arrangement and attachments of skirts.
1.2.14 Hull watertight bulkheads' construction plan.
1.2.15 Console to deck connection detailed construction plan.
1.2.16 Deck edge and bulwark (if any) details and construction plan, including detailed structural arrangement drawings of hull to deck connection.
1.2.17 Detailed cathodic corrosion prevention and arrangement plans and drawings for the Vessel throughout.
1.2.18 Mast structural and construction plan and mast equipment arrangement plan.
1.2.19 Piping diagrams for fuel oil, lubrication oil, bilge, firefighting, scuppers and drains system, if applicable.
1.2.20 Fire prevention, fire control and firefighting system drawings.
1.2.21 Drawings of the main switchboard and all other switchboards and the electrical system.
1.2.22 Engines arrangement and setting plans and drawings of their fuel lines and exhaust gas piping and arrangement.
1.2.23 Fuel oil tank(s) and its associated piping system.
1.2.24 Drawings of the anchor, and the anchoring system, and anchoring arrangement plan.
1.2.25 Lifesaving appliance arrangement plan and fire safety plan.
1.2.26 Distress signals, alarm systems, and internal/external communication arrangement and system plan.
1.2.27 Navigation lights, sound and signal diagrams and any other external lighting arrangement plan.
1.2.28 Lightning arrestor drawing.
1.2.29 Vessel overall lighting arrangement and light control plan.
1.2.30 Vessel alarm and signals, internal communication systems and public address systems plan.

1.3 Documents to be provided by the Contractor

Not less than one (1) month before the Delivery Acceptance of the Vessel, the Contractor shall provide for GNC's acceptance a list of all documents to be provided. When the Vessel is delivered to the Government Dockyard, the Contractor shall deliver to the Government all the technical information, leaflets, literature, manuals and booklets etc. and whatsoever items that are necessary for the operation, handling, services, maintenance, spare parts, repairs and the technical understanding of any one of all the engines, machinery, motors, pumps, equipment, fittings and outfitting items of the Vessel.

Part VII - Annex 7 – World Meteorological Organisation (WMO) - State of the Sea

Beaufort scale number	Description	Wind speed	Wave height	Sea conditions	Land conditions
0	Calm	< 1 km/h (< 0.3 m/s) < 1 mph < 1 knot < 0.3 m/s	0 m 0 ft	Flat.	Calm. Smoke rises vertically.
1	Light air	1.1–5.5 km/h (0.3–2 m/s) 1–3 mph 1–3 knot 0.3–1.5 m/s	0–0.2 m 0–1 ft	Ripples without crests.	Smoke drift indicates wind direction. Leaves and wind vanes are stationary.
2	Light breeze	5.6–11 km/h (2–3 m/s) 4–7 mph 4–6 knot 1.6–3.4 m/s	0.2–0.5 m 1–2 ft	Small wavelets. Crests of glassy appearance, not breaking	Wind felt on exposed skin. Leaves rustle. Wind vanes begin to move.
3	Gentle breeze	12–19 km/h (3–5 m/s) 8–12 mph 7–10 knot 3.5–5.4 m/s	0.5–1 m 2–3.5 ft	Large wavelets. Crests begin to break; scattered whitecaps	Leaves and small twigs constantly moving, light flags extended.
4	Moderate breeze	20–28 km/h (6–8 m/s) 13–17 mph 11–16 knot 5.5–7.9 m/s	1–2 m 3.5–6 ft	Small waves with breaking crests. Fairly frequent whitecaps.	Dust and loose paper raised. Small branches begin to move.
5	Fresh breeze	29–38 km/h (8.1-10.6 m/s) 18–24 mph 17–21 knot 8.0–10.7 m/s	2–3 m 6–9 ft	Moderate waves of some length. Many whitecaps. Small amounts of spray.	Branches of a moderate size move. Small trees in leaf begin to sway.
6	Strong breeze	39–49 km/h (10.8-13.6 m/s) 25–30 mph 22–27 knot 10.8–13.8 m/s	3–4 m 9–13 ft	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.
7	High wind, moderate gale, near gale	50–61 km/h (13.9-16.9 m/s) 31–38 mph 28–33 knot 13.9–17.1 m/s	4–5.5 m 13–19 ft	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.
8	Gale, fresh gale	62–74 km/h (17.2-20.6 m/s) 39–46 mph 34–40 knot 17.2–20.7 m/s	5.5–7.5 m 18–25 ft	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.
9	Strong gale	75–88 km/h (20.8-24.4 m/s) 47–54 mph 41–47 knot 20.8–24.4 m/s	7–10 m 23–32 ft	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.

10	Storm, whole gale	89–102 km/h (24.7-28.3 m/s) 55–63 mph 48–55 knot 24.5–28.4 m/s	9–12.5 m 29–41 ft	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.
11	Violent storm	103–117 km/h (28.6-32.5 m/s) 64–73 mph 56–63 knot 28.5–32.6 m/s	11.5–16 m 37–52 ft	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.
12	Hurricane	≥ 118 km/h (≥ 32.8 m/s) ≥ 74 mph ≥ 64 knot ≥ 32.7 m/s	≥ 14 m ≥ 46 ft	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.

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	
Low	1. Short or average 2. Long	
Moderate	3. Short 4. Average 5. Long	
Heavy	6. Short 7. Average 8. Long	
	9. Confused	

Part VII - Annex 8 – Handling Assessment (HA) at Pre-shipment Construction and Handling Inspection

1. General

1.1 The purposes of the HA are 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 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, either in Hong Kong or 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 and the digital video footage recorded in accordance with Paragraphs 1.5 and 1.6 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, the Contractor or, if necessary, an independent third party such as an 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 protocols stipulated in Paragraphs 2.1 to 2.2 of this Annex 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 center line of the vessel to be assessed with the camera mounted as closed as possible at the transom.

1.6 The Contractor shall provide a suitable logistics vessel from which the Contractor shall record digital video footage of the Vessel to be assessed undergoing the HA. This logistics vessel 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 Representative the following:

(a) an electronic and a 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 devices stipulated at Paragraph 1.4 of this Annex which includes:

(i) the raw data captured in respect of each assessment protocol specified in Paragraph 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 vessel; and

(c) a certificate, signed by both the Contractor and the Government Representative which records accurately the actual Loading Condition of the Vessel as described in Paragraph 1.7.2(e) of Part VII during each assessment of the HA.

1.8 The assessment protocols listed in Paragraph 2.2 below shall be conducted in sea states conforming to WMO Sea States 0 to 2 as specified at Annex 7 of 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 Paragraph 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, an 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 <u>The Vessel shall be prepared for the HA as follows:</u>

2.1.1 Load the vessel as per Full Operational Load condition as specified in Paragraph 1.7.2(e) of Part VII for carrying out the HA;

2.1.2 Proceed to sea with due regard to the Operating Manual developed by the builder relevant to the type of Vessel;

2.1.3 Ensure that the engines are up to operating temperature;

2.1.4 Carry out the trial in less than 10 knots of wind.

2.1.5 Position the craft over calm water with a clear area ahead.

2.2 The HA shall be carried out as per below procedures:

2.2.1 The Vessel shall be travelling through the hump speed by using the Thrust Controls together in accelerating the vessel;

2.2.2 With the Vessel running in a steady course, Thrust Controls are to be set to achieve 25 knots as indicated on the GPS System in Sea State 2 or less, and full 360° turns to port and starboard shall be conducted in the tightest turn radius possible whilst staying within the yaw-speed boundary and maintaining as much speed as possible;

2.2.3 With the Vessel following a steady straight line course upwind, and then downwind, with no yaw angle, the Thrust Controls shall be set to achieve 25 knots as indicated on GPS in Sea State 2 or less. All personnel on board shall be securely seated or braced. When passing a buoy rapidly, reduce the aft engine speed control followed by the forward engine speed control to idle until the GPS speed has reduced to zero;

2.2.4 With the Vessel running in a steady straight line course, the Thrust Controls shall be set to full and record the maximum craft speed indicated on the GPS System over at least one (1) mile or 1.61 kilometre in Sea State 2 or less, then turn the vessel through 180 degrees and the trial to be repeated. Speed of the Vessel shall be in excess of 25 knots. With the estimated top speed of the Vessel running at 30 knots, the Thrust Controls shall be set on full;

2.2.5 The Vessel should then be operated at Cruise Speed of 25 knots in Sea State 2 or less for 30 minutes using an operating area which is relatively clear of other marine traffic and where sea conditions are not expected to cause the pilot to reduce power. Record parameters after 30 minutes;

2.2.6 Stability of the Vessel in operation (scenario 1) in boating mode shall be assessed. With the Vessel floating on water without being lifted out of water, it shall be demonstrated that positive stability is maintained with three (3) crew members at the furthermost position of side deck, while the remaining five (5) persons in normal seating position (so as to simulate rescuing a casualty from water);

2.2.7 Stability of the Vessel in operation (scenario 2) in boating mode shall be assessed. With the Vessel floating on water without being lifted out of water, it shall be demonstrated that positive stability is maintained with three (3) crew members at the furthermost position of the bow, while the remaining five (5) persons in normal seating position (so as to simulate rescuing a casualty from water);

2.2.8 Stability of the Vessel in operation (scenario 3) with travelling in sub-hump mode. With the Vessel travelling at a speed prior to reaching the hump speed, it shall be demonstrated that the Vessel remains stable with positive stability with two (2) crew members standing and moving in the cockpit to access various equipment;

2.2.9 Stability of the Vessel in operation (scenario 4) with travelling in over-hump mode. With the Vessel travelling at a speed after reaching the hump speed, it shall be demonstrated that the Vessel remains stable with positive stability with two (2) crew members standing and moving in the cockpit to access various equipment;

2.2.10 Figure-of-eight test shall be carried out. Having placed two buoys 100 m apart in the water, the Vessel shall run and manoeuvre a figure-of-eight course around the buoys at a speed of 20 to 25 knots without touching either of the buoys and exceeding the yaw speed boundary as set out in the Operating Manual developed by the builder relevant to the type of the Vessel;

2.2.11 Test of approaching a stationary buoy shall be carried out. While the Vessel is travelling at low speed, the Vessel shall move towards a floating buoy and gradually stop by touching the buoy (nose on, with the bow being zero metre from the buoy) under control, then reverse away from the buoy;

2.2.12 The Vessel shall be demonstrated that astern manoeuvrability on land and water is available, by being able to reverse from a fixed object. i.e. another vessel, or building;

2.2.13 The Vessel shall be demonstrated that a speed of 5 knots is achievable in Sea State 2 or less with one thrust unit shut down while the Vessel is in Full Operational Load condition as stated in Paragraph 1.7.2(e) of Part VII;

2.2.14 The Vessel shall be demonstrated that with one lift fan in operation, the Vessel is able to move to the nearest place of safe haven not less than three (3) nautical miles 8 knots in Sea State 2 or less while the Vessel is in Full Operational Load condition as stated in Paragraph 1.7.2(e) of Part VII;

2.2.15 In order to simulate the manoeuvring capability with single thrust fan failure, the Vessel shall be demonstrated that with one side (port or starboard) of the thrust fan being switch off, full turn to the same side is achievable. This shall be repeated for the other side;

2.2.16 With all thrust and lift systems working, the Vessel shall be demonstrated for its capability in overcoming obstacle clearance by travelling over pyramid obstacle of a height of 0.5 metres on water and on land;

2.2.17 The Vessel shall be demonstrated in turning 360 degrees to port, and then to starboard, both of which within one (1) craft length on water and on land;

2.2.18 The Vessel shall be demonstrated in climbing a hard surface slope of 1:10 over 30 metres at a speed of not greater than 10 knots;

2.2.19 The Vessel shall be demonstrated in achieving a turning circle of less than 100 metres while travelling at a speed of 25 knots and a stopping distance of less than 40 metres;

2.2.20 The Vessel shall be demonstrated in returning the Vessel with its own power to the cradle via a slipway and shutting down the Vessel in accordance with the Operating Manual developed by the builder relevant to the type of Vessel;

2.2.21 On completion of the assessment, the Vessel shall be free of any loose items or damage, and an inspection to confirm this shall be carried out;

2.2.22 The Vessel shall be demonstrated on the tolerance of damage to the skirt system. With the alternate skirt fingers removed or tied up to simulate the reduced lift capability, Items 2.2.1 to 2.2.18 above shall be repeated with at least 50% of the required parameters achieved;

2.2.23 The vessel shall be reversed out of hanger or suitable storage area for demonstrating the reversing capability.

3 Results

The performance of the hovercraft as reflected in the results of the assessment stipulated in Paragraph 2 above shall be recorded, and included in a report to be submitted to MD and HKPF.