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 **two (2) Hovercraft** (viz., "Hovercraft") to be supplied to the Government of the Hong Kong Special Administrative Region ("HKSAR") of the People's Republic of China (hereinafter referred to as the "Government") for use by the Hong Kong Police Force ("HKPF").

1.1.2 The primary and overriding aim of this chapter of Part VII, is to provide the HKPF with two (2) twin-engine, aluminium-hulled and diesel-fuelled Hovercraft complying with "The Hovercraft Code" issued by the UK Maritime Coastguard Agency, or equivalent standard. The Hovercraft shall be a fully amphibious hovercraft riding on an air-cushion, which is fully capable of being effectively deployed in Hong Kong Waters. The Hovercraft shall be able to travel over open water and open land consisting of both hard and soft (mud) surfaces including swamp areas, sandy and rocky beaches, low lying bushy areas and on level or inclined ground within the HKSAR territory. Robustness of construction, ergonomics, seakeeping, high-speed control response, stable and predictable manoeuvrability at high speeds with smooth ride characteristics and stability are of fundamental importance.

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

(a) Essential Requirements [E];

(b) Those specifications which are without any label (viz., [E] or [D]) ("Specifications without Label"); and

(c) Desirable Specifications [D].

1.1.4 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 providing sufficient details to substantiate that the product and the services offered meet the Essential Requirements as stipulated in Annex C to Part II - the Conditions of Tender, failing which its tender will not be considered further.

1.1.5 All (a) Essential Requirements **[E]**, (b) if and to the extent the Contractor has indicated compliance, Specifications without Label, and (c) if and to the extent the Contractor has indicated compliance, Desirable Specifications labelled with [D], shall also form part of the Contract and be of equal materiality and importance upon the award of the Contract. Where the Tenderer has indicated non-compliance with any Specification without Label, it shall have proposed Counter-Proposals to such Specifications without Label in accordance with Clause 17.3 of Part II – Conditions of Tender for the Government's evaluation. The whole of this Part VII, including all Essential Requirements, shall also form part of the Contract and be of equal materiality and importance upon the award of the Contract.

1.1.6 The Hovercraft shall be Ready for Use before the Delivery Date and shall be delivered by the Delivery Date as per the schedule stipulated under Schedule 2 – Delivery Schedule of Part V.

1.1.7 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 Hovercraft

1.2.1 The Hovercraft shall be safe, fit and suitable for the operational purposes for which it is intended, namely to be used in supporting the operation of the mother Vessel navigated by the HKPF anywhere within Hong Kong Waters and in adjacent waters in emergencies. The primary role of the Hovercraft shall be undertaking sea safety patrols, search and rescue and

law enforcement operations. As a secondary role, the Hovercraft shall be used to provide logistical support to HKPF officers. The Hovercraft shall also be capable of operating as a standalone unit for achieving these primary and secondary roles.

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 Hovercraft 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 Hovercraft must have the essential shipbuilding and workshop facilities such as lifting gear, hull construction and calibration equipment, machinery installation and calibration equipment and Hovercraft launching or slipping facilities.

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

1.5 Design and Construction Responsibility

1.5.1 It is the SOLE responsibility of the Contractor to supply the Hovercraft which are safe, fit and suitable for the intended operational purposes of the HKPF, as set out in Paragraph 1.2 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 hull construction and outfittings, stability, sub-division and operational efficiency.

1.5.2 The Hovercraft shall be designed and constructed in accordance with the Hovercraft Code published by the Maritime Coastguard Agency UK ("Hovercraft Code") or equivalent, in the version as at the Contract Date, which shall apply in relation to the relevant requirements specified therein. 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 of Part V; and (b) references to "RO Requirements" shall mean the requirement of the rules and regulations of the RO as specified in Schedule 9 of Part V**. 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 of Part V, 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.

1.5.3 The Hovercraft shall 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 of Part V. Certification of the Hovercraft refers to the process in facilitating the issuance of this Certificate of Compliance. Although a 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. All plans, particulars and documentation, which are required for the certification of the Hovercraft by the RO, in addition to those listed in Annex 3 to this Part VII, shall be approved by the RO before submission to MD for endorsement and final approval prior to the commencement of work. Any subsequent modifications or additions shall be treated in the same manner. Those drawings which are not required under the ship certification approval process, shall be submitted to MD for approval before work is carried out.

1.5.4 Notwithstanding the submission of the preliminary plans and drawings by the Contractor as part of its tender for the Contract, all plans and drawings of the Hovercraft except the design stresses and scantlings, shall be submitted to GNC for approval before completion of the Hovercraft design. The design stresses and scantlings including internal structural members shall be determined according to the RO Requirements, ISO 12215 and the Hovercraft Code or equivalent as found appropriate.

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

1.5.6 Even if the Contractor may appoint a sub-contractor to design the Hovercraft 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 include the unit price of a Hovercraft quoted in Schedule 1 – Price Schedule in Part V, which shall be deemed to have included the cost of surveys to be carried out by the relevant RO in respect of that Hovercraft (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 the HKPF (COMMS) or their representatives as part of the Technical Acceptance.

1.6.3 Subject to Paragraph 1.6.7 of this Chapter, an advance written notice of not less than five (5) working days (if the Hovercraft is located in Asia), and ten (10) working days (if the Hovercraft is located other than in Asia) must be given to GNC before the representatives of GNC and other Government officers are invited to conduct a survey visit for the Hovercraft. 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 Submission 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 by the respective deadlines specified in Clause 11 of the Conditions of Contract.

The Delivery Date(s) for the Hovercraft 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 instalments 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 and material / equipment procurement status is required to be submitted to MD during the construction of the Hovercraft. The weekly report shall be submitted from Monday to Wednesday of Hong Kong time.

1.6.6 MD may designate consultant(s) from the 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 Hovercraft. The Contractor shall cooperate with the consultant(s) and afford them unhindered access to the Hovercraft 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 or 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 Hovercraft at the shipyard where the Hovercraft 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 or heating as required, 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 Hovercraft 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 (1) month's advanced written notice of its readiness to invite the Government to conduct the Pre-Shipment Construction and Handling Inspection or, otherwise, as agreed by the Government.

1.6.12 A Pre-Shipment Construction and Handling Inspection of the Hovercraft, 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 Hovercraft (if the Contractor has built the Hovercraft in a place outside the HKSAR) to confirm that the construction of the Hovercraft 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, or under any provision of the Contract Documents has been completed satisfactorily. To mitigate the commercial risk which would result from shipment of the Hovercraft 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 Annex 7 of this Part VII. The purpose is to enable early identification and rectification of undesirable performance before shipment.

1.7 Procedures for Hovercraft Acceptance

1.7.1 Stage 1 - Pre-shipment Construction and Handling Inspection

(a) Safety of Hovercraft 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 Paragraph 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 Hovercraft is safe to go to sea for the intended tests and trials specified in the Contract shall be submitted.

(b) Handling Assessment of Hovercraft

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 Hovercraft shall be carried out as per the requirements and procedures stated in Annex 7 to this Part VII at or near the site where the Hovercraft is constructed.

(c) Pre-shipment Speed Trial

Pre-shipment speed trial shall be carried out at or near the site where the Hovercraft is constructed, and shall be carried out in the presence of GNC officers and HKPF representatives or their appointed agents.

(1) The actual mean speed shall be determined by taking the 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.

(2) The pre-shipment speed trial shall be carried out with the engine power at the 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 Hovercraft fails to achieve the Contract Speed stated in Paragraph 2.5.1 of this Part VII, the Government will deem that the Hovercraft has failed to pass Stage 1 - Pre-Shipment Construction and Handling Inspection.

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

1. The Contractor on the condition that the instrument has been calibrated by a certified body acceptable to GNC and the HKPF; or
2. A Global Positioning System (“GPS”) supplied by the Government; or
3. A GPS or Differential Global Positioning System (“DGPS”) which is properly calibrated (with supporting calibration documents) and installed on board the Hovercraft as acceptable to GNC and the HKPF; or
4. 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 Hovercraft to check for any hull damage before shipping to Hong Kong. If any hull

damage found, it shall be rectified at or near the site where the Hovercraft 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 Hovercraft shall then be shipped to Hong Kong 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 Hovercraft 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 Trials

As in all other tests and trials to be conducted for the Hovercraft 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 Hovercraft 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 the relevant personal particulars in respect of 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 Hovercraft 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)	(20%)	(50%)	90%
Crew	2	2	2
Officers	nil	1	1
Kit	10 kg	15 kg	20 kg
Equipment	10 kg	15 kg	20 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 Paragraph 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 Hovercraft 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.

(1) The actual mean speed of the Hovercraft (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 for wind, wave, and weather conditions.

(2) 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:

1. The Contractor on the conditions that the instrument has been calibrated by a certified body acceptable to GNC and the HKPF; or
2. A GPS supplied by the Government; or
3. A GPS or DGPS, which is properly calibrated (with supporting calibration documents) and installed on board the Hovercraft as acceptable to GNC and the HKPF; or
4. Other speed measuring methods acceptable to GNC and the HKPF.

(3) 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.

(4) The Contract Speed stated in Paragraph 2.5.1 shall be achieved by the Hovercraft 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 Hovercraft fails to achieve the minimum Contract Speed stated in Paragraph 2.5.1 of this Part VII, the Government will deem that the Hovercraft has failed to pass the Official Sea Trial.

(5) 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.

(6) 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 representative 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 Hovercraft, 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 Hovercraft speed versus propulsion engines rpm and power, with particulars of the Hovercraft loading 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 the port side, to be repeated for the 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 Hovercrafts, when running from full ahead, to stop.

(k) Astern Running Test

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

(l) Emergency Steering Test

An Emergency Steering Test shall be carried out to ascertain that the Hovercraft can still be steered satisfactorily when the electrical power supply to the steering system has been disabled.

(m) Anchoring Test

(n) Turning Test including 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 Hovercraft 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 following completion of the tests and trials specified in Paragraph 1.7.2 of this Part VII, the contents 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 test methodology, engines running condition, sea, weather and wind conditions, Hovercraft 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 Operational Acceptance**

(a) All tests and trials as required in this Part VII shall all have been conducted as part of the Technical and Operational Acceptance including Pre-Shipment Construction and Handling

Inspection of the Hovercraft 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 Hovercraft 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 Operational 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 Hovercraft cannot pass all of the tests comprising the Technical and Operational 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 Hovercraft, after its successful completion of Technical and Operational 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, Hovercraft stability, machinery, electrical and electronic equipment are in good working order and must hand over the Hovercraft and 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 Paragraph 8.2 of this Part VII.

(e) The Contractor must provide fourteen (14) days advance notice in writing for Hovercraft delivery when the Hovercraft 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 Operational Acceptance, the Government does not consider that the Hovercraft is in Ready to Use condition.

(f) On delivery, the Hovercraft must be in a clean, tidy, fully fitted and operational condition.

(g) The Delivery Acceptance of the Hovercraft 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 Hovercraft 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 12 months from the date of the Acceptance Certificate of the Hovercraft, together with Hovercraft, shall be delivered to MD upon Delivery Acceptance.

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

1.8.3 The Contractor is responsible for arranging the Hovercraft for Guarantee Slipping at the end of

the 12-month Warranty Period. In addition to any defects which the Contractor may be required to rectify 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 are set out in Annex 1 to this Part VII.

1.9 Support Services

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

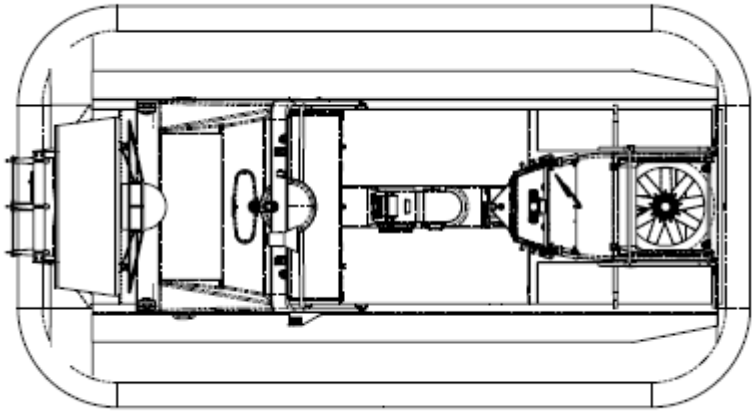
1.9.2 The above applies not only to the two engines (propulsion and lift) but also to all other Equipment, hull and skirting, etc., installed in as well as on the Hovercraft. Support and maintenance services must be available (i.e. serviceable) in Hong Kong in respect of the Hovercraft and return of the whole or part of the Equipment to the original place of manufacturer or supplier shall not be necessary in order to carry out any repair work.

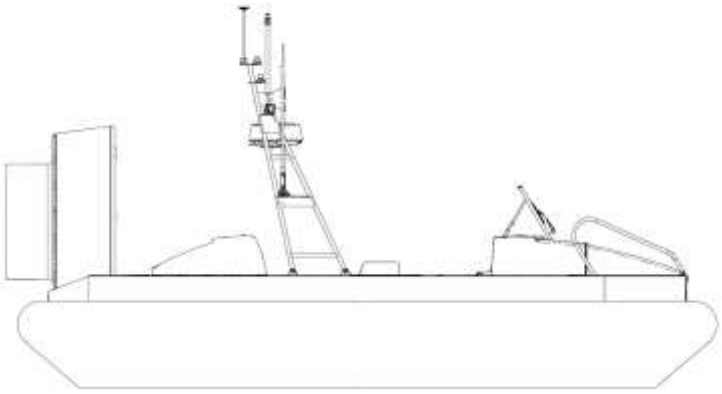
1.10 Asbestos Free

The Hovercraft 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 Hovercraft. An asbestos free certificate or a statement of compliance issued by the service supplier to this effect shall be provided upon delivery of the Hovercraft.

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 of this Part VII, this Chapter contains the more particular technical specifications for the Hovercraft. The significance of Essential Requirements is explained in Paragraph 1.1 above.

2.2.2 The work to be performed under this Contract consists of the design, construction, outfitting, testing and delivery of two (2) Hovercraft. 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 propose an appropriate design for the Hovercraft, 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 Hovercraft, 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 Hovercraft that are described in this Part VII, together with their requirements for design and installation standards that are stipulated in any parts of this Part VII, are the items that must be included in the complete "As-built" Hovercraft delivered to the Government.

2.3 General Description

2.3.1 The Hovercraft shall be fitted with two engines providing propulsion (thrust) and lift separately. The Hovercraft shall be designed to carry three (3) persons with seating provided, with a payload of at least 350 kg; **[E]**

2.3.2 The Hovercraft shall be designed with a detachable canopy covering the consoles and crew seats; **[E]**

2.3.3 The hull of the Hovercraft shall be built in marine grade aluminium alloy, suitable for use in the marine environment, sheltered waters, over land as well as mud; and **[E]**

2.3.4 The Hovercraft shall be designed for access to shallow water and intertidal mudflats for law enforcement purposes and amphibious search and rescue.

2.4 Rules and Regulations

2.4.1 The Hovercraft shall be designed and constructed in accordance with the Hovercraft Code or equivalent, in the latest version as at the Contract Date; **[E]**

2.4.2 The Hovercraft shall be issued with a Hovercraft Safety Certificate of Compliance (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 in the RO's own capacity in declaring full compliance with the Hovercraft Code. All plans, particulars and documentation, 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 the commencement of work. Any subsequent modifications or additions are to be treated in the same manner;

2.4.3 The Hovercraft shall be surveyed by the representatives of the RO during construction for compliance with the plans, particulars and documentation approved by the RO and by GNC, including relevant tests and trials. Records of survey shall be submitted to GNC on request;

2.4.4 The Contractor shall design, build and supply the Hovercraft 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 Hovercraft must comply with the requirements of the RO specified in Schedule 9, or the requirements of any of the RO's 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 RO's 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 of Shipping 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:

(1) IEC 60092 – 350, Electrical Installations in Ships – Part 350: Shipboard Power Cables – General Construction and Test Requirements;

(2) 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; and

(3) 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-paragraphs (a) to (i) above or the American Welding Society ("AWS") or other applicable international standards or rules acceptable by MD;

(m) International Regulations for Preventing Collisions at Sea 1972 including the latest amendments;

(n) International Organization for Standardization:

(1) ISO 12215 – Small craft – Hull construction and scantlings;

(2) ISO 12216 – Small craft – Windows, port lights, hatches, deadlights and doors. Strength and watertightness requirements;

(3) ISO 10133 – Small craft – Electrical equipment – Extra low-voltage D.C. installations;

(4) ISO 7840 – Small craft – Fire resistant fuel hoses;

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

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

(7) ISO 13297 – Small craft – Electrical systems – Alternating current installations;

(8) ISO 13929 – Small craft – Steering gear – Geared link systems;

(9) ISO 10592 – Small craft – Hydraulic steering systems; and

(10) 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 fully loaded condition [i.e. full fuel plus three (3) persons on board as specified in Chapter 1.7.2(e) of this Part VII] and with all engines running at their declared Maximum Continuous Rating (MCR), the guaranteed minimum highest achievable speed under the Official Speed Trial Conditions as stated in Annex 5 to this Part shall be as follows: **[E]**

Minimum highest achievable forward speed in still air on water:	28knots **[E]**
Minimum highest achievable forward speed in still air on hard and soft ground:	15 knots

2.5.2 The Hovercraft shall also be designed for loitering operations. The Hovercraft shall be capable of operating at 2 to 5 knots. **[E]**

2.6 Principal Dimensions

Length Overall:	6.5 – 7 metres **[E]**
Extreme Breadth:	3.5 – 4 metres **[E]**
Maximum Height:	2.5 – 3 metres **[E]**

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:	Composite Material **[E]**
Air Propeller Duct (Shroud):	Composite Material **[E]**
Rudder(s):	Marine Grade Aluminium / Composite Material **[E]**
Consoles:	Composite Material **[E]**

2.8 Hovercraft Operating Profile and Environment

2.8.1 The Hovercraft shall be a twin-engine hovercraft with separate engines for propulsion (thrust) and lift, with separate fans for propulsion and lift. The Hovercraft shall be designed to carry three (3) persons with seating provided, with a payload of at least 350 kg.

2.8.2 Summary of Operational Hours / Range

Number of hours / day:	10 hours / day
Number of days / year:	180 days / year
Endurance for fuel capacity over ground and sea:	4 hours at the patrol speed of 20 knots at sea **[E]**

2.8.3 The Hovercraft shall be able to operate (fulfil its operational roles) safely within Hong Kong over ground as well as the sea surface. The Hovercraft shall be capable of deploying in mudflat areas outside mangrove forested areas and along major channels within mangroves. It

shall be capable of operating over mud, very shallow water, swampland, marshland, beaches and concrete slipways.

2.8.4 The Hovercraft shall designed to withstand anticipated head wind force up to 11 knots and wave height up to 0.6m.

2.9 Seakeeping and Manoeuvrability

2.9.1 The Hovercraft shall have good seakeeping performance under weather condition as specified in paragraph 2.8.4 of this Part VII. The Hovercraft shall be stable and resistant to capsize with sufficient inherent stability.

2.9.2 The Hovercraft 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 Hovercraft. All painting colour schemes for the Hovercraft and fittings shall be approved by GNC and HKPF before application;

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

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

2.10.4 The Hovercraft's name shall be marked permanently on both sides of the console of the Hovercraft. Details of the size and calligraphy shall be confirmed by MD and the HKPF;

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

2.10.6 Safety markings for the prevention of person tripping in the Hovercraft 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) Hovercraft's name;

(c) Year of manufacture; and

(d) Maximum number of persons including the crew that the Hovercraft 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 communications 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, warnings and other information as required by MD and

HKPF.

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 and HKPF.

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

2.12 Other Design Features

2.12.1 Permanent list is not allowed.

2.12.2 Permanent ballast can only be used as agreed by GNC.

2.12.3 The Hovercraft shall be designed and constructed so that there is no undue vibration in the hull structure and machinery.

2.12.4 Protective cover for storage of the hovercraft shall be provided.

2.12.5 Hazard warning for the air propeller and duct guard shall be fitted.

Chapter 3 Hull

3.1 Structures of the Hull and Scantlings

3.1.1 The Hovercraft 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 independent from the propulsion engine. Surface effect craft with side walls immersed in water while the Hovercraft is on cushion are not acceptable. The Hovercraft shall provide seats for three (3) persons. The hull structure shall be constructed of marine grade aluminium alloy, attached with full length inflatable sponsons surrounding the deck edges. The hull shall be divided into, the passenger / load compartment and the fan and engine bay. These compartments shall be separated by the aft cockpit bulkhead, The Hovercraft shall be fitted with replaceable landing pads or skids to facilitate parking. The Hovercraft shall be designed to support the maximum weight on three-quarters of the supports of the landing pad. 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 Hovercraft'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 rules, ISO12215 and the Hovercraft Code or equivalent as found appropriate, in the latest version as at the Contract Date, unless the rules and regulations of the RO specify that version of such rules and regulations as at the date of commencement of construction of the Hovercraft shall apply in relation to the relevant requirements specified therein. It shall be capable of withstanding stresses generated by wave impacts and other conditions in the operational environment. All material and build processes for aluminium construction shall comply with an approved standard acceptable to the RO as specified in Schedule 9. Their selection 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 the hull and deck shall comply with the applicable RO's rules for watertight integrity if not otherwise specified by MD or the HKPF at or prior to the kick-off meeting.

3.1.4 The hull design shall incorporate a bilge system which is capable of draining the cockpit in accordance with the requirements of the RO and the Hovercraft Code or equivalent, in the version as at the Contract Date unless the rules and regulations of the RO specify that version of such rules and regulations as at the commencement of construction of the Hovercraft shall apply in relation to the relevant requirements specified therein.

3.1.5 The Hovercraft shall be constructed with watertight compartments and / or inflatable buoyancy tube around the outside of the hull which provides buoyance when the Hovercraft 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 Hovercraft 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 in the latest version as at the Contract Date.

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

3.1.9 The Contractor shall carry out quality control throughout the construction of the Hovercraft 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 with 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 practices to prevent fatigue and other failures in the version as at the Contract Date unless the rules and regulations of the RO specify that version of such rules and regulations as at the date of commencement of construction of the Hovercraft shall apply in relation to the relevant requirements specified therein. 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 the RO for approval before construction.

3.2.3 The Contractor shall submit certification of the qualifications of each individual welder and inspector. Welds installed 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 be 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 numbered and indexed to the controlled manufacturing procedures;

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

(d) If applicable, welding and inspection procedures identifying clearly the type and extent of NDT inspection carried out on the Hovercraft's structure. Normally, not less than 10% butt welding of the hull structure shall be subjected to Ultrasonic Test ("UT") or Radioactive Test ("RT");

(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 be easily unbolted for replacement and the whole skirt system shall be accessible without having the Hovercraft lifted out of the parked position on a hard surface.

3.3.2 The air cushion shall have sufficient depth to provide stable performance whilst going into wind and waves, as well as traversing higher obstacles within the design limits of the Hovercraft.

3.3.3 Details of the skirt system with detailed dimensions and specifications shall be submitted to the RO and MD, 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, or equivalent, in the latest version as at the Contract Date.

3.3.5 The skirt system shall be such as to ensure adequate stability when hovering on the air cushion under all operating conditions. The skirt shall be designed according to the relevant requirements of the Hovercraft Code.

3.4 Stability

3.4.1 The offered Hovercraft shall meet the stability requirements of the RO and the Hovercraft Code, or equivalent, in the latest version as at the Contract Date. **[E]**

3.4.2 The Hovercraft is required to comply with the intact stability requirements when the Hovercraft is 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 according to the relevant requirements of the Hovercraft Code.

3.4.4 When the Hovercraft is floating with the lift system not operating, the freeboard shall be not less than 200 mm, where details of freeboard measurement are given in the relevant requirements of the Hovercraft Code.

3.4.5 Buoyancy tanks may be provided if required.

3.4.6 Final stability assessment result shall be delivered to MD prior to the Official Sea Trial mentioned in Paragraph 1.7.2 of this Part VII.

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. The dry film thickness of each coating shall be specified.

3.5.4 The Contractor shall guarantee all painting work for one (1) year against defects in materials and workmanship. At Delivery Acceptance the Contractor shall provide MD with a letter of certification from the paint manufacturer, signed by coating inspectors with qualifications of NACE Level 2 or FROSIO Level III, to certify that the paint has been applied under the paint manufacturer's quality control and in accordance with the manufacturer's requirements including, but not limited to, the surface preparation (blasting profile and water soluble salt content), surface temperature of the metal surfaces above dew point, atmospheric conditions, (temperature and relative humidity), dry film thickness and method of application.

3.5.5 All deck areas shall be covered with hard wearing anti-slip paint.

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

3.6 Console

3.6.1 The offered Hovercraft shall have two (2) consoles, a forward or Primary Console and a smaller rear or Secondary Console. The layout of both consoles shall be submitted for MD's approval before any construction work on the console commences. To facilitate the efficient visualisation and inspection of the design of the consoles, the Contractor, apart from a drawing submission including layout plan, shall build a full size mock-up of the consoles to show the positions and arrangement of deck plates, seats, the ENE, and any other fixtures that may influence the ergonomics of the man machine interface, ease of accessibility for inspection and maintenance, for inspection, modification (if necessary) and confirmation by MD and the HKPF. The consoles of an existing Hovercraft may be used as the basis for initial discussions;

3.6.2 Primary Console

(a) The Primary Console shall be designed to deflect wind up and over the heads of the coxswain in both the seated and standing positions and to house the equipment required by the coxswain to control the Hovercraft.

(b) The Primary Console's design shall be optimised ergonomically so that a coxswain (approximately 1.64 metres in height) can operate the controls and displays for extended periods, from both the seated and standing positions, without incurring unnecessary physical strain.

(c) The layout of the controls and displays shall be designed to ensure that the coxswain's left-to-right viewing angle from both the seated and standing positions does not exceed 190 degrees.

(d) The control or displays of the following equipment shall be installed in the Primary Console and located in front of the coxswain in natural positions, with the highest priority devices being located in prime positions. Controls shall ideally be positioned between elbow and shoulder height. Instrument panels and display screens shall be located at or below sitting eye height. All controls and displays shall be operable when wearing normal uniform with foul weather gear and lifejacket and shall include:

(1) Steering handle bar with steering being achieved by turning the handlebars from left to right to move the rudders in the slipstream of the propulsion fan;

(2) Engine throttle control twist grip on the starboard side of the handlebars, which is operated by the Driver's right hand;

(3) Lift engine speed control lever on the port side of the steering handlebars to be operated by the Coxswain's left hand;

(4) Engine monitoring display panel;

(5) Engine start control;

(6) 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;

(7) Electric horn;

(8) Police siren and flashing blue light control panel;

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

(10) GPS receiver;

(11) Radar, chartplotter control and displays; and

(12) Fuel tanks level gauge, if possible.

3.6.3 Secondary Console

(a) The Secondary Console shall be located at the rear of the open cabin designed to be

operated by a second crew member to house the following equipment:

(1) Radio communication controls and microphone;

(2) Loudhailer control unit and microphone; and

(3) EQ-HKPF equipment and related display (paragraph 7.7.1 refers).

3.6.4 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 time operation;

(c) Lockers shall be provided, if space permits, to allow for the watertight storage for officer's 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;

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

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

(f) A waterproof black / grey cover shall be provided to cover the console down to deck level when the Hovercraft is not in use; and

(g) 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) The location and dimensions of lockers or other storage acceptable to the HKPF shall be discussed at the kick-off meeting and agreed by the HKPF; and

(c) Lockers or other storage acceptable to the HKPF shall be provided for one set of emergency repair tools and all lifejackets onboard.

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, or void spaces and their mounting facilities, shall be approved by MD and the HKPF during the kick off meeting. Lockers or other storage shall be ready in the mock-up for inspection before finalisation.

3.8 Deck, Seating and Attachment Systems

3.8.1 High quality upholstered bench seating for three (3) persons, anti-vibration deck covering and handrails shall be provided to reduce the risk of impact injuries and long-term health impairment to both coxswain and boarding officers resulting from the harsh maritime environment in which the Hovercraft will operate.

3.8.2 The seats shall be designed to prevent occupants from falling or being thrown onto the deck or overboard, to optimise body posture thereby minimising the potential for spinal or other injuries and to mitigate the potentially harmful forces to which the Hovercraft and crew conducting the type of operations specified in Paragraph 1.2.1 according to the operational profile specified in Paragraph 2.8 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.

(b) Protective covers: Covers shall be supplied to protect all of the seats from rain and ultraviolet radiation when not in use.

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 Hovercraft to enable operators to move safely around the Hovercraft 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 designs of the fixtures, fittings and finishing specified, shall be discussed during the kick-off meeting and drawings shall be submitted to GNC and the HKPF within one month from the date of the kick-off meeting for approval.

3.9 Gunwale Fittings

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 engines and / propulsion system for routine checking and troubleshooting including while the Hovercraft is underway at sea.

3.10.2 All machinery shall be protected by a suitable guard. Details of the design shall be discussed at the kick-off meeting and submitted to 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 Hovercraft shall be equipped with one aluminium or stainless steel anchor complying with relevant requirements of Rule of RO with certificate issued by the RO and suitable swivel, shackles and secured stowage to be provided by the Contractor.

3.11.2 Two 30 m long 20 mm diameter braided nylon warps for anchoring and towing shall be provided by the Contractor in a suitable secure stowage to prevent movement of the stored anchor whilst the Hovercraft is in operation.

3.11.3 Two 30 m long 16 mm diameter nylon warps for mooring shall be provided by the Contractor in a suitable secure 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, in the version as at the Contract Date unless the rules and regulations of the RO specify that version of such rules and regulations as at the commencement of construction of the Hovercraft shall apply in relation to the relevant requirements specified therein. The following strong points with approved design 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 Hovercraft

(a) The Hovercraft shall be provided with two means of lifting for docking, storage, inspection and maintenance purposes, designed for use with the fixed knuckle cranes and telescopic cranes onboard vessels, travel hoists and truck mounted cranes:

(1) 4-Point Lifting Method

The Hovercraft shall be designed with 4 (four) strong point lifting attachments permanently fitted to the hull. A spreader frame shall be provided if the bending stress induced during lifting exceeds the Hovercraft's permissible tolerances or if the lifting wires / strops would otherwise foul the radar frame or equipment fitted thereto. The design of the lifting attachments, wires / strops and spreader, etc., shall be approved by the RO complying with Hong Kong Merchant Shipping (Local Vessels) (Works) Regulation and shall match, where practical, the lifting facilities at the HKPF's operational bases.

(2) Lifting Sling Method

The Hovercraft shall be designed to allow the Hovercraft to be hoisted ashore by means of lifting slings around the hull with permanent markings at the designated lifting points. The hull structure shall, if it is necessary, be strengthened and approved by the RO. The locations at which the slings are to be positioned shall be marked clearly.

(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 in a welded condition. Detailed drawings of the lifting arrangements shall be approved by the RO.

3.11.6 All the lifting devices / accessories shall be designed to withstand at least six times the mass of the Hovercraft in a fully loaded condition. 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 and lifting sling method designs shall be discussed at the kick off meeting and agreed by MD and the HKPF. To avoid the need for costly and unnecessary alteration or modification of existing equipment, the Contractor shall, prior to any construction, submit detailed drawings of both methods so that the HKPF can check dimensional compatibility with its existing lifting facilities.

3.12 Cathodic Protection

3.12.1 Sacrificial anodes suitable for the hull materials shall be installed on the hull.

3.12.2 The hull shall where appropriate be fitted with sacrificial anodes suitable for the hull materials to protect the Hovercraft against corrosion for one year. Details to be discussed at the kick-off meeting.

3.13 Cradles

The Contractor shall supply the Hovercraft with a suitably designed metal slipping cradle with appropriate safety features on which the Hovercraft 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. The design shall be submitted to MD for approval.

Chapter 4 Machinery

4.1 General Requirements

4.1.1 The Contractor shall note that the Hovercraft is for use in Hong Kong and it is desirable that the main engines and any other machinery offered by the Contractor are those at present commonly used by similar craft operating in Hong Kong Waters, and that they have good support for spare parts and after sale services locally in Hong Kong.

4.1.2 The Hovercraft shall be powered by two engines for propulsion (thrust) and lift respectively. Both engines shall be four-stroke diesel engines of adequate power to deliver the Contract Speed as stated in Paragraph 2.5 of this Part VII. **[E]**

4.1.3 If either engine is having an output power of 130 kW or more, such engine(s) shall have Type Approval Certificate(s) issued by an RO or other entities acceptable to MD in compliance with IMO Tier II emission requirements, and which shall be provided to MD. **[E]**

4.1.4 The engines shall be capable of operating on diesel complying with specifications set out in Cap. 311L, Schedule 1 – Air Pollution Control (Motor Vehicle Fuel) Regulation of the Laws of HK. In addition, the engines shall also be capable of operating on B5 Diesel (5% biodiesel) complying with the specification in Annex 10 to this Part VII.

4.1.5 The design and installation of machineries shall comply with the requirements of the RO and the latest Hovercraft Code or equivalent, in the version as at the Contract Date.

4.1.6 The routine engine check service (including oil change) for onboard engines and gearboxes shall be provided by the Contractor under warranty period.

4.1.7 Training shall be provided by the Contractor including providing video for the procedure for engine change, fan duct change with their alignment adjustment.

4.1.8 The Contractor shall be responsible for ensuring the correct installation and setting up of the engines including the choice of propulsion fan and axial (lift) fan in accordance with the manufacturer's recommendations.

4.1.9 The Hovercraft shall be equipped and fitted with all machineries described each complying with the specifications set out in this Part VII for such machinery. The Spare Parts to be provided shall be of the same model as supplied for the Hovercraft and shall equally comply with all specifications set out in this Part VII.

4.1.10 A lift-up engine cover shall be provided to permit instant access to all components within the engine bay. Sufficient space in the vicinity of all 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 engines, gearboxes, fuel oil tanks etc. shall be carefully designed to enable their removal from the Hovercraft for maintenance in a practicable manner so to avoid the need for the deck or frame to be cut.

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

4.1.12 Each engine system shall include the following accessories:

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

(b) Dead-man's switch and 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.

4.1.13 The Contractor shall supply the Hovercraft with a comprehensive Hovercraft information system for display on the monitors located at the console. The information shall include but not be 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; and

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

4.2 Propulsion and Lift System

4.2.1 The hovercraft shall be supported during operation on a cushion of low-pressure air, contained under the craft by an open loop and segment skirt system constructed in flexible proofed fabric (see Skirt Section, Maintenance Manual). The skirt allows the craft to lift ,as a minimum 0.33m clear of the ground, and will allow obstacles not exceeding this height to pass into the air cushion and under the craft with minimum drag.

4.2.2 Propulsion and Lift Engine

The Hovercraft shall be operated by a propulsion (thrust) and lift system. The Hovercraft shall be powered by two (2) separate diesel engines for propulsion (thrust) and lift via the propulsion fan and axial (lift) fan respectively, so that individual fan speeds can be controlled separately to assist control particularly during slow manoeuvres.

4.2.3 Propulsion Fan and Lifting Fan

(a) The Hovercraft shall be equipped with one (1) propulsion fan as part of the propulsion (thrust) system and one (1) lift fan;

(b) Air for the cushion shall be provided by the lift fan, which shall be an axial fan constructed with composite blades. These blades, which shall be pitch-adjusted by dismantling the hub, shall be trimmed at the tips to give a running clearance in the duct of approximately 6mm. In the event of blade damage, the blades should be capable of being replaced individually or, as a set. The uniformity of the blades shall be such that no balancing of the complete fan is necessary provided that all blades are of an identical length. The lift fan shall be mounted in the bow on top of a right-angle drive gearbox, driven by the lift engine via a Centa-flex shaft and centrifugal clutch;

(c) Propulsive thrust shall be provided by a multi-bladed fan contained within a double skin duct fitted with an intake mesh guard. The fan shall comprise a two-part cast alloy hub which retains up to eight identical injection moulded composite blades. These blades, which shall be pitch-adjusted by dismantling the hub, shall be capable of being trimmed at the tips to give a running clearance in the duct of approximately 6mm. In the event of blade damage, the blades may be replaced individually or, as a set. The uniformity of the blades shall be such that no balancing of the complete fan is necessary as long as all blades are of an identical length;

(d) The failure of one propulsion fan or lift fan, or its control system, shall not render any other propulsion fan or lift fan inoperative; and

(e) The propulsion and fan system shall comply with the requirements of the RO and the Hovercraft Code or equivalent.

4.3 Rudder System

Directional control of the Hovercraft shall be provided by an air rudder type manoeuvring system, which consists of vertical aluminium/ composite rudders abaft of the propulsion fan, which are controlled from the steering console, allowing the craft to manoeuvre and turn in its own length.

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 checking of the engines and other main components of the Hovercraft.

4.4.2 Arrangements shall provide sufficient air to the engines and shall provide adequate protection against damage, as distinct from deterioration, due to ingress of foreign matter as well as to prevent over heating (specific operating environment, i.e. Hong Kong).

4.5 Fuel Oil Tank

4.5.1 The fuel oil for the engines shall be supplied from one or more fuel oil tanks. The maximum capacity of the fuel tank(s) shall provide endurance for the Hovercraft of 4 hours at a speed not less than 20 knots at sea. The Contractor shall design and locate the fuel oil tank in accordance with the Rules of 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 tightness.

4.5.4 The Contractor shall provide the initial fills of fuel oil, lubrication oil, coolant, and hydraulic fluids using fluids and additives prescribed by the 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 Fuel Oil Tank(s):

(a) Fuel oil tank(s) shall be arranged to allow the Hovercraft 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 Hovercraft shall be designed and built with one or more fuel tank(s) to service the Hovercraft's engines. The tank(s), if more than one, shall be interconnected;

(b) The location of the fuel oil tank(s) shall not render the Hovercraft being non-compliant with the requirements 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 sloshing and accelerated forces due to the Hovercraft's movements at all speeds at sea, without damaging the tank and ship structure;

(d) A quick closing valve or cock shall be fitted in the fuel supply line pipe as close as possible to the fuel tank (or each fuel tank if there is more than one fuel tank) or a spill proof fuel pipe connector which allows rapid disconnection of the fuel supply in emergency; and

(e) Provisions to the fuel oil tank:

(1) A tank contents gauge shall be fitted in the console. A level gauge in litres and inspection hole shall be provided for each tank;

(2) Suitable provision such as drip trays shall be made for collecting any oil discharge;

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

(4) Tank drain(s) and earthing protection shall be provided;

(5) The fuel oil tank shall be fitted with anti-condensation ventilating device acceptable to GNC;

(6) Water-in-fuel sensor(s) shall be provided; and

(7) Except the electric wires for the fuel oil tank level sensor(s), no other shall pass through any fuel tank. Ventilation for the fuel tank shall comply with national or other acceptable industrial standards.

4.5.7 Adequate maintenance access opening shall be provided for on board routine checking and replacement fuel tank sensors (fuel tank capacity sensor, fuel tank temperature sensor) without the need of removal hull structure or lifting out fuel tank from vessel.

4.5.8 Fuel tank shall be easily removed for hot work or the deck fittings should be bolt type as far as practical.

4.6 Bilge System

4.6.1 The Hovercraft shall be fitted with a bilge system to the requirements of the RO and the Hovercraft Code, or equivalent, in the latest version as at the Contract Date.

4.6.2 A bilge audible and visual alarm panel shall be fitted in the console, with float switches to be provided, to continuously monitor and give visual warning of high bilge water level within the engine bay or fuel compartment even when the vessel is afloat and unmanned for the alert of the persons ashore.

4.6.3 The engine bay and fuel compartment shall be bilged by means of two electric pumps that are operated from the primary console. The main cabin shall be bilged with a manual pump attached to the side of the hull. All the pumps shall have loose hose attachments so that they can be discharged into a portable container. Buoyancy tanks if fitted are to be bilged by a portable pump with access gained via hatches.

4.6.4 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.

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

Chapter 5 Electrical System

5.1 General Requirements

5.1.1 All the electrical equipment and installation shall meet the RO Requirements or the Hovercraft Code, or equivalent, in the latest version as at the Contract Date.

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 ("D.C.") 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 D.C. System.

5.1.6 The Hovercraft shall be supplied with a comprehensive wiring diagram schematic. The Contractor shall submit a layout plan showing the exact location of all 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 All Equipment shall be easily and safely accessible for inspection, maintenance and ventilation. 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 practicable, 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 D.C. 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 The Contractor shall submit a layout plan showing the exact locations of the Equipment.

5.1.13 All Equipment installed shall be accompanied by operation and maintenance manuals.

5.1.14 The Equipment installation standards shall serve to enhance safety and not present hazards to the operators, e.g. all metal panels exposed to the operator shall be grounded properly. Warnings of any potential hazards shall be displayed in both English and Traditional Chinese, or with universally recognisable labels.

5.1.15 Complete electrical system schematic diagram and all electrical equipment wirings diagram of the vessel shall be provided, and complete engine electric wiring and schematics diagrams,

engine gauges and sender wiring diagrams, engine starting and shutdown system schematic diagram, etc. shall also be provided.

5.2 Batteries

5.2.1 At least one group of 12-volt maintenance-free batteries shall be provided for the 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) as required and in accordance with the RO's Requirements specified in Schedule 9 of Part V.

5.2.4 The engine-driven alternators shall be able to charge the batteries and to provide 12V D.C. power to the shipboard services.

5.2.5 Batteries shall be permanently installed in compliance with the RO requirements or other acceptable standards in a dry, ventilated location above the anticipated bilge water level.

5.2.6 In consideration of the intended operational role of the Hovercraft, the batteries shall be installed in a manner that restricts their movement horizontally and vertically. A battery, as installed, shall not move more than 10 mm in any direction, when exposed to a force corresponding to twice the battery's weight.

5.2.7 Batteries installations shall be designed, installed and 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) will 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 Renewal of batteries can be directly carry out on board without the need of remove /modify of battery cabinet and battery rack. Adequate accessible maintenance space shall be available on top of each battery for on board routine checking battery voltage/current, battery terminal inspection and maintenance without the need of removal of all obstructive batteries.

5.2.14 All batteries of the vessel shall be automatically kept fully charge without the need of crew to operate selector switch for regular select which battery bank being charged.

5.2.15 Each battery bank shall be labelled for identification of services to be powered up.

5.3 Distribution Network

5.3.1 12V D.C. 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) Hand-held searchlights;

(g) Siren;

(h) Electric bilge pumps;

(i) Blue flashing light; and

(j) 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 petrol tank compartments.

5.4.2 Cables that are not sheathed shall be supported throughout their length in conduits, cable trunking, or trays, or by individual supports at maximum intervals of 300 mm.

5.4.3 Sheathed cables and battery cables to the battery disconnection switch shall be supported at maximum intervals of 300 mm, with the first support not more than one metre from the terminal. Other sheathed cables shall be supported at maximum intervals of 450 mm.

5.4.4 Conductors which may be exposed to physical damage shall be protected by sheaths (armoured cables), conduits or other equivalent means. Cables passing through bulkheads or structural members shall be protected against damage to insulation by chafing.

5.4.5 The metallic sheathing, armour or braid of cable, shall be earthed properly at both ends. All bare terminals shall be insulated properly with approved cable insulators.

5.4.6 Wiring shall run along conduits with 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. The opening shall be at upper part of the bulkhead otherwise suitable protection shall be arranged.

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;

(b) IP 55 as a minimum, if exposed to splashing water; and

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

5.6.3 Panel-boards (switchboards) shall be marked permanently with the nominal system voltage.

5.7 Receptacles / Sockets

Receptacles / sockets installed in locations subjected to rain, spray or splashing shall have a minimum protection of IP 55 (IP 66 recommended), in accordance with IEC 60529 when not in use, e.g. protected by a cover with an effective weatherproof seal, the cover of the socket shall be UV stabilized, chemically and impact resistant.

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 Hovercraft'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 requirements 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:

(1) Port side light;

(2) Starboard side light;

(3) Stern light;

(4) Masthead light;

(5) Anchor light;

(6) Police blue light; and

(7) An air-cushion Hovercraft when operating in the non-displacement mode shall, in addition to the lights prescribed in Rule 23 in COLREG, exhibit an all-round flashing yellow 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) One (1) radar reflector;

(b) One (1) siren; and

(c) One (1) horn.

5.10 Lightning Protection

The Hovercraft shall be fitted with a proven lightning protection system to protect the personnel on board and the electronic equipment installed on board. 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

The Contractor shall supply two (2) high-powered hand-held white LED searchlights. These 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. Weathertight facilities for storing the 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.

5.12 Floodlights

Independently controlled high-powered white floodlights shall be supplied to cover the fore and aft decks and Hovercraft's sides.

5.13 Driving Lights

The Hovercraft shall be fitted with two (2) front mounted forward facing "driving lights" (having a similar use and function as vehicle headlights) for illumination of obstructions when navigating at night over beaches / mudflats or uneven terrain.

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

6.1 General Provision

6.1.1 The life-saving appliances and fire-fighting equipment shall comply with the RO's Requirements and the Hovercraft Code as applicable in the latest version as at the Contract Date.

6.1.2 All LSA and FFE shall be submitted to GNC for approval in advance.

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.

6.2.2 Three (3) self-inflatable life jackets shall be provided.

6.3 Fire-fighting Equipment

6.3.1 Two (2) fixed Pyrogen canisters shall be situated in each engine bay.

6.3.2 Two (2) hand operated portable extinguishers shall be mounted on each side of the cabin.

Chapter 7 Electronic Navigational Equipment

7.1 Description of Electronic Equipment System

7.1.1 Except for the equipment which is listed in 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 Hovercraft'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 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 in this Part VII for evaluation.

7.1.6 In addition to all the ENE that the Contractor is required to provide for each Hovercraft under Chapter 7 of this Part VII, the Contractor shall also provide one (1) complete Hovercraft set of this equipment upon the delivery of the Hovercraft as Contract Spare Parts, including cabling, control panels, gauges etc. Please also see Schedule 1 of Part V. In the event that any equipment is substituted during the Contract Period, the Contractor shall also supply two sets of the substituted equipment, as spare parts.

7.1.7 All the Electronic Equipment onboard the Hovercraft and spare parts shall have local technical support and maintenance services in Hong Kong upon the completion of the Warranty Period.

7.1.8 The Contractor shall submit design description, schematic diagrams, hardware and software specifications, installation drawings and integration design including but not limited to the Electronic Equipment specified in Chapter 7 of this Part VII to HKPF for approval within the time specified by the HKPF and prior to the commencement of any such work during design stage.

7.1.9 Upon receipt of a request from the HKPF, the Contractor shall alter or adjust or modify any of the deliverables as specified in Paragraph 7.1.1 and 7.1.2 of this Part VII to the satisfaction of the HKPF without causing any delay to the Implementation Plan or such other time requirements set out in the Contract, at no additional cost to the Government.

7.2 General Requirements

7.2.1 All the ENE shall be marine type and comply with the relevant regulations of the Safety of Life at Sea Convention ("SOLAS"), International Electrotechnical Commission ("IEC") and the International Telecommunications Union recommendations in the International Radio

Regulations ("ITU-R"), unless explicitly stated otherwise. The Electronic Equipment shall comply with all relevant International Maritime Organization ("IMO") recommendations on performance standards and operational features. The Electronic Equipment shall perform effectively even under the most adverse weather conditions. All radio communications equipment, including radars and radios, shall also comply with the requirements of the Office of the Communications Authority ("OFCA") of the HKSAR.

7.2.2 The Contractor shall observe and adopt the International Commission on Non-Ionizing Radiation Protection ("ICNIRP") Guidelines [formerly International Radiological Protection Association ("IRPA") Guidelines] and the Code of Practice issued by OFCA of the HKSAR on the limits of exposure to radio frequency electromagnetic fields in the frequency range from 100 kHz to 300 GHz for the protection of operators, workers and the public against Non-Ionizing Radiation ("NIR") hazards, so as to provide a safe and healthy working environment under all normal conditions. In case of multiple simultaneous exposures, the combined effect of such exposure shall also be assessed in accordance with the ICNIRP Guidelines.

7.2.3 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 Organization in particular in relation to all harmful radiation. The Contractor shall also disclose in writing the existence of any radio frequency radiation hazard emitted from the Equipment, which is harmful to human beings under normal operating conditions, by the safety standards adopted by ICNIRP, American National Standards Institution ("ANSI"), or other equivalent national or international standards.

7.2.4 All ENE shall be suitable for round-the-clock operation on the Hovercraft. 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 nigh time, without causing eye-strain, glare and / or discomfort. Equipment control keys and buttons shall be suitably back-lit with adjustable brightness levels to aid operation in the dark without causing eye-strain, glare and / or discomfort.

7.2.5 Design Standards

(a) Environmental Conditions:

(1) All ENE shall be capable of operating continuously to the specifications throughout its normal life span in the HKSAR climate and environment. The following parameters shall apply unless otherwise stated:

1. Ambient temperature between 0° C and 40° C; and between -5° C and +50° C if the equipment (including display units and antennae) is exposed to the open air;

2. Relative humidity up to 95%, non-condensing;

3. Salt and chemical corrosion as found in a tropical coastal environment; and

4. Materials that promote mould growth shall not be used.

(2) ENE shall be capable of withstanding the knocks and jolts likely to occur during repair work or rough handling.

(b) Power Supplies:

(1) The power supply for all ENE shall be protected by appropriate circuit-breakers;

(2) All the ENE shall be capable of working normally when powered by the Hovercraft's battery-backed D.C. supply system. A converter shall be provided if required;

(3) Two spare power supply connections shall be required with a negative earth and be connected to a designated 12 Volt D.C. (nominal) battery-backed power

supply. The battery shall be charged up when an engine generator is working;

(4) There is a possibility of D.C. leakage through the negative grounding to the D.C. battery power bank on the supplied Equipment if it is not connected properly. The Contractor shall take precautions to prevent this type of leakage, e.g. by using an isolation converter;

(5) The ENE's power supply shall be compatible with the Hovercraft's electrical system. If necessary, a voltage stabiliser or regulator shall be provided and installed to maintain the ENE in proper working condition when connected to the unsteady D.C. voltage from the generator to protect the ENE from the adverse effects of excessive voltage, current spikes and surges;

(6) Suitable lightning protection devices (e.g. lightning surge arrestors / dissipaters) shall be incorporated for protecting the ENE and its accessories against damage due to lightning; and

(7) Selected ENE equipment shall be connected to individual external switches for controlling the power on or off status of the individual ENE equipment and the illumined device on the control panel. The location of external switches shall be easily accessible. The actual devices to be connected to the external switches shall be subjected to approval by HKPF.

(c) Safety:

(1) All ENE supplied shall be of a safe design and shall be installed in a safe manner as approved by the GNC and COMMS. The standard of installation shall enhance the Equipment's safety features and not present any hazards to the user;

(2) 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;

(3) Electrical contacts and PCBs shall also be protected in an appropriate manner that does not impair their electrical characteristics;

(4) Lightning protection device(s) [e.g. lightning surge arrestor(s) / dissipater(s)] are required, particularly for antennae installed outside the protection zone of the Hovercraft's own lightning protection device(s);

(5) The lightning surge arrestor(s) / dissipater(s) of each feeder cable shall be grouped and concentrated in a "lightning arrestor / dissipater panel" to be located inside the console for ease of maintenance; and

(6) Warnings of any potential hazards associated with the ENE shall be displayed in Traditional Chinese characters, English and universally recognised labels, in visibly prominent positions.

(d) Design Practice:

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

(2) The normal serviceable life of the ENE shall be a minimum of five (5) years operation onboard the Hovercraft. During the serviceable lifetime of the ENE, it shall be possible to maintain the ENE performance with reasonable repair and set up as defined in this Part VII;

(3) 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;

(4) The display digits in the ENE control panel shall be easily legible;

(5) 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;

(6) 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;

(7) 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);

(8) Adequate testing points and other testing facilities, e.g. extension boards, testing probes, shall be provided to permit ease of maintenance; and

(9) 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 (3) years by high grade enamel painting, plating, galvanising, anodising, or any other suitable surface treatment; and

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

7.2.7 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 (3);

(b) The ENE shall be supplied with all auxiliary items required including but not limited to the following for normal operation:

(1) Connectors;

(2) Circuit-breakers;

(3) Lightning arrestors / dissipaters;

(4) Power sockets;

(5) Plugs; and

(6) Cables.

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

(d) All exposed connectors shall be protected by weatherproof material (e.g. 3M self-adhesive tape or equivalent) to prevent water ingress;

(e) Special attention shall be paid to the compass safe distance [Marine Guidance Note MGN 57 (M+F) and IMO Resolution A.694 (17)] of the ENE and the Radiation Hazard Zone of the radar scanner in the Hovercraft's design. Positioning of the ENE and the associated accessories shall be planned carefully in respect to their relative distances to eliminate any chance of radio interference that might occur during operational use;

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

(1) The relevant Merchant Shipping Notices ('M' Notices) published by the

Department of Transport (London), in the version as at the Contract Date unless it specifies that version of such standard as at the commencement of construction of the Hovercraft shall apply in relation to the relevant requirements specified therein, in respect of setting and installing the compass, VHF radio and sounding devices are observed;

(2) Satisfactory performance of the ENE;

(3) Protection from mechanical and water damage;

(4) Ease of accessibility for maintenance and repair;

(5) Manufacturers' recommendations are followed strictly;

(6) Precautions and measures shall be taken and adopted in the installation of the ENE to ensure that the g-forces and vibration encountered by the Hovercraft travelling at high speed in rough seas will not affect the operation of the ENE; and

(7) The installation in the external environment shall withstand the conditions stated in Paragraph 7.2.5(a)(1) of this Part VII.

(g) Adequate measures to prevent interference between the ENE shall also be provided, which for receiving apparatus and other ENE that may be affected by frequency induced voltage shall include being earthed, screened and protected efficiently according to the rules, regulations and recommended practices regarding screening of electric wiring;

(h) All precautions and provisions shall be taken and made to minimise the effect of sea spray and exposure to weather on the console panels, equipment controls and display units and, to protect the Equipment in such conditions. Suitable weather protection covers, which do not obstruct users from operating the equipment, shall be provided as necessary; and

(i) All the equipment cables shall be covered properly so that they will not be destroyed or loosened by people and water.

7.2.8 Cable Laying

(a) General Cable Requirements:

(1) All cables shall be rated and sized properly;

(2) The signal cables shall be screened properly to reduce the cross-talk level as necessary; and

(3) All feeder cables shall be of one length, without joints, from antennae to the Equipment and from equipment to equipment, unless such joints are necessary under the specific installation conditions encountered or for ease of maintenance. All joints if provided shall be reliable and durable.

(b) Cables shall be laid in concealed cable trunks and trays inside consoles or other compartments or under the deck unless approved otherwise by the GNC and COMMS, with due consideration given to the ease of maintenance of the Hovercraft as a whole. Solutions adopted shall not pose occupational safety and health risks such as tripping, snagging or impact hazards to the Hovercraft's crew during operations.

(c) Watertight rubber grommets, insulated bushes or cable glands shall be used to protect the cables when passing through the metal covers of distribution boards, boxes, or any other metal work or exposed structure.

(d) The Contractor shall be responsible for the supply, installation and inter-connection of all cables and all related installation materials within the system, as well as the final connection between the power supply and the ENE.

(e) Wires and cables shall be as short as practicable with sufficient slack:

(1) To enable parts to be removed and replaced during servicing without

disconnecting other parts;

(2) To facilitate field repair of broken or cut wires; and

(3) To facilitate movement of the Equipment for maintenance purposes.

(f) All wiring terminations shall be finished in a neat and approved manner and shall be identified separately by a unique identification wiring code number.

7.2.9 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, ENE sub-assemblies and internal and external cables shall be marked or labelled clearly with their own unique identification codes in English, in a permanent manner, so as to identify each individual function. Such labels shall be recorded and organised properly in a document and handed over to COMMS through GNC prior to Delivery Acceptance;

(d) All switches, connectors, jacks or receptacles shall be marked clearly, logically and permanently during installation. All wires and cables shall be identified at every termination and connection point with permanent type markers; and

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

7.2.10 Acceptance Test

(a) The acceptance tests for the ENE shall consist of three (3) parts: bench tests, Factory Acceptance Trials ("FAT") and on-site commissioning tests as follows:

(1) ENE bench tests shall be performed to demonstrate 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;

(2) The Contractor shall carry out the FAT in the presence of GNC and COMMS representatives to demonstrate that each ENE item individually and that all ENE as a whole were installed and implemented properly. If the Hovercraft is not constructed in the HKSAR, the Equipment FAT shall be conducted at the manufacturer's shipyard before the shipping of the Hovercraft to the HKSAR in accordance with the procedures specified at Paragraph 1.6.12 of this Part VII;

(3) The on-site commissioning tests shall be carried out by the Contractor as part of the Technical Acceptance in the presence of GNC and COMMS officers after completion of installation of all ENE; and

(4) The on-site commissioning tests shall include an inventory check, an NIR hazard test, ENE installation inspection and thorough technical, functional and integration tests of individual ENE items and all ENE together as a whole and, a sea trial, to verify that the ENE has been commissioned properly and is ready to be put into service on the Hovercraft.

(b) The Contractor shall ensure and demonstrate, as part of the on-site commissioning tests, that the electrical and magnetic fields as well as the power density radiated from all installed ENE do not expose occupational personnel and members of the general public to radiation in excess of the limits contained in the 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 complies with the stated NIR safety standards; and

(c) At least two (2) months prior to the bench tests, the FAT and the on-site commissioning tests, the Contractor shall submit details of the schedules and test procedures of all ENE for COMMS approval. Once all of the test procedures have been established and agreed by the HKPF, these shall be followed during the relevant tests. Any delay in the submission of these procedures may lead to a corresponding delay in their agreement and, hence, in the commissioning of the Equipment for which the Contractor will assume the financial liability.

7.2.11 Documentation

(a) At least six (6) weeks prior to Delivery Acceptance, for each individual item of Equipment, the Contractor shall supply to COMMS, through GNC, three (3) paper copies of the operational manuals and maintenance manuals in English (at least one (1) original) and two (2) soft copies in 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 Hovercraft set out in Paragraph 8.2.2(h) of this Part VII. The manuals shall provide the information listed below:

(1) Description of the principle of operation;

(2) Details of installation and setting up procedures;

(3) Maintenance instructions including mechanical assembling and disassembling procedures;

(4) Schematic diagrams and block diagrams with their respective descriptions; and

(5) Fault finding and calibration procedures.

(b) Drawings showing the proposed design of conduit / trunking routes for the Equipment installed onboard, including future maintenance considerations shall be submitted to GNC and COMMS for approval before installation.

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

(1) Operational manuals and maintenance manuals specified in Paragraph 7.2.11(a) of this Part VII [to have been supplied at least six (6) weeks prior to Delivery Acceptance];

(2) Properly organised individual Equipment testing results including details of test and calibration procedures;

(3) On-site commissioning and sea trial reports of all Equipment as witnessed by COMMS;

(4) The initial parameter settings and readings of all Equipment at the time of the on-site commissioning;

(5) "As installed" drawings showing the positions of all individual items of the Equipment installed and the routing of the interconnecting cables between equipment;

(6) A block diagram showing the interconnections between all equipment units complete with their technical protocols and the wiring schedule;

(7) "As fitted" diagram showing the locations and positions of all circuit-breakers controlling the power to the Equipment; and

(8) The completed NIR Report as required by Paragraph 7.2.10(b) of this Part VII.

(d) The documents specified at Paragraphs 7.2.11(a) to (c) of this Part VII and the training materials specified in Paragraph 9.1.4 of this Part VII shall be supplied in both paper copy and in DVD format or other format acceptable to COMMS; and

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

7.2.12 Electronic Components / Spares Parts / Spare Units / Maintenance

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

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 that the Acceptance Certificate in respect of that Hovercraft 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;

(c) The Contractor shall keep sufficient spare parts for the ENE in Hong Kong with no extra cost to Government for fulfilling the warranty services requirement as specified in Paragraph 7.2.13(b) of this Part VII;

(d) The Contractor shall provide and install sea chart update service when the updates version of the sea charts is released; and

(e) The Contractor shall indemnify the Government in respect of any damages to all the HKPF equipment as specified in Paragraph 7.8 of this Part VII if the damages were caused by defects or malfunctions of the Vessel or its equipment onboard. Paragraph 1.4 of Annex 1 of this Part VII shall also apply to all HKPF equipment as specified in this Part VII.

7.3 Electronic Navigational Equipment Specifications

7.3.1 Integrated multi-functional display unit incorporating radar, satellite compass, secure AIS, DGNSS 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 Point Position Indicator ("PPI") sweep.

(d) The radar shall be fitted with an auto-track function which provides acquisition and tracking of at least six targets in a way similar to Automatic Radar Plotting Aid ("ARPA"). The radar shall provide data on any chosen target. Such ARPA-like auto-track function shall support CPA and TCPA features for the tracked targets.

(e) The radar shall have at least the following operational controls/features:

(1) Operator selection of north up, head up, course up;

(2) True Motion ("TM") and Relative Motion ("RM") modes;

(3) At least three (3) different brightness levels;

(4) Information displaying Hovercraft's own latitude/longitude, position and speed;

(5) Trails;

(6) Fixed and variable range ring;

(7) Variable Range Marker ("VRM");

(8) Electronic Range and Bearing Line ("ERBL");

(9) Manual rain and sea clutter suppression;

(10) Gain control;

(11) Auto-clutter sea control;

(12) Range up;

(13) Range down;

(14) Vectors;

(15) Centre picture;

(16) Acknowledge alarm; and

(17) Panel brilliance.

(f) 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 Hovercraft is operating at high speeds in the maritime environment.

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

(h) The radar shall be aligned with the heading of the Hovercraft.

(i) The Contractor shall ensure at the design stage that unnecessary radar blind zones are not created. The Contractor shall, in particular, ensure that equipment installed before the radar scanner such as navigation lights, floodlights, horn speakers and the like do not obstruct the radar scanner's emissions if at all possible. Where such obstruction is unavoidable it shall be discussed with the HKPF at the kick-off meeting and mock up meeting post Tender award. If such obstruction becomes apparent after installation, the Contractor shall rectify it.

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

(k) The radar shall fulfil the following minimum performance requirements:

(1) Reference:	Magnetic and True North
(2) Warm-up Time:	< 120 seconds
(3) Distance Accuracy:	<1% of the range
(4) Bearing Accuracy:	<1°
(5) Operational Maximum Wind Speed:	At least 70 knots
(6) Scanner Size:	≥18 inches nominal
(7) Scanner Rotation:	24 rpm and 48 rpm or greater rotation speed
(8) Beam Width H/V:	< 5.2°/25°
(9) Transceiver Output Power:	at least 165mW
(10) Integrated Multi-Functional Display (MFD):	9-inch LCD touchscreen colour display;

	Resolution 1280 x 800 pixels or better for 16:9 aspect ratio. Other aspect ratios of equivalent size and resolution are acceptable. Brightness of 1200 cd/m^2 or greater.
(11) Operating Temperatures:	Better than –5℃ to +55℃ for the antenna/scanner unit. Better than –5℃ to +45℃ for the display unit.
(12) Waterproofing	Radome antenna: IPX6, Display unit: IPX6
(13) Reference:	Magnetic and True North
(14) Warm-up Time:	< 120 seconds

(l) The integrated Multi-Functional Display ("MFD") unit as specified in paragraph 7.3.1(m) of this part VII shall comprise a flush-mounted touchscreen liquid crystal display ("LCD") colour display of a type suitable for use on an open deck vessel. The integrated MFD 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.

(m) The integrated MFD shall incorporate control keys and processor equipment to integrate, control, operate and display data of radar, secure AIS, satellite compass, DGNSS and chartplotter functions.

(n) The crew operator shall be able to select the following modes of presentation at the integrated MFD:

(1) radar image only;

(2) plotter image only; and

(3) plotter image overlaid with radar image.

(o) The radar system's in-built chartplotter shall support the following functions:

(1) Operator selectable North Up or Course Up presentation;

(2) Operator selectable TM or RM presentation;

(3) Waypoints and routes;

(4) Seamless and smooth zoom in and zoom out;

(5) Seamless and smooth chart panning;

(6) Layers of chart details;

(7) Monitor own vessel position and heading;

(8) View information of charted objects;

(9) Own vessel vector;

(10) Man-Over-Board ("MOB");

(11) Provide detailed navigational sea charts covering the entirety of Hong Kong Waters and future updates into a format readable by the chart plotter; and

(12) The sea chart can be updated using the chart card with the sea chart update file.

(p) The radar system shall be interconnected with the DGNSS and satellite compass so that real-time data from these 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 DGNSS location data to the radar system for resilience purposes.

(q) The system at the integrated MFD shall be able to display the own vessel's heading (in degrees north) and position (in latitude and longitude).

(r) 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.

(s) The integrated MFD shall comply with relevant requirements of the IEC 60945 Damp heat 66℃ at 95% relative humidity.

(t) 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").

(u) The radar shall provide with interface for controlling and retrieving radar information using an external software with the following requirements:

(1) Turn on and off the radar units;

(2) Turn on and off the transmission of the radar;

(3) Setting the gain of the radar;

(4) Setting the range of the radar;

(5) Setting the rain clutter of the radar; and

(6) Setting the interference level of the radar.

7.3.2 Satellite Compass

(a) The Contractor shall supply and install one satellite compass set. The installation location of satellite compass shall submit to HKPF for approval during mock up meeting before installation;

(b) The satellite compass **DATA SHALL BE DISPLAYED IN** integrated MFD.

(c) The sensor unit shall incorporate two 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 satellite compass shall support GPS, GLONASS, BeiDou, Galilo and QZSS for pinpoint global positing and heading accuracy.

(f) The maximum heading update rate for ARPA targets shall be 20 Hz for ARPA targets as specified in Paragraph 7.3.1 (p) of this Part VII.

(g) Performance:

(1)	Reference:	Either Magnetic North or True North
(2)	Warm-up Time:	Less than one second
(3)	Accuracy:	+1.0° typical
(4)	Resolution:	0.1°
(5)	Deviation Compensation:	Automatic
(6)	Operating Temperatures:	Sensor unit: 0℃ to 50℃; Display unit: 0℃ to 55℃
(7)	Waterproofing:	Sensor unit: IPX5, Display unit: IPX6

7.3.3 Differential Global Navigation Satellite ("DGNSS System") in integrated with radar, electronic chart system and integrated MFD.

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

(1) The DGNSS shall support at least GPS, GLONASS satellite positioning systems;

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

(3) The DGNSS 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;

(4) The DGNSS system shall be fully compatible with the radar;

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

(6) The DGNSS system shall support at least the following data displayed either at the DGNSS display unit or the radar display;

(7) Position (latitude/longitude): to at least four (4) decimal points**;**

(8) Horizontal Position accuracy (at speed of 15kt): less than or equal to 10m**;**

(9) Course: 1° resolution**;**

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

(11) Date and time: selectable as GMT or local mode**;** and

(12) Satellite status information.

(b) The DGNSS system's antenna/receiver shall fulfil the following technical requirements:

(1)	Receiver Type:	8 or more channel parallel receiver
(2)	Receiving Frequency and Code:	1,575.42 MHz (C/A code)
(3)	Position Accuracy:	Within + or - 30 metres rms or better 95% of the time
(4)	Warm Start Time:	0℃ to 55℃ or better
(5)	Ambient Temperature:	0℃ to 55℃ or better
(6)	Waterproofing:	IPX7 or better
(7)	Correction:	IALA compliant Beacon RTCM SC-104

7.3.4 Public Address ("PA") / Siren, Loudhailer / External Broadcasting System:

(a) The PA / siren, loudhailer / external broadcasting system shall be an off-the-shelf product and no customization shall be required;

(b) The system shall function as a siren and powerful loud hailing system designed especially for hailing and alerting other craft in the marine environment. It shall consist of a master control unit, a control panel, a fist microphone, amplifier, horn type loudspeaker(s) and related components and accessories;

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

(d) The master control unit shall be recessed into the 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";

(e) Verbal messages shall be broadcast through a fist microphone mounted on the console;

(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 time operations and to a maximum level which will enable messages to be heard at least 0.2 km away;

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

(j) The PA shall be integrated with the Intercommunication System; and

(k) The vessel horn operation shall be direct acting, simple and easy for vessel user operate especially in emergency situation. The vessel horn shall not be a horn speaker driven by ENE equipment multi-purpose PA amplifier. The vessel horn shall be a 12V electric horn, powered by vessel battery and operated by pressing electric horn switch.

7.4 International Maritime Mobile ("IMM") VHF Radio

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

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

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

(c) Fully compatible with the GMDSS;

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

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

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

(g) Specific Features and Requirements:

(1) Power ON / OFF;

(2) "Transmit" indicator, volume and squelch controls;

(3) Channel number indicator;

(4) Quick selection of Channel 16 (156.8 MHz);

(5) Dual watch and triple watch on Channel 16 and selected channel(s);

(6) Channel scanning between Channel 16 and selected channels; and

(7) 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 1μV for 20dB SINAD.
(c)	Inter-modulation Rejection:	65 dB or better.
(d)	Adjacent Channel Selectivity:	65 dB or better.
(e)	Squelch:	Adjustable squelch control.
(f)	Spurious Rejection:	65 dB or better.
(g)	Audio Output Distortion:	At least 0.2 watt at rated output with less than 10%.

7.4.4 The Contractor shall supply and install a VHF antenna, and connect to the VHF radio.

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

7.4.6 The use of IMM VHF fixed radio will be decided by the HKPF at the kick-off meeting. The corresponding cost shall be included in the Total Purchase Price in Schedule 1 of Part V, which shall not depend on the decision at Kick-Off meeting

7.5 Secure Automatic Identification System ("S-AIS")

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

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

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

7.5.4 The S-AIS shall support cipher DES, AES and support cipher keys:

(a) Up to 128 or above time limited keys;

(b) Manual keys input; and

(c) External application input.

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

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

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

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

surges.

7.5.8 The VHF antenna, GPS antenna and Combined VHF / GPS antenna shall fulfil the following requirements:

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

(b) GPS band Frequency: 1575.42 MHz;

(c) VSWR: <2:1; and

(d) Nominal impedance: 50 ohms.

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

(a) Normal mode - function as a normal SOLAS Class A AIS broadcasting and receiving without encryption;

(b) Secure mode - only encrypted AIS data will be broadcast, both encrypted and non-encrypted AIS messages will be received; and

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

7.5.10 The S-AIS shall equip a display unit for showing the S-AIS information and S-AIS equipment configuration.

7.5.11 The Contractor shall provide and install a secure mode switch on the dashboard to enable the officer to change the operational modes as specified in Paragraph 7.6.8 of this Part VII.

7.6 Intercommunication ("IC") System

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

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

7.6.3 The IC system shall provide the Hovercraft 's crew with a modular and expandable platform on which they can communicate with each other within their own Hovercraft via IC and with others elsewhere via radio and mobile telephone networks.

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

7.6.5 One of the main equipment units of the IC system shall be powered by the Hovercraft's D.C. supply and then distribute power to the other main equipment and associated equipment of the IC system via the Ethernet network.

7.6.6 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").

7.6.7 The EBIU shall:

(a) Form an Ethernet network on the Hovercraft;

(b) Be connected to three (3) radio transceivers, including one (1) unit of HKPF Marine Radio Communications System as specified in Paragraph 7.7.1(a) of this Part VII, one (1) unit of International Maritime Mobile VHF radio as specified in Paragraph 7.4.1 of the Part VII and one (1) HKPF 3G / LTE mobile telephone;

(c) Be connected to the Hovercraft's radar, navigation and engine notification alarms if these equipment alarm interfaces are available;

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

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

7.6.8 The RIUs shall be:

(a) Fixed nodes, the purpose of which shall be to integrate onboard radio systems as specified in Paragraph 7.6.7(b) above;

(b) Able to form individual communication channels within fixed nodes into groups by the operators as specified in Paragraph 7.6.8(a) above; and

(c) Connected to the Hovercraft's D.C. power supply and the AIUs via the Ethernet network.

7.6.9 The AIUs shall:

(a) Be fixed nodes connected to the Ethernet network as specified in Paragraph 7.6.4 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") / Fixed Communications Units ("FCUs") via waterproof plugs and sockets;

(d) Receive and distribute voice communications; and

(e) Have a full duplex intercom capability.

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

(a) Be the operator's primary gateway to connect to both the operators' audio head gear and the major equipment as specified in Paragraph 7.6.6;

(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.

7.6.11 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 the IC system as specified in Paragraph 7.6.7(a), capable of interfacing with the small belt-mounted wireless radio specified at Paragraph 7.6.11(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 7.6.11(a);

(c) Enable an operator who is no longer connected to the IC system by a PCU / FCU and extension cable, such as a boarding officer who has left the Hovercraft, 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.

7.6.12 The audio headgear shall:

(a) Be compatible for use with both ballistic and impact protection helmets and connecting to the HKPF's existing Safety Helmet audio headgear (details to be provided at the kick off meeting) with the PCU / FCU;

(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 82dB or below; and

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

7.6.13 For each Hovercraft delivered under this Contract, the Contractor shall supply:

(a) Sufficient channels from RIUs for the devices listed at Paragraph 7.6.7(b) above and other systems as provided for in this Specification;

(b) Sufficient AIUs with plug-in points for four (4) crew locations as specified in Paragraph 7.6.9 above;

(c) Four (4) PCUs / FCUs including cables as specified in Paragraph 7.6.10 of this Part VII. The use of PCUs / FCUs will be decided by the HKPF at the kick-off meeting. The corresponding cost shall be included in the Total Purchase Price in Schedule 1 of Part V, which shall not depend on the decision at Kick-Off meeting;

(d) One (1) wireless base station as specified in Paragraph 7.6.11(a) of this Part VII;

(e) Four (4) sets of audio headgear which needed to connected to the HKPF's existing safety helmet (as advised by HKPF during kick-off meeting);

(f) Four (4) waterproof connection cables to be capable of connecting to the HKPF's existing Safety Helmet audio headgear (details to be provided at the kick off meeting) with the PCU / FCU;

(g) Four (4) small belt-mounted wireless radio as specified at Paragraph 7.6.11(b) of this Part VII; and

(h) All other components required that have not specified in this specifications to enable the IC system to operate.

7.6.14 The system administrator shall be able to configure the IC system by laptop computer on site in the Hovercraft 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.

7.6.15 The Contractor shall, in respect of all of the Hovercraft delivered under this Contract, supply two (2) sets of laptop computers including system administrator software and Symantec Endpoint Protection software and their perpetual software and virus definition update licenses with which the IC system can be configured, programmed and troubleshot.

7.6.16 The IC system shall be suitable for continuous operation in the Hong Kong climate and maritime environment throughout its life span in accordance with the specifications in this Chapter. It shall be:

(a) Capable of operation in temperatures ranging from -5^{o}C to 50^{o}C

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

(c) Protected to IP67 standard or be enclosed in an IP67 watertight box.

7.7 Installation / Space / Cabling for the Existing HKPF Equipment

7.7.1 The Contractor shall, at no cost to Government, install onto each Hovercraft the supply and install the associated accessories and cables for the following equipment (EQ-HKPF), which shall be provided by the HKPF. Details of location, space, cable, and power requirements of EQ-HKPF shall be provided at the kick-off meeting:

(a) HKPF Marine Radio Communications System ("MRCS") TETRA mobile radio. The present equipment type is the TETRA mobile radio with separate control panel, speaker box and speaker microphone. The MRCS TETRA Radio is a wide-band version with a frequency range of 380 MHz to 430 MHz. The radio is powered by a +12V D.C. nominal supply. HKPF will provide the exact model of the MRCS TETRA Radio, at least three months in advance of the on-site installation of the MRCS TETRA Radio. No additional costs associated with the installation of a radio of a different type shall be chargeable to the Government; and

(b) Stowage for toughpad. The exact model of the toughpad will be provided during kick-off meeting.

7.7.2 The Contractor shall:

(a) Coordinate and finalise the positions of all the radios, radar equipment and antennae systems during the detailed system design stage;

(b) Reserve sufficient space for the installation of the MRCS TETRA Radio, including for flush mounted panels;

(c) Note that the MRCS TETRA 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 MRCS TETRA Radio's installation;

(f) Supply and install one UHF antenna for MRCS TETRA radio a frequency range of 380 MHz to 430 MHz at a VSWR of 1.5 or less. The Contractor shall provide and install suitable co-axial cable surge suppressors to the UHF antenna to protect the radio equipment from lightning surges;

(g) Design, rig and suitably mount the antennae to ensure EMC and avoid interference;

(h) Fit and install the MRCS TETRA Radio in the HKSAR in the positions that were finalised during the detailed design stage, subject to any subsequent EMC-necessitated alteration;

(i) Design and provide mounting bracket for the MRCS TETRA Radio;

(j) Provide all necessary cables, materials, labour and transportation for the equipment installation; and

(k) Provide stowage for the toughpad as specified in Paragraph 7.7.2 of this Part VII.

7.7.3 COMMS shall:

(a) Connect up the MRCS TETRA Radio using the connectors, cables and wires installed by the Contractor;

(b) Test the VSWR of the RF cables and UHF antennae to confirm that neither exceeds 1.5; and

(c) Commission the MRCS TETRA Radio.

Chapter 8 Services Support

8.1 General Requirement

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

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

(b) Spare parts;

(c) Reliability (frequency and time to repair breakdown);

(d) Time interval between maintenance periods;

(e) Time to undertake scheduled maintenance (downtime); and

(f) All machinery and equipment installed in the Hovercraft shall be serviceable in the HKSAR.

8.1.2 Allowable Hovercraft 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 operational profile as specified in Paragraph 2.8.2 of this Part VII.

8.1.3 Maintainability - the Hovercraft shall be easy to maintain by ensuring that there shall be:

(a) Good access to all installed items for monitoring, service and overhaul; and

(b) Readily available 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. At the Delivery Acceptance of the Hovercraft, the approved Inventory List will be used to check that all the items have been delivered to MD in a satisfactory state. The detailed inventory list for the whole Hovercraft covering all discrete items down to major component / unit level shall include the following:

(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 the Hovercraft;

(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 Hovercraft 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 Hovercraft 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 Hovercraft, where the list shall include:

(1) Description;

(2) Type or model (if applicable);

(3) Makers part number or equivalent (if applicable);

(4) Location;

(5) Quantity;

(6) Supplier or agents name and contact details;

(7) Order lead time;

(8) Shelf life; and

(9) Unit cost;

(e) Four (4) copies (at least one (1) original) of manufacturers' operation, maintenance and workshop manuals in English and Traditional Chinese 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 Hovercraft 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 Hovercraft delivered covering:

(1) Daily user check and operational procedure;

(2) Operating details of each system; and

(3) Emergency operation procedure.

(The precise format and details required shall be subject to the Government's approval when the configuration of the Hovercraft 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 Hovercraft'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

(1) 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 Hovercraft; and

(2) 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

(1) 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 Hovercraft in Hong Kong Waters;

(2) Four (4) 200 mm x 150 mm colour photographs showing the profile of the Hovercraft in Hong Kong Waters; and

(3) Four (4) 150 mm x 100 mm colour photographs showing the profile of the Hovercraft in Hong Kong Waters.

(c) Softcopy of Photographs

(1) 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 of which should be issued by the RO;

(c) Performance test certificates of all equipment (e.g. electronics, switchboards, etc.);

(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 Hovercraft (valid for twelve (12) months from the date of Acceptance Certificate of the Hovercraft);

(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 Hovercraft 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.

8.2.7 Hovercraft Model

The Contractor shall provide the Government with three (3) Hovercraft models suitably scaled so that the model length overall is between 300 mm to 400 mm. The models shall include all major external fittings above and below the waterline such as the collar, console, hull, appendages including skirt, propulsion system, mast, mast fittings and navigation lights, lifesaving equipment, fire-fighting equipment and cleats, etc. according to the approved GA Plan as agreed by the Government. The Hovercraft model and fittings shall be made to an overall

exact scale standard relevant to model making.

Chapter 9 Training

9.1 General

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

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

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 training shall be provided by such personnel in one visit

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

9.2 Training on Electronic Navigational Equipment (ENE) Maintenance

9.2.1 ENE Maintenance Training Course

(a) The ENE maintenance training course shall enable the maintenance staff to:

(1) Acquire full knowledge and appreciation of all aspects of the design considerations, day-to-day operation, inter-connected system operation, fault breakdown, routine maintenance and fault finding / repairing procedures of the ENE being offered; and

(2) Effectively maintain the ENE. This shall include practical demonstrations and tests.

(b) The maintenance training shall include, but not be limited to the following items:

(1) Introduction of the Equipment locations;

(2) Equipment operation, working principles and functional description;

(3) Equipment block and schematic functional drawings and descriptions;

(4) Equipment adjustment / calibration procedures and parameter settings;

(5) Equipment construction and mounting;

(6) Equipment and signal interfacing; and

(7) Preventive maintenance and trouble-shooting.

(c) The course shall enable technical staff to effectively maintain the Equipment;

(d) The course shall be held immediately after the commissioning of the Equipment on the Hovercraft; and

(e) A total of up to twenty (20) trainees will attend the course for efficient training. The training course shall accommodate the specified number of trainees.

9.3 Training on Operation and Maintenance of the Hovercraft

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

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

(a) Operator training on Hovercraft 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 Hovercraft operations

(a) In respect of the Hovercraft 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 hovercraft operator's training syllabus, which shall cover on board ENE Equipment, systems, first level maintenance and troubleshooting, as well as all aspects of hovercraft 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 hovercraft operator's training course according to the approved syllabus to twenty-two (22) 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 design, 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 sixteen (16) HKPF and six (6) officers of Government Dockyard Maintenance Section technical and maintenance staff in the HKSAR or overseas.

9.3.5 All facilities, venues, and materials necessary for the training courses mentioned in Chapter 9 of this Part VII and otherwise required in these Technical Specifications shall be provided by the Contractor unless otherwise specified. The training shall also be conducted in Chinese (Cantonese) and / or English with relevant training materials to be supplied by the Contractor. The training materials shall be provided before the training, in both paper and CD-ROM format.

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

ABS	American Bureau of Shipping
AC	Alternating Current
AFFF	Aqueous Film-Forming Foam
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
AVLS	Automated Vehicle Location System
AWS	American Welding Society
BNC	Bayonet Neill-Concelman
BS	British Standards
BSB	data encoded in the BSB format
BWA	Biological Warfare Agent
CBRN	Chemical, biological, radiological and nuclear
CCD	Charge-coupled device
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
FM200	heptafluoropropane
COG	course over ground
CPA	Closest Point of Approach
CPU	Central Processing Unit
CRT	Cathode ray tube
c/w	Come with
CWA	Chemical Warfare Agent
dB	Decibel
dBi	decibel isotropic
dBm	Decibel-milliwatts
DC	Direct Current

DDR	Double Data Rate
deg	Degree
DGPS	Differential Global Positioning System
DISS	DNC Digital Nautical Chart
DPDT	Double-pole, double-throw
DSC	Digital Selective Calling
DTRS	Digital Trunk Radio System
DVD	Digital Versatile Disc
DVI	Digital Video Interface
DVR	digital video recorder
E.C.C.	Engine Control Console
ECDIS	Electronic Chart Display and Information System
ECS	Electronic Chart System
EFFS	External Fire-Fighting System
EFCP	External Fire-Fighting Control Panel
EGNOS	European Geostationary Navigation Overlay Service
ENC	Electronic Navigational Charts
ENE	Electronic Navigational Equipment
E/R C.C.	Engine Room Control Console
FTP	Fire Test Procedures
FO	Fuel oil
FOV	Field of View
g	Gravity
GB	Gigabyte
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
HazMat	Hazardous Material
HEPA	High-efficiency particulate arrestance
HCFC	Chlorodifluoromethane
HD	Hard Disk
HDD	Hard Disk Drive
HDMI	High Definition Multimedia Interface

HPS	Harbour Patrol Section
HSC	High-speed Craft
HVAC	Heating, ventilation and air conditioning
Hz	Hertz
ICR	Information Collection Request
IHO	International Hydrographic Organization
IMM	International Maritime Mobile
IMO	International Maritime Organisation
IEC	International Electrotechnical Commission
IP	Ingress Protection
IPX	Internetwork Packet Exchange
IR	Infrared
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	Kilometre
km/h	Kilometre per hour
kts	Knots
kW	Kilowatt
L/min	litre per minute
LO	Lube oil
LCD	Liquid Crystal Display
LCG	Longitudinal Centre of Gravity
LED	Light-emitting Diode
L/s	Litre per second
LSA	Lifesaving Appliances
m	Metre
m/s	Metre per Second
m3	Cubic Metre
M/E	Main engines
MARPA	Mini-automatic Radar Plotting Aid
MCR	Maximum Continuous Rating
MCS	Monitoring and Control System
MEI	MEI Corporation

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
mph	Mile per hour
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
NFPA	National Fire Protection Association
NMEA	National Marine Electronics Association
ns	Nanosecond
NTRIP	Networked Transport of RTCM via Internet Protocol
NUC	Not Under Command
OBE	On-board electronics
OSHA	Occupational Safety and Health Administration
Pa	Pascal
PAL	Phase Alternating Line
p.s.i.	Pounds per square inch
PTO	Power take off
PVC	Polyvinyl Chloride
RAM	Random Access Memory
RCA	Radio Corporation of America
RGB	Red Green Blue
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

SBAS	Satellite-based augmentation systems
SENC	System Electronic Navigation Chart
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
TFT	Thin-Film Transistor
TIFF	Tagged Image File Format
TMR	TOPEX/Poseidon Microwave Radiometer
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
VDR	Voyage Data Recorder
VGA	Video Graphics Array
VHF	Very High Frequency
VMAP	Vector Map
V.S.W.R.	Voltage Standing Wave Ratio
VTC	Vessel Traffic Centre
VTS	Vessel Traffic Services
W	Watt
WMS	Web Map Service
W/H E.C.C.	Wheelhouse Engine Control Console

Part VII - Annex 1 - Warranty Services and Guarantee Slipping

1. Warranty Services

1.1. The Contractor shall provide Warranty Services in relation to all aspects of the Vessel during the Warranty Period, including Guarantee Slipping as stipulated in this Annex. Both the Warranty Services and Guarantee Slipping shall be carried out locally in Hong Kong. If the Contractor appoints a local sub-contractor to perform the Warranty Services (hereinafter "local agent"), the Contractor shall ensure that the local agent appointed will perform the Warranty Services and Guarantee Slipping in full compliance with the requirements of the Contract including those as set out in this Annex 1. It must be emphasized that it is the Contractor's responsibility to ensure the Warranty Services and Guarantee Slipping are performed in full compliance with the terms of the Contract. The Contractor shall arrange their own technical staff with all the necessary skills, qualifications and experiences to conduct the services. Unless the technical staff from the local agent meet all these requirements, the technical staff from the local agent shall not provide the required Warranty Services but those technical staff from the Contractor to travel to Hong Kong for providing the Warranty Services. The Contractor shall provide the curriculum vitae of the local agent's engineers involved in providing the Warranty Services as part of the Deliverables to be provided as part of the Delivery Acceptance. The Government reserve the rights to reject any engineer whose qualification and experience are not acceptable to GNC and the Government reserves the right not to accept the Vessel.

1.2. The Government reserves all rights and claims against the Contractor in the event that any warranty claim has not been handled in accordance with the terms of the Contract including this Annex.

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 or any part thereof is handed over for the Warranty Services and/or Guarantee Slipping, the Contractor shall be responsible for the collection and due return of the Vessel in good order (including all freight from and to the Government Dockyard and insurance (as further mentioned below)). Should there be any loss or damage of the Vessel or any Warranty Item (as defined in Paragraph 1.5 below) caused by any reason whatsoever while the Vessel is in the possession or control of the Contractor (including even when the Vessel is at the Government Dockyard or a maintenance base of the user department) or at the shipyard of the Contractor or an authorised agent appointed by it, the Contractor shall pay for the cost for the loss or damage plus 20% as and for liquidated damages but not as a penalty. Throughout the Warranty Period, notwithstanding anything to the contrary in the Contract, the Vessel and all Warranty Items are deemed to be at the Contractor's risks, and the Contractor shall insure and keep insured, at his own expense, a property insurance with the Government to be named as the sole payee, for an indemnity amount of not less than the purchase price of the Vessel plus 20% to protect the Government property against all risks. The Certificate of Insurance and evidence showing that the premium has been paid shall be available for inspection in advance. The Contractor shall provide this insurance policy before the commencement of the Warranty Services and/or Guarantee Slipping. Any excess payable under the insurance policy shall be borne by the Contractor.

1.5. Total Vessel Warranty

It is required that the Vessel is covered by the free of charge Warranty Services for one year after the date of the issue of the Acceptance Certificate in respect of the Vessel. If there is more than one (1) Vessel, each such Vessel shall be covered in the aforesaid manner. The Warranty Services shall cover the entire Vessel and all its Equipment (including without limitation all Equipment specified in Schedules 6 and 7 in Part V and all Electronic Navigational Equipment as defined in Chapter 7 of Part VII), fittings and outfit and all Spare Parts (collectively, "Warranty Items") against defects 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. In order not to violate the warranty of the engine(s) and gearbox(es), the Contractor shall also provide the corresponding periodic maintenance services based on the manufacturer(s)' recommendation within the Warranty Period at no extra cost to the Government.

1.6. Procedures for Warranty Claim

Without prejudice to the provisions of the Contract, 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 deployed shall originate from the manufacturer of the original Warranty Item to be repaired of the same model and with the same or better specifications and must be able to be found in the latest spare parts list issued by such manufacturer. Alternative components shall not be used without the prior approval in writing of the MD.

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

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 replaced during the Warranty Period shall have a new warranty period of one year commencing from the date of replacement.

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

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

1.8.5. The Warranty Period of the Vessel shall be suspended if operational downtime results from any confirmed failure in any Warranty Item and this suspension will count from the date when the relevant fault report was first issued.

1.9. Recurrent Defects

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

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

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

1.12. Updated/Upgraded Information

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

1.13. Warranty of Electronic Navigational Equipment

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

2. Guarantee Slipping

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

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

2.2.1. Pre-guarantee slipping inspection and trial

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

2.2.2. Engines and Gearboxes

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

All of the work listed at Paragraphs 2.2.12 ((a) to ((i) shall be carried out by the manufacturer's authorised agent/dealer. All the work procedures and the spare parts used shall comply with the manufacturer's specifications and requirements.

2.2.3. Hull and Deck Items (where applicable):

(a) Paint Under the Water Line

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

(b) Paint Above the Water Line

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

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

2.2.4. Mechanical & Electrical

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

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

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

Dock Trial Check List

General items will be checked during dock trial	
1.	Engines start and stop testing
2.	Engines emergency stop check
3.	Engines speed and clutch unit testing
4.	Engines speed high and low idle speed testing
5.	Engines gauges and alarm check
6.	Propulsion system testing
7.	Anchor testing
8.	Navigation lights testing
9.	Vessel horn testing
10.	Fire protection system check

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

Sea Trial Safety Check List

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

(l) Other trials or testing of equipment as required by the Government Representative; and

(m) Any item or component found defective shall be repaired or replaced.

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

Part VII – Annex 2 – Implementation Timetable

	Milestones	Completion Dates
1	Issuance of "Notification of Conditional Acceptance"	To be advised after Tender Evaluation
2	Contract Date (the date of the last party signing the Articles of Agreement)	The date when the last party signs the Articles of Agreement. The Government will not sign the Articles of Agreement until and unless the Contractor fulfils all of the conditions precedent as specified in Clause 25.2 of Part II Conditions of Tender (save to the extent waived by the Government, if any).
3	Kick-Off Meeting	To be held within two (2) months after the Contract Date at the Government Dockyard or the Contractor's Shipyard
4	Completion of hull structures	The Contractor shall propose the completion dates of Milestones 4-8 for GNC's approval within two (2) months after the Contract Date.
5	Completion of installation of engines, propellers and steering gear	
6	Completion of installation of electronic navigation equipment	
7	Pre-shipment Construction and Handling Inspection	
8	Shipment to Hong Kong	
9	Vessel Ready for Use (including without limitation the passing of the Technical Acceptance)	On or before the Delivery Date applicable to the same Vessel
10	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

Part VII - Annex 3 - Drawings Submission Timetable

Item No.	Drawings Approval	Completion Date
1	**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.***
2	**Structural Construction Plan in Mid-Ship and Bulkhead Section**	
3	**Construction Profile and Deck Plan**	
4	**Tank Capacity Plan**	
5	**Engine Mounting Arrangement**	
6	**Power / Speed Estimation and Curve**	
7	**Intact and Damaged Stability Plan**	
8	**Details of Electronic Navigational / Communication Equipment**	
9	**Details of Deck Equipment, Outfitting, Furniture, etc.**	
10	**Details of Engines' Arrangement**	
11	**Consoles Arrangement and Schematic Diagram**	
12	**Instrumentation and Control System**	
13	**Calculation of Fuel Capacity**	
14	**Details of Electrical and Electronic Equipment**	
15	**Electrical Load Calculations**	
16	**Schematic Layout of Electrical Circuits**	
17	**Paint Schedule**	
18	**Lightning Protection Arrangement**	
19	**Torsional Vibration Calculation (if applicable)**	
20	**Others as required**	

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

Part VII - Annex 4 – Main Items Inspection Timetable

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

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

VESSEL NAME: _____			Inspection date	Outstanding / Reinspection / Remarks
Item	Items to be Inspected			
Electrical and Machinery Installation				
EM-1	General inspection on installation of machinery:			
	a) General inspection on installation of propulsion engine and lift engine			
EM-2	Propulsion engine and lift engine:			
	a) Test of engine safety devices and alarms			
EM-3	Fuel oil system:			
	a) General inspection & dimension checking of fuel oil system			
	b) Fuel oil tank low level alarm test			
	c) Fuel oil tank final cleaning/internal inspection before filling			
	d) Fuel oil tank high level alarm test			
	e) Fuel oil tank content gauge calibration and test			
	f) Inspection of piping penetration of bulkhead and deck			
	g) Hydraulic test of fuel oil piping			

	h) Water-in-fuel sensor(s) test			
EM-4	Bilge system:			
	a) General inspection & dimension checking of bilge system			
	b) Inspection of piping penetration of bulkhead and deck			
	c) Hydraulic test of piping			
	d) Functional test of bilge system			
EM-5	Functional test of drainage system			
EM-6	Batteries:			
	a) Inspection of battery connectors and housing boxes			
	b) Inspection of battery charger			
	c) Operational test of battery charger Test of outboard engines and generator consecutive starting by each group of battery (start/stop at remote and local control)			
EM-7	Electrical installation:			
	a) Inspection of lightning conductor			
	b) General inspection of cable layout, insulation and cable sizes			
	c) Inspection of cable penetrations of bulkhead and deck			
	d) Inspection of transformers / circuit breaker			
	e) Inspection of tally plates			
EM-8	Main switchboard & panels (if applicable):			
	a) Main switchboard & panels - high voltage injection test			
	b) Cable size checking of electrical switchboard installations			
	c) Inspection of DC distribution panel			
	d) Megger test of the electrical system			
	e) Earthing test of the electrical system			
EM-9	Primary Control console:			
	a) Inspection of control console including checking of weathertightness			
	b) Functional test of console controls			
	c) Inspection of navigation equipment control panel			
	Secondary Control console			
	d) Inspection of control console including checking of weathertightness			
	e) Functional test of console controls			
	f) Inspection of navigation equipment control panel			
EM-10	Lighting:			
	a) Inspection and functional test of general lighting			
	b) Inspection and functional test of emergency lighting including capsize lights			
	c) Inspection and functional test of floodlight installation			
	d) Inspection and functional test of searchlight installation			
EM-11	Navigational lights and signals			
	a) Inspection and functional test of navigational lights			
	b) Test of horn/whistle/siren			
EM-12	Electronic equipment tested by COMMS			
EM-13	Test of noise level during sea trial			

Note:

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

Part VII - Annex 5 – Endurance and Performance Tests

Date of Test:		Place of Test:	
Vessel's Identification:		Vessel's Name:	

Conditions at Endurance and Performance Test			
Person On board	**3**	Dummy Weight	**20 kg**
Fuel (Petrol)	**90%**	Other Equipment	**20 kg**
Sea Conditions			

Engines:	**Propulsion**	**Lift**	**Propellers:**		
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. (°C)	Others	Others
__% of rated Power	At Minimum Crushing Speed		>15 min						
50% of Rated Power/rpm			>15 min						
60% of Rated Power/rpm			>15 min						
70% of Rated Power/rpm			>15 min						
80% of Rated Power/rpm			>15 min						
90% of Rated Power/rpm			>15 min						
100% of Rated Power (Endurance Test)			>15 min						

Remarks:

Witness by:	MD Representative	Shipyard Representative

Part VII - Annex 6 –As Fitted Drawings and Documents

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

1. As-Fitted Drawings

1.1. At not less than six (6) weeks before the delivery acceptance of each Vessel, the Contractor shall deliver to the Government four (4) hard copies and two (2) soft-copies in .pdf and .dwg (where applicable) files of the following plans and drawings that contain the technical information of that Vessel and its machinery and equipment as they are when the Vessel is on the day accepted by the MD. These are termed the final version of the "As-Fitted" Plans and Drawings, and they must consist of the following ones as well as any other additional ones that may be required by GNC/MD during the design and construction of the Vessel and before the Vessel is accepted by the Government.

1.2. The As-Fitted Plans and Drawings shall be prepared by professional ship draughtsmen and they shall be prepared in the professional manner, scale, size and style normally required of in the ship design and construction business sector. All plans and drawings shall show and be clearly marked with the profile, plan, and section views of the layout, arrangement details, and construction details in the manner required by GNC officer.

1.2.1. General Arrangement Plan.
1.2.2. RO approved stability information booklet and the inclining experiment report.
1.2.3. Hydrostatics, cross curves and intact and damage stability calculations for all ship loading conditions specified in the Technical Specifications.
1.2.4. Vessel subdivision drawings and stability calculations.
1.2.5. Painting scheme of the whole Vessel.
1.2.6. Vessel draught marking diagram (if applicable).
1.2.7. Equipment layout diagram.
1.2.8. Hull structural construction and hull scantlings drawings.
1.2.9. Hull shell and frames and the framings' arrangement and construction plan.
1.2.10. Steering system and steering arrangement diagrams (if applicable).
1.2.11. Superstructure or consoles and deck structural and construction plan (if applicable).
1.2.12. Hull watertight bulkheads' construction plan.
1.2.13. Consoles to deck connection – detail construction plan (if applicable).
1.2.14. Engine casing to deck connection detailed construction plan (if applicable).
1.2.15. Deck edge and bulwark (if any) details and construction plan, including detailed structural arrangement drawings of hull to deck connection (if applicable).
1.2.16. Detailed cathodic corrosion prevention and arrangement plans and drawings for the Vessel throughout.
1.2.17. Mast structural and construction plan and mast equipment arrangement plan.
1.2.18. Anchoring arrangement plan.
1.2.19. Piping diagrams for fuel oil, lubrication oil, bilge, firefighting, scuppers and drains system (as 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 (if applicable).
1.2.22. Propulsion engine and lift engine arrangement and setting plans and drawings of their

fuel lines and arrangement (as applicable).

1.2.23. Main fuel oil tank drawing and its associated piping and manifold(s), and filling, overflow and ventilation system.

1.2.24. Drawings of the anchor, and the anchoring system.

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. Vessel overall lighting arrangement and light control plan.

1.2.29. Vessel alarm and signals, internal communication systems and public address systems plan.

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

Part VII – Annex 7 – Handling Assessment ("HA") at Pre-shipment Construction and Handling Inspection

1. General

1.1 The purpose of the HA is to:

(a) ensure that the offered Vessel's performance characteristics are compatible with the HKPF's operational role; and

(b) mitigate the risks to all parties associated with potential rejection of a constructed vessel at the Delivery Acceptance.

1.2 The Contractor shall arrange for a HA of the completed Vessel to be assessed by the Contractor, in the presence of MD's and HKPF's representatives, at or near the site where the Vessel is constructed. The HA shall be conducted and completed within two days. At least ten (10) working days in advance of the HA, the Contractor shall submit for MD's approval a HA programme proposal which includes details of the procedures under which the HA is to be conducted and the formats in which the Contractor proposes to capture and present the data recorded by the device(s) in accordance with Paragraph 1.4 of this Annex 7 and the digital video footage recorded in accordance with Paragraphs 1.5 and 1.6 of this Annex 7 during the HA. For the avoidance of doubt, this data and video footage shall be able to be copied, moved, deleted and played using Microsoft Windows' built-in software. Otherwise, the Contractor shall supply appropriate computer software that is compatible with Microsoft Windows for the reviewing of this data and the video footage at no extra cost to the Government. The HA shall be observed by the Government Representatives. At least one (1) of the HKPF's representatives shall be aboard the Vessel to be assessed to monitor and verify the conduct and results of each attempt at an assessment.

1.3 The Vessel to be assessed shall be completed and ready for delivery.

1.4 The Contractor shall ensure that an objective record (which can be reviewed by the Government Representatives or, if necessary, an independent third party such as a RO) of the date, time, position, speed, course, roll, pitch, yaw, trim, running angle and three-dimensional acceleration data generated during the HA. The HA shall be conducted in accordance with the assessment protocols stipulated in Paragraphs 2.1 to 2.2 of this Annex 7 and captured using a suitable device(s) which has/have been properly calibrated and, if required by the Government, with supporting calibration documents issued by the manufacturer or calibration laboratory.

1.5 The Contractor shall, throughout the HA, record date and time stamped aerial digital video footage of the Vessel to be assessed and, using digital video recording equipment affixed at appropriate locations as agreed by the HKPF on the Vessel to be assessed, record digital video footage of the:

(a) field of view from the control console forward over the bow to the horizon. For the avoidance of doubt, the camera shall be mounted on the longitudinal centre line at a height and distance from the bow which shall correspond with the eye position of a coxswain, 1.64 metres tall, seated at the helm;

(b) position of the helm and throttle controls at all times; and

(c) view facing astern with the field of vision centred on the longitudinal centre line of the Vessel to be assessed with the camera mounted as closed as possible at the transom.

1.6 The Contractor shall provide a suitable logistics boat from which the Contractor shall record digital video footage of the Vessel to be assessed undergoing the HA. This logistics boat shall be capable of a comparable speed and be piloted at a distance and position from the Vessel to be assessed.

1.7 The Contractor shall, immediately after the HA, provide to the Government Representatives the following:

(a) an electronic and printed record of the data recorded during the HA in a format(s) approved by MD in accordance with Paragraph 1.2 above by the device(s) stipulated at Paragraph 1.4 of this Annex which includes:

(i) the raw data captured in respect of each assessment protocol specified in Paragraphs 2.1 to 2.2 of this Annex;

(ii) a graphical depiction of each assessment showing the position and the track of the Vessel to be assessed throughout the assessment; and

(iii) on one chart the speed in knots and the roll and the pitch in degrees;

(b) the following copies of the digital video footage stipulated in Paragraphs 1.5 and 1.6 of this Annex stored on a digital storage medium in a format approved by MD in accordance with Paragraph 1.2 above, namely:

(i) aerial digital video footage;

(ii) fixed digital video footage captured from the Vessel;

(iii) digital video footage captured from the logistics boat; and

(c) a certificate, signed by both the Contractor and a Government Representative, which records accurately the actual Loading Condition of the Vessel as described in Paragraph 1.8.1(f) of this Part VII during each assessment of the HA.

1.8 The assessment protocols listed in Paragraphs 2.1 to 2.2 of this Annex shall be conducted in sea states conforming to WMO Sea States 0 to 2 as specified at Annex 8 of this Part VII, unless otherwise agreed with the Government Representative.

1.9 The Vessel to be assessed is required to complete and pass each of the assessments set out in Paragraphs 2.1 to 2.2 below. The Contractor shall have no more than five (5) attempts in total to complete and pass each of these assessments. If, at any time during an assessment, a Government Representative considers that it is unsafe to continue that assessment, the assessment shall be terminated immediately and that assessment shall be deemed to have been failed.

1.10 An identical mark should be affixed in a prominent location on the tested hovercraft. (HKPF)

2. Assessment Protocols

2.1 Handling Assessment – Light Operational Load Condition

The following assessment shall be conducted at Light Operational Load Condition as specified at Paragraph 1.7.2(e) of this Part VII.

2.1.1 Straight Line Assessment

(a) The coxswain shall accelerate from stationary to at least twenty-eight (28) knots within one (1) minute. At any time during this assessment, the bow of the Vessel should not rise above the horizon line with the automatic trim control system (if fitted) turned off. Should the bow rise above the horizon line with the automatic trim control system (if fitted) turned off, it shall not be for more than five (5) seconds as evidenced by the digital video footage. If the Vessel to be assessed does not achieve this, it shall be deemed to have failed the assessment.

(b) If the Vessel, maintaining the same course and settings, does not maintain a mean speed of at least twenty-eight (28) knots for a period of no less than one (1) minute, the Vessel shall be deemed to have failed this assessment.

2.2 Handling Assessment – Full Operational Load Condition

The following assessments shall be conducted at Full Operational Load Condition as specified at Paragraph 1.7.2(e) of this Part VII.

2.2.1 Straight Line Assessment

(a) The coxswain shall accelerate from stationary to at least twenty-eight (28) knots within one (1) minute. At any time during this assessment, the bow of the Vessel should not rise above the horizon line with the automatic trim control system (if fitted) turned off. Should the bow rise above the horizon line with the automatic trim control system (if fitted) turned off, it shall not be for more than five (5) seconds as evidenced by the digital video footage. If the Vessel to be assessed does not achieve this, it shall be deemed to have failed the assessment.

(b) If the Vessel, maintaining the same course and settings, does not maintain a mean speed of at least twenty-eight (28) knots for a period of no less than one (1) minute, the Vessel shall be deemed to have failed this assessment.

2.2.2 Speed Transition Assessment

(a) The coxswain shall accelerate from stationary to five (5) knots and, once the Vessel reaches five (5) knots, maintain course and settings for a period of no less than one (1) minute.

(b) The coxswain shall then accelerate from five (5) knots to ten (10) knots and, again, maintain course and settings for a period of no less than one (1) minute.

(c) This assessment protocol shall be repeated incrementally at successive five (5) knot intervals until the maximum achievable speed has been reached.

(d) At each successive speed increment, the Vessel shall hold that speed within a range of ± 10% for the full one (1) minute.

(e) During this assessment protocol, the bow of the Vessel shall not rise above the horizon line. Should the bow rise above the horizon line, it shall not be for more than five (5) seconds as evidenced by the digital video footage. If the Vessel to be assessed does not achieve this requirement it shall be deemed to have failed the assessment.

2.2.3 Directional Control Assessment

(a) The coxswain shall bring the vessel to a speed of twenty-eight (28) knots with the ride control system (if fitted) turned off.

(b) At this juncture and if safe to do so, the coxswain shall remove his hands from the controls. Without human interference in respect of helm, throttle or trim the vessel shall not deviate from its base heading by more than five (5) degrees within a period of twenty (20) seconds.

2.2.4 Avoidance Line Assessment

An avoidance line test shall be conducted in accordance with the test procedures as in ISO 6185-4, except the loading condition and the distance from the point of start-to-turn to the imaginary line of maximum distance being seventy (70) metres. The vessel shall be required to demonstrate a maximal manoeuvring speed at no less than twenty (20) knots.

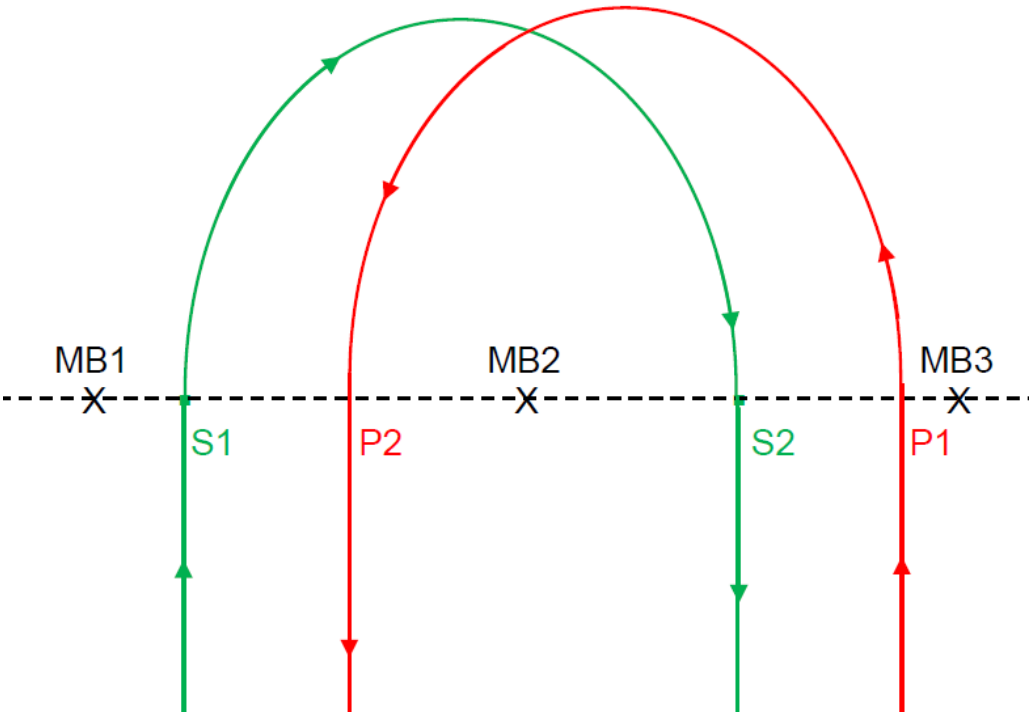
2.2.5 U-Turn Test

(a) The vessel to be assessed shall make a straight line course in a direction perpendicular to an imaginary line with three (3) collinear marker buoys on the imaginary line, as shown in

the diagram below. MB1, MB2 and MB3 are the marking buoys each being twenty-five (25) metres apart.

(b) When the vessel crosses the imaginary line at S1 which is anywhere between MB1 and MB2, the speed of the vessel shall be not less than twenty (20) knots, turning to the starboard side (as indicated by the green line) with any speed that is safe to drive and making a U-turn with the vessel crossing the imaginary line again at S2 which is anywhere between MB2 and MB3. The speed of the vessel shall be not less than twenty (20) knots at S2 or after crossing the imaginary line again. The time measured from S1 to the point at or after the vessel crosses the imaginary line and regains a speed of forty-five (45) knots shall not exceed twenty-five (25) seconds.

(c) The vessel to be assessed shall then repeat the test described at Paragraph 2.2.5(a) and (b) of this Part VII (Annex 7) but this time crossing the imaginary line anywhere between MB2 and MB3 and turning to the portside (as indicated by the red line).



Part VII - Annex 8 – Definition of Waves and Sea

Beaufort scale number	Description	Wind speed	Wave height	Sea conditions	Land conditions
0	Calm	< 1 km/h (< 0.3 m/s) < 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 9 – Tenderer's Presentation

1. General

1.1 Those Tenderers, who passed the Stage 1 and 2 of the Tender Evaluation Procedures, are required, at the discretion of the Government and at their own costs and expenses, to make a verbal presentation of their proposals to the Government Representatives within twenty-one (21) calendar days upon notice. The presentation shall be conducted by a team of qualified persons who are authorized by the Tenderer. Face-to-face presentation in person is preferred, where should be held at Government premises as designated by the Government Representatives as far as practicable. Presentation by way of video conference may also be considered at the Government's discretion.

1.2 The Tenderer shall introduce, explain and clarify their tender proposals during the presentation. In no circumstances should additional information or new/amended proposal not set out in their tender submissions be accepted. Tender assessment will be made solely based on the Technical Proposal submitted before the Tender Closing Date. The presentation will **not** be taken into account in marking under the Marking Scheme in Annex D to Part II – Conditions of Tender.

1.3 The Tenderer shall focus in presenting the Technical Proposal submitted in respect of its proposed design, philosophy and solutions to be adopted, Counter-Proposals as well as the Excess Proposals therein involving higher standard of specifications and proposed innovative suggestions, if applicable. The scope of presentation shall be strictly based on and within the contents of the Tenderer's Technical Proposal submitted, without any disclosure, clarification or deliberation of the Price Proposal submitted. Organisation introduction and brief of the company profile should be kept to the minimum, which should not be more than five (5) minutes. The length of presentation shall not exceed three (3) hours.

1.4 The presentation shall be followed by a Question and Answer Section for the Government Representatives to make further enquiry about the Tenderer's Technical Proposal and presentation. Such Question and Answer Section should not be construed as any commitment by the Government. Any requests from the Tenderer for the Government to provide additional information about the tender requirements laid down in the Tender Documents or other vessel project plans of the Government will **not** be accepted.

2. Scope of Presentation

2.1 According to the requirements set out in Paragraphs 1.1 to 1.3 above, the presentation shall cover the following topics and follow the numbering sequence below.

(1) Organisation Introduction (not more than five minutes)

(2) Hull

(3) General Arrangement

(4) Fire Safety Equipment

(5) Lifesaving Appliances and Arrangements

(6) Machinery

(7) Electrical System

(8) Operational Systems

(9) Innovation Suggestions

Part VII - Annex 10 – B5 Diesel Specification

B5 Diesel

TEST ITEM	UNIT	TEST METHOD	SPECIFICATION
Density at 15℃	℃	ASTM D-1298	0.83 - 0.84 max.
Colour	---	ASTM D-1500	1.5 max.
Cetane Number	---	ASTM D-613	51 min.
Cetane Index	---	ASTM D-4737	51 min.
Cold Filter Plugging Point	℃	IP-309	-3 max. (A) 21max. (B)
Distillation Recovery at 250℃	Vol%	ASTM D-86	65 max.
95% Recovery	℃		355 max.
Flash Point	℃	ASTM D-93	66 min.
Sulfur	wt%	ASTM D-5453	0.001 max.
Kinematic Viscosity at 40℃	Cst	ASTM D-445	2.0-4.5
Acid Number Strong	mgKOH/g	ASTM D-974	Nil
Total	mgKOH/g		0.25 max.
Ash	wt%	ASTM D-482	0.01 max.
Conrandson Carbon	wt%	ASTM D-189	0.1 max.
Water content	Vol%	ASTM D-95	0.05 max.
Copper Strip Corrosion 1 Hours/100℃	---	ASTM D-130	No. 1 max.
Lubricity (HFRR)	Micron		460 max.
Polycyclic Aromatic Hyrocarbon	wt%	IP 391	11 max.
Cloud point	℃	ASTM D-2500	-3 max. (A) 21 max. (B)
FAMEs (biodiesel) content	wt%	EN14078	4.5 - 5.5
Diesel content	wt%		94.5min.
Calorific Value	MJ/kg	ASTM D-240	45 min

REMARKS : (A): WINTER: Nov. - Feb.
(B): SUMMER: Mar. - Oct.