FAQs on EOI to Design and Develop Autonomous Inter-Gateway Feeder ("aIGF")

A. Process and Evaluation		
S/N	Query	Reply
1	My understanding is that an EOI is normally followed by an open tender at a later stage to award a project. From the EOI document, it seems that the project will be awarded after the EOI closes. Appreciate if you could clarify the procedure for awarding the project and the process after EOI.	This EOI is not a tender and is used to gauge market interest, available solutions, and technology gaps. MPA and PSAC will assess the returns of the EOI and may refine the aIGF requirements before launching a Request for Proposal ("RFP") to implement the Project. MPA and PSAC reserve the right to approach EOI Participant(s) directly after the EOI closes to enhance the proposal without going through an RFP. We highly encourage interested Participants to submit proposals for the EOI. At the EOI stage, participants are expected to provide design concepts, feasibility analysis, mock-ups or models (digital and/or physical), and prototype concepts, together with a roadmap for further development. Any subsequent RFP, if issued, will set out more detailed requirements on design maturity, test-bedding, and commercial commitments. Participants are encouraged to treat the EOI submission as a substantive proposal rather than a preliminary expression of interest, as it may form the basis for direct award negotiations.
2	Does this EOI lead to a subsequent tender (e.g. RFP)?	
3	Can MPA clarify the intended boundary between the EOI and any subsequent RFP, especially in relation to the level of design maturity, prototype commitment, and commercial certainty expected at each stage?	
4	Will there be an EOI briefing session, and if so, when is it likely to be held?	As published in EOI website, interested participants were invited to submit their questions by 15 May 2026. A consolidated reply is published in this FAQs. There will be no briefing session.

5	May we check if there will be a briefing by MPA for interested participants? Is there a possibility of matching companies to relevant interested consortiums?	Interested participants are encouraged to form consortiums with like-minded ecosystem partners with complementary capabilities, such as technology providers, research institutes and classification societies, etc. The EOI submission should include clear roles/responsibilities of the consortium members and include supporting documents on the consortium formation, i.e., Letter of Support or other documents. The formation of a consortium is a strategic decision by the Participants as they are in a better position to select their partners to develop a commercially feasible proposal to meet the EOI requirements. MPA and PSAC will not match-make consortium members.
6	What are the evaluation criteria that will be applied for this EOI?	Proposals will be evaluated by a joint panel based on the assessment criteria set out in Section 6 of the EOI, which include: (i) Technical and commercial robustness; (ii) Safety and training considerations; (iii) Financial strength, experience, and capability; (iv) Degree of collaboration and potential for commercialisation and scale-up; and (v) Compliance with the requirements specified in Section 3 and Appendix A of the EOI.
7	Will this EOI result in a single or multiple awards, similar to previous EOIs or Calls-for-Collaboration (CFCs)?	Depending on the quality and suitability of the EOI submissions, one or more proposals may be shortlisted after the evaluation and engaged for further deliberations. No indicative number has been preset at this stage.
8	Indicatively, how many proposals does MPA/PSA expect to select or progress under this EOI?	
9	Will MPA/PSA shortlist multiple EOI participants or select a single preferred solution for further development?	
10	Is the intention to select one preferred concept, or could multiple concepts be carried forward into the next stage?	

11	How will MPA/PSA balance innovation versus technical maturity in evaluating proposals? Will a lower-risk, more mature but less ambitious concept be viewed more favourably than a more advanced but less mature concept?	The evaluation will consider both innovation and technical maturity, with emphasis on safety, feasibility, and operational suitability in port waters. There is no fixed weightage between ambition and maturity disclosed at the EOI stage. Participants are encouraged to clearly articulate technology readiness levels, risk mitigation strategies, and development roadmaps in their proposals.
12	What is the indicative weighting between technical, commercial, innovation, and Singapore value capture?	Proposals will be assessed based on the quality and strength of technical and commercial feasibility, robustness and completeness of safety and training requirements, and proven financial strength, experience, and capability in value-chain development. Technical, commercial, innovation and local value capture are all important considerations for the EOI proposal.
13	Is it expected that the bidder will supply a model (digital or physical) before being awarded the project?	The supply of a physical or digital model is not a mandatory requirement for the EOI submission. However, participants are encouraged to include concept design drawings, renderings, or a preliminary digital model as part of their technical proposal to illustrate the proposed vessel design and system architecture. At the RFP stage (if applicable), more detailed design deliverables may be required as part of the technical proposal. The specific design deliverable requirements for the RFP will be defined and communicated in due course.
14	Will MPA/PSA conduct clarification interviews or technical presentations post-submission?	MPA and PSAC may conduct clarification sessions or technical presentations with selected Participants as part of the EOI evaluation, at MPA and PSAC's discretion. Participants will be notified accordingly.
15	Is the EOI expected to be industry-funded only, or will there be co-funding support prior to RFP award?	The EOI is an assessment exercise and does not involve any funding. Co-funding arrangements, if any, will be communicated at the RFP stage.

16	Will there be any form of full or partial funding award associated with the EOI outcomes?	
17	What Technology Readiness Level (TRL) is expected at EOI, RFP award, and 2029 operations?	The Project is expected to be operational by 2029, and the participant shall propose a project timeline and milestones to be met. Participants should state the current TRL of their proposed technologies and R&D required to be conducted in Singapore to increase the TRL for operational readiness by 2029.
18	What are the critical milestone dates for: concept design approval; detailed design freeze; system integration completion; first autonomous trials; and operational handover (target 2029)?	Participants are expected to propose a project timeline and milestone schedule as part of their EOI submission, demonstrating how they would achieve operational readiness by 2029. In developing their proposed milestone schedule, participants should consider the full project lifecycle from EOI selection to operational handover, including the time required for detailed design, procurement, construction or retrofit, system integration, classification society review, regulatory approval, sea trials, and autonomous navigation trials in Singapore port waters. Participants should also account for the time required to obtain the necessary approvals from MPA for MASS operations in Singapore waters, which will be developed in conjunction with the project. Participants are encouraged to identify the critical path activities in their proposed schedule and to clearly flag any dependencies on regulatory approvals, infrastructure readiness, or third-party deliverables that could affect the 2029 operational target.
19	Is the final contract awarded from PSAC or MPA?	The aIGF project is a joint initiative between MPA and PSAC, and both organisations are involved in the evaluation of EOI submissions and any subsequent RFP process. Any contractual arrangements will be discussed directly with the Participant of the selected proposal. In the meantime, participants should address their EOI submissions to both MPA and PSAC.

B. Commercial, Ownership and Deployment		
S/N	Query	Reply
20	What is the scope of the whole project? Whole new vessel, retrofit, only on vessel side autonomous, port automation included?	The scope of the aIGF project encompasses the full end-to-end development cycle from design and engineering through to construction or retrofit, system integration, test-bedding, certification, and operational demonstration. The expectation is that the selected participant or consortium will deliver a fully operational aIGF vessel capable of conducting autonomous inter-gateway operations between PSAC's terminals by 2029.
21	Could you kindly clarify whether the expected scope includes the full construction and delivery of the vessel to PSA, or whether the project is primarily focused on the design, development, and demonstration?	On the question of new-build versus retrofit, both approaches are acceptable. Participants may propose either a new-build vessel or a retrofit of a suitable existing vessel, provided the proposed solution fully meets the operational, safety, autonomy, and technical requirements set out in Section 3 of the EOI and Appendix A. Participants proposing a retrofit should clearly articulate how the existing vessel's design and systems will be modified to achieve the required performance standards, and should address any constraints or limitations arising from the retrofit approach. On scope boundaries, the primary focus of the EOI is on the design and development of the aIGF vessel and its autonomous systems. However, the scope is not limited to the vessel alone. Proposals may also include cargo handling systems, autonomous berthing and mooring solutions, and integration with existing port infrastructure and systems, where these are necessary to enable safe and efficient autonomous inter-gateway operations. Participants are not required to propose full port automation solutions but are encouraged to address how the aIGF will interface with PSAC's existing terminal operating systems, crane infrastructure, and port management platforms. Please refer to Sections 2.3, 3.9, and 3.27 of the EOI for further guidance on the expected scope of port-side integration.
22	Party that would operate the vessel.	At the EOI stage, there is no prescribed model for vessel ownership and operation. Participants are expected to propose viable business, ownership, and operating models as part of their submission, including how the aIGF would be deployed to support inter-gateway operations between PSAC terminals. These aspects will be considered as part of the overall technical and commercial evaluation of proposals. MPA and PSAC remain open for Participants to propose different business models and will assess their viability.
23	Party that would own the vessel.	
24	Ownership model to be clarified — Will PSAC/PSAM be the owner of the aIGF or will	

	operations be conducted via a chartering model through feeder owners/operators?	
25	If a consortium is selected, could you please advise whether MPA/PSA intends to fund and take ownership of the vessel, or whether alternative commercial and ownership arrangements are being considered?	MPA and PSAC have not prescribed a fixed funding or ownership model at this stage and remain open to a range of commercial arrangements. Participants are expected to propose a viable ownership and business model as part of their EOI submission, and these proposals will be assessed as part of the overall commercial evaluation. MPA and PSAC remain open for Participants to propose different business models and will assess their viability. With respect to funding, co-funding arrangements for the R&D and development phase of the project will be communicated at the RFP stage. Participants with specific questions on funding support are encouraged to engage MPA directly.
26	What is the envisaged total number of aIGF vessels under MPA's longer-term vision, for example towards 2030? Will these be procured by PSA or industry service providers?	At this stage, no fleet size has been determined. The EOI is not a tender and is used to gauge market interest, available solutions, and technology gaps. Longer-term deployment models, including fleet size, will be considered based on outcomes from the EOI and subsequent phases. Participants are encouraged to propose scalable designs that can accommodate future fleet expansion, and to include scale-up scenarios in their submissions.
27	Can MPA/PSAC share the expected implementation rollout strategy (e.g. single-vessel prototype vs pilot fleet) and the indicative number of aIGF vessel sets envisaged for initial and subsequent deployment phases? (Ref. 2.4)	

28	In view of the expected operational timeline by 2029, Participant may propose a feeder retrofit to suit the requirements in lieu of a new-built — MPA/PSAC to confirm acceptance.	A retrofit approach is acceptable in principle, provided the proposed solution fully meets the operational, safety, autonomy, and technical requirements set out in Section 3 of the EOI and Appendix A. Participants proposing a retrofit should clearly articulate how the existing vessel's design and systems will be modified to achieve the required autonomy level, cargo capacity, energy efficiency, and port integration capabilities, and should address any constraints or limitations arising from the retrofit approach relative to a new-build.
29	As per our understanding, "DEVELOP AUTONOMOUS INTER-GATEWAY FEEDER" is defined as the "PROJECT". Project to be operational by 2029. Does this mean the project will only be awarded in 2029?	The target for the project is to be built, delivered, and commenced operations by 2029. Project award is expected in 2027. This would allow approximately two years for vessel design, construction, system integration, testing, and commissioning. Participants should assess the feasibility of this indicative timeline against their proposed vessel design and construction methodology. The EOI submission should clearly highlight any schedule risks, constraints, expected construction duration, and the availability of the proposed shipyard.
30	Does this mean the vessel has been built and is in operation by 2029?	
31	Project to be operational by 2029. What is the expected timeline for contract award, construction, and vessel delivery?	
32	To better understand the broader context for this initiative, we would also appreciate any guidance on MPA/PSA's longer-term	This is not a one-off demonstration exercise. It will support the industry including terminal operators, vessel owners, ship designers and technology developers to demonstrate the technical and operational viability of autonomous vessel operations in Singapore's complex port waters and assess the longer-term commercial viability of autonomous vessels for deployment.

	plans for this concept. In particular: (a) whether the current EOI is intended as a one-off demonstration or as the first step toward a broader deployment programme; (b) whether there is any current view on the potential numbers of vessels that may eventually be required for inter-gateway feeder transfers; and (c) how MPA/PSA sees the concept developing beyond the initial project.	At this stage, no fleet size has been determined. The EOI is not a tender and is used to gauge market interest, available solutions, and technology gaps. Longer-term deployment models, including fleet size, will be considered based on outcomes from the EOI and subsequent phases. Participants are encouraged to propose scalable designs that can accommodate future fleet expansion, and to include scale-up scenarios in their submissions.
33	Please advise on the expected role of the bidder, specifically whether the bidder is to act as the owner or operator of the vessel after its delivery.	The EOI does not prescribe a fixed role for the Participants with respect to vessel ownership or operation after delivery. Participants are expected to propose a viable ownership and business model as part of their EOI submission. Possible models include direct ownership and operation by the participant or a consortium member, a chartering or leasing arrangement with PSAC, a service-based model in which the participant operates the aIGF on behalf of PSAC, or a hybrid arrangement. The proposed ownership and operating model will be assessed as part of the overall commercial evaluation.
34	How will IP generated under the project be allocated among consortium members and PSA/MPA?	Participants should discuss with their consortium members on IP arrangement. If IPs are created using public funds, the Singapore National IP Protocol shall be used to guide IP management.
35	Define energy efficiency and productivity KPIs	Participants are invited to propose relevant KPIs as part of their commercial case, which will inform KPI definitions at the RFP stage.

		Indicative KPIs to be tracked may include energy consumption per TEU-mile, turnaround time per berth call, berth-to-berth cycle time, % uptime in autonomous mode, and reefer-supported TEU-hours.
36	Define uptime/availability guarantees	The aIGF shall have 24/7 operational capability with predictive maintenance systems to minimise downtime to less than 15 days annually. Participants should propose uptime and availability guarantees consistent with this requirement and provide supporting maintenance regime details.
37	15 days in total downtime or 15 days of unplanned downtime?	The 15-day downtime limit refers to planned downtime. Participants should clearly distinguish between planned and unplanned downtime in their proposed uptime, availability guarantees and demonstrate how their maintenance strategy minimises unplanned outages over the vessel's operational life.
C. Consortium and Participation		
S/N	Query	Reply
38	For Clauses 5.3 and 6.4, how strictly should "all work done should be conducted in Singapore" be interpreted? Can specialised software development, subsystem design, or equipment manufacturing occur overseas?	The intent of Clauses 5.3 and 6.4 is to ensure that core activities such as system design and engineering, integration, test-bedding, certification, and deployment are conducted in Singapore. Participants may propose overseas activities where necessary, provided these are clearly justified and aligned with the overall objectives of value creation and deployment in Singapore. MPA and PSAC place value on the development of local maritime technology capability, and the extent to which the proposed solution involves Singapore-based design, engineering, and technology development will be considered as part of the overall evaluation. Participants are encouraged to describe the proposed design and engineering work allocation including the roles of Singapore-based and overseas resources in their EOI submission.
39	Please clarify if all system design and engineering need to be performed in Singapore, or can be outside of Singapore.	
40	We understand from Clause 5.3 that the Lead Applicant must be Singapore-based and that	

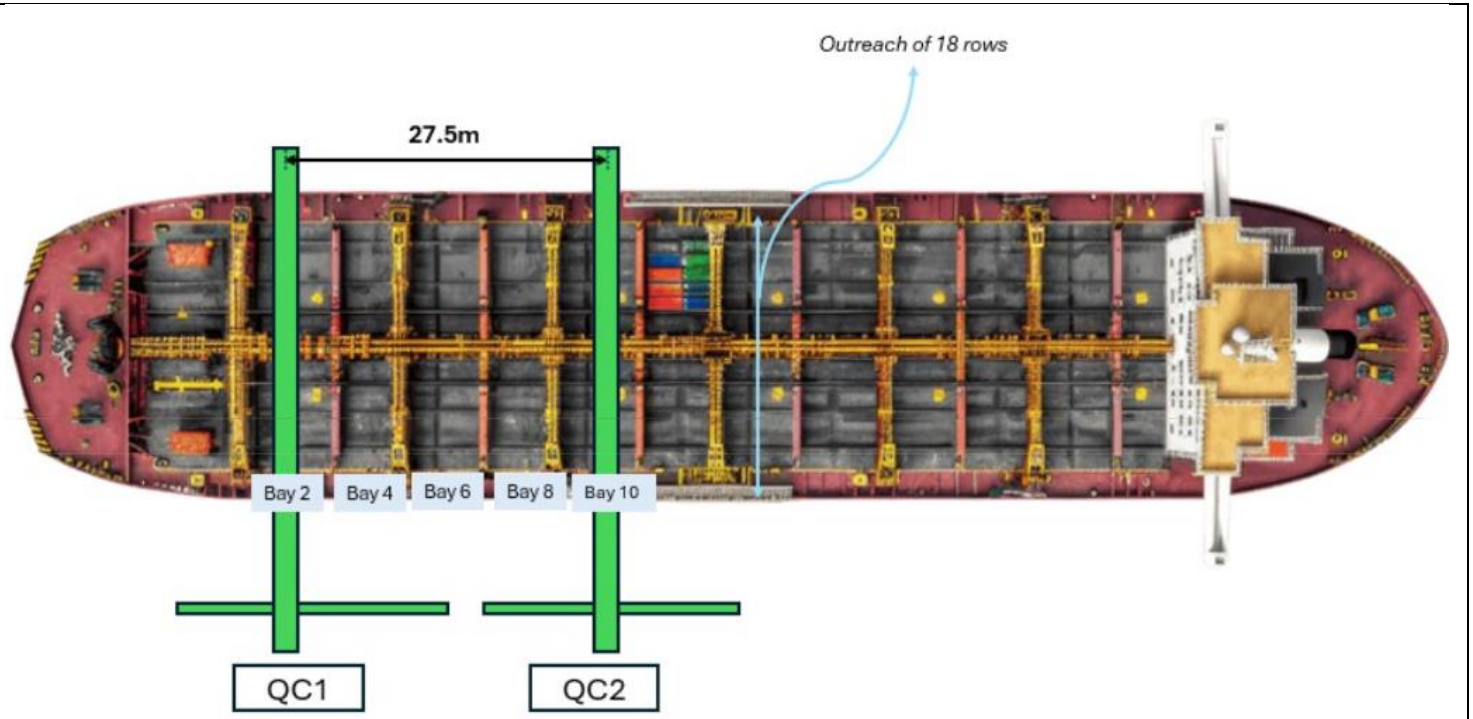
	the work should be conducted in Singapore. In some potential consortium configurations involving overseas shipyards, certain activities — particularly core shipbuilding and preliminary system engineering — may need to be carried out at overseas yards, while integration, test-bedding, and certification activities could be undertaken in Singapore. Could you please advise whether this would be acceptable, how consortium roles should be structured to meet this requirement, and whether there is any expected proportion of work to be performed in Singapore?	
41	Can a foreign-based company head the project even with local companies in the consortium?	No. As set out in Clause 5.3 of the EOI, the Lead Applicant must be a Singapore-based company. A foreign-based company may participate in the consortium as a member or technology partner, but it is not eligible to serve as the Lead Applicant. The Lead Applicant bears primary responsibility for the submission, for the consortium's obligations under the EOI and any subsequent RFP or award, and for ensuring that the project delivers meaningful value to Singapore's maritime ecosystem. These responsibilities are considered most appropriately held by a Singapore-based entity with a substantive presence and accountability in Singapore.

		Foreign-based companies with relevant capabilities and technologies are nonetheless strongly encouraged to participate as consortium members in partnership with a Singapore-based Lead Applicant. Participants who are uncertain whether their Singapore-based entity meets the requirements for Lead Applicant eligibility under Clause 5.3 are encouraged to seek clarification from MPA directly before submitting their EOI return.
42	Can the bidder engage vendors, solution providers, or basic designers that are not Singapore-based?	Yes, participants are permitted to engage vendors, solution providers, and designers that are not Singapore-based. However, all proposed consortium members, subcontractors, and key vendors, regardless of their location, will be subjected to assessment from a technology and supply chain resilience perspective. Participants should provide details of all key vendors and solution providers and the scope of work they will perform in their EOI submission to facilitate this assessment.
43	Please advise whether there are any exclusivity requirements or selection criteria for the newbuilding yard	There are no exclusivity requirements at this stage. However, participants should be aware that the aIGF project involves the development of autonomous vessel technology for deployment in Singapore's critical port infrastructure, and that the selection of all consortium members and subcontractors including the newbuilding yard will be subjected to assessment from a technology and supply chain resilience perspective. Participants are encouraged to address the rationale for their choice of yard in their EOI submission.
44	As the EOI does not specify whether a ship operator is required, please clarify if operator participation is mandatory. If so, kindly advise whether there are any exclusivity requirements or selection criteria for the operator, such as not preferable for shipping liners from another country.	Operator participation is not a requirement for EOI submission. However, participants are expected to address the proposed operating model for the aIGF as part of their submission, including how the vessel will be crewed, managed, and operated during the demonstration phase and beyond. Where a participant proposes a model that involves a third-party ship operator, the identity and qualifications of the proposed operator should be included in the submission. There are no exclusivity requirements at this stage.

45	Can international technology suppliers participate as subsystem providers within the consortium, provided the main engineering and deployment activities remain in Singapore?	Yes. Lead Applicants may engage international technology suppliers and ensure requirements stipulated in Section 5 of the EOI are met.
46	Please advise whether there is any exclusivity related to the autonomous technology service provider due to security	There are no exclusivity requirements at this stage. However, participants should be aware that the aIGF project involves the development of autonomous vessel technology for deployment in Singapore's critical port infrastructure, and that the selection of all consortium members and subcontractors including the newbuilding yard will be subjected to assessment from a technology and supply chain resilience perspective. Participants are encouraged to address the rationale for their choice of technology service provider in their EOI submission
47	Please advise whether there is any exclusivity of autonomous technology.	
48	Refer to clause 3.2.7, please advise whether there is any exclusivity of autonomous technology.	
49	Are Singapore IHL/RI partners mandatory for shortlisted proposals?	Singapore Institutes of Higher Learning (IHLs)/ Research Institutes (RIs) participation is strongly encouraged to address technology gaps identified in the proposal through R&D.
50	The IHLs/RIs shall be from publicly funded institutes in Singapore with strong interest to work with the industry to translate research into industry solutions." Can you	The reference to IHLs and RIs in Clause 5.3 is intended to encourage the participation of Singapore's publicly funded research community i.e. RIs, and similar bodies as consortium members where their research capabilities and domain expertise can contribute meaningfully to the project. The inclusion of IHLs and RIs in the consortium is intended to bring research depth and innovation capability and support translating research outputs into practical, deployable solutions over the course of the project. As per clause 3.5, participants shall provide a comprehensive assessment of existing technological limitations regarding

	elaborate on this? Must the IHL provide a tested solution ready for commercialisation? Is there no R&D element in this proposal?	Maritime Autonomous Surface Ships ("MASS") and ROC. Specifically, the proposal must identify specific gaps where current off-the-shelf or proprietary technology falls short of meeting regulatory, safety, or operational requirements, and outline the necessary R&D pathways required to bridge these gaps. IHLs/RIs' research activities within the project should be directed toward solving real technology gaps rather than being purely academic in nature. IHLs and RIs that are currently working on relevant technologies are welcome to participate, provided they can demonstrate a credible plan for maturing those technologies for operational deployment by 2029. Participants should clearly describe the proposed role and contribution of any IHL or RI consortium member in their EOI submission, including the specific research areas they will address, the current maturity of any relevant research outputs, and the plan for translating those outputs into the operational aIGF system.
51	Will learnings from one consortium be shared with others or retained confidentially?	MPA and PSAC reserve the right to aggregate or anonymise information before sharing on a need-to basis. Commercially sensitive and confidential information will be protected accordingly.
D. Vessel Design and Naval Architecture		
S/N	Query	Reply
52	Can MPA confirm whether an articulated tug-barge (ATB) or tug-barge configuration is fully acceptable in principle? Is this a preferred solution?	Tug-barge or articulated tug-barge configurations are acceptable in principle, as mentioned under Section 3.4.2 and footnote 1 of Section 2.3. The EOI does not indicate any preferred vessel configuration.
53	For a tug-barge concept, do the dimensional requirements in Clause 3.2.9 apply to the full operating combination or	The dimensional requirements apply to the full operating combination as the full unit will be berthed alongside the quay. They should therefore be interpreted as applying to the overall tug-barge system rather than to either component individually. The combined tug-barge system should achieve the minimum 800 TEU cargo capacity, and the overall system dimensions should be compatible with the berth dimensions, maximum crane outreach which is capable of serving vessels of up to 18 rows, and navigational constraints of the operating route.

	specifically to the cargo unit alongside the quay?	Participants proposing a tug-barge design should clearly describe how the system meets each of the requirements in Clause 3.2.9 and should address any specific operational or safety considerations arising from the tug-barge configuration including the autonomous coupling and decoupling of the tug and barge, the stability and structural interface between the two units, and the implications for the autonomous navigation and berthing systems.
54	It is specified that a tug-barge design may be proposed. How would that affect requirements in Clause 3.2.9?	
55	What is the design DWT basis for 800 TEU?	The cargo capacity requirement is a minimum of 800 TEU, with modular design allowing for different cargo configurations. Participants are to propose the DWT basis as part of their vessel design, taking into account the hull form, cargo configuration, and stability requirements.
56	Maximum allowable draft at terminals?	The maximum draft at Pasir Panjang Terminal is 15m and 23m at Tuas Port. The freeboard shall be a minimum of 7.5m during full load and lowest tide, sufficient to be above the height of the Tuas Port (7.5mCD) wharf fenders. Participants should design to these freeboard constraints.
57	Please advise the maximum draft of the aIGF design	
58	Minimum moulded breadth of 27.5m — is the requirement due to the outreach of the quay cranes, and can more information be provided for these cranes on bay 2 and bay 10.	The 27.5m dimension referenced in the EOI relates to the spacing between cranes at the designated berths, and not a minimum vessel beam requirement. The quay cranes can serve vessels of up to 18 rows. Participants are therefore free to propose a vessel beam that they consider appropriate. On simultaneous crane operations, cranes will operate along the length of the vessel rather than from both sides of the quay. Participants should design the vessel's cell guide arrangement or container stack configuration accordingly. Please refer to the image below for reference on the crane configuration.
59	Could a beam lesser than 27m (e.g. 23.5m) be considered within design requirements?	
60	Participant would like to clarify with respect to the	

	feeder's minimum moulded breath requirement. The intent for cranes access appears to be for simultaneous crane operation from both sides of the quay; Participant is however unclear how simultaneous cranes operations from across quays can operate due to safety concerns. Should simultaneous crane operations be along the length of the feeder instead? Participant is raising concern on this minimum moulded breadth requirement as the L/B ratio for a 800TEU will be high which increases the propulsion powering requirement where the source of power (batteries, electric motors, engines etc.) will increase in capacity and costs exponentially.	

61	Are length and breadth specifications relevant or can the dimensions be different as long as the minimum 800 TEU requirement is met?	There is no maximum dimension prescribed in the EOI. The dimensions specified in Clause 3.2.9 are minimum dimensions intended to provide a general indication of the vessel size required to achieve the 800 TEU minimum capacity. They are not intended to be prescriptive design constraints. Participants are free to propose vessel dimensions that differ from those specified, provided the proposed design achieves the minimum 800 TEU capacity and compatible with the infrastructure and navigational constraints of the operating route between Pasir Panjang Terminal and Tuas Port. Participants should clearly state the proposed vessel dimensions and provide justification for any significant deviation from the indicative dimensions in Clause 3.2.9. Detailed berth and channel dimension information will be provided at the RFP stage (if applicable).
62	These are minimum dimensions, are there any maximum dimensions?	
63	Any air draft restrictions?	There are no air draft restrictions applicable to the inter-gateway routes. Participants are encouraged to include any assumptions made in their EOI submissions.
64	What are the required maximum speeds?	Maximum speed is not prescribed in the EOI. The operating route between Pasir Panjang Terminal and Tuas Port is approximately 13 nautical miles, and the design of the power system shall be optimised for a mission profile consisting of a 24-hour turnaround time between berths and a 4-hour transit time. Participants should propose an appropriate service and maximum speed consistent with this mission profile, considering hull resistance, energy efficiency, and port water speed restrictions. Speed requirements will be formalised at the RFP stage.
65	Please advise the minimum, maximum, and service speed pertaining to vessel requirements. High efficiency for optimum cruising speed (assumed service speed) is specified.	
66	Requirement in Clauses 3.2.6 and loading/offloading time is needed to understand what the optimum speed is. Are there any other restrictions such as speed limits in the shipping lane?	Speed limits applicable in Singapore port waters, including the approach channels to Pasir Panjang Terminal and Tuas Port, are governed by the MPA's port regulations and directions. Participants should refer to the MPA Port Marine Circular and the relevant information on MPA’s website for the applicable speed limits along the operating route.

67	What is the defined route distance (nm) between terminals?	The indicative one-way distances are as follows: • Pasir Panjang Terminal to Tuas Port ≈ 13 nm • Pasir Panjang Terminal to Keppel ≈ 16 nm • Tuas to Keppel ≈ 22 nm. The routing is subjected to MPA traffic management and may include precautionary areas. Participants should state their assumed route distances as part of their operational design and voyage optimisation proposals. Detailed route information will be provided at the RFP stage (if applicable).
E. Vessel Systems and Technical Requirements		
S/N	Query	Reply
68	Is it necessary for the vessel to be fully covered by an internal and external CCTV system?	On external coverage, the vessel is expected to have comprehensive external CCTV coverage sufficient to support remote situational awareness from the ROC, including coverage of the deck, cargo areas, mooring stations, and the vessel's immediate surroundings during berthing and cargo operations. Full 360-degree external coverage is the design intent. On internal coverage, CCTV coverage of every individual compartment is not mandated. However, all manned or potentially occupied spaces, including the engine room, cargo control room, any crew accommodation, and access points, should be covered. Unmanned void spaces and structural compartments with no operational significance do not require CCTV coverage. Participants should propose an internal CCTV layout that provides adequate coverage of all operationally significant spaces and justify their proposed coverage scheme in the EOI submission. On remote accessibility, all external CCTV cameras and all internal cameras covering operationally significant spaces should be remotely accessible from the ROC. This is essential to support remote monitoring and supervision of the vessel during autonomous operations. Participants should describe the proposed CCTV system architecture, including the data transmission, storage, and remote access arrangements, in their EOI submission.
69	In particularly with regards to the internal CCTV system, must every individual compartment be covered by CCTV?	
70	Must all CCTV cameras be remotely accessible? If not, please specify which must be remotely accessible.	
71	Please advise and elaborate on what kind of supplementary sensors and detectors can be used	Participants are free to propose any sensor suite they consider appropriate to meet the detection, situational awareness, and autonomous navigation requirements set out in Section 3 of the EOI and provide their design considerations and technical specifications for assessment. Participants should clearly describe the proposed

	for the aIGF. Any prohibited supplementary sensor type and make to be noted by the bidder?	sensor suite, the rationale for each sensor type, and the integration architecture in their EOI submission. Sensor selection will be subject to review at the RFP stage.
72	Are the LiDAR and radar subsystems intended to operate as independent systems, or can they be integrated and utilised cohesively as part of a combined sensing solution?	On integration, LiDAR and radar subsystems may be integrated and utilised cohesively as part of a combined sensor fusion solution. The EOI does not require these systems to operate as entirely independent and isolated systems. Participants are encouraged to propose a sensor fusion architecture that maximises the complementary strengths of different sensor modalities including radar, LiDAR, electro-optical, and infrared systems to achieve robust and reliable situational awareness across the full range of operating conditions. On radar subsystem in Clause 3.4.9(b), this refers to a dedicated radar sensor suite forming part of the autonomous navigation and obstacle detection system, which is separate from and in addition to the mandatory navigational radars required under Clause 3.4.7 for compliance with SOLAS and COLREGs. The navigational radars required under Clause 3.4.7 serve the vessel's statutory navigation and watchkeeping functions, while the radar subsystem under Clause 3.4.9(b) is specifically intended to support the autonomous collision avoidance and obstacle detection functions of the vessel. Participants may propose architectures in which data from both radar systems is fused, provided the statutory functions of the navigational radars are not compromised.
73	Please clarify whether "radar subsystem" in Clause 3.4.9(b) refers to a dedicated sensor suite, separate from the mandatory navigational radars specified in Clause 3.4.7.	
74	Please advise whether there are any restrictions on the use of alternative satellite service providers (e.g. VSAT).	There are no restrictions on the use of specific satellite service providers or communication technologies at this stage. Participants are free to propose any satellite communication solution including VSAT, LEO satellite services, or other alternatives that meets the bandwidth, latency, reliability, and availability requirements set out in Section 3.4.10. As with other technology choices, the selection of satellite service providers will be subjected to assessment from a technology, licensing requirements and supply chain resilience perspective. Participants should clearly describe the proposed communication architecture, including the primary and backup communication links, in their EOI submission.
75	To transmit the information securely to MPA and PSAC system(s)	At EOI stage, participants should propose a cybersecurity architecture that can support real-time transmission of relevant system health, network activity, and anomaly detection data to external monitoring systems operated by MPA and PSAC. The proposed architecture should meet the cybersecurity requirements stated in the EOI

	for real-time cyber monitoring, detection and intervention." Please share more information on MPA and PSAC system(s) interface requirements.	document. Participants should describe the proposed cybersecurity monitoring architecture, the data to be transmitted, the transmission protocols, and the proposed interfaces with MPA and PSAC systems in their EOI submission. The information should be routed from vessel to ROC before transmission to MPA and PSAC system(s). Detailed interface requirements for MPA and PSAC's cybersecurity monitoring systems will be provided at the RFP stage (if applicable).
76	Please advise if any vessel-specific class notations are required. If not, bidder to propose.	Participants are expected to propose appropriate class notations for the aIGF vessel as part of their technical proposal, commensurate with the vessel's autonomous operations, propulsion system, energy storage systems (if applicable), and the applicable requirements of the chosen classification society. Relevant notations that participants may wish to consider include autonomous or remote-control notations, battery and electric propulsion notations, and any notations relevant to the vessel's intended operating area and cargo type. The proposed class notations will be subject to agreement with MPA and PSAC at the RFP stage. Participants can refer to the list classification societies authorised by the MPA as recognised organisations (RO) here.
77	May PSA/MPA identify the main equipment required for the predictive maintenance system? Kindly clarify if MPA/PSAC have an approved vendor list, since it is heavily dependent on end user suitability	The predictive maintenance system is expected to cover, at minimum, the main propulsion and power generation systems, energy storage systems (if applicable), thruster and steering systems, and critical auxiliary machinery. Participants are free to propose a predictive maintenance solution, including the sensors, data acquisition systems, analytics platform, and condition monitoring software, that they consider appropriate for the aIGF's machinery configuration and operational profile. MPA and PSAC do not have a prescribed approved vendor list for the predictive maintenance system at this stage. Participants are free to propose an appropriate solution that covers both critical and non-critical machinery.
78	Please elaborate on what is meant by Section 3.14.1. Is there any existing system to be followed with regards to Clause 3.14.1?	Section 3.14.1 refers to the requirement for the aIGF to be equipped with a vessel management and monitoring system that provides integrated oversight of all key vessel systems including propulsion, power management, cargo systems, and autonomous navigation from a centralised platform accessible both onboard (where applicable) and from the Remote Operation Centre (ROC). The intent is to ensure that the vessel's operational status can be monitored comprehensively in real time, vessel is able to carry out manoeuvring, berthing and

		cargo operations safely and that system alerts, alarms, and performance data are presented in a coherent and actionable format to the remote operator. There is no existing system that participants are required to follow or integrate with at this stage. Participants are free to propose any vessel management and monitoring system they consider appropriate, provided it meets the functional requirements of Section 3.14.1 and is compatible with the overall system architecture of the aIGF.
F. Cargo and Port Integration		
S/N	Query	Reply
79	Provide a list of different types of container/cargo types that are being considered by PSA/MPA.	The aIGF is primarily intended to carry standard ISO dry containers between Pasir Panjang Terminal and Tuas Port. Referring to 3.9.5, the vessel should be designed to accommodate a mix of 20-foot and 40-foot standard dry containers, including general purpose, high-cube containers, Out-of-Gauge and refrigerated containers (reefers). The vessel is also expected to have the capability to carry a proportion of IMDG-classified containers subject to the applicable segregation and stowage requirements. Participants should clearly state any cargo type limitations or exclusions in their proposed vessel design and provide justification accordingly.
80	For the minimum 800 TEU requirement, can we confirm that these containers are in accordance with ISO standards of maximum weight and centre of gravity?	Yes, participants should design the vessel to carry containers in accordance with ISO 668 and ISO 1496 standards, including the maximum gross mass limits specified therein. For design purposes, participants should assume a standard homogeneous loading condition based on ISO maximum gross mass containers unless a specific cargo mix and weight distribution is proposed and justified. Participants should clearly state the design loading condition including the assumed average container weight and the maximum stack weight in their EOI submission. Any assumptions that deviate from ISO maximum gross mass should be clearly identified and justified.
81	Please advise whether IMDG compliance is required throughout all container holds or only for a specific cargo area. Also, advise if there is any maximum number (out of	On IMDG coverage, IMDG compliance is not required throughout all container holds. Participants can propose designated specific cargo areas or holds for IMDG-classified containers, consistent with the segregation and stowage requirements of the IMDG Code. The vessel design should clearly identify the designated IMDG cargo areas and the classes of dangerous goods that can be accommodated in each area. On the question of the maximum number of IMDG containers, a specific maximum number has not been prescribed in the EOI. Participants can propose a reasonable IMDG capacity as part of their cargo plan,

	800 TEU) of IMDG containers to be carried.	considering the segregation requirements of the IMDG Code, the vessel's structural and ventilation arrangements, and the operational requirements of the inter-terminal feeder service. Participants should note that the carriage of certain classes of dangerous goods including Class 1 explosives and Class 7 radioactive materials may be subject to additional restrictions.
82	For Clause 3.9.2, is a hatch-less fully cellular arrangement a preference or merely one possible option? Would PSA accept a hatch-covered solution if turnaround, safety, and automation objectives are still met?	A hatch-less, fully cellular configuration is presented as a possible design option, not a mandatory requirement. Participants should consider the cost-benefits of the two options including productivity, operational efficiency and manpower resilience.
83	What are PSA's actual operational expectations for lashing? Is "zero or minimal lashing" an aspiration, or a firm requirement?	"Zero or minimal lashing" reflects an operational objective to enhance safety and turnaround efficiency. Alternative solutions may be proposed, provided they meet safety, automation, and operational performance goals.
84	Maximum % of reefer containers? Does requirement 3.9.6 apply to all containers on the main deck level?	There is no prescribed maximum percentage of reefer containers. Participants can propose a design that has the capability to accommodate reefers, including the proposed location and power. The design should include safety requirements to reduce the need for crew to climb additional tier to plug/unplug. The reefer power distribution requirement at Tier 82 applies across the vessel/bays. Participants should propose a reefer stowage plan that addresses both hold and deck-level configurations and clearly state the assumptions underpinning their design.
85	Is automated mooring required?	There is no fixed berth designated for the aIGF within the current port infrastructure. The inclusion of an automated mooring system is an optional requirement in the EOI but will be considered for the overall

86	Please advise the available mooring facility and capacity at Pasir Panjang and Tuas Port terminals. Does the project include an auto mooring system?	autonomous operations concept of the aIGF. Participants are encouraged to propose an automated or semi-automated mooring solution as part of their autonomous operations architecture, and to describe how the proposed mooring system interfaces with the vessel's autonomous navigation and berthing systems and existing facilities at PSAC's terminals and the additional R&D needed to meet the requirements as specified in Section 3.27 of the EOI. Participants proposing a conventional mooring arrangement should provide justification for this approach and describe how mooring operations will be conducted in the absence of crew onboard. Detailed information on the mooring facilities and berth capacity at Pasir Panjang Terminal and Tuas Port will be provided at the RFP stage (if applicable).
87	Where would the vessel be docked.	
88	Will MPA/PSAC provide Interface Control Documents (ICDs), APIs, or data schemas for integration with PSA port systems, including the Maritime Digital Twin and relevant maritime single window platforms?	To ensure seamless terminal flow, the proposed system must provide high fidelity integration with Singapore's maritime digital ecosystem and PSAC's operating system, including full compatibility and automated data exchange with existing port management systems, specifically the Maritime Digital Twin and relevant maritime single window, and use of open-architecture protocols to allow for future scaling and cross-platform communication between vessel and shore-side infrastructure. MPA and PSAC will share relevant ICDs, APIs, and data schematics at the RFP stage (if applicable) to support detailed integration design.
89	Please provide further details of "existing port infrastructure" so that integration protocols can be developed and proposed accordingly.	PSAC terminal details can be found in the link: https://www.globalpsa.com/wp-content/uploads/2026/04/PSA-SINGAPORE.pdf. At EOI stage, participants should propose an integration architecture based on their understanding of typical container terminal infrastructure and clearly identify the key integration points and protocols they intend to use.
90	Please advise if any communication protocols or network architectures have already been implemented at the	Detailed information on the communication protocols and network architectures currently implemented at Pasir Panjang Terminal and Tuas Port will be provided at the RFP stage (if applicable). At EOI stage, participants are free to propose open communication architectures and protocols that they consider appropriate for the aIGF system, provided these are consistent with the reliability, latency, bandwidth, and cybersecurity requirements set out in Sections 3.4.10 and 3.15 of the EOI. Participants should clearly describe the proposed communication

	existing terminal infrastructure, or whether participants are free to propose open communication architectures and protocols.	architecture including vessel-to-ROC, vessel-to-terminal, and vessel-to-VTS links, and identify any dependencies on specific terminal infrastructure or protocols that would need to be confirmed at the RFP stage (if applicable).
91	Please provide the terminal layout, particularly the bay with dimensions provided.	At EOI stage, participants should propose a vessel design based on standard container terminal bay dimensions and clearly state the assumptions made in their submission. For berth details, please refer to PSAC's resources within their website.
92	May PSA/MPA provide more detailed information (e.g. crane location, height range, outreach range) on existing crane infrastructure at both terminals.	At EOI stage, participants should propose a vessel design including hatch cover configuration, cell guide arrangement, and above-deck container stack height that is compatible with the typical crane infrastructure found at major container terminals in Singapore. PSAC terminal details can be found in this link: https://www.globalpsa.com/wp-content/uploads/2026/04/PSA-SINGAPORE.pdf. The quay crane is capable of serving vessels of up to 18 rows. Participants should clearly state the assumptions used in their vessel design and flag any specific crane infrastructure requirements that would need to be confirmed at the RFP stage.
93	What other PSAC operational and technical requirements, other than those listed, are there? Please specify.	The requirements set out in Section 3.9 of the EOI represent the primary PSAC operational and technical requirements known at the time of EOI issuance. Additional detailed operational and technical requirements including terminal-specific interface requirements and operational protocols will be provided at the RFP stage (if applicable) following further engagement with PSAC. Participants should note that PSAC's operational requirements may evolve as the project progresses, and the limited RFP will reflect the most current and complete set of PSAC requirements.
G. Mission Profile and Operations		
S/N	Query	Reply
94	Can MPA share the representative environmental design	Participants are expected to develop their proposals based on reasonable and representative port operating conditions in Singapore, consistent with the operational requirements stated in Section 3 (e.g. sea state 4 operations, survivability up to sea state 5).

	basis, including sea state, currents, visibility, rainfall, wind, traffic density, and wake environment?	
95	Can MPA/PSA provide the assumed mission profile in more detail, including typical route lengths, transit durations, expected number of cycles per day, expected waiting time, anchorage patterns, and berth occupancy constraints?	The EOI provides a baseline mission profile, including high-frequency inter-terminal transits and a reference turnaround time of 24 hours between berths for an 800 TEU aIGF (which includes a diverse range of ISO containers, refer to 3.9.5). Participants are expected to define and justify detailed assumptions including loading/unloading, waiting time, charging, inspections, and contingencies in their proposed Concept of Operations (ConOps).
96	Please advise if there are any additional operational modes to be considered beyond the current listed modes: Harbour, Loading/Discharge, Sailing, and Mooring/Anchorage.	Participants may also consider the following additional modes or sub-modes in their system design e.g emergency stop and safe state mode, in which the vessel transitions to a stationary safe condition in response to a critical system failure or safety-critical event; degraded operations mode, in which the vessel operates with reduced autonomy capability pending remote takeover or intervention; and maintenance mode, in which the vessel is alongside with systems in a maintenance or standby configuration. Participants should also consider designing the aIGF to support varying levels of operational control, including autonomous, semi-autonomous, and independent/manual modes, as appropriate for different phases of operation and contingency scenarios. Participants are encouraged to propose any additional operational modes they consider necessary for safe and efficient operations, with supporting justification.
97	Is it assumed that the location of the anchorage is along the specified route? If not, please provide the specific anchorage location.	The anchorage locations relevant to the aIGF's operations are the designated anchorage areas in Singapore port waters that are accessible from the operating route between Pasir Panjang Terminal and Tuas Port. Participants should design the vessel's autonomous anchorage capability to be compatible with the designated anchorage areas in Singapore port waters as published in the Singapore Port Marine Notices and the relevant nautical charts. The specific anchorage locations to be used in the operational design will be confirmed at the RFP stage (if applicable) in consultation with MPA's Port Operations Control Centre. Participants should describe the proposed

		autonomous anchoring procedure including the approach, anchor deployment, anchor watch, and weighing anchor sequences in their EOI submission.
98	Please provide the time breakdown of different operation modes under a 24-hour turnaround if available. Assuming it is: Loading — Transit — Offloading — Loading — Transit. Please confirm. Assuming that the available charging time is 16 hours for the design of a 24-hour turnaround time between berths and a 4-hour transit time	A detailed time breakdown for the 24-hour operational cycle has not been prescribed in the EOI, as this will depend in part on the vessel design, speed profile, and cargo handling arrangements proposed by Participant. The general operational sequence assumed i.e. Loading, Transit, Offloading, Loading, Transit may be used as the basis for their energy system sizing calculations, subject to the assumptions that the participant makes regarding port stay duration and transit time. It is expected that the minimum port stay alongside is 12 hours. With this as a reference, participant can provide their assumptions for the EOI submission.
99	What is the specific Operational Design Domain (ODD) for the aIGF?	The ODD for the aIGF encompasses the port waters of Singapore between Pasir Panjang Terminal and Tuas Port, including Jurong Island Terminal, within Singapore's port limits. The specific route corridors between Pasir Panjang Terminal and Tuas Port have not been prescribed in the EOI, as the optimal routing will depend in part on the vessel design, speed profile, and autonomy architecture proposed by each participant. Participants should state their assumed route corridors and distances as part of their operational design and ConOps submissions. In defining their proposed ODD, participants should address the full range of operating conditions expected in Singapore port waters, including sea state up to 4 for normal operations and survivability up to sea state 5, as specified in Section 3 of the EOI. Participants should also clearly define any operational limitations or exclusion zones within the proposed ODD and describe how the aIGF will transition between different operational modes including open water transit, port approach, and berthing across the ODD.
100	What are the specific route corridors between Pasir Panjang and Tuas terminals?	

101	Kindly confirm whether the operating route may be revised to specific terminals (Pasir Panjang and Tuas), and whether these terminals are intended to be fixed for the duration of the operation and lifespan of the vessel.	The primary operating route for the aIGF is between Pasir Panjang Terminal and Tuas Port, as described in Section 1.2 of the EOI. This route is intended to be the fixed operational basis for the demonstration phase of the project. Participants should design the vessel and its systems for this specific route and operating environment. Beyond the demonstration phase, MPA and PSAC do not preclude the possibility that the aIGF concept could be extended to other terminal pairs or operating routes as the programme matures. Participants are encouraged to consider the adaptability of their proposed solution to other routes or port environments as part of their longer-term scalability narrative, but this is not a requirement for the EOI submission.
102	For Clause 3.2.6, what exactly is included in the "24 hours between berths" expectation for an 800 TEU? Does this include loading/unloading, waiting time, charging, battery swapping, inspections, and contingency delays?	The EOI provides a baseline mission profile, including high-frequency inter-terminal transits and a reference turnaround time of 24 hours between berths for an 800 TEU aIGF. For planning purposes, participants can assume a minimum port stay of 12 hours at the terminal for cargo operations, with the remaining time accounting for transit between terminals and any anchorage requirements. Participants are expected to define and justify detailed assumptions, including loading/unloading, waiting time, charging, inspections, and contingencies, in their proposed ConOps.
103	For Clause 3.17.2, what is the operational rationale behind the requirement to accommodate up to 2 days at anchorage?	The anchorage requirement reflects the need for operational resilience and flexibility, including contingencies arising from weather, traffic congestion, or port scheduling constraints. Participants should propose how their designs and systems would safely support such scenarios.
104	May we enquire on the port stay duration, the minimum and maximum time required for both	For planning purposes, participants can assume a minimum port stay of 12 hours at the terminal for cargo operations, with the remaining time accounting for transit between terminals and any anchorage requirements.

	Pasir Panjang and Tuas Terminals?	
105	Number of voyages per day per vessel? (Ref. 3.12.3)	For an 800 TEU aIGF, a turnaround time of 24 hours between berths is expected.
106	Are non-inter-gateway use cases (e.g. anchorage shuttle, Jurong Island connectivity) acceptable as secondary use cases?	Secondary use cases are acceptable as supplementary proposals, provided the primary inter-gateway use case requirements are fully addressed. The routing requirements include high-frequency transits between Pasir Panjang Terminal and Tuas Port (including Jurong Island Terminal), and the aIGF should be able to accommodate up to 2 days at anchorage.
H. Autonomy and Navigation		
S/N	Query	Reply
107	Can MPA clarify the expected validation basis for autonomous navigation performance? Digital simulation only, model basin testing, hardware-in-the-loop, sea trials, or some combination?	Participants are expected to propose appropriate validation approaches that commensurate with system maturity and risk, which may include a combination of digital simulation, model testing, hardware-in-the-loop testing, and/or sea trials. The suitability of proposed validation methods will be assessed as part of the proposal evaluation.
108	What autonomy level is MPA/PSA truly targeting by 2029: supervised autonomy, remote-assisted autonomy, or practical "fully autonomous" operation within a constrained port operating domain?	Participants are expected to propose autonomy concepts that may include supervised autonomy, remote-assisted autonomy, or highly autonomous operations within a defined operational design domain, supported by an appropriate ROC and fallback mechanisms. Proposals should clearly articulate the intended modes of operation across different operational phases, the role of human-in-the-loop where applicable, and a development and validation roadmap towards higher levels of autonomy consistent with operational and regulatory readiness.

109	Is there a preferred IMO MASS autonomy degree targeted for demonstration and full operations?	Participants should propose an aIGF design for autonomous operations, capable of different modes of autonomous operations including but not limited to a) Remote operations with autonomous system support (with crew onshore at a Remote Operations Centre); b) Autonomous operations supported by remote takeover capabilities; c) Autonomous operations (with no or reduced crew onboard). Participants should clearly indicate the level of autonomy for each ship function. Participants may propose a progressive autonomy development roadmap, with a clear target degree for the 2029 demonstration and a pathway toward higher autonomy degrees in subsequent phases. Participants should ensure that the aIGF design meets the requirements of the INTERNATIONAL CODE OF SAFETY FOR MARITIME AUTONOMOUS SURFACE SHIPS (MASS CODE).
110	Which IMO MASS degree of autonomy is the target (Clause 3.7.1)? Degree 2 (remotely controlled with seafarers onboard), Degree 3 (remotely controlled without seafarers onboard), or Degree 4 (fully autonomous)?	
111	May PSA/MPA advise which exact degree of autonomy is to be achieved for operational requirements with respect to IMO guidelines MASS?	
112	Regarding Clause 3.2.2(b) "Autonomous operations supported by remote takeover capabilities": as this operation mode description does not mention "crew", please confirm this is intended to	The description of the autonomous operations mode in Clause 3.2.2(b) is intended to describe a mode in which the vessel operates autonomously without crew onboard the vessel, supported by remote monitoring and takeover capability from the ROC. This is consistent with the broader intent of the aIGF project to develop an unmanned autonomous vessel for inter-gateway feeder operations. However, participants should note that the achievable degree of autonomy by 2029, and whether the vessel will operate without any crew onboard from the outset will depend on the maturity of the proposed technology, the outcomes of the regulatory approval process, and MPA's assessment of the safety and risk levels. Participants should clearly state their proposed autonomy level and crewing arrangement for the 2029 demonstration in their

	be fully autonomous without crew onboard.	EOI submission and describe the pathway toward fully unmanned operations if the initial demonstration involves a reduced crew or safety officer onboard.
113	What are the required or preferred autonomous contingency behaviours in the event of degraded capability?	In the event of connectivity degradation or complete failure, the system shall prioritise critical systems to ensure safety of operations or execute pre-programmed fallback measures (autonomous return to designated location and/or station-keeping at a safe location). Participants are invited to propose a comprehensive set of fallback measures covering the full range of degraded capability scenarios, with a clear priority hierarchy.
114	Will MPA issue or endorse local guidance on COLREG interpretation for autonomous vessels during normal navigation?	All vessels, including vessels fitted with autonomous and/or remotely operated functions, shall conform to the International Regulations for Preventing Collisions at Sea (COLREG)
115	Are there defined benchmarks for acceptable false-positive/negative rates for AI collision avoidance?	Specific benchmarks for false-positive/negative rates are not prescribed at EOI stage. Participants are invited to propose performance metrics as part of their technical proposal, which will inform requirements at the RFP stage.
116	The requirement states "detecting and avoiding obstacles at distances of at least 6 nautical miles" (Clauses 3.6.3 and 3.7.3). Is 6 NM detection required for all object types or just large vessels?	The 6 nautical mile detection requirement in Clauses 3.6.3 and 3.7.3 is primarily intended to ensure that the aIGF's autonomous navigation and collision avoidance systems can detect and track conventional vessel traffic including large commercial vessels, tankers, and other port traffic at a range sufficient to allow safe and timely collision avoidance manoeuvres consistent with the COLREGS and the vessel's speed and manoeuvrability envelope. It is acknowledged that achieving 6 NM detection range for all object types including small craft, unlit objects, and floating debris may not be technically feasible with current sensor technologies across all conditions. Participants are therefore invited to propose a tiered detection performance framework that distinguishes between different object categories, specifying the detection range, detection probability, and false alarm rate achievable for each category under representative operating conditions. At a minimum, participants should address detection performance for the following categories: large vessels and commercial traffic; small craft and harbour vessels; unlit or low-visibility objects; and floating debris and semi-submerged hazards.
117	What are the detection requirements for small craft, unlit objects, and floating debris?	

		Participants should also describe how their proposed sensor fusion architecture integrates data from multiple sensor modalities such as radar, lidar, electro-optical, and infrared systems to maximise detection performance across object categories and environmental conditions. Minimum detection performance requirements for small craft and other non-AIS targets will be formalised at the RFP stage.
118	What are the positioning accuracy requirements during transit in open water, during berthing and unberthing operations, and during cargo operations alongside?	Specific positioning accuracy requirements are not prescribed in the EOI at this stage, as these will depend in part on the vessel design, the proposed autonomy architecture, and the berthing and cargo handling systems proposed by participant. As a general principle, the positioning accuracy of the aIGF should be sufficient to ensure safe navigation across all operational scenarios including open water transit, port approach, berthing, and unberthing, taking into account prevailing weather and environmental conditions such as wind, current, tidal variation, and vessel wake. Participants are expected to propose appropriate positioning accuracy targets for each operational phase as part of their technical proposal, with supporting justification based on the operational and safety requirements of each phase. Participants should also describe the degraded-mode positioning capability available in the event of primary positioning system failure.
119	Are there specific berthing precision requirements?	Specific berthing precision requirements such as positional tolerance, heading tolerance, and approach speed constraints are not prescribed in the EOI. These parameters will be defined in conjunction with PSAC's terminal operating requirements and crane interface specifications and will be formalised at the RFP stage (if applicable). Participants are nonetheless expected to propose berthing precision targets as part of their autonomous berthing system design, with reference to the crane outreach and bay geometry at the designated berths. As a general principle, the berthing system should be capable of positioning the vessel within the tolerances required for safe and efficient quay crane operations without manual adjustment and should achieve this consistently across the range of environmental conditions including tidal variation, current, wind, and vessel wake expected in Singapore port waters. On approach speed, participants should propose maximum approach speeds for the final berthing phase that are consistent with safe operations in the port environment and compatible with the vessel's fendering and mooring system design. Participants should also describe the control architecture for the autonomous berthing
120	What is the positional tolerance at berth (X metres)? What is the heading tolerance? What are the approach speed constraints?	

		sequence, including the transition from open water navigation to port approach and final berthing modes, and the role of any ROC-based supervision during the berthing phase.
121	Refer to Clause 3.4.6. Is this a part of the autonomous part?	Yes, the requirements of Clause 3.4.6 are intended to be integrated with and form part of the overall autonomous systems architecture of the aIGF. The systems described in Clause 3.4.6 should be designed to operate autonomously or semi-autonomously as appropriate, consistent with the overall autonomy concept described in Section 3.2. Participants should describe how the systems in Clause 3.4.6 interface with the autonomous navigation, monitoring, and control systems of the vessel in their EOI submission.
I. Remote Operations Centre (ROC)		
S/N	Query	Reply
122	Please advise whether establishment of a shore-based remote operations centre would be part of the project scope. If so, where is the designated location?	The establishment of a Remote Operations Centre is considered part of the project scope. As set out in Section 3.2.3 of the EOI, the aIGF is expected to be supported by a ROC that enables remote monitoring, supervision, and where necessary, remote takeover of the vessel during autonomous operations. The ROC is a key component of the overall system architecture and participants are expected to include a ROC proposal as part of their EOI submission. While the designated location of the ROC has not been prescribed in the EOI, it is currently planned to be located within PSAC's premises. Participants may consider a modular ROC design to allow for deployment and operation across multiple sites, in support of the longer-term scalability of the aIGF. Participants should clearly describe the proposed ROC location, the communication architecture linking the ROC to the vessel, and the staffing and operational procedures for the ROC in their submissions. The ROC location and specification will be subject to agreement with MPA and PSAC at the RFP stage (if applicable).
123	ROC location and redundancy requirements?	ROC location is currently planned within PSAC's premises. On redundancy, participants should propose a redundancy architecture that ensures the system remains fail-operational at all times, with no single point of failure capable of compromising the safe operation of the aIGF. Participants should clearly describe the proposed redundancy measures, including backup systems and failover arrangements, as part of their EOI submission.
124	Is a secondary or backup ROC required at EOI stage or later project phases?	Participants should ensure that the ROC meets the requirements of Part III Chapter 18 on Remote Operations of the INTERNATIONAL CODE OF SAFETY FOR MARITIME AUTONOMOUS SURFACE SHIPS (MASS CODE).
125	For the ROC proposal, kindly clarify if MPA/PSAC	MPA and PSAC do not have a prescribed approved vendor list for the ROC. Participants are free to propose ROC systems and vendors that they consider appropriate, subject to the functional, cybersecurity, and communication

	have an approved vendor list, since it is heavily dependent on end user suitability.	requirements set out in Sections 3.2.3 and 3.4.10 of the EOI. The proposed ROC solution will be assessed as part of the overall technical evaluation, and end user suitability, including the human-machine interface design and the operational procedures for ROC operators, will be an important consideration.
126	Does the ROC need to be integrated with the existing marine traffic control system?	The ROC is expected to conduct data and information exchanges with MPA's Vessel Traffic Information System. Participants should propose a ROC architecture that is capable of secure data exchanges in their EOI submission.
J. Safety and Technical Standards		
S/N	Query	Reply
127	Target safety integrity level?	Participants should propose an appropriate safety integrity level target for safety-critical systems as part of their safety case, which will be reviewed and aligned at the RFP stage (if applicable).
128	What level of redundancy is required for critical systems?	Critical systems including propulsion, steering, navigation, autonomy, and communications links to the ROC shall meet a minimum of N+1 redundancy with independent power feeds. Participants should provide a single point of failure analysis as part of their technical proposal and propose redundancy levels for all critical systems with reference to applicable Classification Society and flag state requirements.
129	What is the required redundancy level for sensors?	Participants are expected to propose an appropriate sensor suite and redundancy architecture as part of their technical proposal, commensurate with the proposed autonomy level, the complexity of the operating environment, and the applicable safety integrity level targets for the vessel's autonomous navigation and collision avoidance systems. As a general principle, the sensor architecture should be designed such that no single point of failure in the sensor suite results in a loss of situational awareness sufficient to compromise the safe navigation or station-keeping of the vessel. Participants should clearly describe the proposed sensor types, their coverage arcs and detection ranges, the degree of overlap and cross-validation between sensor modalities, and the system's behaviour in the event of individual sensor degradation or failure. Sensor redundancy requirements will be formalised at the RFP stage in conjunction with the overall safety case and system integrity requirements.
130	Kindly advise whether there are any restrictions or prohibitions in terms of	There are no restrictions or prohibitions on the selection of classification society, provided the chosen classification society is one of the 8 Recognised Organisations (ROs) authorised by MPA. The list of ROs can be found here.

	classification society (IACS members) selection.	There is no MASS notation recommendation. Proposals should meet the requirements of the INTERNATIONAL CODE OF SAFETY FOR MARITIME AUTONOMOUS SURFACE SHIPS (MASS CODE).
131	Is there a preferred Classification Society or MASS notation recommended by MPA?	
132	Are there wake, noise, or emissions limits beyond current port regulations?	Participants are expected to design and operate the aIGF in full compliance with all applicable MPA port directions, the Prevention of Pollution of the Sea Act, and any other relevant Singapore statutory requirements.
K. Propulsion and Energy		
S/N	Query	Reply
133	May PSA/MPA further elaborate on "its conventional equivalent counterpart". Conventional in terms of propulsion system, fuel type or energy source, or with or without advanced monitoring and remote-control system?	The reference to "its conventional equivalent counterpart" in Section 3.4 is intended to establish a performance benchmark against which the aIGF's efficiency and capability will be assessed. For the purposes of this EOI, the conventional equivalent counterpart should be understood as a conventionally powered feeder vessel of equivalent cargo capacity, approximately 800 TEU operating on a comparable inter-gateway route, with a conventional diesel propulsion system, conventional crewing arrangements, and without advanced autonomous navigation or remote-control capabilities. The comparison is therefore intended to capture the full range of improvements that the aIGF is expected to deliver relative to a conventional vessel, including improvements in energy efficiency, emissions, operational cost, and safety. Participants should clearly define the conventional equivalent counterpart they have used as the basis for their performance comparisons in their EOI submission.
134	PSA/MPA please provide conventional equipment counterparts, full vessel specifications, and operational profile to size battery capacity.	Participants are expected to propose a vessel design and energy system based on their own engineering assessment of the requirements set out in the EOI, including the 800 TEU minimum capacity, the operating route between Pasir Panjang Terminal and Tuas Port, and the 24-hour operational cycle. Participants should clearly state all assumptions made in sizing the battery capacity including assumed transit distance, speed profile, port stay duration, hotel load, and cargo handling power demand and provide supporting calculations in their EOI submission.
135	Available shore charging capacity (MW)?	Currently, there are no shore base (including cold ironing) charging infrastructure in the port. The electrical capacity, infrastructure, and facilities required to support direct charging or battery swapping are design

136	Please advise what the available power in kW for charging the battery from the grid is. This will determine the charging duration. If not, please provide the expected charging duration.	parameters that will be assessed during the EOI stage and subsequently sized to support the operational demands of the aIGF, should electric vessel designs be shortlisted for further evaluation. This approach ensures that future infrastructure investments are not pre-set as fixed constraints but are instead right-sized and fit-for-purpose based on the outcomes of the EOI evaluation. Participants are therefore encouraged to propose their preferred charging approach, whether direct charging or battery swap, and specify the associated infrastructure requirements as part of their EOI submission. MPA and PSAC will assess the feasibility and sizing of the required shore-side infrastructure in tandem with the evaluation of shortlisted concepts.
137	Please advise the available charging power in kW for a containerised battery swapping system from substation at shore. This will determine the charging duration. If not, please provide the expected charging duration.	
138	What type of electrical charging facilities will be available? Will Megawatt Charging System (MCS) protocol be commonly adopted for shoreside? (Ref. 3.2.7)	
139	May we enquire on the presence of charging infrastructure at both terminals, PPT and Tuas? If yes, please provide their	

	specifications to size the battery upon port stay duration.	
140	Assuming that charging infrastructure is to be autonomous. If the charging system is to be compliant with Singapore's major container terminals, we need to understand what is available at the terminals. Also, it is assumed that the charging infrastructure (if any) in Singapore's major container terminals would set the standard for charging.	
141	If the vessel adopts full electric using marine batteries as the main source of power, is there any requirement to keep to a specific battery chemistry? (Ref. 3.4.14)	No specific battery chemistry is mandated. Participants should justify their choice of battery chemistry with reference to safety, energy density, lifecycle, and thermal management considerations.
142	Explain more on what the meaning of modular and scalable energy architecture is?	The reference to a modular and scalable energy architecture in Section 3.12 is intended to encourage participants to design the vessel's energy storage and power management systems in a way that allows the energy capacity to be adjusted, either upward or downward, without requiring fundamental redesign of the vessel or its systems. In practical terms, this means that the energy storage system should be designed around standardised,

		interchangeable modules, such as containerised battery packs or standardised battery rack units that can be added, removed, or replaced as operational requirements evolve, as battery technology improves, or as the vessel's duty cycle changes over its operational life. Scalability also means that the energy architecture proposed for the initial aIGF vessel should be capable of being replicated and scaled across a larger fleet of vessels without significant re-engineering. Participants should describe how their proposed energy architecture meets these modularity and scalability objectives in their EOI submission.
143	Availability of methanol/ammonia or other alternative fuels	The availability of specific alternative fuels at Singapore's terminals is subject to ongoing infrastructure development. Do note that MPA has launched our methanol bunkering licensing framework and methanol is commercially available. Participants proposing net-zero fuel designs should state their fuel assumptions and provide a Well-to-Wake sustainability assessment as part of their proposal.
144	Are specific net-zero fuels preferred or discouraged for the aIGF?	No specific net-zero fuels are preferred or discouraged at this stage.
145	On clause 3.13, to confirm that this refers to net-zero fuels that would be potentially made available in Singapore in the future and not necessarily now?	Clause 3.13 does not require that the proposed net-zero fuel be currently available in Singapore. Participants may propose fuel solutions that are anticipated to become available in Singapore within the project's operational timeline, provided they supply preliminary Well-to-Wake sustainability evidence and a credible assessment of the fuel's availability pathway. Participants should clearly state their assumptions regarding fuel availability and infrastructure readiness, and MPA/PSAC will take these into account in evaluating the commercial and technical viability of the proposed energy solution.
146	What level of well-to-wake sustainability evidence is required at EOI stage?	Preliminary evidence of the fuel's Well-to-Wake sustainability is required at EOI stage. Detailed lifecycle assessments will be expected at the RFP stage.
147	Preliminary evidence of the fuel's "Well to Wake" — does this refer to nascent technologies as well?	Yes, preliminary Well-to-Wake evidence may reference nascent or emerging fuel technologies, provided participants clearly state the current maturity of the fuel pathway and the assumptions underpinning their sustainability assessment. Where a fuel technology is at an early stage of development or commercial availability, participants should acknowledge this and provide a credible roadmap for how the fuel would be available and viable for use in Singapore by the time of operational deployment. Detailed lifecycle assessments will be expected at the RFP stage.

148	What is the propulsion configuration (number of azimuth thrusters and tunnel thrusters) of the existing vessel? Any special requirements on thruster configuration?	Participants can propose any propulsion arrangement they consider appropriate for the vessel's operational requirements, including the autonomous berthing and manoeuvring requirements set out in the EOI. The propulsion configuration should be designed to provide the redundancy, manoeuvrability, and dynamic positioning capability necessary to support safe autonomous operations in Singapore port waters without tug assistance, unless the participant's proposal specifically includes tug support as part of the berthing concept. Participants should clearly describe the proposed propulsion configuration and provide justification for the design choice in their EOI submission.
L. Manning and Training		
S/N	Query	Reply
149	Minimum onboard crew requirement?	The minimum onboard crew requirement is not prescribed, as this is subjected to regulatory approval and the proposed autonomy level. Participants should propose their minimum manning requirements without compromising safety, including ROC manning, with supporting justification including how the manning is supported or reduced (if any) by the incorporation of these function(s).
150	Please confirm the acceptable minimum manning of the vessel shall be as per Singapore flag requirement.	
M. Confidentiality and Information Sharing		
S/N	Query	Reply
151	Will MPA & PSAC seek the participant's prior consent before sharing any submitted information with third parties, as referenced under Clause 7.4?	MPA and PSAC reserves the right to share any information submitted by Participants in their EOI for the purpose of assessing the Participant's Proposal and may appoint selected technical reviewer(s) with relevant domain expertise from local research institutes, with measures put in place to safeguard confidential information. Prior consent will not necessarily be sought. Any part of the submission that is considered by Participants to be confidential should be clearly marked. MPA and PSAC reserves the right to aggregate/anonymise the information before sharing on a need-to basis.
152	Does marking part or the whole of the submission as "Confidential" mean that MPA & PSAC will not share such information with any	Marking a submission as confidential does not constitute an absolute bar on sharing. MPA and PSAC reserve the right to aggregate or anonymise confidential information before sharing on a need-to basis. Participants who have specific confidentiality concerns are advised to contact MPA directly.

	third parties under Clause 7.4?	

Disclaimer:

This FAQ document is intended to provide general clarifications and information regarding the EOI for the aIGF. While we have made every effort to ensure the accuracy and completeness of the information provided, it is important to note that this document is for informational purposes only. The information contained herein may be subject to change, and MPA and PSAC reserve the right to update, modify, or withdraw any part of this FAQ at any time without prior notice. This document does not constitute legal advice, and readers should not rely on it as a substitute for professional consultation.