General Feedback

Section of Code	Feedback Received	MCA Position
General	It is not clear where hydrogen powered vessels are covered	Vessels using alternative power sources other than li-ion batteries are not currently included in Workboat Code Edition 3. Vessels using alternative power sources other than li-ion batteries shall follow the process set out in MGN 664. The MCA is currently developing new regulations on alternative fuels and power sources (including hydrogen), which will be added to Workboat Code Edition 3 in due course following consultation.
	There is no statement on whether li-ion batteries may be used as emergency batteries or engine start batteries	Lithium-ion or lead-acid batteries may be used as emergency batteries or engine start batteries

1: Forward

Section of Code	Feedback Received	MCA Position
1.1 This Code contains mandatory requirements that apply to workboats, including remotely operated unmanned vessels (ROUVs), that operate to sea, and to all dedicated pilot boats, carrying cargo and/or not more than 12 passengers, which includes any industrial personnel. The Code applies to United Kingdom (UK) vessels wherever they may be. It also applies to non United Kingdom workboats in UK waters that operate from UK ports. The Code, including the appendices and annexes to which it refers, are given statutory authority by the Merchant Shipping (Small Workboats and Pilot Boats) Regulations 2023 ("the 2023 Regulations") where a vessel is certified under those Regulations as meeting the requirements of the Code.	What about ROUVs that can be manned? The mix of ROUV combinations (manned/unmanned, always unmanned, sometimes manned) are not always appropriately addressed via the workboat code requirements	Annex 2 on Remotely Operated Unmanned Vessels sets out requirements purely for Remotely Operated Vessels which are Unmanned. For Remotely Operated Vessels which wish to be operated as manned then the process set out in MGN 664 shall be followed
1.2 This Code applies to workboats, including ROUVs, and dedicated pilot boats when they are in commercial use. It may also be used for barges, pontoons, and similar small vessels when under tow, as specified in section 26. It does not apply when such vessels are in use for recreational, sport or pleasure use, for which there are more appropriate codes.	It seems odd to put focus on to ROUVs before stating anything about the Regulations. Suggest the order is wrong and would more naturally sit alongside Section 1.8 which is also about ROUVs	Section 1.2 sets out the scope of the Code, not just ROUVs (i.e. workboats, ROUVs, dedicated pilot boats, certain vessel types under tow)
1.3 The ROUVs to which the Code applies are vessels with no persons on board,	Is it correct to state that the expectations are equivalent to those of the general public when these vessels are typically operating outside of the	The safety of a vessel, and its operations, needs to meet appropriate standards at all times, regardless of whether a vessel is working within or beyond the purview of the general public.

where the vessel is operated from a Remote Operation Centre. Such vessels are treated, by both UK and international law, as a type of cargo vessel and the level of safety and protection provided for in the Code for those persons coming into contact with such vessels and/or operating the vessel remotely, is considered to be commensurate with the current expectations of the general public for these types of vessel.	purview of the general public and that therefore the tolerability and management of risk may be more appropriately taken with regard to regulatory expectation and commercial decision making?	
	It seems odd to put focus on to ROUVs before stating anything about the Regulations. Suggest the order is wrong and would more naturally sit alongside Section 1.8 which is also about ROUVs	Section 1.3 has been moved to become the new Section 1.7
1.6 Independent rescue boats, when engaged in commercial use, may use the Rescue Boat Code instead of this Code, in accordance with MGN 466(M).	General comment throughout the Code the MGN 664 full title should be included within the code either as a footnote or other. This applies to all references to MGNs or other SI, MSN, guidance notice, etc. Without this then this Code does not provide for a good "one stop shop"	MIN XXX sets out all references in the Code, and details the full titles. It is more appropriate for references to be detailed in MIN XXX which will be regularly updated.
1.8 Vessels intending to operate as Remotely Operated Unmanned Vessels are required to meet the requirements set out in section 2 to 8 of Annex 2 in addition to the relevant sections of the Code that are not disapplied under section 1.2 of Annex 2.	How are they to be dealt with if they also need to be certified for the carriage of people as a workboat, or for the limited carriage of people such as for a reduced duration under a lower WBC category?	Annex 2 on Remotely Operated Unmanned Vessels sets out requirements purely for Remotely Operated Vessels which are Unmanned. For Remotely Operated Vessels which wish to be operated as manned then the process set out in MGN 664 shall be followed
1.11 This is the third edition of the Code. It replaces The Workboat Code Edition 2, as amended which was introduced in December 2018 and also the original Code titled, "The Safety of Small Workboats and Pilot Boats – A Code of Practice" that was introduced in 1998. This Code applies to workboats, pilot	How are the transitional arrangements intended to apply to existing certified ROUVs, it would be unreasonable to expect them to comply with a wholly new regulatory standard where they have previously been able to make risk based applications	Certified ROUVs will have the option of applying to either renew their current certification, or have the option of moving to, and meeting, the requirements of Workboat Code Edition 3

boats and remotely operated unmanned vessels, the keels of which are laid, or are at a similar stage of construction, on or after the date the 2023 Regulations come into force, subject to the transitional arrangements contained in those Regulations., From the same date, this Code supersedes the original Code, Workboat Code Edition 2, as amended, and also Marine Guidance Note MGN 280(M) “Small Vessels in Commercial Use for Sport or Pleasure, Workboats and Pilot Boats – Alternative Construction Standards” as applicable to small workboats and pilot boats.		
1.17 The Workboat Certificate, Light Duty Workboat Certificate, Pilot Boat Certificate or Workboat Certificate with a Pilot Boat Endorsement are UK issued certificates.	Does this imply that a workboat certificate will be issued in respect of an ROUV or is there a separate category for these. How will it be managed for ROUVs that operate outside of UK waters under UK flag or for ROUVs which are certified but not UK flagged and which operate outside of UK waters	ROUVs are a type of workboat, therefore could be issued with a Workboat Certificate. ROUVs operating outside of UK waters under UK flag or certified but not UK flagged and operate outside of UK waters will be treated the same as a traditional workboat operating in these ways would
1.19 Guidance for vessel owners/operators wishing to operate their vessels outside the UK is contained in MGN 416 (M).	MGN 416 does not sufficiently address ROUVs which are intended to be more portable	MGN 416 will be updated to apply to ROUVs and Workboat Code Edition 3
1.24 The authorisation of been influenced by the requirement to have a local capability for the efficient handling of the needs of owners/operators of vessels. Authorised Certifying Authorities are permitted to charge for undertaking Code of Practice examination and certification processes in accordance with the terms of their authorisation. Arrangements for payment of any charges will be made	It is clear that the CA must have capability for efficient and accurate delivery of the Code, what is not clear is how the MCA intends to make this judgement for the certification of ROUVs many of which will be beyond the capability of most of the UK CAs, specifically because of the need to adjudge software and systems based approaches. The MCA also does not have this capacity. It should be	Workboat Code Edition 3 carefully sets out responsibilities for CAs and the Administration (MCA) for the certification of ROUVs

directly between the Certifying Authority (or a Certifying Authority's authorised person) and the party requesting such services.	necessary for the MCA to assess the competence and capability of the CA to issue ROUV certificates before they do so	

2: Definitions

Section of Code	Feedback Received	MCA Position
2 Definitions	Need to have definitions for DPS, PES and software	New definitions have been developed, where appropriate
	Where there are pre-existing international/IMO definitions these should be used rather than MCA created definitions e.g. MASS	The term MASS was used purely for the IMO MSC Regulatory Scoping Exercise, all definitions relating to autonomy at IMO are still in development
"Battery box" means a dedicated box of steel or other equivalent material, in which a battery is located;	In certain cases definitions introduce requirements as well, requirements which should be included in the relevant sections. Including too much detail in a definition may lead to details being missed when people only reference the specific requirements in a relevant section of the Code Definition needs further work	Definitions are being reviewed as part of the post-consultation process
	Plastic or GRP battery boxes no longer permitted? As this is only shown under definitions and not in the electrical section maybe MCA don't intend this to be a technical requirement – to clarify? Delete "steel or equivalent material" from definition and include requirements in the relevant section, to include plastic or GRP boxes	
	It is not clear in the proposed new code what an equivalent material might be which will achieve the highest level of fire resistance; and how are the gassing and subsequent explosive actions to be contained? We are asking MCA to provide classification and recommendations	
	This definition is not clear to include or exclude FRP (with insulation properties) is allowable. An FRP	

	insulated box should provide equal protection from a battery fire but the wording seems to intentionally preclude it. This should be updated to specifically include FRP boxes insulated according to FTP Code Part II tests. Without this clarification then CAs will be open to interpret this at will. A0 is a new requirement which was not discussed within the TWG. Need to discuss risk and reality. Many of the existing type approved battery packs in “enclosures” are built within FRF boxes and operate safely	
	How does this apply to a hybrid or electric drive vessel where a GRP hull forms the boundary?	
“Battery-electric” means a vessel with a propulsion motor powered exclusively by lithium-ion batteries	It might be beneficial to keep some definitions broader and more open, e.g. to allow for future integration of new technology (the preferred chemical compound might change with later generations of batteries) What about other types of batteries? Definition needs further work Tied by definition to lithium-ion, it may be better to separate battery type. For example a vessel can equally be a battery-electric with lead acid batteries.	Annex 1 of Workboat Code 3 is specifically for li-ion batteries and covers a broad range of battery chemistries. Specific applicable requirements may be developed for other non-lithium chemistries where applicable in the future. Annex 1 has been extended to incorporate lead-acid batteries
	Confusion over battery-electric vs. battery-hybrid vessel definition Clarity required over these definitions, particularly regarding categorization for the use of diesel fuel for direct/indirect propulsion systems	Definitions clarified in post consultation review
	It was said to be the MCA;s intent to use Annex 1 to republish the Annex to include hydrogen fuel cell technology	The MCA is currently developing new regulations on alternative fuels and power sources, which will be added to Workboat Code Edition 3 in

	etc. once MCA is ready. By directly referencing li-ion batteries here then that precludes other technologies being included later. Suggest wording to the effect of “powered exclusively by propulsive power systems described in Annex 1” and “fuel and propulsion technology described in Annex 1”	due course following consultation. The definition of battery-electric does not preclude future regulations on alternative fuels and power sources.
“Battery-hybrid” means, in the context of this Code, a vessel with a propulsion system that can be powered by both diesel fuel and lithium-ion batteries.	Confusion over battery-electric vs. battery-hybrid vessel definition Definition needs further work Clarity required over these definitions, particularly regarding categorization for the use of diesel fuel for direct/indirect propulsion systems	Definitions clarified in post consultation review
	Tied by definition to lithium-ion, it may be better to separate battery type. For example a vessel can equally be a battery-electric with lead acid batteries.	Annex 1 has been extended to incorporate lead-acid batteries
“Battery room” means a dedicated room of steel or other equivalent material with A0 fire integrity in which a battery is located;	Definition needs further work	Definitions clarified in post consultation review
	It is not clear in the proposed new code what an equivalent material might be which will achieve the highest level of fire resistance; and how are the gassing and subsequent explosive actions to be contained? We are asking MCA to provide classification and recommendations	Text clarified in post consultation review
“Hazardous space” means a space or compartment where combustible or explosive gases or vapours are liable to accumulate in dangerous concentrations, and are divided into three zones (refer to IEC 60079-10-1:2020 for details): .1 Zone 0 – a space where an explosive atmosphere is present frequently or for long continuous periods;	In certain cases definitions introduce requirements as well, requirements which should be included in the relevant sections. Including too much detail in a definition may lead to details being missed when people only reference the specific requirements in a relevant section of the Code	The definition is taken from the IEC definition, introducing different hazardous space zones, and does not introduce requirements

.2 Zone 1 – a space where an explosive atmosphere is present occasionally during normal operation; or .3 Zone 2 – a space where an explosive atmosphere is present rarely, and only occurs for short periods, during normal operations		
“High voltage” means an electrical system with an output of 60V or more	Definition is not in line with international standards >60V is not aligned with IEC recognised standards. From IEC =>1000V, low voltage = 51-999V, extra low voltage =<50V Definition needs further work Where does this come from? It should align with the definitions elsewhere in the industry e.g. Class BV definitions are: Safety voltage =/<50V RMS AC & 50V DC Low voltage 50V-1000V RMS AC, 50V-1500V DC High voltage >1000V RMS AC, >1500V DC Class trat 24V batteries the same as, say, 9000V batter storage	Definition amended to align with recognised international standards
“Latency” means the time interval between a signal being sent from the ROUV and being displayed to the remote operator at the ROC, and comprises the time taken to process the data and transmit a signal, and for the signal to be received and processed;	Only refers to transmission from vessel to operator – should it also encompass transmission from operator to vessel? Does this definition work in both directions i.e. from the ROC to the ROUV?	Definitions clarified in post consultation review
“Lithium-ion battery” means a rechargeable battery containing lithium in any chemical form;	There are some definitions relating to batteries that are problematic. Lithium-ion covers a large spectrum of battery chemistries, not all of which are same for marine use, it may be better to simply use the term battery so as not	Definition is suitable, as in the Annex it sets out the requirement that batteries shall be suitable for marine use

	to include any unsafe chemistries or exclude new technology. Battery technology can then be reviewed on its own merit in 8.4	
	Should this be lithium battery?	No, the correct term is lithium-ion battery
"MASS" means Maritime Autonomous Surface Ship and includes every description of vessel or craft used in navigation that can for any part of its voyage, fully or in part navigate or operate autonomously or through remote operations;	As the term MASS is recognised internationally to include what the MCA call ROUVs it would be useful to tie the two together, early on in this Annex	The term MASS was used purely for the IMO MSC Regulatory Scoping Exercise, all definitions relating to autonomy at IMO are still in development. Therefore it would not be suitable to tie the definition of ROUV to the term MASS which may soon be changed
"Power Management System" (PMS) means an electronic device which performs the role of converting information on power availability into human readable formats;	Disagree with definition. PMS automatically manages the availability of power and increases the reserve of generating capacity if load is increased. What is described as a power monitoring system	Text clarified to incorporate consultation feedback
"Propulsion system" means all components that convert power into movement: .1 for diesel or petrol fuel powered vessels the propulsion system is the internal combustion engine including the fuel tank, fuel, motor, driveshaft and propeller, .2 for battery-electric powered vessels the propulsion system comprises the charger, battery, electric circuit, protection device(s), controller motor, driveshaft and propeller; and .3 for a battery-hybrid powered vessels the propulsion system includes both .1 and .2;	This is an odd definition, what is the purpose of including it, ship systems could be divided as propulsion, mission specific and ancillary – fuel is included but what about cooling water etc.	The definition sets out the three propulsion system groups in the scope of the Code
"Remote Operation Centre (ROC)" means either a shore-based location which is permanent or mobile or a manned vessel from which a ROUV is operated;	Definition needs further work Should state or an appropriate location on a manned vessel from which an ROUV is operated	Definitions are being reviewed as part of the post-consultation process

	The IMO phrase here is remote control centre is there should be some recognition here that this is one and the same to avoid confusion. Or just use the same phrase instead?	The IMO has not yet agreed a name, or definition for a Remote Operation Centre, all definitions used so far were purely for use within the IMO MSC Regulatory Scoping Exercise
"Remote Operator" means any person, including the Master, with recognised or certifiable experience who is engaged in the remote operation of a ROUV;	Who 'recognises' the experience of the operator	The Maritime and Coastguard Agency Seafarer Services Team
"Remotely Operated Unmanned Vessel (ROUV)" means a vessel with no persons on board, that is operated from a location remote to the vessel	Ask the MCA to adopt the terms advised by IMO i.e. renaming of ROUVs A new term, which is not in use internationally – there are a number of internationally recognised terms for these vessels already in use. Suggest that a definition align with IMO is used Definition needs further work	Terms used by the IMO were purely for the IMO MSC Regulatory Scoping Exercise, all definitions relating to autonomy at IMO are still in development
	This might be an operational mode only i.e. sometimes the vessel is an ROUV, sometimes it might be manned, at other times it might even be autonomous. Whilst I agree with the ROUV designation, it should be recognised that this is not necessarily a permanent designation	Annex 2 on Remotely Operated Unmanned Vessels sets out requirements purely for Remotely Operated Vessels which are Unmanned. For Remotely Operated Vessels which wish to be operated as manned then the process set out in MGN 664 shall be followed
	Should this term reference the use of the section of ROUV that is MASS to recognise the link otherwise MASS just sits as an entity on its own and there is little point to have that definition within the code	The term MASS was used purely for the IMO MSC Regulatory Scoping Exercise, all definitions relating to autonomy at IMO are still in development. Therefore it would not be suitable to tie the definition of ROUV to the term MASS which may soon be changed

“Steel or other equivalent material” means any non-combustible material which, by itself or due to insulation provided, has structural and integrity properties equivalent to steel at the end of the applicable exposure to the standard fire test;	With reference to our comments regarding the definition of a “battery box”, does this mean that the whole compartment of a GRP/FRP/aluminium vessel needs to be insulated as opposed to just 300mm below the waterline?	“Steel or other equivalent material” means any non-combustible material which, by itself or due to insulation provided, has structural and integrity properties equivalent to steel at the end of the applicable exposure to the standard fire test
"Workboat" means a small vessel in commercial use for purposes other than sport or pleasure, including a dedicated pilot boat.	Is an ROUV a workboat or a separately designated vessel type – ROUV, this is important to understanding the language and application of the Code	An ROUV is a type of workboat
Section 2	It feels as if many of the definitions introduced for Annex 1 are highly specific and cause the list to become over-lengthy	Definitions are being reviewed as part of the post-consultation process
Section 2	Include a definition for power source – is it a battery, or can it include both battery and EM?	A power source is a source of power (e.g. battery, generator)

3: Application, Interpretation and Certification

Section of Code	Feedback Received	MCA Position
3.2.1 The Code sets out the requirements for safety of a vessel and any persons on board. Operational activities (e.g. commercial diving) are not considered under the Code.	How is the 'safety of the vessel' defined, in respect to itself or its risk to other vessels and the environment, i.e. what if an owner of an ROUV determines that it is expendable under a defined operating regime or procurement model	A ROUV should not pose a hazard to any other water users, or to the environment
3.4.2 Where the vessel owner/operator wishes to use an equivalent means of compliance to the Code, the Certifying Authority shall, on behalf of the vessel owner/operator, submit a request for equivalence to the Administration who may consult with others as deemed appropriate.	The assumption here is that if looking to certify a ROUV but can't comply you would need to start the MGN 664 process. The difference could be made much clearer as there is a real risk of CA following a 'traditional' approach and therefore presenting an argument at the back end of the process and having ignored MGN 664. This would be likely to add significant cost and delay to projects. Suggest a reference to the MGN 664 process. This is also the case in section 4 of the main body of the text where there doesn't seem to be a breakout of the process to push into the case-by-case process with the authority. There are also other areas of Annex 2 that suggest equivalent standards would be considered on a case-by-case basis e.g. 3.3.1/7.2.6 etc (adds confusion as not clear if this pushes into MGN 664 or traditional exemptions/equivalence route)	The option to use the MGN 664 process, where appropriate, has been clarified further within the Code
3.4.3 Any equivalences agreed for the vessel by the Administration shall be recorded on the SWB2 and a copy of the equivalence	Is the SWB2 sufficient for the certification and recording of compliance from an ROUV?	Certifying Authorities will be provided additional information to aid development of SWB2 for Remotely Operated Unmanned Vessels

shall be kept by the Certifying Authority on the vessel's file.		
3.5.6 A vessel certificated under sections 3.1.3 or 3.1.4 above, that changes to a more onerous operational type or area category of operation, must comply with the section(s) of this Code applicable to that change of operation or area category of operation.	What about if it is dual certificated for operations in more than one area category under different modes of operation i.e. Cat 0 ROUV, Cat 4R manned	Text clarified to incorporate consultation feedback
3.7.2 The Unique Identification Number is formed of 12 digits, with each digit given a specific role: The first (alpha) digit relates to the identity of the initial Certifying Authority. The second and third (numeric) digits give the last two digits of the year of Certifying Authority receipt of the completed SWB1. The fourth and fifth (alpha) digits denote the vessel type. The sixth, seventh and eighth (numeric) digits relate to the length of the vessel rounded down to the nearest metre, i.e. 7.95 metres would be '007'. The ninth to twelfth (numeric) digits are a unique sequential identifier, applicable within the year of initial certification denoted by the second and third digits. The sequential number should lie within a band of 0001-9999.	Is an alpha designation required for ROUVs?	Yes, a ROUV would need an alpha designation
3.8.1 To be issued with a Certificate for a particular Area Category of Operation, a vessel shall comply with all of the requirements of the Code for that Area Category of Operation to the satisfaction of the Certifying Authority.	What about if it is dual certificated for operations in more than one area category under different modes of operation i.e. Cat 0 ROUV, Cat 4R manned	Text clarified to incorporate consultation feedback

3.14.4 A risk assessment shall be conducted for a Remotely Operated Unmanned Vessel in their intended Area Category of Operation, particularly where operating within congested areas.	What is the scope of the risk assessment, is operational or design based and to what depth is expected to go. Note that the link through to Appendix 8 from Section 31 is only in relation to cyber risk of risk assessment for operation activities in order to inform safe systems of work. Is the CA only required to sight this risk assessment or do they also need to make an assessment of it. This is particularly important for ROUV operations and poorly defined in this section	The scope of the risk assessment for a ROUV would depend on the vessel in question. The risk assessment would address the specific risks associated with operating a ROUV, especially in congested waters. Other areas for consideration would be covered by the risk assessment requirements set out in 3.14.1-3.14.3
	The requirement for risk assessment could perhaps be repeated in Annex 2 with more specific requirements to hazid, FMEA and that risk analyses should take into account the introduction of new technology and/or new application of existing technology which could render the need for technology qualification as well?	The need for a risk assessment will be cross-referenced and clarified in Annex 2

4: Certification and Examinations

Section of Code	Feedback Received	MCA Position
4.4.1.1 The vessel owner/operator shall arrange for an annual examination of a workboat to be carried out by an authorised person, on behalf of the Certifying Authority, within 3 months either side of the anniversary date of the compliance/renewal examination, at intervals not exceeding 15 months.	No reference is made to a need to examine arrangements at the ROC. Is this within the scope of the ROUV WBC Certificate and to what extent?	Text clarified to incorporate consultation feedback
4.6.2 During the renewal examination the vessel shall be examined out of the water.	A renewal examination for an ROUV should also include in-water trial and demonstration of control systems	Text clarified to incorporate consultation feedback
4.7.4 For the purposes of this section, an “incident” includes: .1 any collision; .2 any grounding; .3 any fire; .4 any event involving: .1 the hull; .2 the keel and keel attachments; .3 the rudder; .4 any other fitting that is below the waterline; .5 the propulsion system; .6 the steerage equipment; .7 the machinery; or .8 any critical equipment	How about any event with the ROUV system resulting in a loss of control, including those at the ROC	The MCA notes your comment on this specific section with thanks

5: Construction and Structural Strength

Section of Code	Feedback Received	MCA Position
5.1.2 A vessel which operates in area category of operation 0, 1, or 2 shall be fitted with a watertight weather deck over the length of the vessel and shall have a permanent accommodation space.	This mandates a permanent accommodation space for Cat 0, 1, 2 vessels but this may not be the case for an ROUV and is in any case accounted for in Chapter 21	A ROUV is not required to have a permanent accommodation space
5.1.9 A Remotely Operated Unmanned Vessel is not required to have a permanent shelter installed.	ROUV out clause, but this doesn't appropriately map to 5.1.2, 5.1.4, 5.1.7 – a permanent shelter is not a defined term, do you mean a 'permanent accommodation space', a 'substantial enclosure' or a 'permanent and enclosed accommodation space and steering position'?	Consistency of terminology has been clarified

8: Machinery, Propulsion and Fuel Systems

Section of Code	Feedback Received	MCA Position
8.1.1 A vessel fitted with a petrol, diesel, hybrid or lithium-ion battery powered propulsion system shall be provided with a propulsion system suitable for marine use and with sufficient fuel capacity or charge for its intended area category of operation.	What about conventional lead-acid batteries?	Annex 1 has been extended to incorporate lead-acid batteries
8.3.1 Where a vessel is fitted with a battery-hybrid (diesel fuel and lithium-ion battery) propulsion system it shall be designed to use one power source as primary power with the other source used as a boost or in an emergency. Requirements for electric propulsion systems are detailed in Annex 1.	If hybrid is classed as secondary, it will be able to possibly provide boost and do emergency propulsion/power generation. The system should also be allowed to form the primary propulsion power source for low speed operation (loitering/maneuvering)	Text clarified to allow a battery-hybrid propulsion system to use one power system as primary power, with the other source as secondary, boost or emergency
	This is complicated and may restrict potential safe design. Many hybrid vessels can use either internal combustion or electric as first choice and the other means as the secondary or alternative. It does not have to be 'boost' or 'emergency'	
8.3.2 A hybrid propulsion system shall be designed so it is not vulnerable to a single point of failure, meaning that the second power source shall be able to automatically take over and provide power in an emergency.	Does this mean that one powertrain (with one diesel engine and one EM but with only one driveshaft e.g. parallel hybrid) is a sufficient set up? Or do the redundancy requirements and single point of failure only apply to the actual power sources – which only seems to only include the battery and the fuel tank. How much power shall be provided in an emergency from the second power source? Is "limp home mode" sufficient?	A parallel hybrid would be a sufficient design The ability to limp home would be acceptable.

	A non-hybrid vessel does not have this ability, while a good design decision as far as practicable, what single points of failures count? If the gearbox fails and the electric motor and diesel engine are installed to the same box is that non-compliant? A hybrid vessel therefore must have multiple shafts and electric drive in separate space from ICE	Text clarified to incorporate consultation feedback
8.3.3 A fuel tank and lithium-ion batteries used as a source of power for propulsion shall be located in separate spaces which do not share a boundary with any accommodation space or each other.	Requires reference to subsequent rules for colocation exclusion clause	Cross-references clarified in Code
	This paragraph forbids the arrangement where a battery space shares a boundary with a diesel fuel tank or accommodation space. In smaller vessels this may be impractical, other rules internationally have insulation requirements on boundaries such a this. We suggest that retrofitting small existing vessels with battery hybrid systems is one of the main ways that the workboat industry can achieve net zero in the upcoming decade and therefore barriers to this should be reduced as much as possible.	Lithium-ion batteries used as a source of power for propulsion may share a boundary with fuel tank(s) or accommodation space, where the boundary is of steel or other equivalent material.
	There should be clarification as to whether a sealed, insulated and separately ventilated battery box within a larger space (such as propulsion room) is considered a separate battery space for the purpose of this rule (the distinction is clearer in Annex 1 but this should also be defined in 8.3.3)	
	This paragraph also appears to forbid the shared boundary of a fuel tank and accommodation space, but only in	

	battery hybrid vessels (whereas this is permitted in simple diesel vessels). Is it the intention of the rule to apply in this case?	
	We have serious concerns with regard to applying this paragraph retroactively to existing vessels. We are aware of vessels that do not meet this and to reconfigure their arrangement to do so would require significant internal structural change. A number of battery hybrid vessels being brought to UK WBC are designed and built for the more mature Norwegian market.	
	We suggest, in the interest of harmonization with internal standards, that the guidelines from the Norwegian Maritime Authority is studied, which addresses a number of these points (guideline for electrical energy storage systems (maritime EES systems) on board Norwegian ships of less than 24 meters in length (L) circular series V number RSV 09-22/04/05/2022/journal no 2121/154280)	These guidelines, and the Norwegian Maritime Authority, were consulted during the development of this Annex
	Note the text of this paragraph is tempered somewhat by Annex 1 2.4.1/2 which allows for case-by-case approval of alternative arrangements, such as fuel tank/battery room boundary. However, this does not address the fuel tank/accommodation boundary issue suggest this is formalised somehow with examples and clarifications	Lithium-ion batteries used as a source of power for propulsion may share a boundary with fuel tank(s) or accommodation space, where the boundary is of steel or other equivalent material.
	The separation of fuel tank and batteries may be an impractical measure for smaller (and particular	The issue of vessel size, or risk, is addressed in Annex 1 Section 2.4.1

	uncrewed) vessels. Perhaps allow for alternative means of protection, which are proportionate to the fact that the vessel may not be carrying any person How will this separation be managed for small ROUVs which don't have the real-estate to maintain such separations	
	Definition of boundary, does a deck also count as boundary so no deckhouse above fuel tanks or battery rooms? While li-ion batteries are troublesome if they do overheat, the power management charging and battery management systems will all alarms and shut down if the temperature limits are exceeded. If they all fail and a call does overheat thermal runaway starts slowly and there is time to escape the vessel. In electric vessels there is a 0.0012% chance of a batter fire between 2010 and 2020. The arrangements and requirements proposed are disproportionate to the risk and excessive compared to other nations meaning UK development of technology will fall behind as no vessel will be suitable for viable conversion	Lithium-ion batteries used as a source of power for propulsion may share a boundary with fuel tank(s) or accommodation space, where the boundary is of steel or other equivalent material.
	This is unnecessarily restrictive. If there is suitable fire protection (insulation) between the fuel tank and the battery box, then there is no reason why the two should not safely be located in the same space	
	This is going to prove very difficult to achieve on smaller vessels around the 10m to 15m mark when trying to the trim of the vessel. PLA already have a	

	13.6m hybrid pilot vessel which has HDPE MGO fuel tanks located in the same space as the li-ion batteries. This was agreed with MCA at time of build in accordance with WB2, and allowed for the tanks and batteries to be removed from the machinery space which was considered to be primary heat source. Can MCA confirm how they will approach existing vessels fitted with hybrid technology in accordance with WB2 and the guidance that preceded the publication of MGN 550 (M+F), once the previous codes are repealed?	
8.4.2 A vessel intending to operate on a pure electric propulsion system powered other than by lithium-ion batteries may be considered on a case-by-case basis, subject to approval by the Administration. The vessel owner/operator shall demonstrate that an appropriate level of safety is provided to the satisfaction of the Administration which shall include verification that the machinery and systems have been installed in accordance with UK authorised Recognised Organisation standards	Meaning a vessel with electric (or hybrid) propulsion that uses conventional lead acid batteries has to be approved separately by the MCA. What is the logic behind this?	Annex 1 has been extended to incorporate lead-acid batteries
8.5.1 A vessel may be fitted with a battery-hybrid or pure electric outboard.	By not cross-referencing to Annex 1, the MCA is allowing vessels propelled by battery-powered outboard motors to go through without the additional safety requirements set out in Annex 1 (remembering that the principle risks are primarily regarding the power source and not the motor itself)	Text clarified to incorporate consultation feedback

8.5.2 The battery used as a source of power for propulsion for a hybrid or electric outboard may be of a lithium-ion or other type suitable for marine use.	Seems inconsistent, since otherwise an approval by the Administration is required for non-li-ion batteries to be installed?	Annex 1 has been extended to incorporate lead-acid batteries
8.10.3 Means shall be provided to isolate a source of fuel which may feed a fire in a machinery space. The means of closure shall be positioned outside the machinery space and shall be fitted as close to the fuel tank as possible. If the means of closure fitted is remotely operated, it shall have a manual override.	Manual override of fuel tank closure – in the case of an uncrewed vessel, this may introduce additional risk as activation of the manual override may place personnel in harm's way	A ROUV may only be boarded (where meeting appropriate requirements as set out in Annex 2 for the following reasons: .1 to carry out maintenance; .2 to carry out an inspection; .3 to download data; .4 to prepare the vessel for a voyage; or .5 in an emergency. Therefore a manual override would only be available for use when the vessel is not being controlled from a Remote Operation Centre
8.10.6 A vessel which uses lithium-ion batteries as a source of power for propulsion shall have means provided to isolate the batteries from outside, or remotely to, the battery space or battery box.	Is this the right section for this paragraph, as it seems to refer to lithium-ion batteries	Section moved to Annex 1

9: Electrical Installations

Section of Code	Feedback Received	MCA Position
9.1.3.2 All exposed non-current carrying conductive parts of both fixed and portable electrical equipment which are liable under fault conditions to become live (including similar parts inside non-metallic enclosures) are to be connected to earth unless the equipment is: .2 supplied at a voltage not exceeding 250 V by safety isolating transformers supplying only one consuming device, or;	Should also require installation monitoring or earth leakage protection	The MCA notes your comment on this specific section with thanks
9.1.3.3 All exposed non-current carrying conductive parts of both fixed and portable electrical equipment which are liable under fault conditions to become live (including similar parts inside non-metallic enclosures) are to be connected to earth unless the equipment is: .3 constructed in accordance with the principle of double insulation (Class II) as per IEC 61440 or equivalent insulation intended to prevent the appearance of dangerous voltages on its accessible parts due to a fault in the basic insulation.	Should also require installation monitoring or earth leakage protection	Text clarified to incorporate consultation feedback
9.3 Batteries	The use of lithium-ion batteries is only considered for propulsion. There is a complete lack of guidance for the use of batteries (li-ion or otherwise) for house loads i.e. stored in battery boxes above a certain power, stored above deck or not, ventilated or not, etc	House loads would be covered in Section 9.

	Annex 1 is very specific to li-ion propulsion systems. 9.3 on backup power batteries needs to be updated to include li-ion batteries which are a far cry from the intent of how 9.3 was originally written. Many 12V and 24 li-ion batteries are now being fitted to existing and new workboats and the MCA needs to address this. Some aspects of Annex 1 are equally applicable here to 12 and 24V systems not used for propulsion systems. I suggest a quick review and to apply some of the Annex 1 rules here to the backup power batteries. The class rules would be a good starting point for this – at least they should be integrated with a (monitored) BMS and have fire detection and fire suppression in the space (fire port and suitable extinguisher type and size would suffice)	Backup power batteries which are li-ion would be included with Section 9 and Annex 1
9.3.2.3 Where there is a possibility of dangerous gases occurring within the battery stowage space, the space shall be ventilated. Where ventilated, air shall be supplied at a level below the top of the batteries, and shall be exhausted from the highest point of the space directly to the open air. The system shall be designed in a way that dangerous gases may not re-enter the battery stowage space.	It should be considered that all battery spaces have such a possibility, e.g. under fault charging conditions	Point noted
9.5.4 Electric cables shall not, where practicable, pass through hazardous spaces except when powering equipment installed within the space.	This can be allowed if transiting within metal pipework gas tight to the hazardous space	Text clarified to incorporate consultation feedback

10: Steering, Rudder, and Propulsion Systems

Section of Code	Feedback Received	MCA Position
10.1.2 Sufficient horizontal and vertical arcs of visibility shall be provided from the control position in all conditions of loading so as to avoid impeding the maintenance of a proper lookout as required by the International Regulations for the Prevention of Collisions at Sea. Remotely Operated Unmanned Vessels shall have a proper lookout provided by visual and auditory readouts from cameras and sensors (including radar, where fitted) which are replicated at the Remote Operation Centre.	*I see that there is general is references to ROUV throughout the document, e.g. 10.1.2, perhaps these multiple referenced could be moved or copied to Annex 2 as well?*	The overall consensus from feedback was to not replicate text from the main body of the Code to Annex 2
10.1.3 A vessel owner/operator and all crew shall be aware of and respond appropriately to the dangers of interaction between vessels. See MIN XXX.	Does this adequately include 'remote operators' also this is an unverifiable requirement, other than in an incident investigation so why does it need stating here?	The MCA notes your comment on this specific section with thanks
10.2.4 If emergency steering is totally impractical the vessel shall be restricted to area category of operation 4, 5 or 6. Alternative safety measures and/or procedures to deal with any primary steering failure situation shall be subject to approval of the Certifying Authority.	Is this intended to include an out clause for emergency steering for ROUVs or is there an expectation that emergency steering control will be provided for ROUVs, in which case footnote 24 should include an option for an independent secondary system of control	A ROUV would need to have emergency steering

11: Bilge Pumping

Section of Code	Feedback Received	MCA Position
11.1.5 To prevent pollution, any space containing potential pollutants shall not be fitted with auto-start bilge pumps.	No auto-start on bilge pumps in space potentially containing pollutants – there is a contradiction between this point and the requirements in Annex 2. We need to have clarity on which requirement takes precedence	Requirements have been clarified as part of the post-consultation review

12: Stability

Section of Code	Feedback Received	MCA Position
12B.1 Section 12B.1 applies to all vessels carrying 16 or more persons regardless of the certificated area category of operation, and those vessels operating in area category of operation 0 and 1 carrying 7 or more persons, subject to minimum safe manning levels being agreed by the Certifying Authority.	Is damage survivability not considered to be relevant for an ROUV particularly where no onboard mitigations can assist with emergency response and the vessel needs to be recoverable?	Text clarified to incorporate consultation feedback

13: Freeboard and Freeboard Marking

Section of Code	Feedback Received	MCA Position
13.1.2	Perhaps there is scope for minimum freeboard requirements to be reviewed for uncrewed vessels?	A ROUV shall meet the freeboard requirements set out for workboats

15: Fire Safety

Section of Code	Feedback Received	MCA Position
15.1.1.1 The machinery space shall be capable of being isolated to minimise the risk of fire extinguishing medium escaping.	A number of ROUVs have not previously met this requirement due to the inability to remotely seal the machinery space, typically this is managed via oversized fire extinguishing systems but their performance is not proven	Where a ROUV is unable to meet this requirement this may be assessed on a case-by-case basis by the Administration
15.1.1.2 The following shall be capable of being stopped from outside, or remotely to, a machinery space in the event of a fire: .1 fans within machinery space(s); and .2 fans feeding machinery space(s); and .3 pumps transferring fuel or oil; and .4 centrifuges; and .5 any other equipment in areas identified to increase risk of fire acceleration.	Remote operation of these systems from a ROC is not considered robust enough due to potential failures in comms, it would be expected that these systems might be required to automatically stop in the event of a fire being detected	Text clarified to incorporate consultation feedback

16: Fire Appliances

Section of Code	Feedback Received	MCA Position
16.3 Portable Fire Extinguishers	Why have portable extinguishers been disapplied for ROUVs, they should still be carried for when the vessel is undergoing servicing and maintenance and to allow shore based fire-fighting when alongside	Requirements have been clarified as part of the post-consultation review
16.4.2.3 A fire pump shall be fitted with sea and hose connections capable of delivering one jet of water to any part of the ship through hose and nozzle, one fire hose of adequate length with a 10 mm nozzle and a suitable spray nozzle.	Fire pump requirements have not been disapplied for ROUVs however how is the fire water expected to be delivered on board the vessel without a hose operator?	Text clarified to incorporate consultation feedback
16.6.1 Where practicable or deemed necessary all vessels shall carry at least two fire buckets with lanyards long enough to reach the sea from the weather deck. Buckets shall be of suitable material and size for their intended service.	Why have fire buckets not been disapplied for ROUVs	Text clarified to incorporate consultation feedback

17: Radiocommunications Equipment

Section of Code	Feedback Received	MCA Position
17.4 Portable VHF Radio	Should this be disapplied for ROUVs?	Text clarified to incorporate consultation feedback
17.7.1 A vessel owner/operator shall ensure that the radio equipment is being tested and operating effectively prior to departure. Equipment shall be maintained regularly according to manufacturer's instructions. Additionally, for Remotely Operated Unmanned Vessels testing shall be carried out following any power or communications outage either on the Remotely Operated Unmanned Vessel or at the Remote Operation Centre.	What shore based provision for GMDSS radio do you expect a ROC to have for an ROUV, does the ROUV have to loop everything back to the ROC, this is the first mention of an ROUV specific requirement but doesn't consider the practicalities of compliance with the chapter	All radio equipment outputs shall be looped back to the ROC
17.8.1 A vessel, while at sea, shall maintain a continuous radio watch: .1 on VHF Digital Selective Calling (DSC), on Channel 70; .2 for broadcasts of Maritime Safety Information (see MIN XXX); .3 where practicable, on VHF Channel 16; .4 where practicable, on VHF Channel 13; .5 on distress and safety DSC frequency 2187.5 kHz if fitted with a MF/HF DSC radiotelephone; .6 for satellite shore-to-ship distress alerts, if fitted with a terminal for a recognised GMDSS satellite service.	How is this expected to be implemented for an ROUV, by looping back to the ROC	Yes, by being looped back to the ROC
17.9.1 A vessel shall be issued with a valid Ships' Radio Licence by the relevant authority	For information note that the radio license covers all transmissions at sea and may prevent the use of some sensor systems on ROUVs, operators should be aware of this fact	Each ROUV shall be issued with a valid Ships' Radio Licence

19: Navigation

Section of Code	Feedback Received	MCA Position
19.2.2 Any alternative arrangements to 19.2.1 (e.g. Transmitting Magnetic Heading Device) may be considered on a case-by-case basis to the approval of the Certifying Authority. Alternative arrangements shall be of an equivalent standard to a magnetic compass, and shall at a minimum: .1 be independent of the vessel's main power supply; and .2 have means of determining the ship's heading; and .3 have means of displaying the ship's heading at the control position(s); and .4 have means of correcting headings and bearings to true at all times (e.g. a valid deviation card).	Conclude that this is the expected solution for an ROUV, what does 'independent of the vessel main power supply' entail, a separate battery bank, why does this have to be separate?	Independent of the vessel main power supply means powered by a power source independent to that of the vessel's main source of power. This needs to be separate to ensure the vessel's heading remains available at all times
19.2.3.2 The compass, alternative device or a repeater: .2 means shall be provided for taking bearings as nearly as practicable over an arc of the horizon of 360 degrees.	How is the means for taking bearings all around expected to be implemented on an ROUV	A ROUV shall be fitted with a compass or accepted alternative device
19.2.7 For vessels certified to operate in area category of operation 0, 1, 2, 3 or 5, a compass light shall be fitted.	Is a compass light required for an ROUV?	Where a ROUV has a compass on board which would need a light to be seen at night, it shall be fitted with a compass light
19.3.1 Charts and nautical publications shall be kept up to date and accessible for the entire duration of the voyage.	Conclude this can be achieved in the ROC only?	For a ROUV this would be at the ROC
19.3.4 Electronic Chart Display and Information System (ECDIS) or an electronic chart plotting system which complies with the	7.4.5 of the Annex states all ROC workstations shall meet section 19.3 of the WBC, therefore, as above, the referred MGN 319 states that the	The requirements for ROUVs set out in Workboat Code Edition 3 are appropriate to the risks and needs of the sector. The MCA is prioritizing a package of work to specifically address the need for proportional requirements for the smallest of ROUVs

requirements of MGN 319 (M+F) as amended, may be accepted as an alternative to the requirements of 19.3.1	specifications for electronic plotting systems have been developed by the Sea Fish Industry Authority. These are not available online. Is it possible to publish these standards, cognizant that the GUI for the chart plotting systems will not be on board but in the ROC? The Annex already states that this requirement is not compulsory for vessels operating in Area Category 6, however, the group feels the existing area categories may not be appropriate for ROUV operations i.e. if a small ROUV was operated within VLOS at an offshore wind farm, would it still be required to comply with the above regulation? The group would like to understand more about the SFIA specifications placed on the requirement and also engage in discussions on operating environments for ROUVS	Copies of the specifications are available from Sea Fish Industry Authority, Sea Fish House, St. Andrews Dock, Hull HU3 4QE
19.4.1 A vessel shall be equipped with a waterproof electric lamp suitable for signalling.	Is this function expected to be replicated for an ROUV?	Yes, this is set out in Section 5.4.1 of Annex 2

22: Protection of Personnel

Section of Code	Feedback Received	MCA Position
22.1.1 All vessels shall comply with the requirements of the Merchant Shipping and Fishing Vessels (Health and Safety at Work) Regulations 1997 (SI 1997 No. 2962), as amended. For further guidance see MIN XXX.	Why has this been disapplied for ROUVs, surely there are still H&S requirements that must be compliant for maintenance, or onboard occupation such as confined space, working at height, machinery guarding	Text clarified to incorporate consultation feedback
22.2.2.7 Additional handrails shall be fitted for: .1 decks without bulwarks or guardrails; and .2 access stairways; and .3 ladders; and .4 passageways; and .5 side and ends of the deckhouse; and .6 other locations where handrails would mitigate any identified risk.	Surely this still applies to ROUVs in order to provide safe access	Clarified this applies in specific conditions
22.2.5 Non-slip surfaces	Why has this been disapplied for ROUVs?	Clarified this applies in specific conditions

24: Tenders and Daughter Craft

Section of Code	Feedback Received	MCA Position
24 Tenders and Daughter Craft	This hasn't been disapplied for ROUVs, under what circumstances is application envisaged?	The ROUV sector have indicated that they would wish to use ROUVs as tenders or daughter craft

25: Cargo Carrying, Lifting, High Speed and Bow Push Up Operations

Section of Code	Feedback Received	MCA Position
25.4 High Speed or Planing Mode Operations	This has been disapplied for ROUVs	High speed or planing mode operations has been disapplied for ROUVs, if a ROUV wishes to operate in high speed or planing mode they may be considered on a case-by-case basis via the MGN 664 process

26: Towing and Non-Self Propelled Vessels

Section of Code	Feedback Received	MCA Position
26.1.1 The definition of towing includes three specific towing methods as outlined below: .1 by a towline about which the towing vessel is free to manoeuvre such that there is a risk of girting, where if the towline is attached towards amidships, it could adopt an angle to the towing vessel and provide a capsizing moment; .2 side by side with the towing vessel firmly attached alongside the towed vessel or floating object, so as to be able to manoeuvre as if one vessel; .3 fore and aft with the bow of the towing vessel firmly attached to the stern of the towed vessel or floating object, so as to be able to push, pull or manoeuvre as if one vessel.	As with lifting, how is this section intended to cover things like towed arrays etc and why is this operation disapplied for ROUVs?	The specific allowances for ROUVs to tow are set out in Annex 2. Where a ROUV wishes to carry out towing operations beyond those permitted in the Code, they may be considered on a case-by-case basis via the MGN 664 process

28: Manning

Section of Code	Feedback Received	MCA Position
28 Manning	No equivalent arrangements appear to have been given for ROUVs?	A separate MGN setting out guidance on manning qualifications and experience for those working with ROUVs will be published in due course

31: Safety Management

Section of Code	Feedback Received	MCA Position
31.3.2 The required extent of cyber security measures shall be commensurate with the size, complexity and type of operation of the vessel, and shall be determined by the vessel owner/operator and shall be to the satisfaction of the Certifying Authority. Cyber security measures shall include at a minimum the following: .1 the systems, assets, data and capabilities which would impact vessel operations if disrupted; .2 roles and responsibilities of those managing cyber-risks. This shall be documented and made available to the Certifying Authority on request; .3 measures to minimise risks and defend against cyber-attacks; .4 means to successfully detect a cyber-attack in a timely manner; .5 resilient means to restore key systems; .6 means to ensure critical back-up systems maintain functionality during a cyber-attack; .7 measures to successfully back-up and restore critical systems following a cyber-attack.	What guidance will be given to CAs to assist in determining whether an appropriate but proportionate cyber RA has been undertaken, particularly for ROUVs but other operators in general	Text clarified to incorporate consultation feedback
	The cyber requirements are in general not currently being met and these are examples should be balanced against the size of the vessel and the potential risk it poses the environment and 3rd parties. The group agrees that this is not practicable for the small ROUVs, and a lower size limit should be established for clarity	The MCA is prioritizing a package of work to specifically address the need for proportional requirements for the smallest of ROUVs
31.3.5 An electronic log shall be kept by the vessel owner/operator of: .1 systems which are permitted to be remotely accessed; and .2 all occurrences of remote access.	The cyber requirements are in general not currently being met and these are examples should be balanced against the size of the vessel and the potential risk it poses the environment and 3rd parties. The group agrees that this is not practicable for the small ROUVs,	The MCA is prioritizing a package of work to specifically address the need for proportional requirements for the smallest of ROUVs

	and a lower size limit should be established for clarity	
31.3.6 Vessel owner/operator shall have a suitable back-up plan which will allow the vessel to reach a safe haven in a safe and responsible manner following a cyber-attack. Where practicable, back-up files required to resume safe operations following a cyber-attack shall be located on board the vessel.	What is the expected means of achieving this for an ROUV, completely secondary control system? Can it just be a safe state and not a safe haven?	Text clarified to incorporate consultation feedback

Appendix 5: Safe Manning

Section of Code	Feedback Received	MCA Position
Appendix 5	No equivalent arrangements appear to have been given for ROUVs? Are all the mandatory training courses still required for remote operators?	A separate MGN setting out guidance on manning qualifications and experience for those working with ROUVs will be published in due course
	The MCA has still not put in thought in how to crew electric vessels. Crews should be trained to at least EV competent or authorised person on all vessels with electric propulsion. For bigger systems the cut off in engineering qualifications has been 1500kw depending on the category of the vessel. If the vessel were to fit into this would require them to carry a SMEOL STCW or AEC however these qualifications are just aimed at diesel knowledge which would be irrelevant for pure electric propulsion and take no account of the electrotech knowledge that should be required for these vessels. A rethink is needed. The MCA need to formulate a policy and training scheme for crews on pure electric powered vessels and a qualification for hybrid propulsion	The MCA notes your comment on this specific section with thanks

Appendix 8: Safety Management System

Section of Code	Feedback Received	MCA Position
Appendix 8	No additional requirements appear to have been given for ROUVs?	Additional requirements relating to SMS and cyber security for ROUVs and ROCs are set out in Section 8 of Annex 2

Appendix 9: Saving and Transitional Arrangements for Existing Vessels

Section of Code	Feedback Received	MCA Position
Appendix 9	The transitional arrangements make no account for ROUVs that are currently certified under LLEx that might need to comply in order to convert to WB3 certificates Or for ROUVs with existing WBC certificates for their manned operations. This should be addressed	Certified ROUVs will have the option of applying to either renew their current certification, or have the option of moving to, and meeting, the requirements of Workboat Code Edition 3
	No thought appears to have been given to how to regulate existing vessels which now need to come under Annex 1. It would be helpful to be explicit on these vessels in this appendix. The same applies to those which would come under Annex 2 where they are only mentioned in section 1 and Annex 2 but section 1 and/or Annex 2 is not included in appendix 9	

Appendix 10

Section of Code	Feedback Received	MCA Position
Appendix 10	No provision appears to have been made to address specific limits for ROUVs e.g. operating centre, comms means etc	The MCA notes your comment on this specific section with thanks

Annex 1

General Comments

Section of Code	Feedback Received	MCA Position
Annex 1	The new requirements surrounding battery spaces may involve a complete re-design of a vessel	The MCA notes your comment on this specific section with thanks
Annex 1	Battery and fuel tank segregation requirement are very different to achieve on the size of platform that this Code is written for	Lithium-ion batteries used as a source of power for propulsion may share a boundary with fuel tank(s) or accommodation space, where the boundary is of steel or other equivalent material.
Annex 1	Focusing solely on li-ion batteries instead of leaving it open for the development of other energy storage devices does seem to be very short term	Vessels using alternative power sources other than li-ion batteries are not currently included in Workboat Code Edition 3. Vessels using alternative power sources other than li-ion batteries shall follow the process set out in MGN 664. The MCA is currently developing new regulations on alternative fuels and power sources, which will be added to Workboat Code Edition 3 in due course following consultation.
Annex 1	The reference to IEC 62619 is not current edition. It is better to quote IEC standard for clarity as there are the documents that class societies rely upon for Type Approval of li-ion batteries is not BS EN versions. Again MGN 550 is not relevant or appropriate	All references have been updated to the current edition, and MIN XXX will be frequently updated. MGN 550 is currently being updated to align with Workboat Code Edition 3
Annex 1	Reference to MGN 550 should be removed. This is not an appropriate standard for <24m vessels in its current form and is very out of date	MGN 550 is currently being updated to align with Workboat Code Edition 3
Annex 1	This is a good idea but is highly prescriptive without any detail. Either the section needs to be complete enough to design and assess an installation without ambiguity or interpretation or simplified to the main aims and refer to somewhere else e.g. RO as noted in 8.4.2	Annex 1 has been written in a goals-based format to prevent regulation from stifling developments in this innovative space

Annex 1	There are already vessels of various types that use other than lithium ion batteries (including some Class VI passenger vessels, certificated by the MCA) in which – for example – conventional but sealed lead acid batteries are used. There are some operators who wish to use sealed lead acid batteries for electrical propulsion. It is not clear why MCA restricts this Annex to li-ion batteries. This has been raised previously but no satisfactory answer provided by MCA	Annex 1 has been extended to incorporate lead-acid batteries
Annex 1	This section hybrid/electric vessels appears fairly generic, li-ion batteries have been a concern of ours from a fire perspective. In discussion with the fire and rescue service they have not identified an effective fire-fighting medium apart from significant amounts of water and time (their experience is mostly with cars). They have identified the possibility of some new means to do so, but may need to be fitted at manufacture	Annex 1 has been written in a goals-based format to prevent regulation from stifling developments in this innovative space
Annex 1	It is noted that potentially hybrid should include other fuels others than diesel, this definition is limiting as new technologies emerge – e.g. the possibility of petrol/ battery outboard systems would be excluded	Vessels using alternative power sources other than li-ion batteries are not currently included in Workboat Code Edition 3. Vessels using alternative power sources other than li-ion batteries shall follow the process set out in MGN 664. The MCA is currently developing new regulations on alternative fuels and power sources, which will be added to Workboat Code Edition 3 in due course following consultation.
Annex 1	Is there a reason why we are excluding LPG powered vessels with the environmental challenges being faced?	

1: Ventilation

Section of Code	Feedback Received	MCA Position
1 Ventilation	Include ISO reference. There must be a reference to battery manufacturer's recommendations	Text clarified to incorporate consultation feedback
1.2.1 Exhaust ducts shall, during normal operations, prevent exhaust gases or seawater from being drawn through air intakes.	Need to include prevention of rainwater as well	Text clarified to incorporate consultation feedback
1.2.2 Ventilators and ventilation fans located within, or feeding, battery boxes and battery rooms shall be composed of Ex-rated and non-static materials and components, and shall be of a construction suitable for the battery box or battery room, and for any corrosive gases which may be produced by the batteries.	What does this mean? It requires definition	It is not clear what the respondent would like defined
1.2.3 Dedicated active ventilation ducting shall be used to discharge off-gassing from batteries to the open air and shall be located at a height above deck sufficient to prevent inadvertent downflooding if the vessel is heeled (see MIN XXX).	The way that the MCA has written the limits the clause to active (i.e. fan-assisted) ventilation. It should include passive ventilation as well	Text clarified to incorporate consultation feedback
1.3.2 The number of air changes per hour required for a battery box or battery room shall be calculated using, at a minimum, the following variables: .1 battery box or battery room volume; .2 distance between vent and battery box roof or battery room ceiling; .3 maximum volume of battery gas released during a thermal runaway event;	MCA needs to provide information as to where suitable calculations exist. They are not given in MGN 550(M) for example	Text clarified to incorporate consultation feedback

.4 battery size(s); and .5 design pressure of the bulkhead or deck.		

2: Battery-Electric Propulsion

Section of Code	Feedback Received	MCA Position
2.1.1 The design and installation of the propulsion system and batteries shall be suitable for marine use with due consideration of humidity, temperature, degradation due to a saltwater environment and vibration	This is not helpful, when there exist suitable ISO standards (ISO 16315:2015) and RO guidance available to help determine. As elsewhere in the code, it would be helpful to designers, builders, operators, CAs and the competent surveyors if the MCA strengthened this by referring to appropriate standards and RO guidance, then to be listed in MIN XXX	Appropriate references have been added to MIN XXX
2.2.1 A risk assessment shall be carried out by the vessel manufacturer, and shall be submitted via the Certifying Authority to the Administration for consideration and approval. The risk assessment shall, at a minimum, assess all risks associated with the following components and systems: .1 batteries; .2 battery management system; .3 battery box or battery room; .4 spaces surrounding battery boxes or adjoining battery rooms; .5 charging system; .6 fuses and cables; .7 switchgear .8 alarms and shutdowns; .9 sensors and detectors (see section 3.2 of this Annex); .10 fire suppression system; .11 passive or active ventilation; .12 fire extinguishers (if appropriate);	Potentially large burden and shift of responsibility away from applicant and towards MCA if we need to approve RA The MCA is retaining approval to themselves – when the whole purpose of the code is to allow competent CAs (including RO CAs) to undertake appropriate design review, survey and certification. MCA is not sufficiently staffed to undertake the number of applications that are developing, without considerable delay to builders and operators' requirements. That is the whole point of having competent specialist CA surely? The risk assessment needs to include all those factors but also needs to consider whole ship risks, and therefore – for electrical propulsion or hybrid vessels definitely needs to be integrated with the whole vessel risk assessment, undertaken in concert by the designer,	The roles of Certifying Authority and Administration are clearly set out within the Code

.13 cooling system (if installed); .14 hybrid power management system (if installed); .15 interfaces with other vessel systems; and .16 any sensors, detectors, safety measures or other equipment installed in excess of the requirements of the Code. The risk assessment shall consider the components of the batteries and connected systems both individually and as an entire operating unit, and shall be carried out either as part of, or in addition to, the risk assessment required in section 3.14 of the Code.	equipment supplier, boat builder and owner/operator	
	Include ISO reference, this case by case basis is far too time consuming for this new type of product, standards have been created to support this technology and should be referenced and allowed via notified body, CA or RO certification. You cannot ask every vessel to be submitted to the Administration	Appropriate references have been added to MIN XXX
2.2.1.8 A risk assessment shall be carried out by the vessel manufacturer, and shall be submitted via the Certifying Authority to the Administration for consideration and approval. The risk assessment shall, at a minimum, assess all risks associated with the following components and systems: .8 alarms and shutdowns;	"alarms and shutdowns (to include BMS responses to sensor inputs)". We aught to specifically consider the strategy and the ability of BMS to reduce discharge rate as well as consider the margins on temperature given before the battery is damaged. Good systems have a gradual warning as it gets hotter (warning and power limit at 40°, shutdown after 5 minutes at 45°, more power de-rate at 50° and if over 60° for even a moment it will shut down). If the vessel has no ability to de-rate or just waits until 60° and shuts down that is not good	Text clarified to incorporate consultation feedback
2.2.2 Lithium-ion batteries intended to power a vessel's engine shall comply with a recognised standard (see MIN XXX).	"Lithium-ion batteries intended to power a vessel's [internal combustion] engine…"	Text clarified to incorporate consultation feedback
	Change wording of engine to motor	
	This needs to be amended to 'recognised standards' (plural) because there are a number of	

	separate standards which require to be satisfied to ensure that they are appropriate for marine propulsion use e.g. IEC and UN standards and where available e.g. DNV – RO rules	
2.2.3 Lithium-ion batteries intended to be used as a source of power for propulsion shall be tested at cell, module and system levels meeting a recognised standard to the approval of the Administration (see MIN XXX).	It is proposed and welcomed to accept ISO small craft safety standards with regard to full electric driveline (on a general level) except for batteries e.g. ISO 16315 and ISO 13297 on a general level	Feedback welcomed
	HVIL is only mentioned once in the document with regard to charging. Perhaps to be mentioned/applied elsewhere too?	The MCA notes your comment on this specific section with thanks
	What is the recognised standard and where can it be found?	Recognised standards are listed in MIN XXX
	The Administration does not approve the standards used for testing li-ion batteries. There are international (IEC and UN) standards and RO rules	
2.2.4 An intention to test lithium-ion batteries shall be notified to the Certifying Authority and Administration in good time, and the Certifying Authority may require that a surveyor witness the battery tests.	May or must? May is open to interpretation if things go wrong. Clarification is sought from the MCA. Furthermore, what does the battery test consist of and what training is required to bring code examiners who have the depth of knowledge required at this time	May – as the Certifying Authority retains the option to have a surveyor witness battery tests
	These batteries are tested iaw the various IEC and UN standards and (where applicable) the RO rules and certified as such. Certainly the CA should sight the appropriate certification for the batteries, but it is highly unlikely that the CA would undertake witnessing of the actual testing. That is not used for other	

	equipment requiring certification, so is inappropriate for suitably certified li-ion batteries	
2.2.5 The MCA reserves the right to have an MCA surveyor, or other designated person, witness battery tests.	Have all MCA surveyors been trained in lithium-ion battery technology to enable them to conduct this role? Who is a designated other person and what qualifications do they need to be recognised and qualify as a dedicated person? What is the situation with lithium-ion battery banks not used as a source of power for propulsion? This is an unnecessary additional expense for the client	May – as the Administration retains the option to have a surveyor witness battery tests
2.3.1 A battery-electric powered vessel shall be provided with sufficient charged capacity for its intended area category of operation. A battery-hybrid powered vessel shall be provided with a combination of sufficient charged capacity and fuel for its intended area of operation.	This must be explained in greater detail, what is the requirement in comparison to category, operational profile?	This requirement mirrors a requirement for Workboats with traditional sources of power – a vessel shall have suitable quantities of charge or fuel for its intended area of operation
2.3.5 Batteries and its connections shall have ingress protection with a minimum IP44 rating which is appropriate to the risks associated with the: .1 location in which the batteries are installed; and .2 risk of ingress.	Clarity required over who determines the 'appropriateness' of risks associated with battery location/ingress	To be determined by the vessel designer
2.3.6 The following information shall be clearly displayed in both the battery box or battery room (see section 2.7.2) and in its immediate vicinity. Internationally recognised signage shall be used where appropriate (see also Appendix 6 of the Code):	Yes it is important that the battery chemistry is known and available (for example to the fire brigade), but much of this information (charging/discharging rates and temperature) is of no value whatsoever – if posted up in the battery room or/in the battery box – because there is no	Text clarified to incorporate consultation feedback

.1 battery cell chemistry; .2 fire suppression system requirements and method of operation; .3 maximum charging and discharging characteristics; .4 safe upper and lower ambient temperature; .5 what protective device(s) and/or safety feature(s) are installed, if applicable; and .6 battery manufacturer's name.	'local' means of measuring or recording the data, for comparison with limits. This information is much better being in the operating manual and available at the helm position, where the display system will display the relevant data – especially under warning or alarm levels	
2.4.1 Battery boxes and battery rooms shall be located away from high risk factors including, but not limited to, critical components, fuel tanks, fire hazards, escape routes and life-saving apparatus, and shall not be located in front of a collision bulkhead. Where, due to the size of the vessel, this is not practicable alternative arrangements providing an equivalent level of safety may be considered on a case-by-case basis	In small vessels this restriction on no batteries in fuel tank spaces is unnecessary, so long as suitable SFP is provided between the battery box and the fuel tank and system. A properly informed HAZID and RA will advise the sensible approach rather than over-restrictive	Lithium-ion batteries used as a source of power for propulsion may share a boundary with fuel tank(s) or accommodation space, where the boundary is of steel or other equivalent material.
2.4.2 Lithium-ion batteries approved by the battery manufacturer to be safely co-located with other equipment within a battery box or battery room may be co-located with the following: .1 critical equipment; .2 fuel tanks; .3 fire hazards; and .4 electrical equipment subject to completion of a risk assessment carried out by the vessel owner/operator, and submitted via the Certifying Authority to the Administration for consideration and approval.	This allows a more appropriate but – the MCA is retaining approval to itself, when it is not currently staffed to do so without considerable delay	The MCA notes your comment on this specific section with thanks

2.4.5 Batteries shall be positioned and secured to minimise exposure to mechanical damage or excessive vibration.	"Batteries shall be positioned and secured to minimise exposure to mechanical damage, [slamming accelerations] or excessive vibrations"	Text clarified to incorporate consultation feedback
2.4.6 Battery casing shall be composed of flame-retardant materials.	Are battery manufacturers technical specs sufficient for confirmation? Why not reference the ISO TS?	References are being reviewed as part of the post-consultation process
2.4.11 Outgoing circuits from batteries shall have switchgear or equivalent means to electrically isolate the circuits.	This should be dual pole isolated	The MCA notes your comment on this specific section with thanks
2.4.15 Equipment and spares used for maintenance of batteries, connected systems and electrical equipment shall be manufacturer approved and to the satisfaction of the Certifying Authority.	MCA allows CAs to satisfy themselves regarding equipment, tools etc. required to maintain the batteries and system, but not the overall approval?	This is correct
2.5.2 Where batteries used as a source of power for propulsion are replaced they must be of an equivalent type, including full compatibility all on-board systems.	"Where batteries used as a source of power for propulsion are replaced they must be of an equivalent type, including full compatibility [with] all on-board systems [and new and old batteries must not be connected in parallel unless specifically permitted by the manufacturer]"	Text clarified to incorporate consultation feedback
2.6.3 Electrical equipment shall, as far as practicable, be located in non-hazardous areas. Only electrical equipment required either for operational reasons or for lighting within the space itself may be installed within battery boxes, battery rooms or ventilation exhaust ducts, and shall not contribute any additional overall fire risk (see MIN XXX). Such equipment shall be Ex-rated and IIC atmosphere certified.	Arguably all electrical equipment is required for operational reasons?	Text clarified to incorporate consultation feedback
	Be aware that some battery systems (approved for motive power and sufficiently safe for marine use) have their BMS' integrated with the battery pack. So, in these cases, the BMS would be inside the battery box along with their batteries. No reason why not, so long as there is remote reporting to the PMS at the helm display of the operating, warning and alarm	The MCA notes your comment on this specific section with thanks

	conditions, for charge rate and temperature	
2.6.4 Lithium-ion batteries which meet the safe co-location requirements of section 2.4.2 of this Annex are not required to meet the requirements of section 2.6.3 of this Annex.	Due to the differing safety implications surrounding li-ion batteries, we feel the list of exclusions should be expanded to include section 2.6.5	The MCA notes your comment on this specific section with thanks
2.6.10 Battery boxes and battery rooms shall not form a means of access to any other compartment, or form part of an escape route	This needs looking at carefully, preferably on a vessel by vessel (or design by design for production vessels) basis. It may well be the case that battery boxes are located to either side by sealed from a passageway that may be an escape route. Common sense and risk based judgement should be applied	A battery may have a boundary with an escape route, however, a battery room shall not form part of an escape route
2.6.11 Where battery modules or systems are contained within gastight containers, a safety pressure relief valve or weak point must be included within the container design.	This vent/weak point should ventilate to open air, not into the vessel's interior	Text clarified to incorporate consultation feedback
2.6.12 Person(s) working in in a battery room, or in a space containing a battery box, shall carry an emergency escape breathing device (EEBD).	Clarity required over the scenarios in which this is applicable. Where compartments are open for access by maintenance crews, they are fully ventilated with airflow through the compartment	Text clarified to incorporate consultation feedback
	This seems over the top when all other safety measures are taken into account	
2.7.2 Batteries, high voltage equipment, battery systems and compartments shall be adequately labelled using internationally recognised symbols, where available.	Care needs to be taken here: in this code, MCA have defined 'high voltage' as 'over 60V DC or 60V RMS (AC)' yet international recognition, including other IMO and MCA regulations 'high voltage as over 1000V DC or AC'.	Definitions are being reviewed as part of the post-consultation process

	Important for MCA not to conflate/confuse the issue	
2.7.5 There shall be at least one person on board the vessel who is trained in the range alarms produced by the battery, BMS and PMS/EMS, the meaning of the alarms and any required action(s). For Remotely Operated Unmanned Vessels this person(s) shall be in the Remote Operation Centre.	There shall be at least one person on board the vessel who is trained in the range [of]…"	Text clarified to incorporate consultation feedback
2.8.1 Where the sole means of starting the propulsion system is by batteries there shall be a spare battery to provide back-up power for starting of the propulsion system. Charging facilities for the spare battery shall be available.	Is this clause for hybrid or battery electric or both? Spare battery and start battery powered system doesn't make too much sense, hybrid only?	This could be either battery-electric or battery-hybrid, depending on the design of the propulsion system
2.9.1 All vessels which use batteries as a source of power for propulsion shall have a Battery Management System and a Power Management System/Energy Management System installed, details of which shall be submitted via the Certifying Authority to the Administration for consideration and approval. If a Battery Management System is replaced, or has its programming significantly altered, details of the replacement or reprogramming shall be submitted via the Certifying Authority to the Administration for reconsideration and approval.	Despite the level of detail provided in the Annex, the MCA is retaining approval to itself, which leads to a disjointed process and delays. If the BMS is replaced with an identical unit (perhaps due to a warranty fault, etc.). I see no reason why the vessel has to be held up awaiting approval of the change	An identical, off the shelf, unit may have different programming to the original BMS due to upgrades and vessel-specific adjustments
2.9.2 A Battery Management System shall be required to detect, monitor, respond and produce alarms to, at a minimum, the following operational conditions:	Ideally, the BMS should monitor the temperature at cell level, too. That is the clearest indication that things are going wrong and the BMS then act to isolate that cell and prevent	Text clarified to incorporate consultation feedback

.1 voltage (at cell, module and system level); .2 temperature (at module and system level); and .3 current (at string level)	overcharging/thermal runaway. Most BMS' monitor temperature at cell level	
2.9.4 An alarm shall be produced at the control position(s) if any of the following occurs: .1 loss of communication between the Battery Management System and Energy Management System or Power Management System; .2 Battery Management System failure; .3 the cooling system (if installed) develops a fault or fails; .4 the Battery Management System has disconnected a battery pack(s); .5 low remaining battery charge; .6 ambient temperature in the battery box or battery room exceeds a specified level; or .7 a build-up of explosive gases are detected (as per the requirements of section 3.2.2 of this Annex).	This is the absolute minimum requirement. For safer operation, the BMS should provide to the PMS warning level on charge and temperature, it is recognised that MCA may consider that this is covered by 2.9.2. However, the provision of both warning level and alarm level indicators to control position should be encouraged	The MCA notes your comment on this specific section with thanks
2.9.4.6 An alarm shall be produced at the control position(s) if any of the following occurs: .6 ambient temperature in the battery box or battery room exceeds a specified level; or	"ambient temperature in the battery box or battery room exceeds a specified level [(which in no case is to exceed the peak operating temperature as specified by the battery manufacturer)]	Text clarified to incorporate consultation feedback
2.9.4.8 An alarm shall be produced at the control position(s) if any of the following occurs: .8	Haven't gone so far as to say the BMS should be able to automatically enter limp mode because in 2.9.2 it says "BMS required to RESPOND to the following operational conditions" – temperature is one of them. New paragraph – [it is strongly recommended that a BMS shall have a backup source of power and that this	Text clarified to incorporate consultation feedback

	should be located away from the main battery so that it remains functional for as long as possible in the event of a battery fire]	
2.9.6 A Battery Management System shall be tested and inspected as per the manufacturer's requirements. The Battery Management System manufacturer must supply testing and inspection requirements for annual maintenance.	Is this "annual"? Surely it should be "in accordance with the manufacturer's instructions"? Could be more or less frequent	The Battery Management System shall be tested and inspected as per the manufacturer's requirements
2.9.8 A Battery Management System shall provide an indication at the control position(s) when servicing of the batteries, ventilation, fire suppression and connected systems is due.	The PMS or other methods of determination might record when servicing is due, but many BMS' do not	Text clarified to incorporate consultation feedback
2.9.11 It is strongly recommended that a Battery Management System shall log battery usage history, warnings and faults.	The PMS is more likely to be able to do this, than the BMS	Text clarified to incorporate consultation feedback
2.10 Charging of Lithium-ion Batteries	Solar panels allowed to charge? MGN 550 mentions dangers of trickle charging, which is a real concern for vessels away from the grid. May need some expert advice on this one	Battery Management Systems monitor and manage charging of lithium-ion batteries. Solar panels have not be referred to in this section.
2.10.1 A vessel with a battery-electric propulsion system shall charge its lithium-ion batteries: .1 using shore charging; .2 from a mother vessel; or .3 from a platform-based facility.	'may' would be more sensible	The MCA notes your comment on this specific section with thanks
2.10.2 A vessel with a battery-hybrid propulsion system shall charge its lithium-ion batteries by: .1 shore charging; and/or	'may' would be more appropriate	The MCA notes your comment on this specific section with thanks

.2 charging from a mother vessel; and/or .3 charging from a platform-based facility; and/or .4 a self-charging battery-hybrid propulsion system.		
2.11.2.1 Electric charging points shall be: .1 located at a height above deck sufficient to prevent inadvertent downflooding if the vessel is heeled;	Locating above deck is not practical given the nature of design of a ROUV e.g. the shore-power connection fitted to the x-class USV is installed inside the payload bay, which is a well-protected area from all sides but not above deck height. In this case, the socket would be more exposed if mounted above the deck	Where a vessel is unable to meet the requirements of Annex 1 Section 2.11.2 the Administration may consider alternative arrangements on a case-by-case basis subject to approval
2.12.1 Vessels with a self-charging battery-hybrid propulsion system shall be designed to safely charge the lithium-ion batteries whilst operating in a diesel mode of propulsion. This shall be demonstrated to the satisfaction of the Certifying Authority.	Definition required over whether this refers to direct/indirect diesel propulsion e.g. thrusters powers by diesel gensets	Refers to diesel powered propulsion in general

3: Fire Safety and Appliances

Section of Code	Feedback Received	MCA Position
3.1.1 Batteries shall, in accordance with the battery manufacturer's recommendations, be located within either a: .1 steel, or equivalent, plated battery box; or .2 dedicated steel, or equivalent, plated battery room with A0 fire integrity.	Surely, particularly for small vessels, suitably insulated (as at S15 for machinery spaces) GRP or aluminium battery boxes are acceptable? There appears to be a simplified attempt to replicating existing safety for new technologies without identifying the needs, causes etc of the new technologies. What is an equivalence for steel in a lithium battery box? And why has this been chosen. Going electric for environmental concerns and then making it impossible or at least useless by including unsuitable requirements, lightweighting is needed, and so what equivalence is being sought? Strength? Why? Fireproofing, okay, though use of additives to FRP. Much clearer detail necessary and reasoning must be reviewed for the application of the requirements	"Steel or other equivalent material" means any non-combustible material which, by itself or due to insulation provided, has structural and integrity properties equivalent to steel at the end of the applicable exposure to the standard fire test
3.2.1 Battery rooms and every space containing a battery box shall be fitted with suitable detectors in relation to the: .1 battery size; .2 battery power; .3 ventilation system; .4 cooling system; and .5 fixed fire extinguishing system. These shall include smoke, heat and flame detectors, and these shall activate auditory and visual alarms in the affected space and at the control position(s).	The requirement appears to require detection for the ventilation system. This is only applicable if the ventilation system is mechanical. If the ventilation system is passive then this type of monitoring is not applicable and the wording needs to make this clear that it is an option not to have mechanical systems that alarm when they are active. There is no need to require the detection in both the battery room and the battery enclosure, if it is in the battery enclosure (with redundancy) then it is not necessary to have it in the	Text clarified to incorporate consultation feedback

	battery room/compartment. This should be an “or” not an “and”. If the safety systems are in the battery enclosure then the detection happens so much earlier and moves the decision making process for the crew to be so much earlier and is much safer. In this case, detection in the battery room in addition is irrelevant	
3.2.2 Gas detector(s) able to detect gases likely produced by the battery’s specific chemistry, or type, shall be fitted in battery boxes and battery rooms. If the concentration of gas in the battery box or battery room reaches 60% Lower Explosive Limit (LEL) the battery shall be automatically disconnected, all electrical circuits in the space shall be de-energised, and auditory and visual alarms shall be emitted in the affected space and at the control position(s).	“Gas detector(s) able to detect [explosive] gases likely [to be] produced by the battery’s specific chemistry, or type, shall be fitted in battery boxes and battery rooms. If the concentration of [explosive] gas in the battery box or battery room reaches 60% [of the] Lower Explosive Limit (LEL) the battery shall be automatically disconnected, all electrical circuits in the space shall be…” [where detection of other gas that may be vented by the battery’s specific chemistry can be used to give early warning of a fault arising (e.g. CO) then it is strongly recommended that these should be installed]	Text clarified to incorporate consultation feedback
	Safety concerns over inadvertent system isolation when exposed to other gas-releasing sources present within the space	A battery box or battery room should not contain other equipment or materials which release gases
	There needs to be a clarification around the detection required. Does this mean that the detection need to be H2, CO2 or offgas. I believe here that the intent is to fit a detector to detect the offgas from li-ion batteries. If this is the case then this should specifically be stated. It would be our preference to require this offgas detection as this	The gas detectors required need to be specific to detect gases likely to be produced by a battery’s specific chemistry

	would ensure a higher level of safety. Visual and auditory alarms within the effective space if that space is unmanned and too small for a person to get in the space. The wording should be revised and it is not relevant to require local alarms where a space is too small to accommodate a person This is placing an over-onerous requirement. The availability and reliability of systems capable of detecting all gases potentially to be given off by a failing li-ion battery simply aren't on the market	
3.2.4 Gas detectors in battery room(s) large enough to be entered shall have gas detectors positioned at breathing height.	"[Toxic] gas detectors". Hydrogen detectors may not be very effective at breathing height due to its buoyancy and the major harm caused by hydrogen is when it accumulates and explodes	Text clarified to incorporate consultation feedback
3.4 Fixed Fire Suppression Systems	If a raise of temperature within a li-ion battery is addressed early e.g. before it breaks out of the battery pack (read enclosure/box etc.) through its various safety measures (temperature delta, auto shutdown, isolation, detection, propagation isolation between modules or cells through SFP, suppression etc.) then there is no reason to have additional suppression system in the compartment that houses the battery packs. If the safety systems are all in the battery enclosure then it is not necessary to have duplication in the battery compartment space surrounding those battery enclosure(s). The advantage of fighting a re/raised temperature scenario before it becomes an issue and breaks	The MCA notes your comment on this specific section with thanks

	out of the enclosure are huge and the MCA needs to recognise this. The wording should change from “and” to “or”	
3.4.2 A fixed fire suppression system shall be of an MCA, or equivalent, approved type appropriate to the battery box or battery room, and shall be able to prevent heat propagation at battery pack level. For further requirements see section 16.4 of the Code. The fixed fire suppression system shall be tested to the satisfaction of the Administration.	The reference to 16.4 in section 3.4.2 is not necessary because unless 16.1.1 is rewritten then there is no requirement for these vessels to fir either SFP or FFF under those sections because the level of 120kw (for inboard diesel under 16.1) and 750kw (for individual machinery spaces under 15.1.3.2) is way above that fitted to this size of boats. For instance ATL 12m workboats are fitted with 300kw/800V systems. Agreed that the fitment should be in accordance with 16.4 however both the wording is not clear that this is the intent (use the word fitment) but this also does little to address the point about a fire test procedure not being in existence	Text clarified to incorporate consultation feedback
	The requirement is for an approved FFF system appropriate to the battery box or battery space. The MCA have put no thought into this requirement because there is no li-ion fire test that is document for this type of fire. The fire test must be specified before this is published otherwise no li-ion EESS can be fitted to these small WB vessels. The MCA were notified of this need in March 2021 and nothing has happened and this now provides a major blocker for industry. There needs to be clarity around this. Publish a fire test on li-ion fires	The MCA notes your comment on this specific section with thanks
	The MCA has no process or system for approval of fire suppression systems	

	suitable for extinguishing li-ion battery fires?	
	There is no type approval for li-ion fixed systems, and what are the tests the Administration will be carrying out? A simple replication of old requirements without consideration of the new technologies. You can't put out lithium ion, battery safety is around the installation, vibration, temperature controls and BMS. Why have fire suppression for a fire that can't be suppressed? Just ensure getting off is safe	Fire suppression for li-ion battery fires provide a time delay to allow all persons on board time to evacuate the vessel
3.5.1 Portable fire extinguishers may only be used as an alternative if installation of a fixed fire suppression system would constitute a safety risk. Any portable fire extinguishers intended for use in battery boxes or battery rooms shall be suitable for such purposes, and provide an equivalent level of safety to the satisfaction of the Administration	As the Administration has no process for the approval of fire extinguishers suitable for li-ion battery fires, they should publish a list of suitable fire extinguishers and limitation for operation of such	The MCA notes your comment on this specific section with thanks
3.5.2 A minimum of two portable fire extinguishers with a minimum fire rating of 34B (in addition to the requirements of section 16 of the Code) shall be readily accessible for the battery box or battery room. Vessel owners/operators shall follow the battery manufacturer's requirements regarding the types of portable fire extinguishers permitted to be used in battery boxes and battery rooms.	Irrelevant for a ROUV with automatic system deployment and nobody on board being sent in to enter the compartment	Requirement to carry portable fire extinguishers is disapplied for ROUVs

Annex 2

General Feedback

Section of Code	Feedback Received	MCA Position
Annex 2	Developers of very small ROUVs are likely to suffer the biggest impact of these changes as they will likely struggle to find space to fit all of the extra equipment required by this Code. A small ROUV (e.g. Sail Drone) may not have the space available to adhere to the requirement, and as such will be forced down the lengthy, expensive “case-by-case” approach. It is likely that developers of very small ROUVs will be forced to flag their vessels elsewhere as they will not physically be able to meet the criteria specified in the new annex There appears to be mechanism for scaling requirements with regard to size, risk or complexity of the ROUV which results in either overly onerous or overly simplistic requirements. LR has always maintained that a proportional approach to certification must be taken and that this should reflect the risk presented.	The requirements for ROUVs set out in Workboat Code Edition 3 are appropriate to the risks and needs of the sector. The MCA is prioritizing a package of work to specifically address the need for proportional requirements for the smallest of ROUVs
Annex 2	There are limitations placed on the activities that can be carried out by uncrewed vessels. This restricts future development, and closes the door even when demonstrated to be safe	Annex 2 on Remotely Operated Unmanned Vessels sets out requirements purely for Remotely Operated Vessels which are Unmanned. For Remotely Operated Unmanned Vessels which wish to operate beyond the limitations set out in Annex 2 shall follow the process set out in MGN 664
Annex 2	The ROUV Annex does not fit with the style of the document and introduces confusion between certifiable requirements for the vessel and the	Annex 2 has been written in a 'goals-based' format to prevent these regulations from stifling developments in this innovative space.

	operational requirements – it appears more in the style of a guidance document	
Annex 2	We are aware of a number of businesses, large and small, that will be unable to achieve the expected standard for software safety for ROUVs and as such will be disproportionally affected by the requirements	The MCA notes your comment on this specific section with thanks
Annex 2	Consideration of the training requirements of remote operators needs to be defined	A separate MGN setting out guidance on manning qualifications and experience for those working with ROUVs will be published in due course
Annex 2	S-VDR to be reintroduced. Incorporate VDR table from MASWRG Code (Annex A to chapters – vessel data recording). Rename section to “official logbook and voyage data recording”	Text clarified to incorporate consultation feedback
Annex 2	Suggest further alignment with MASWRG Code: - Data to be recorded – general principles - Data security and access - Data format - System testing	Text clarified to incorporate consultation feedback
Annex 2	In other sectors of the MCA (passenger or fishing etc), recent advice from MCA has been that they do not plan to update sector specific rules regarding innovative technologies (future fuels and unmanned vessels). Rather, these sections point towards MGN 664 for the approval of innovative technology aspects. The Annex of WBC3 appears at odds with other areas of the MCA	MGN 664 provides guidance on how to process an application for vessels that use Innovative Technology; and sets out a clear pathway for certification, until Workboat Code Edition 3 comes into force. The Annexes to Workboat Code Edition 3 will act as a template for future approvals in other vessel sectors in the MCA.
Annex 2	There appears to be no mechanism for managing dual-certified ROUVs, those	Text clarified to incorporate consultation feedback

	that can carry people and may do so for short distance or limited duration voyages. The underpinning assumption that an ROUV will always be unmanned and therefore does not need to provide for the safety and protection of people who may occasionally be onboard. We have found this is generally proven to be an incorrect assumption. Conversely, other ROUVs which can never carry people will be disproportionately affected by applying requirements within the Code intended primarily for the management of risk associated with keeping people safe at sea. A clear certification path should be given for ROUVs that: a) can, b) cannot, or c) may occasionally, carry people at sea when operating in different modes	
Annex 2	The ROUV Annex contains a significant number of operational or owners requirements, these make it very difficult to understand from a CA perspective what is in or out of the scope of assurance review and what needs to be verified in order to allow for the issue of a certificate. It should be clear what are safe design requirements and what are safe operation requirements and the assurance route for each	The MCA notes your comment on this specific section with thanks
Annex 2	A significant number of requirements have no underpinning performance standard or use vague language which is incompatible with good engineering practice and regulatory writing. Particularly complex issues are left to the discretion of the Administration or	Annex 2 has been written in a 'goals-based' format to prevent these regulations from stifling developments in this innovative space

	CA without providing a clear requirement for equivalent or an accepted means of compliance. No clear definition of risk of hazard is presented and there is no clear assurance route for determining which is or is not critical with regard to design requirements and mitigation. A more structured approach should be defined for determining the criticality and assurance of ROUV systems – e.g. a Risk Based Certification approach. This is particularly important to ensure consistency of application by CAs	
Annex 2	Significantly, the requirements for Programmable Electronic Systems which underpin the fundamental operating concept of ROUVs are insufficient and underpinned by reference standards which, to date, have had extremely limited application in the marine domain. It is unreasonable to think that the industry is capable of determining and complying with the requirements as written. Our experience suggests that significant gaps remain in the industries capability to respond to these requirements. We have recently re-written our approach to software safety for naval ships in line with what we might expect for ROUVs and in a way that we understand industry is able to respond. A much more transparent and practical approach to software assurance needs to be defined in the WBC Annex Significant concern that insufficient attention has been paid to software	The MCA notes your comment on this specific section with thanks

	assurance, even in an ROUV software plays a critical role in consolidating the onboard data, transmitting this and re-presenting it to the operator for action. Software processing is unavoidable and must be assured as a key part of the safety argument for ROUVs as well	
Annex 2	A significant concern is whether we would be able to issue a certificate to an ROUV against the WBC3 whilst having outstanding or unresolved questions regarding its safety	A certificate should not be issued for a vessel if the Certifying Authority has outstanding or unresolved questions regarding its safety
Annex 2	The Annex should be laid out more clearly with relation to the Code, some chapters have been grouped in odd ways and others glossed over, there also isn't a clear demarcation between CA and Administration activities or even what is design and what is operation It would make for far easier reading and application if the Annex followed the structure of the Code with regard to chapter headings with clear statements regarding the application or not of the code requirements together with any additional requirements for ROUVs, this might be dealt within a single section if the deviations are minimal	The MCA notes your comment on this specific section with thanks
Annex 2	Conclude that CAs will be specifically delegated to sign off ROUVs in this Annex in accordance with a demonstrated competency framework, i.e. specific delegation will be required in order to ensure competent application	The roles of Certifying Authority and Administration are clearly set out within the Code
Annex 2	Manned/unmanned vessels, in particular whether any relaxation in	Annex 2 on Remotely Operated Unmanned Vessels sets out requirements purely for Remotely Operated Vessels which are Unmanned. For

	manned requirements are available particularly for limited duration manning	Remotely Operated Unmanned Vessels which wish to operate beyond the limitations set out in Annex 2 shall follow the process set out in MGN 664
Annex 2	The Annex does not address vessels which are not intended to be manned, and therefore can't currently under the WBC but also for which many of the solutions are not appropriate or applicable	
Annex 2	Issue with the provisions prohibiting ROUVs from towing and being fitted with a lifting device. Our WWG agreed with the assessment from the MAS community that these provisions would not only prove excessively onerous, but they gave the impression – unfairly or otherwise – that the MCA was abdicating its responsibility of providing guidelines in this respect	A Remotely Operated Unmanned Vessel shall not be permitted to tow. Where necessary, a Remotely Operated Unmanned Vessel may be permitted by the Certifying Authority to undertake towing of survey equipment. Applications for towing operations other than for survey equipment may be considered on a case-by-case basis subject to the approval of the Administration. A Remotely Operated Unmanned Vessel shall not be permitted to be fitted with a lifting device. Where necessary, a Remotely Operated Unmanned Vessel may be permitted by the Certifying Authority to be fitted with a lifting device(s) for the lifting of survey equipment. Applications for lifting operations other than for survey equipment may be considered on a case-by-case basis subject to the approval of the Administration.
Annex 2	The rules around crewing and personnel transfer are counter to many standard operating procedures in use today. These new restrictions would significantly hamper the future growth of the industry. Standard practice for many USVs is to operate as "operationally uncrewed", effectively transitioning back and forth between USVs and standard human operated workboats multiple times during a single voyage. The new Code should not prohibit this widespread standard practice	Annex 2 on Remotely Operated Unmanned Vessels sets out requirements purely for Remotely Operated Vessels which are Unmanned. For Remotely Operated Vessels which wish to be operated as manned then the process set out in MGN 664 shall be followed

Annex 2	Many of the technical requirements are not fitted to current vessels, which would either need an expensive retrofit programme or an extensive redesign	The MCA notes your comment on this specific section with thanks
Annex 2	MCA's proposals do not take into account the diversity within the USV sector (especially smaller USVs)	The requirements for ROUVs set out in Workboat Code Edition 3 are appropriate to the risks and needs of the sector. The MCA is prioritizing a package of work to specifically address the need for proportional requirements for the smallest of ROUVs
Annex 2	Banning passenger or personnel transfer or the use of USVs for transporting dangerous goods would impact the UK's strategy for developing USVs	For Remotely Operated Unmanned Vessels which wish to operate beyond the limitations set out in Annex 2 shall follow the process set out in MGN 664
Annex 2	While it is clear from the scope of the Workboat Code that this document does not apply to autonomous underwater vessels, it might be appropriate to re-slate this	Text clarified to incorporate consultation feedback
Annex 2	The list of prescriptive requirements is insufficient to manage the risk associated with ROUVs to acceptable levels	The MCA notes your comment on this specific section with thanks
Annex 2	Annex 2 seems to be a combination of prescriptive mitigations but without a clear understanding what they are being put in place to achieve and what the acceptable level of safety is being asked for. There is a missed opportunity here to structure this document (and specifically the Annexes) in a way that clearly articulates the goal that is trying to be achieved, how well it needs to be achieved, and what the acceptance means of compliance would be. This would make it much clearer why things are being asked for and also make it much easier to demonstrate	Annex 2 has been written in a 'goals-based' format to prevent these regulations from stifling developments in this innovative space.

	equivalence (either in the traditional approach or via the MGN 664 process)	
Annex 2	The definition of an ROUV or the scope of Annex 2 not take into account that: - A command-and-control link operator/service provider - A command-and-control link frequency asset used may be shared with other radiocommunication operators (not participating in the provision of the command-and-control link) It is proposed that this is taken into account by including the following scope/applicability statement or similar: Where any function of a ROUV is essential to, or can prejudice, continued safe operations of the ROUV, that function and the equipment performing the function, (including equipment remote from the ROUV), shall be considered as part of the ROUV level of autonomy that are covered by the code	The MCA notes your comment on this specific section with thanks
Annex 2	Annex 2 does not appear to define the ROUV level of autonomy that are covered by the code	The extent of autonomy covered by Annex 2 is an autonomous vessel which is remotely operated and has no persons on board. The degrees of autonomy set out by the IMO were developed purely for the use of the MSC Regulatory Scoping Exercise
Annex 2	Includes several requirements for risk assessments or analyses; however, it does not specify the minimum quality requirements for conducting these requirements. It is recommended that Annex 2 specify minimum standards to be applied for risk assessments and any other analyses	Risk assessments are individual to each vessel and use case, therefore it would not be appropriate to specify blanket minimum standards

Annex 2	In general, where secondary or back up functionality is required, it is recommended that standard requires that the functionality is demonstrated to be independent from the primary means of implementing the function	Text clarified to incorporate consultation feedback
Annex 2	For ROUV operation it is possible that: - A command-and-control link operator/service provider will in many cases be different for the ROUV operator. During a voyage, the ROUV may even traverse between several different command-and-control link operator coverage areas and ROCs may be connected to the various command and control link providers through commercial ground telecommunication network providers of varying quality - The frequency asset used may be shared with other radiocommunication operators (not participating in the provision of the command-and-control link), each providing its own service and serving its own designated operational coverage area which may overlap the area of the command-and-control link provision. The frequency asset used may even be unprotected in which case there is a much weaker radio regulatory protection provided against any potential interference, and little or no legal/regulatory	The MCA notes your comment on this specific section with thanks

	recourse of mitigation may be possible in case such interference happens	
Annex 2	It is recommended that Annex 2 specifies requirements to provide sufficient assurance that ROUV system architectures provide containment for the effects of equipment failures, so that the whole-system level effects of such errors are acceptably benign. In order to provide assurance that individual systems contributions to functions that are performed jointly across multiple systems are sufficiently assured, in additional to specific equipment-centric requirements, it is necessary to adopt a functional safety approach: This involves: - identifying the ROUV system level functions - determining the severity of associated functional failures - determining how individual systems/equipment could contribute to ROUV system level functional failures, taking into account the system architecture, and - obtaining assurance that the individual systems/equipment achieve suitable integrity given the extent to which they could contribute to ROUV system level functional failures The range of potential different ROUV system functionalities, concept of operations, levels of automation and architectures being covered by Annex 2 results in an intractable number of potential combinations/permutations of	The MCA notes your comment on this specific section with thanks

	interdependencies. This makes it practically impossible to write a comprehensive set of siloed, system-centric requirements that can sufficiently manage, in a proportionate manner, the risks associated with the interdependences It is therefore recommended that, alongside prescriptive, system-centric requirements, Annex 2 also includes requirements for the applicant to undertake analyses/assessments to demonstrate that the ROUV system as a whole achieves sufficient levels of functional safety. See ABS advisory on autonomous functionality, BV guidelines for autonomous shipping, DNV autonomous and remotely operated ships, MASWRG. As well as addressing whole-system level risk, formalising such an approach in Annex 2 would bring a level of consistency of approach to these assessments	
Annex 2	Does Annex 2 include requirements to provide warning signs for other sea users/responders of hazardous areas of the unmanned vessel?	Other water users should not board a Remotely Operated Unmanned Vessel
Annex 2	Recommend including a requirement that the ROUV must be a safely controllable and manoeuvrable during all operating phases (b) it must be possible to make a smooth transition from one operating phase and/or condition to other (including turns etc) without danger of exceeding the safe operating limits	The MCA notes your comment on this specific section with thanks
Annex 2	There are clearly requirements that cover a much broader scope than just	The roles of Certifying Authority and Administration are clearly set out within the Code

	the vessel (including communication and ROC). It is unclear of the scope of what the CA is expected to be looking at i.e., are they expected to only be looking at the vessel aspects or are they also checking that the ROC requirements are being met. In the former it is unclear how are these aspects being overseen. This is highlighted by 8.1.6 – note this is only a strong recommendation and doesn't include all of the requirements being demonstrated	
Annex 2	There is a general theme of vague and unspecific requirements (e.g. 4.3.4). This is hugely subjective and offers no clarity as to what is enough highlighting the risk of inconsistent expectations and the risk highlighted in 'MCA delegation risk' about a race to the bottom on safety. These either need to be much tighter and specific or suggest delegating to a commercially competitive organisation introduces significant issues	The MCA notes your comment on this specific section with thanks
Annex 2	There are no specific requirement for where the ROC should be located i.e. in the UK. Surely there is a real risk here that those in control of the vessel might not be able to be held accountable for their actions in any incident. It should also be considered about how things like the logbook or data would be retrieved in the event of an incident. Perhaps this could be tightened up	A Remote Operation Centre is not restricted to locations within the UK.
Annex 2	*I would like to see a requirement for CONOPS i.e. a detailed description of the entire operation of the ship (which*	Text clarified to incorporate consultation feedback

	must be updated when changes are made to the design, operation, and location). This could be added to the beginning of 7.6.1 to enhance/clarify	
Annex 2	*What is the development of a 'workboat'? Any boat performing 'work' (e.g. survey)? If so, these requirements apply to all ROUVs, even as small as 1m? It may not be feasible to apply these requirements to very small ROUVs. Is it feasible to have a lower limit e.g. 5m*	"Workboat" means a small vessel in commercial use for purposes other than sport or pleasure, including a dedicated pilot boat. The requirements for ROUVs set out in Workboat Code Edition 3 are appropriate to the risks and needs of the sector. The MCA is prioritizing a package of work to specifically address the need for proportional requirements for the smallest of ROUVs

1: Forward

Section of Code	Feedback Received	MCA Position
1.1.2 Vessel owners/operators wishing to operate a vessel with a level of autonomy different to that of Remotely Operated Unmanned Vessels may be considered on a case-by-case basis by the Administration.	So each vessel which is manned and also remotely operated needs to be referred to the MCA?	Text clarified to incorporate consultation feedback
	There is no definition of what level of autonomy a ROUV has. Different levels of autonomy for a ROUV might include direct real time control of the control surfaces, waypoint following, automatic engagement of position hold under various circumstances etc. Please define what level of autonomy is addressed by Annex 2	The extent of autonomy covered by Annex 2 is an autonomous vessel which is remotely operated and has no persons on board. The degrees of autonomy set out by the IMO were developed purely for the use of the MSC Regulatory Scoping Exercise
1.2 Sections of the Workboat Code disapplied for Remotely Operated Unmanned Vessels	The numbering is out of sync with the WBC content structure. Some areas should be applicable (e.g. damage stability), others disapplied (e.g. fire buckets)	Text clarified to incorporate consultation feedback
	There are times in the operation of a normally uncrewed ROUV that a safety number (a qualified master) remain onboard. It would be sensible to recognise this fact without disapplying the ROUV categorisation of the vessel by introducing this section with the sentence: “except for those occasions when a crew may be onboard, the following sections of the workboat code may be disapplied”	Annex 2 on Remotely Operated Unmanned Vessels sets out requirements purely for Remotely Operated Vessels which are Unmanned. For Remotely Operated Vessels which wish to be operated as manned then the process set out in MGN 664 shall be followed

2: Application and Interpretation

Section of Code	Feedback Received	MCA Position
2.1.1.1 A Remotely Operated Unmanned Vessel shall not: .1 be fitted with a deck crane or other lifting device;	Not being fitted with a lifting device or deck crane will restrict the operational scope of the boat	A Remotely Operated Unmanned Vessel shall not be permitted to tow. Where necessary, a Remotely Operated Unmanned Vessel may be permitted by the Certifying Authority to undertake towing of survey equipment. Applications for towing operations other than for survey equipment may be considered on a case-by-case basis subject to the approval of the Administration. A Remotely Operated Unmanned Vessel shall not be permitted to be fitted with a lifting device. Where necessary, a Remotely Operated Unmanned Vessel may be permitted by the Certifying Authority to be fitted with a lifting device(s) for the lifting of survey equipment. Applications for lifting operations other than for survey equipment may be considered on a case-by-case basis subject to the approval of the Administration. Annex 2 on Remotely Operated Unmanned Vessels sets out requirements purely for Remotely Operated Vessels which are Unmanned. For Remotely Operated Vessels which wish to be operated as manned then the process set out in MGN 664 shall be followed
	Reference needs to be made to the exclusion clauses listed within section 2.1.3	Text clarified to incorporate consultation feedback
	Does this preclude ROV or towed arrays or UUV recovery devices	A Remotely Operated Unmanned Vessel shall not be permitted to be fitted with a lifting device. Where necessary, a Remotely Operated Unmanned Vessel may be permitted by the Certifying Authority to be fitted with a lifting device(s) for the lifting of survey equipment. Applications for lifting operations other than for survey equipment may be considered on a case-by-case basis subject to the approval of the Administration.
	I think should be questioned; a LARS system for ROV is for sure a lifting device. I see they open up for a case-by-case use in 2.1.3, but what is the rationale behind this general lifting device ban? Why not? This may be a functionality specifically required to allow operations	
2.1.1.6	Typo	Text clarified to incorporate consultation feedback

A Remotely Operated Unmanned Vessel shall not: .6 be recognised as either a d or be a certified workboat with a pilot boat endorsement;	Proof-reading required over the meaning of “d” Do you mean dedicated pilot boat?	
2.1.1.8 A Remotely Operated Unmanned Vessel shall not: .8 transfer passengers or industrial personnel;	Not to transfer passengers or industrial personnel will restrict the use cases available *There are development where ROUVs (USVs) are focusing on personnel transfer. This is a reality*	Annex 2 on Remotely Operated Unmanned Vessels sets out requirements purely for Remotely Operated Vessels which are Unmanned. For Remotely Operated Vessels which wish to be operated as manned then the process set out in MGN 664 shall be followed
2.1.1.10 A Remotely Operated Unmanned Vessel shall not: .10 operate as a mother vessel (see section 24 of the Code).	Not to operate as a mother vessel – why this restriction? What about offshore transfer or a mother vessel to other USVs, ROVs or UUVs *ROUVs (USVs) can and do act as motherships, specifically with the potential to operate port to port, even operating ROV, winches, AUVs, lifting equipment. To omit these functionalities this early would be a mistake and would require corrective action later*	A ROV or UUV is ship’s equipment, not a tender; therefore there would not need be a tender/mother vessel relationship. Where a ROUV wishes to carry out operations beyond those permitted in the Code, they may be considered on a case-by-case basis via the MGN 664 process
2.1.2 A Remotely Operated Unmanned Vessel shall not be permitted to tow. Where necessary, a Remotely Operated Unmanned Vessel may be permitted by the Certifying Authority to undertake towing of survey equipment. Applications for towing operations other than for survey equipment may be considered on a case-by-case basis subject to the approval of the Administration.	Towing of survey equipment is allowed but where is this distinguished above, suggest that towing is given a proper definition (buoyant, semi-submerged objects for the purposes of relocation)	“Towing” means the act of towage of one vessel or floating object by another vessel where the two are connected: .1 by a towline about which the towing vessel is free to manoeuvre such that there is a risk of girting, where if the towline is attached towards amidships, it could adopt an angle to the towing vessel and provide a capsizing moment. .2 side by side with the towing vessel firmly attached alongside the towed vessel or floating object, so as to be able to manoeuvre as if one vessel, .3 fore and aft with the bow of the towing vessel firmly attached to the stern of the towed vessel or floating object, so as to be able to push, pull or manoeuvre as if one vessel

2.1.3 A Remotely Operated Unmanned Vessel shall not be permitted to be fitted with a lifting device. Where necessary, a Remotely Operated Unmanned Vessel may be permitted by the Certifying Authority to be fitted with a lifting device(s) for the lifting of survey equipment. Applications for lifting operations other than for survey equipment may be considered on a case-by-case basis subject to the approval of the Administration.	This is not clear the Code says lifting is not allowed, then it is, how can a designer discern what requirements are to be applied and what conditions it is acceptable? Lifting should be given a proper definition	"Lifting device" means a device used for lifting or lowering loads, and includes its attachments used for anchoring, fixing, supporting the device and connections between device and load;
	There are developments where remotely operated cranes are under design for use on ROUVs. This wording should be carefully considered so as to prevent technical development	For Remotely Operated Unmanned Vessels which wish to operate beyond the limitations set out in Annex 2 shall follow the process set out in MGN 664
2.1.4 A Remotely Operated Unmanned Vessel shall not be permitted to carry dangerous goods. Where necessary, a Remotely Operated Unmanned Vessel may be permitted by the Certifying Authority to carry the following dangerous goods exclusively for the use of the vessel: Class 3 – paint or paint related material; and .2 Class 2 – aerosols (for lubricants).	Consider rewording so as not to specify the dangerous goods permissible	It is necessary to specifically detail permissible dangerous goods
	Will alternative fuels such as hydrogen be permitted to be carried?	The MCA is currently developing new regulations on alternative fuels and power sources (including hydrogen), which will be added to Workboat Code Edition 3 in due course following consultation.
	Consideration/discussion should be conducted with designers of ROUVs designed for logistic purposes	For Remotely Operated Unmanned Vessels which wish to operate beyond the limitations set out in Annex 2 shall follow the process set out in MGN 664
2.1.5 Where a fire bucket(s) is located on board a Remotely Operated Unmanned Vessel it shall be adequately secured prior to departure.	Carriage of fire buckets is not appropriate and should be disapplied – it undermines the authority of the requirements – it would be reasonable to expect that everything on board will be secured before departure	Text clarified to incorporate consultation feedback
	Seems very odd and random. Surely something like ensuring any loose items are securely fastened would be much more appropriate?	
2.1.6	Suggest add 'as applicable' to make it clear that some only apply if people are onboard	The MCA notes your comment on this specific section with thanks

A Remotely Operated Unmanned Vessel shall comply with the pollution prevention requirements of section 30 of the Code.		
2.2.1 All Remotely Operated Unmanned Vessels shall have an Official Log Book which is completed and kept at the control position.	The control position is not sufficiently defined and should be explicit in relation to ROUVs. Conclude this can be digital in SOLAS, also what is the required sampling rate for this data	"Control position" means a conning position which is manned whilst the vessel is underway. For a ROUV the control position is the location from which the vessel is operated (whether on board a manned vessel or at a shore-based ROC)
	Please update the Code to: - include records of training in the minimum list of contents for an OLB - clarify the requirements for the carriage/location of an OLB in the following circumstances: - when the control position is handed over to another ROC - when the control position is handed over to the vessel itself (in instances where the vessel can operate in both manned and unmanned modes)	The MCA notes your comment on this specific section with thanks. The log book regulations apply to ROUVs of greater than 25 GT; however, an official log book may instead be kept at the Remote Operation Centre, rather than on board the vessel.
2.2.2 Information recorded within an Official Log Book shall, at a minimum, include: .1 course (including accuracy and compass error); .2 weather (including wind, swell and visibility); .3 speed in knots; .4 overboard discharges (if applicable); .5 weight of cargo; .6 duration, time and location of any signal loss, or circumstances where contact could not be re-established with the Remotely Operated Unmanned Vessel; .7 loss of steering, including duration of any steering loss; .8 occurrence of engineering or navigational alarms;	No mention of pre-departure checks, operation of bilge pumps, machinery failures, significant operations, i.e. deployment of ROV, anchoring, passage plan or route plan check and satisfactory upload, software versions. These are important for vessel safety	Text clarified to incorporate consultation feedback
	Suggest add in 'incidents', as that term is now preferred through reporting regulations and reporting bodies, include MAIB	The term accidents is used in the Statutory Incident
	It is not particularly clear what the different requirements are between 2.2.2 and 2.2.3. It would be reasonable to assume that the information in section 2.2.2 was a timestamped log from the vehicle (actual position) or is it intended to be the planned mission, or	Section 2.2.2 sets out minimum information to be recorded within the Official Log Book. Section 2.2.3 sets out minimum data retainment requirements at the Remote Operation Centre

.9 impairment of situational awareness (e.g. failed camera or sensor); .10 completed maintenance activities; .11 a record of test results for critical systems (see section 3.6 of the Code); .12 a record of all accidents involving the Remotely Operated Unmanned Vessel; .13 a record of any near-misses. Supporting information to prove that any departure from the COLREGs was necessary to avoid immediate danger shall also be recorded. All near-misses shall be reported; .14 handover information (including watchkeeper's initials and handover time); and .15 a record of when a Remotely Operated Unmanned Vessel's control is switched between Remote Operation Centres, or if the vessel transitions to manned operation.	both? Or is judgement permitted on how frequently this information should be recorded (e.g. whenever there is a change of state?)	
2.2.2.1 Information recorded within an Official Log Book shall, at a minimum, include: .1 course (including accuracy and compass error);	Is accurately a standard requirement and is it understood how it is measured	Text clarified to incorporate consultation feedback
2.2.2.8 Information recorded within an Official Log Book shall, at a minimum, include: .8 occurrence of engineering or navigational alarms;	Is this sufficiently broad (i.e. does it include safety alarms) or too broad (i.e does it include warnings)	Text clarified to incorporate consultation feedback
2.2.2.9 Information recorded within an Official Log Book shall, at a minimum, include: .9 impairment of situational awareness (e.g. failed camera or sensor);	Hardware, software and/or environmental i.e. reduced visibility	The MCA notes your comment on this specific section with thanks
2.2.2.11	This cross-reference is broken, and has changed, what does it refer to?	Text clarified to incorporate consultation feedback

Information recorded within an Official Log Book shall, at a minimum, include: .11 a record of test results for critical systems (see section 3.6 of the Code);	Pre-departure tests, commissioning tests? Is this intended to be like the inclining test record in the T&S booklet	
2.2.2.12 Information recorded within an Official Log Book shall, at a minimum, include: .12 a record of all accidents involving the Remotely Operated Unmanned Vessel;	Preferred terminology is incidents – as that term is not preferred through regulations and reporting bodies, including MAIB	The term accidents is used in the Statutory Incident
2.2.2.15 Information recorded within an Official Log Book shall, at a minimum, include: .15 a record of when a Remotely Operated Unmanned Vessel's control is switched between Remote Operation Centres, or if the vessel transitions to manned operation.	Wording requires update to cover both to and from manned operations	Text clarified to incorporate consultation feedback
2.2.3 The following Remotely Operated Unmanned Vessel data, at a minimum, shall be retained at the Remote Operation Centre: .1 vessel location; and .2 data from cameras and sensors. All data shall be retained for a minimum of two years.	Vessel location and data from cameras and sensors shall be retained on board for 30 days and for both sets to be aligned with the requirements stated later (data to be available in a human readable format, stored and secured for a duration 30 days on board and 2 years ashore and must be made available to interested states within 48 hours of an incident). The means of recording need not be limited to the use of a specific VDR system or fixed or float free final recording medium. The data could be stored in whatever system was running on board. A further parallel set of data and information will also need to be captured at the ROC	Text clarified to incorporate consultation feedback
	Clarity required over what data needs to be stored for such a lengthy period of time. Would require large amounts	

	of storage infrastructure and investment This requirement to maintain for 2 years is prohibitive and onerous, what is the expected use of this data that justifies its collection and storage for 2 years	
	This requirement is viewed as disproportionate and may potentially result in a massive data storage issue for ROUV operators. This is not a requirement of for any other group of users and the Fast Cluster would like to see the evidence or legislation that indicates such a stipulation is appropriate. Retention of camera data for larger vessels for a shorter period of time may be more appropriate. The group suggests the retainment of the official log book is far more feasible however the requirement for camera data to be retained should be removed from the Annex	
	It is not obvious of the intent of the vessel location requirement in 2.2.3 – is it the vessel's track of 2.2.2 or something less frequent? It may be more appropriate for the archived data of 2.2.3 to be stored somewhere separate from the ROC (e.g. at the operator's head office)	
2.3 Safety of Operations	Lists 3 discrete requirements under the heading of safety or operations. It is not clear that when the intention/goal behind this section is and whether just these 3 requirements are sufficient to achieve the intention/goal. The Annex does not appear to provide the underlying principles/reasons as to	The MCA notes your comment on this specific section with thanks

	why critical items or redundancies might be important. It is proposed that something along the following lines be included: “ROUVs equipment, systems and installations (a) the ROUV system must be designed to reduce the risk to people including crew, ground staff and third parties to a level acceptable to the Certifying Authority. It must also be designed to reduce the risk of material loss of damage to a level acceptable to the Certifying Authority. (1) where any function of a ROUV is essential to, or can prejudice, continued safe operations of the ROUV, that function, and the equipment performing the function, (including equipment remote from the ROUV), shall be considered as part of the ROUV for the purposes of the validity of the certification/approval. (2) each item of equipment, each system, and each installation: (i) when performing its intended function, may not adversely affect the response, operation, or accuracy of any: - equipment essential to safe operation; or - other equipment unless there is a means to inform the ROUV crew of the effect (ii) must be designed to prevent hazards to the ROUV system in the event of a probable malfunction of failure	

	(b) the design of each item of equipment, each system, and each installation must be examined separately and in relationship to other systems and installations to determine if: α – the ROUV is dependent upon its function for continued safe operation and β – failure of a system would significantly reduce the capacity of the ROUV or the ability of the ROUV crew to cope with adverse operating conditions Each item of identified equipment, system and installations categorized by (α) or (β) must be designed to comply with the following additional requirements: (1) it must perform its intended function under any foreseeable operating conditions (2) when systems and associated components are considered separately and in relation to other systems, the Applicant must prove that there is an acceptable inverse relationship between the probability of occurrence of any failure condition and its severity (3) warning and/or caution information must be provided to alert the ROUV crew to unsafe system operating conditions and to enable the ROUV crew to take appropriate corrective action. Systems, controls, and associated monitoring and warning means must be designated to minimise ROUV crew errors that could create additional hazards	

	(4) compliance with the requirements of sub-paragraph (6) (2) may be shown by analysis and, where necessary, by appropriate test. The analysis must consider: (i) possible modes of failure, including malfunctions and damage from external sources (ii) the probability of multiple failures, and the probability of undetected faults (iii) the resulting effects on the ROUV and third parties, considering the stage of operation and operating conditions; and (iv) the ROUV crew alerting cues, corrective action required, and the ROUV crew's capability of determining fault (c) as used in this paragraph, "systems" refers to all pneumatic systems, fluid systems, electrical systems, mechanical systems, powerplant systems and computer systems included in the ROUV design, ROC, command and control data link and communication systems except for the following: (1) functions not considered to be affected by automation and remote control. These are assumed to be covered by existing rules and regulations"	
2.3.1 The vessel owner/operator shall produce a list of critical equipment and systems.	Vague requirement. Critical for what, safety, mission, operations? Is it not clear what this achieves	Critical equipment is a defined term. "Critical equipment" means any equipment or system which, if it fails, would result in the unsafe operation of the vessel, and compromise the safety of other water users, and the safety of the marine environment

	Is the intent that both the owner and operator information is to be displayed, or just one?	Either the vessel owner or operator, as appropriate
2.3.2 A Remotely Operated Unmanned Vessel shall have redundancies installed for critical equipment and systems installed for safe operation.	This is a vague requirement and introduces requirements which are onerous and not well defined, for example a critical safety e-stop is not redundant, also does this mean two propulsion systems are required? Redundancy may not provide diversity and a common fault may occur in all duplicated systems. Higher integrity can be used instead of redundancy? Redundancy and diversity is a solution to a requirement for integrity in those systems which require it	The MCA notes your comment on this specific section with thanks
	The cyber requirements are in general not currently being met and these are examples should be balanced against the size of the vessel and the potential risk it poses the environment and 3rd parties. The group agrees that this is not practicable for the small ROUVs, and a lower size limit should be established for clarity	The MCA is prioritizing a package of work to specifically address the need for proportional requirements for the smallest of ROUVs
	Redundancies are only one of a series of systems – architectural characteristics that can be employed to provide necessary fault-tolerance to achieve a sufficient level of safety. Additionally, redundancy on its own does not address the risk from a common cause failure (CCF) which defeats the redundancy by causing concurrent failure of redundant components. (Software is a credible cause of CCF because its failures are systematic rather than random. Systematic failures can result from	The MCA notes your comment on this specific section with thanks

	faults in specification, design, manufacturing and/or maintenance and therefore affect all instances of identical software). If, as proposed in the comment above, the intent of Annex 2 is to achieve “an acceptable inverse relationship between the probability of occurrence of any failure condition and its severity” through fault tolerance than a suitable combination of independence, redundancy, diversity, separation and segregation is required	

3: Bilge Pumping, Fire Appliances and Alarms

Section of Code	Feedback Received	MCA Position
3 Bilge Pumping, Fire Appliances and Alarms	These sections should map directly back to the code chapters so there is clear identification of the overlaps and alternate requirements. It should be easy for the user to understand how to achieve compliance using a combination of the code and Annex	Text clarified to incorporate consultation feedback
3.1.1 All bilge pumps on a Remotely Operated Unmanned Vessel shall be power driven and automatic starting, and all alarms shall be audibly and visually displayed and audible at the control position(s).	Conflicts with 11.2.1.1 in main body of Code, need clarity on which requirement takes precedent	The requirements of Annex 2 Section 3.1.2 resolves the risk associated with potential pollution: A Remotely Operated Unmanned Vessel shall either have: .1 oily water separators fitted to bilge pumps; or .2 oil sensors fitted to bilge pumps. Where oil is detected by an oil sensor, pumping of bilge water shall automatically stop and a visual and audible alarm shall be displayed and audible at the control position(s).
	This requirement conflicts with 11.1.5 and potentially MARPOL, how is this intended to be resolved, via 3.1.2? Should also consider run time alerts for when the pump is running excessively	Text clarified to incorporate consultation feedback A Remotely Operated Unmanned Vessel shall either have: .1 oily water separators fitted to bilge pumps; or .2 oil sensors fitted to bilge pumps. Where oil is detected by an oil sensor, pumping of bilge water shall automatically stop and a visual and audible alarm shall be displayed and audible at the control position(s).
	Manual starting from control position is advisable in addition. Bilge alarms must be reproduced at control position	Text clarified to incorporate consultation feedback
3.1.2 A Remotely Operated Unmanned Vessel shall either have: .1 oily water separators fitted to bilge pumps; or .2 oil sensors fitted to bilge pumps. Where oil is detected by an oil sensor, pumping of bilge water shall automatically stop and a visual and audible alarm shall be displayed and audible at the control position(s).	Suggest separators/detectors should only be required for compartments in which oil/fuel could feasibly be present (i.e. machinery spaces)	Text clarified to incorporate consultation feedback
	Do you mean an oil content meter? Conclude that the standards for OWS and OCM are per IMO requirements. Also there should be an override allowed to allow the discharge of polluted water to allow for emergency pumping	A ROUV is not permitted to discharge polluted water in an emergency

3.3.10 All fuel shut-offs and ventilation closures shall be fully operable from the Remote Operation Centre.	It may be appropriate for remote fuel shut-off to be operable from the ROC. It is also probably inappropriate for all fuel shut-offs to be remotely operated	The MCA notes your comment on this specific section with thanks
3.2.1 Critical areas and systems of a Remotely Operated Unmanned Vessel, as per section 2.3.1 of this Annex, except where this is impracticable due to the size of the vessel, shall be compartmentalised to aid in fire containment.	Critical areas are not required to be defined in 2.3.1, also see common against 2.3.1 what is defined as critical, the comms antenna is critical but can't be compartmentalized. Seems a bit of a pointless statement could read 'primary propulsion systems' and 'control/communications' systems should be fitted in separate compartments	"Critical equipment" means any equipment or system which, if it fails, would result in the unsafe operation of the vessel, and compromise the safety of other water users, and the safety of the marine environment. Critical areas is in the context of spaces within the vessel, therefore an antenna would not be a "space" that would need to be compartmentalised
3.3.1.2 A Remotely Operated Unmanned Vessel shall have a suitable fixed fire extinguishing system installed. It shall be: .2 of appropriate volume to complete two releases of extinguishing medium; and	In consultation with stat-x, they would never recommend two cannisters to be installed together and space constraints are always an issue	Text clarified to incorporate consultation feedback
	Requirement for two shots. Can the system be oversized or are two independent systems required? Also do the shots have to be made separately or all at once, this is not clear. Why don't we have confidence in the effectiveness of the first shot if a single shot it accepted for all other vessels. There is no risk to life on board, off board systems could provide extinguishing before the vessel becomes a hazard to others	
	This requirement is the example with the largest non-compliance within the results; however, the fixed firefighting system is a problem for almost all of the small ROUVs. The fire-fighting section should be realistically reviewed against the expectation of fitting such a system to small vessel. The group	Text clarified to incorporate consultation feedback The MCA is prioritizing a package of work to specifically address the need for proportional requirements for the smallest of ROUVs

	agrees that this is not practicable for the small ROUVs, and a realistic lower size limit should be established for clarity	
3.3.2 A fixed fire extinguishing system shall be self-activating or fully operable from the Remote Operation Centre.	The vessel should be able to protect itself irrespective of the comms link, where a remotely activated system is fitted. This introduces a critical software challenge that is overly onerous. We suggest that a remote alarm that the fire system has been activated is sufficient. Systems should activate from onboard detection, preferably by mechanical means (no software)	Text clarified to incorporate consultation feedback
	In addition to the text given at 3.3.3, this section needs a note to the effect that a fixed fire fighting system located in an onboard control position or accommodation space must be capable of being isolated against operation for those occasions when persons are onboard for operation or maintenance	Text clarified to incorporate consultation feedback
	For a self-activating system – there should be a corresponding requirement stipulating low probability of spurious activation or that the ROUV should still be able to operate safely after a spurious activation. Has the potential for command-and-control link outages been taken into account in the decision to allow a fire extinguishing system that is not self-activating?	The MCA notes your comment on this specific section with thanks
3.3.3 A Remotely Operated Unmanned Vessel which meets the requirements of section 3.3.1, which is fitted with a self-activating	We would ask that a proper risk assessment on the approach proposed here should be carried out – the complexity of the fire suppression	Text clarified to incorporate consultation feedback Text clarified to incorporate consultation feedback

fixed fire extinguishing system shall either have a delay, or an ability to manually switch off the system, and all alarms from the fixed fire extinguishing system shall provide an on board audible and visual warning.	system described in this section may result in an increased risk of fire suppression not activating when required. Has this balance of risk been addressed in setting out this requirement?	
	What is the purpose of this requirement, to allow for safe maintenance – do you mean manually isolate the system? That is sufficient	
	Please clarify if the requirement is to be able to remotely switch off a self-activating fire extinguishing system	
3.3.5 Where the fixed fire extinguishing system has been activated, or a space has been compromised, an audible and visual alarm shall be activated on board the Remotely Operated Unmanned Vessel.	What do you mean by compromised. Duplicated number, but just delete as doesn't add any value, if it complies with 3.3.1 it should be sufficient – not clear how this requirement is to be measured	Text clarified to incorporate consultation feedback
3.3.6 In event of a fire, a Remotely Operated Unmanned Vessel shall either: .1 remain responsive to commands from the Remote Operation Centre; or .2 automatically enter a defined safe state	This will be difficult/onerous to prove, it invokes safe return to part functionality, for a single engine installation, an ER fire will render the vessel unresponsive to either commands or safe state requirements. Agree however that the principle is important and may be achieved however the requirement may need rethinking	The MCA notes your comment on this specific section with thanks
3.3.7 Where size allows, critical systems shall be protected from areas identified as being of high risk from fire.	Need to define size or builders could use this as a get out clause for structural fire protection. Also still have this issue around the definition of critical systems	The MCA notes your comment on this specific section with thanks
3.3.8 Emergency power and critical back-up systems shall be located separately from	Developers of very small ROUVs are likely to suffer the biggest impact of these changes as they will likely	The MCA is prioritizing a package of work to specifically address the need for proportional requirements for the smallest of ROUVs

main systems, located above the damage waterline and shall be protected from fire.	struggle to find space to fit all of the extra equipment required by this Code This implies the vessel has space to do this	
	The cyber requirements are in general not currently being met and these are examples should be balanced against the size of the vessel and the potential risk it poses the environment and 3rd parties. The group agrees that this is not practicable for the small ROUVs, and a lower size limit should be established for clarity	
3.3.9 Cameras and sensors shall be installed within engine, machinery and battery spaces to provide adequate situational awareness during emergency situations such as a fire, except where it is impracticable due to the size of the vessel. Outputs from cameras and sensors shall be displayed and audible at the control position(s).	What does an audible camera sound like? Also are these sensors in addition to the fire detection requirements. Is control compartment considered to be a machinery space? Why not refer to critical or high risk compartments	Text clarified to incorporate consultation feedback
3.3.10 All fuel shut-offs and ventilation closures shall be fully operable from the Remote Operation Centre	Remote activation of the shutoffs from the ROC becomes a safety critical function relying on comms and as such should not be encouraged as a safety response as it will be onerous to assure, automatic activation linked to release should be preferred	Text clarified to incorporate consultation feedback
	Given the potential for command-and-control link outages, is there a case for requiring self-activating shut off and ventilation closure?	
3.4.1.4 All navigational and engineering alerts shall be audibly and visually displayed	Suggest make the footnote reference the IMO Code on alerts and indictors, 2009 which underpins this	Text clarified to incorporate consultation feedback

and audible at the control position(s) in a timely manner and shall be classed appropriately as: .4 cautions.		
3.4.2 Navigational or engineering alerts shall be reported as specific alerts.	Is this a redundant statement when looking at 3.4.1?	Text clarified to incorporate consultation feedback
	What do you mean? Individual alerts and not grouped alerts? Suggest this is aligned with section 9 of the IMO code on alerts and indictors, it might be more appropriate to report some engineering alerts as common to allow for further analysis away from the operators screens	
	Please clarify what is meant by: - a navigational alert (does this include an alerting to loss of safe separation from other sea-users/obstacles?) - a specific alert	
3.4.3 Sufficient alerts, monitoring, diagnostic tools and controls shall be available the Remote Operation Centre to aid identification and resolution engineering faults, failures or unexpected events.	How is sufficient to be determined What is sufficient? Note that most digital twins, even the most capable are only capable of identifying about 10% of machinery faults	Information from the ROUV shall be replicated at the ROC. The ROC shall not be a digital twin
3.4.4 Alarms and warnings for anchoring or dynamic positioning systems shall be audibly and visually displayed and audible at the control position(s).).	What is the purpose of this requirement, to detect when the vessel is drifting, why not say this, means shall be provided to confirm position holding during anchoring on DP and alerts shall be provided when this exceeds defined limits. Why not use this requirement to introduce COLREGS type alerts, i.e. off course, CTA/TCPA breach	Suitable alarms and warnings will differ depending on the complexity of the dynamic positioning system installed Text clarified to incorporate consultation feedback
	Please clarify what alarms and warnings are required. Is it warnings	

	that the anchor or dynamic positioning system has been engaged or its warnings that these systems have failed/malfunction? There appears to be a typo at the end of the sentence	

4: Connectivity, Pre-Departure Checks and Responding to Distress

Section of Code	Feedback Received	MCA Position
4 Connectivity, Pre-Departure Checks and Responding to Distress	Why is section 14 referenced?	Text clarified to incorporate consultation feedback
	Is it worth pointing to 7.1.3 re the certification/qualifications the ROC radio operator have?	The MCA notes your comment on this specific section with thanks
4.1 Pre-Departure Checks	This can be checked at sea trials, otherwise this is an operator requirement	Yes, this is an operator requirement
4.1.1 Pre-departure checks including, at a minimum, the following shall be carried out for a Remotely Operated Unmanned Vessel prior to each voyage: .1 propulsion and steering; .2 fuel and power; .3 communications; .4 navigational lights and sounds; .5 situational awareness; and .6 system(s) to stop the propulsion system in an emergency	Should include closure of watertight/weathertight closures	The MCA notes your comment on this specific section with thanks
	List includes “propulsion and steering” and “fuel and power” doesn’t talk about what you are actually checking against these i.e. operability of propulsion and steering or fuel level and battery voltage level as examples	It would not be practicable to list every pre-departure check under each heading for the current diversity of ROUVs
4.1.1.4 Pre-departure checks including, at a minimum, the following shall be carried out for a Remotely Operated Unmanned Vessel prior to each voyage: .4 navigational lights and sounds;	Should include shapes	Text clarified to incorporate consultation feedback
4.1.1.5 Pre-departure checks including, at a minimum, the following shall be carried out for a Remotely Operated Unmanned Vessel prior to each voyage: .5 situational awareness; and	Should situational awareness be defined?	The MCA notes your comment on this specific section with thanks
4.1.1.6 Pre-departure checks including, at a minimum, the following shall be carried	This should state “systems to put the vessel into a safe state”	Text clarified to incorporate consultation feedback

out for a Remotely Operated Unmanned Vessel prior to each voyage: .6 system(s) to stop the propulsion system in an emergency		
4.2.1 A Remotely Operated Unmanned Vessel shall meet the carriage requirements for radiocommunication equipment set out in section 17 of the Code. All radiocommunication information shall be displayed and audible at the Remote Operation Centre via a reliable communications link.	Although the group agrees that this is an important aspect of safe operations, this has been very much limited on the available technology and the size of the vessel. The group agrees that this is not practicable for ROUVs, and a lower size limit should be established for clarity	The requirements for ROUVs set out in Workboat Code Edition 3 are appropriate to the risks and needs of the sector. The MCA is prioritizing a package of work to specifically address the need for proportional requirements for the smallest of ROUVs
4.2.4 Should the primary communications system fail a secondary communications system shall be available and be able to enable vessel locating information and basic vessel functionality including, at a minimum, the ability to: .1 command the vessel to enter a safe state; .2 activate the emergency stop; .3 activate not-under-command lights; and .4 receive and respond to critical alarms	I am not sure that this section sufficiently distinguishes between control communications and external communications and it would be better to treat these as separate things. This should be diverse and act on separate onboard systems, i.e. no common mode or single points of failure Appears to conflate the radio communications link for the purposes of communicating with other parties with the command-and-control link used for control of the ROUV which transmits crew commands from the ROC to the ROUV. These are 2 separate functions, and is proposed that they are treated separately in the Annex. By conflating radio communications and command and control, it appears to be possible to comply with 4.2.4 by having a single system for communication with other parties and a single command and control link	Text clarified to incorporate consultation feedback

4.2.4.3 Should the primary communications system fail a secondary communications system shall be available and be able to enable vessel locating information and basic vessel functionality including, at a minimum, the ability to: .3 activate not-under-command lights; and	This should prescribe the use of day shapes and signals as well	The MCA notes your comment on this specific section with thanks
4.3.2 All Remotely Operated Unmanned Vessels shall respond to distress calls and, where practicable, be able to mark a position (including, but not limited to person(s) overboard, another vessel or an oil spill).	What does “mark a position” mean? It tends to imply dropping something in the water but perhaps the intention is that the ROC of made aware of the location of the situation	Text clarified to incorporate consultation feedback
4.3.3 A radio system shall include a speaker system to allow Remote Operation Centre operators to provide auditory updates to persons in distress.	Vessels need to have a speaker? I agree they should be able to make sound signals, I am not sure that a speaker is practical for all ROUVs Understand that this whole section comes from mandatory requirement for vessels to be able to assist a ship or persons in distress, but there has to be a degree of reality applied to how much an ROUV would actually be able to assist. To a person in distress, perhaps overboard and abandoned at sea, the appearance of a vessel would ultimately be very disappointing – perhaps with fatal consequences – when the distressed person realizes or is told (over the mandatory loudspeaker) that the ‘rescuing’ vessel is in fact an ROUV an can do very little of use to help the distressed person How is this being addressed and what is good enough	A ROUV shall be able to communicate over a speaker system with a person in distress. A ROUV will be able to position hold in the vicinity of a person in distress, by doing so will be able to reduce the time needed by search and rescue to locate a person in distress The MCA is prioritizing a package of work to specifically address the need for proportional requirements for the smallest of ROUVs

4.3.4 All Remotely Operated Unmanned Vessels shall have lighting, cameras or sensors to assist, as far as is practicable, in the locating of person(s) overboard.	Is this in addition or superior to their expected situational awareness suite, it seems unreasonable to request on enhanced capability if we are already satisfied that they can maintain a proper lookout. Also there is no size limitation for this. Suggest persons overboard should read persons in the water, overboard implies that they have come from the (unmanned) vessel	A ROUV will not be required to have enhanced situational awareness compared to a conventional vessel. There is no size limitation listed as all ROUV will need to have lighting, cameras or sensors installed, as appropriate, to provide suitable situational awareness for their operations. Text clarified to incorporate consultation feedback
4.3.5 An owner/operator of a Remotely Operated Unmanned Vessel may voluntarily carry other life-saving appliances to provide support in response to a distress call (for example flotation devices or liferafts which can be remotely launched) appropriate to the size and/or stability of the vessel. All life-saving appliances carried shall meet the requirements of section 14 of the Code and be ready for use at all times.	If it is voluntary then whether they are ready or not becomes a bit irrelevant – isn't a vessel only required to respond within the means available to them	A ROUV is only required to respond within their means. However, some ROUV operators have asked whether they would be able to carry some Life Saving Appliances to provide support to other water users
4.4.1 Each Remotely Operated Unmanned Vessel operating in group working shall be directly controlled from the same Remote Operation Centre.	Why does it need to be the same ROC? This could be severely restrictive for operations in the future What is the definition of group working? Introduces the concept of group working. There is no definition for what this means i.e. within a certain proximity etc, Hence this requirement is not effective *This item may challenge the ability of a client to contract multiple ROUV contractors to collaboratively operate*	Text clarified to incorporate consultation feedback

5: Navigational and Anchoring Equipment

5 Navigational and Anchoring Equipment	Why is section 14 referenced? Again, are these separate topics?	Text clarified to incorporate consultation feedback
5.1.1 A Remotely Operated Unmanned Vessel shall be fitted with means of determining the vessel's heading and correcting headings and bearings to true; and this shall be displayed and audible at the control position(s) at all times.	Why would vessel heading require audible updates? As in a vehicle sat nav?	Text clarified to incorporate consultation feedback
5.1.2 A back-up power supply to the equipment in section 5.1.1 of this Annex shall be available in the event of failure of the main electrical power supply.	What are the requirements for a backup power supply, can it be achieved using separated battery banks i.e. does it require a second generation source and do these have to be separated? Also I conclude you mean on the ROUV not the ROC	Back-up power is a secondary source of power. Annex 2 Sections 5.1.1 and 5.1.2 set out requirements for the ROUV not the ROC
	The explicit requirement for a backup power supply for the compass does not seem appropriate. The operator should be given the ability to make a judgement as to what should be on a separate power supply	The MCA notes your comment on this specific section with thanks
5.2.1 A Remotely Operated Unmanned Vessel shall have sensors (e.g. radar, AIS, microphone, vibration) and cameras (e.g. normal, low-light, infrared) installed which provide an equivalent standard of meeting visibility and watchkeeping requirements compared to a manned vessel (see section 7.4.1 of this Annex and MIN XXX). The standard of visibility (see section 10.1.2 of the Code) and watchkeeping requirements shall be to the satisfaction of the Administration.	This is highly subjective and does not provide any indication of what the expected performance standard is, how will the operator and CA resolve the requirements with the Administration. Also do you mean watchkeeper requirements or provision? What does vibration have to do with watchkeeping? Does this introduce a requirement for vibration monitoring?	The required sensors and cameras will depend on the size and operational type of each ROUV. The listed types of sensors and cameras are examples. Vibration monitoring may be important for some ROUVs to ensure that they are operating within the physical operating limits of the vessel and any installed equipment. Meet the requirements for watchkeeping.
	The Fast Cluster again feels this should be appropriate and proportionate to the operating	The requirements for ROUVs set out in Workboat Code Edition 3 are appropriate to the risks and needs of the sector. The MCA is prioritizing a

	environment and the potential risk it imposes. The group agrees that this is not practicable for the small ROUVs, and a lower limit should be established for clarity as well as the requirement for sensors should be driven by the proximity of potential hazards	package of work to specifically address the need for proportional requirements for the smallest of ROUVs
	So approval has to go through the MCA, rather than lying with the competent CA? Can alternatives be considered?	The roles of Certifying Authority and Administration are clearly set out within the Code
	Is visibility the correct term? This requirement could be read as meaning that the sensors and cameras must be clearly visible from a distance. Should this requirement express the need for the situational awareness sensors to have sufficient performance (range, field of view, resolution, sensitivity, acuity etc) so that they provide an equivalent level of situational awareness (of other sea users, obstacles, hazards, signage etc) as a manned vessel. Please define what is an equivalent level of situational awareness to a manned vessel (or at least a process or same principles to be followed in demonstrating equivalence). In doing so this requirement is prescribing the solution to the requirement to provide a suitable level of situational awareness. It may be possible to achieve a suitable level of situational awareness with only 'sensors' or only 'cameras' however these possibilities are discounted by the way 5.2.1 is worded. Is this what is intended?	All ROUVs are required to have cameras and sensors (e.g. radar, AIS). Visibility is the correct term. The requirements for situational awareness are set out elsewhere in the Annex.

	How is this going to be assessed? This seems very vague and 7.4.1 only talks about range of visibility. There are methodologies and approaches out there in other sectors	The required sensors and cameras will depend on the size and operational type of each ROUV.
5.2.2 All Remotely Operated Unmanned Vessels shall have an AIS transceiver installed. The AIS transceiver shall be operable from the Remote Operation Centre.	Should mandate the ability to change the AIS state in mission	The MCA notes your comment on this specific section with thanks
5.2.3 It shall be demonstrated to the satisfaction of the Certifying Authority that sensors and cameras installed on a Remotely Operated Unmanned Vessel are able to work effectively either separately, or in conjunction with each other, without causing interference. All systems and equipment installed on board a Remotely Operated Unmanned Vessel shall be designed to not affect the functioning of sensors and cameras	I think this is the first reference to the CA as opposed to Administration ultimately from a CA perspective we would welcome a discussion on the scope of authority with regard to the Annex for CAs however the determination of 'satisfaction' remains an open area and is more likely to require the Administration's input before a CA could make a ruling	The roles of Certifying Authority and Administration are clearly set out within the Code
	Whereas in this section the competent CA is allowed to approve. There is a great deal of confusion as to whether the CA or the MCA can approve these vessels	The roles of Certifying Authority and Administration are clearly set out within the Code
5.2.4 Sensors and cameras shall be located in a position not likely to be damaged, obstructed, or have their situational awareness compromised by flooding or other environmental conditions (e.g. weather) during normal operations.	Suggest add 'or bird fouling' in the parentheses after 'e.g. weather'	Text clarified to incorporate consultation feedback
5.3.1 Sensors and cameras shall be installed to provide horizontal and vertical arcs of visibility to meet requirements for watchkeeping and all operational activities	This requirement is in direct conflict with 5.2.1 suggest one or the other is kept	Text clarified to incorporate consultation feedback

to the satisfaction of the Certifying Authority. The provision of a proper lookout is required by the International Regulations for the Prevention of Collisions at Sea.		
5.3.3 A Remote Operator shall carry out duties at the control position(s) as both look-out and helmsperson and shall have: .1 unobstructed all-round vision; .2 no impairment of night-vision; and .3 no other impediments to keeping a proper look-out	What is the expected performance standard for this? Is it an assessment of the ROC set up or the ROUV set up and how it is different from 5.2.1	This is in regards to the set up at the control position at the Remote Operation Centre
5.4.1 A Remotely Operated Unmanned Vessel shall be equipped with a remotely operable waterproof electric lamp suitable for signalling which can alter its direction remotely.	Signalling lamp may be overly prescriptive – there may be other means of directing light from a lamp, or lamps, rather than altering the direction of the lamp	The MCA notes your comment on this specific section with thanks
	This is onerous and would not work for all types of USVs	The requirements for ROUVs set out in Workboat Code Edition 3 are appropriate to the risks and needs of the sector. The MCA is prioritizing a package of work to specifically address the need for proportional requirements for the smallest of ROUVs
	This requirement is onerous and bewildering and does not appear to consider the range of alternative sensors on board. If more information can be provided as to why this has been included and why it is deemed essential that would be appreciated. In the absence of suitable justification, the group agrees this should be removed from Annex 2	
	Morse signaling by light is no longer a STCW qualification requirement, so this requirement is unrealistic/unreasonable	Manned workboats are also required to have a light for signalling
5.4.2 A Remote Operator shall be provided with suitable and camera outputs to be able to interpret signals (e.g. flags and Code).	At what range? This is unrealistic. The MCA will be requiring ROUVs to be signalling by flag semaphore next!	Text clarified to incorporate consultation feedback

5.4.3 A Remotely Operated Unmanned Vessel operating in Area Category of Operation 0, 1, 2, 3, or 5 shall be equipped with a searchlight which can be operated from the Remote Operation Centre. The searchlight may be the lamp required in section 5.4.1.	Signalling lamp may be overly prescriptive – there may be other means of directing light from a lamp, or lamps, rather than altering the direction of the lamp This is onerous and would not work for all types of USV – what is the reason/purpose for the searchlight	A searchlight/signalling lamp shall be fitted, to be used to aid in search and rescue situations
5.5	Section mission	Text clarified to incorporate consultation feedback
5.6.1 A Remotely Operated Unmanned Vessel shall meet one of the following requirements: .1 carriage of suitable anchors and cables (as set out in section 20 of the Code) and shall demonstrate effective remote deployment of the anchor(s) to the satisfaction of the Certifying Authority; .2 installation of a dynamic positioning system which is able to accurately maintain a vessel's position (see MIN XXX). In this Annex, dynamic positioning shall mean a system which, at a minimum, can implement station keeping. .3 anchoring systems other than anchors or dynamic positioning systems may be accepted on a case-by-case basis subject to the approval of the Administration.	The idea of an ROUV anchoring in large depths of water is unrealistic and unreasonable (as large ships or code vessels similarly would not anchor in oceanic depths or be expected to DP). Deployment of a sea anchor ought to be acceptable	Text clarified to incorporate consultation feedback
5.6.1.1 A Remotely Operated Unmanned Vessel shall meet one of the following requirements: .1 carriage of suitable anchors and cables (as set out in section 20 of the Code) and shall demonstrate effective remote deployment of the anchor(s) to the satisfaction of the Certifying Authority;	Does the ROUV have to recover the anchor?	A ROUV shall either be able to recover an anchor, or shall be retrieved by a manned vessel which can retrieve both the ROUV and its anchor

5.6.1.2 A Remotely Operated Unmanned Vessel shall meet one of the following requirements: .2 installation of a dynamic positioning system which is able to accurately maintain a vessel's position (see MIN XXX). In this Annex, dynamic positioning shall mean a system which, at a minimum, can implement station keeping.	Dynamic positioning system, implies some form of certification. Is the MCA requiring a DP notation. Preferred terminology would be station keeping or position holding system	Text clarified to incorporate consultation feedback
5.6.2 A dynamic positioning system should, at a minimum, include a: .1 power system; .2 thruster system; .3 dynamic positioning control system; and .4 sensors monitoring and reactive to, at a minimum, vessel heading, movement, wind speed and wind direction.	Dynamic positioning system, implies some form of certification. Is the MCA requiring a DP notation. Preferred terminology would be station keeping or position holding system	Text clarified to incorporate consultation feedback
	It ought to suffice for an ROUV to maneuver in a safe "holding pattern" rather than have to DP as a traditional DP ship	
	Why is it necessary to stipulate these sub-systems? Why are dynamic positioning systems that do not use these sub-systems precluded? Suggest re-phrase this requirement to express the performance and integrity requirements of the dynamic positioning system rather than stipulating how it is to be designated Please provide a definition of a dynamic positioning system	Text clarified to incorporate consultation feedback
5.6.2.4 A dynamic positioning system should, at a minimum, include a: .4 sensors monitoring and reactive to, at a minimum, vessel heading, movement, wind speed and wind direction.	Consider rewording to improve grammar	Text clarified to incorporate consultation feedback
5.6.3	Dynamic positioning system, implies some form of certification. Is the MCA	Text clarified to incorporate consultation feedback

A dynamic position system shall be able to achieve and maintain position in all anticipated weather and operational conditions.	requiring a DP notation. Preferred terminology would be station keeping or position holding system	
	Only needs to be equivalent to the holding power of an anchor, the vessel may have to ride out a bad storm under power	Text clarified to incorporate consultation feedback
5.6.4 A plan detailing contingency measures if anchoring or dynamic positioning fails shall be kept at the control position(s).	Should be a subset of all emergency planning procedures, these should be detailed in more detail in safety management	The MCA notes your comment on this specific section with thanks
5.6.5 Compliance with guidelines for dynamic positioning shall be recorded in a Dynamic Positioning Verification Acceptance Document (DPVAD).	Really onerous requirement	Text clarified to incorporate consultation feedback
	Requiring a DPVAD is an excessive level of assurance for these types of vessels, particularly those conducting survey. It is the recommendation that this is removed and only required as a condition of activity-specific operating guidelines (ASOG) (see MSC.1/Circ.1580)	
5.7.1 A Remotely Operated Unmanned Vessel may carry a tow line to allow it to be towed by another vessel. Where a Remotely Operated Unmanned Vessel carries a towline it shall meet the requirements of Table 26.2.1 of the Code.	The requirement hasn't been disapplied and therefore it is mandated to be carried by 20.4.7	The MCA notes your comment on this specific section with thanks

6: Personnel Health, Safety and Medical Care

Section of Code	Feedback Received	MCA Position
6.1.1 Operators located on board a manned vessel whilst operating a Remotely Operated Unmanned Vessel shall be regulated under the Merchant Shipping and Fishing Vessels (Health and Safety at Work) Regulations 1997.	Therefore this section is not applicable? How can you suddenly allow it when you have removed all of the requirements that make it safe for people to be onboard	This section clearly sets out regulations which apply to those working in a Remote Operation Centre situated on board a manned vessel
6.1.3 Shore-based operators shall complete training and practice vessel drills as required in section 14.11 of the Code. Records of training shall be recorded in the Official Log Book and kept in the Remote Operation Centre.	Is this required, operators may not be assigned to specific vessels but rather to an operation centre, the ROC should maintain a record of training and the log should record who the operator was to allow for an audible trail	Records of training shall be kept in the Remote Operation Centre, so can apply to a person working at a Remote Operation Centre, rather than purely for an individual vessel
	Please update the Code to: - include records of training in the minimum list of contents for an OLB - clarify the requirements for the carriage/location of an OLB in the following circumstances: - when the control position is handed over to another ROC - when the control position is handed over to the vessel itself (in instances where the vessel can operate in both manned and unmanned modes)	An Official Log Book may be obtained free of charge from the Administration. Records of training shall be kept in the Remote Operation Centre, so can apply to a person working at a Remote Operation Centre, rather than purely for an individual vessel
6.2.1 A Remotely Operated Unmanned Vessel shall be able to complete its entire voyage (or legs between ports) without requiring routine maintenance, and this shall be demonstrated to the satisfaction of the Certifying Authority. An	Where is there an equivalent requirement for manned vessel i.e. is there a statutory baseline for invoking this requirement or is it an owners performance issue?	A ROUV could become a hazard to other water users if it requires assistance from a manned vessel due to not being able to complete a leg of a voyage between ports

effective monitoring programme of critical systems and equipment shall be implemented.		
6.2.2 All maintenance personnel shall be appropriately trained in accordance with the risks likely to be encountered when carrying out maintenance of Remotely Operated Unmanned Vessels.	Agree but this is well down the control hierarchy for hazard management, the ROUV should be capable of being put in a safe state to allow for maintenance to occur, this includes the isolation of remote control systems	The MCA notes your comment on this specific section with thanks
6.2.3 Remotely Operated Unmanned Vessels shall be maintained either out of the water, or whilst the vessel is alongside in port (see section 6.3.1).	Highlights that maintenance is only really being considered for the hardware elements. Would updating software be constituted as a maintenance activity and therefore is this too constrictive. This also raises another question around how software is being considered in the ongoing certification process (if at all) and if the frequencies and requirements around this are appropriate	Software shall not be updated whilst a vessel is underway
6.2.4 Specific maintenance task(s) which cannot be completed whilst the vessel is stationary may be permitted on a case-by-case basis to be completed whilst the vessel is in motion where a support vessel is present, subject to approval of the Administration.	Does the administration expect to approve all requests to undertake sea trials to confirm engine maintenance, this seems burdensome and bound up in red tape. Does the conflict with the requirement at 6.1.1 and 6.1.2, responsibility for safety of persons on board falls under H&S and is the responsibility of the owner to determine how to achieve this safely. Can the MCA dictate how the vessel can be maintained. I would suggest a more goal-based requirement in line with SOLAS-II-I Reg 3.9 – ROUVs shall be able to be safely accessed and worked on whilst alongside or out of the water. A safe means of access shall be provided for emergency access at sea for recovery purposes	The MCA notes your comment on this specific section with thanks

	There will be a large number of individual case-by-case applications for persons to be able to go onboard for routine testing and tuning routes. This requirement is unrealistic and could easily and safely be delegated to a competent CA, if at all necessary	
6.3.1 A Remotely Operated Unmanned Vessel which meets the safety requirements of section 22.2 of the Code, has suitable buoyant stability to enable safe boarding, and has structures including, but not limited to, guard rails, handrails and non-slip surfaces may be maintained in the water and boarded: .1 to carry out maintenance; .2 to carry out an inspection; .3 to download data; .4 to prepare the vessel for a voyage; or .5 in an emergency.	Safety requirements of 22.2, which seem to be required to allow personnel to board a vessel in essentially benign conditions (e.g. when berthed in a port) seems onerous	The MCA notes your comment on this specific section with thanks
6.3.2 A Remotely Operated Unmanned Vessel which meets the requirements of section 6.3.1 of this Annex shall have: .1 a manned override to prevent the vessel from being remotely operated if persons are on board the vessel; .2 emergency escape provisions (see section 15.7 of the Code); .3 an appropriate level of fire safety (see sections 15 and 16 of the Code); and .4 life saving appliances (see section 14 of the Code).	These requirements are insufficient to ensure that an appropriate level of safety is provided for people to be onboard, there is insufficient detail and no account made regarding whether the vessel is at sea or alongside and at this point you might as well just require manned certification first	6.2.3 Remotely Operated Unmanned Vessels shall be maintained either out of the water, or whilst the vessel is alongside in port (see section 6.3.1). Therefore a ROUV shall not be boarded for maintenance activities when at sea
	Similar to 6.3.1, the requirement for LSA seems unnecessarily onerous (seems to require a liferaft if taken literally)	Text clarified to incorporate consultation feedback
6.4.1 Remotely Operated Unmanned Vessels are not required to carry medical equipment.	Doesn't need to be said because you have disapplied chapter 23	The MCA notes your comment on this specific section with thanks

7: Remote Control of Remotely Operated Unmanned Vessels

Section of Code	Feedback Received	MCA Position
7 Remote Control of Remotely Operated Unmanned Vessels	By on-board you mean not on-board but on another vessel suggest use at sea or offshore	Text clarified to incorporate consultation feedback
	I cannot help thinking that S7 on remote control of ROUVs should be a separate code	The MCA notes your comment on this specific section with thanks
7.1 Manning Requirements	Who will verify this and is it within the scope of the certificate?	This will be verified during the survey and certification of the vessel. This is in the scope of the Workboat Certificate
7.1.1 A Remotely Operated Unmanned Vessel shall not carry any crew, industrial personnel or passengers.	To build evidence of ability to operate remotely surely you would want to have crew on board until trust in the system has been demonstrated?	Annex 2 on Remotely Operated Unmanned Vessels sets out requirements purely for Remotely Operated Vessels which are Unmanned. For Remotely Operated Vessels which wish to be operated as manned then the process set out in MGN 664 shall be followed Section 7.1.1 does not conflict with Section 6.1.1. Section 6.1.1 sets out regulations which apply to those working in a ROC located on board a manned vessel
	Under what circumstances is this applicable? When under manual or remote control, or even just for maintenance tasks. It is sometimes essential to have a 'standby' crew on board while the vessel is being remotely operated. Under which Code is this circumstance covered?	
	This is very limiting? How are manned ROUVs going to be treated? Also doesn't this conflict with 6.1.1? Need a further statement to clarify that it might in either an a) manned mode in which case compliance with the Code is necessary, or b) in a recovery or trials mode, in which case an appropriate provision is to be in place to ensure the safety of the riding crew. Also need to consider at some point (not here) that on ROUV might have a different category when manned (i.e. reduced)	
	This statement is going completely against safe practice as developed by the UK MASS industry and supported	

	by the UK MASWRG. There are times when an ROUV will carry crew – as a safety number for a particular trial or operation. This procedure needs to be allowed to continue, unless it I MCA intention to prevent continued deployment of the UK MASS sector? *This challenges some of the logistic and crew change functionalities of ROUVs*	
7.1.3 A Remotely Operated Unmanned Vessel is exempted from the requirement to physically carry at least one person qualified for distress and safety radio communication, as provided for in Schedule 2 of the 2023 Regulations. A Remote Operation Centre shall be manned with at least one person qualified for distress and safety radio communication per Remotely Operated Unmanned Vessel, who shall hold a valid GMDSS Radio Operator's Certificate issued by the relevant authority.	Why per vessel, surely it is sufficient to have only one per watch, how many incidents can you expect	Text clarified to incorporate consultation feedback
	What radio operation competencies should the ROC operator have? Noting it says that at least one person should be qualified for distress and safety radio comms but this suggests the actual ROC operator doesn't have to have any, therefore I question what competencies they are expected to have	A person qualified for distress and safety radio communication shall have a GMDSS Radio Operator's certificate issued by the relevant authority A separate MGN setting out guidance on manning qualifications and experience for those working with ROUVs will be published in 2023
7.2 Manning of Remote Operation Centres	Who will verify this and is it within the scope of the certificate?	A separate MGN setting out guidance on manning qualifications and experience for those working with ROUVs will be published in due course
7.2.1 There shall be an appropriate number and experience of personnel to be able to respond effectively during both normal operations (day and night-time) and emergency situations and shall, at a minimum, include: .1 Remote Operators; .2 the Master; .3 waterfront support and technical personnel; and	This implies a minimum of 4 separate individuals. Is this the intent?	Text clarified to incorporate consultation feedback

.4 engineering personnel.		
7.2.1.2 There shall be an appropriate number and experience of personnel to be able to respond effectively during both normal operations (day and night-time) and emergency situations and shall, at a minimum, include: .2 the Master;	This is a potentially fraught designation that implies there is a single person fulfilling that 'traditional' role with various legal implications – which I understand. However it might be more appropriate to address this requirement in a separate clause. The ROC should include a person with designation responsibility for the vessel operation (a master) with ultimate authority for decision making – otherwise you are mandating a master and a operator for each vessel. I see a shore-based master as more of a DPA but with appropriate technical skills	The MCA notes your comment on this specific section with thanks
7.2.3 The remote manning requirements for a Remotely Operated Unmanned Vessel will depend on the category of operation and activities being carried out.	And should be agreed with the Administration?	Text clarified to incorporate consultation feedback
7.2.4 Training and Certification requirements for manned vessels are applicable to operators of Remotely Operated Unmanned Vessels (see section 28 of the Code).	How is sea-survival and firefighting courses that are required for commercial endorsement relevant for a ROUV operator?	A separate MGN setting out guidance on manning qualifications and experience for those working with ROUVs will be published in due course
7.2.6 A Remote Operator shall only manage one Remotely Operated Unmanned Vessel at a time. A Remote Operator may be permitted on a case-by-case basis to manage multiple Remotely Operated Unmanned Vessels at once, subject to the approval of the Administration. The vessel owner/operator shall submit a risk assessment to the Administration which details the maximum number of	Current technology and practices make it appropriate for an operator to manage only one vessel at a time. With technology developments, however, it may in the future be possible and appropriate for an operator to manage multiple vessels in particular scenarios. Suggest that the regulations should provide some leeway for such future developments	Where a ROUV wishes to be manned differently to the requirements set out in the Code, they may be considered on a case-by-case basis via the MGN 664 process

vessels which can be safely managed by a single Remote Operator and meets the following criteria: .1 the minimum personnel, in addition to the Remote Operator, required to ensure safe manning levels and safe operation of each Remotely Operated Unmanned Vessel during both normal operation and emergency situations; .2 controls and data for each Remotely Operated Unmanned Vessel shall be available in a consistent format which is designed and located to prevent accidental or inadvertent operation; .3 all alerts and alarms shall be available in a format which is designed and located to prevent accidental or inadvertent operation; and .4 means to clearly indicate in a consistent format to the Remote Operator which Remotely Operated Unmanned Vessels they have command and control over.		
7.2.7 A Remote Operator shall have a clear escalation route and shall report to the Master	The role of the master is to be better defined especially when the remote operator is in control of more than one craft as permitted by 7.2.6	Text clarified to incorporate consultation feedback
	How quickly, how many remote operators can they oversee?	The MCA notes your comment on this specific section with thanks. A separate MGN setting out guidance on manning qualifications and experience for those working with ROUVs will be published in 2023
7.2.8 All information and data at the Remote Operation Centre shall be presented in a language understood by all persons working at the Remote Operation Centre.	This section needs to be revised with a view of the centre being in another country	Text clarified to incorporate consultation feedback
7.3	Who will verify this and is it within the scope of the certificate?	The MCA notes your comment on this specific section with thanks

Requirements for Remote Operation Centres		
7.3.1 All Remotely Operated Unmanned Vessel alarm, camera, sensor, radar and communication outputs are to be displayed and audible at the Remote Operation Centre, and shall: .1 detect all objects and information to aid safe navigation, including when the vessel is pitching and rolling; .2 appropriately group all data required for the safe operation of a Remotely Operated Unmanned Vessel;	These requirements are unobtainable and needs better bounding and guidance (.1 and .2)	The MCA notes your comment on this specific section with thanks
	Enable the identification, detection is an autonomous function	Text clarified to incorporate consultation feedback
	Noise-cancelling could be read as implying a solution to mitigate noise. Another solution might be to not have a noisy environment in the first place: - Noise is just one of several aspects that could cause crew distraction. Suggest rephrasing to something like: - the ROC and its equipment must allow each ROUV crew at work to perform their duties without unreasonable concentration of fatigue - the ROC crew workplace conditions (temperature, humidity, noise, heat, emissions) must not hamper safe execution of the voyage/mission	The MCA notes your comment on this specific section with thanks
	Specifically .1, .4 and .7 – not clear at all about what is required and how good is good enough	
7.3.1.3 All Remotely Operated Unmanned Vessel alarm, camera, sensor, radar and communication outputs are to be displayed and audible at the Remote Operation Centre, and shall: .3 enable detection and recognition of different vessel types including lights, shapes, sound and light signals (as detailed in parts C and D of COLREGS, 1972);	Details are also contained in the annexes	The MCA notes your comment on this specific section with thanks
7.3.1.4	This section needs revision as the intent is unclear	Text clarified to incorporate consultation feedback

All Remotely Operated Unmanned Vessel alarm, camera, sensor, radar and communication outputs are to be displayed and audible at the Remote Operation Centre, and shall: .4 enable detection at an appropriate range the behaviour of a vessel in view (such as, speed, course, distance, overtaking or crossing);		
7.3.1.5 All Remotely Operated Unmanned Vessel alarm, camera, sensor, radar and communication outputs are to be displayed and audible at the Remote Operation Centre, and shall: .5 aspect and direction of a vessel in view;	In view is not a term of reference within the rules	Text clarified to incorporate consultation feedback
7.3.1.6 All Remotely Operated Unmanned Vessel alarm, camera, sensor, radar and communication outputs are to be displayed and audible at the Remote Operation Centre, and shall: .6 provide sufficient situational awareness for Remote Operators to effectively control, and plan actions for, a Remotely Operated Unmanned Vessel;	How is sufficient to be defined?	Text clarified to incorporate consultation feedback
7.3.1.7 All Remotely Operated Unmanned Vessel alarm, camera, sensor, radar and communication outputs are to be displayed and audible at the Remote Operation Centre, and shall: .7 provide sufficient situational awareness to be able to detect person(s) in or on the water;	How is sufficient to be defined and at what range?	Text clarified to incorporate consultation feedback
7.3.1.8	Vessel motion should be defined separately in this list	Text clarified to incorporate consultation feedback

All Remotely Operated Unmanned Vessel alarm, camera, sensor, radar and communication outputs are to be displayed and audible at the Remote Operation Centre, and shall: .8 monitor the health and operation of critical systems (including navigation, engineering, fire suppression systems and fuel levels or propulsion battery charge) and vessel motion;		
7.3.1.9 All Remotely Operated Unmanned Vessel alarm, camera, sensor, radar and communication outputs are to be displayed and audible at the Remote Operation Centre, and shall: .9 have sufficient noise cancelling properties (e.g. to minimise the impact of the Remotely Operated Unmanned Vessel's background noise) to aid accurate sound perception by Remote Operators;	This section needs better bounding. The ROC noise cancelling properties would not affect the background noise of the unmanned vessel	Text clarified to incorporate consultation feedback
	Any microphone is specifically fitted for noise capture and should therefore include this, more importantly is the need to identify the direction of the noise. See Resolution MSC.86(70)	The MCA notes your comment on this specific section with thanks
7.3.2 A Remote Operation Centre shall have an emergency source of power which, at a minimum, is able to power all critical systems (see section 2.3.1 of this Annex) a suitable emergency plan can be implemented.	The grammar seems to be wrong the emergency plan should be a requirement	Text clarified to incorporate consultation feedback
	Or the vessel put in a safe state, this allows for the use of UPS systems, shore based power outages are unlikely to be resolved within reasonable limits	
7.3.4 No single incident or failure of systems at the Remote Operation Centre shall result in a Remotely Operated Unmanned Vessel entering an unsafe condition.	This cannot be complied with as a single incident may destroy the ROC. A single failure within the system would be better phrasing	Text clarified to incorporate consultation feedback
	What is a safe condition, this should possibly state what the failsafe	The MCA notes your comment on this specific section with thanks

	status/actions of an unoperated ROUV should be?	
7.3.5 A Remote Operation Centre shall have means to display the status of each Remotely Operated Unmanned Vessel. The status of a vessel shall include all the information required to safely and successfully operate a Remotely Operated Unmanned Vessel.	This section requires better bounding	The MCA notes your comment on this specific section with thanks
7.4 Remote Operation Centre Workstations	Who will verify this and is it within the scope of the certificate?	The MCA notes your comment on this specific section with thanks
7.4.1 Remote Operator Centre workstations shall be set-up so that the remote operator at all times: .1 has a sufficient number of screens to display critical information at all times (e.g. alarm, camera, sensor and radio outputs); .2 is able to view all critical alarm, camera and sensor outputs from a single seated position; .3 is able to operate navigation lights and sound appliances (see section 18 of the Code); .4 has a minimum 180° front view from the perspective of the Remotely Operated Unmanned Vessel; .5 is able to monitor a 360° total field of view; .6 is able to monitor critical systems and functions; .7 is able to detect degradation in sensor performance and overall situational awareness; .8 is able to intervene to manage the safe control of the vessel (except during loss of connection between the Remote	.4 and .5 at what range and quality? .4 how do you know what is good enough?	7.3.1 All Remotely Operated Unmanned Vessel alarm, camera, sensor, radar and communication outputs are to be displayed and audible at the Remote Operation Centre, and shall: .5 provide situational awareness for Remote Operators to effectively control, and plan actions for, a Remotely Operated Unmanned Vessel; .6 provide situational awareness to be able to detect person(s) in or on the water;

Operation Centre and Remotely Operated Unmanned Vessel); and .9 is alerted when data has not been refreshed within an acceptable timeframe.		
7.4.1.1 Remote Operator Centre workstations shall be set-up so that the remote operator at all times: .1 has a sufficient number of screens to display critical information at all times (e.g. alarm, camera, sensor and radio outputs);	This section needs better bounding e.g. radio outputs are audible therefore not requiring a screen. The size of the screen can alter the amount of information therefore the number is not a deciding factor	Text clarified to incorporate consultation feedback
7.4.1.2 Remote Operator Centre workstations shall be set-up so that the remote operator at all times: .2 is able to view all critical alarm, camera and sensor outputs from a single seated position;	This is not coherent with 3.4.4 where the requirement is for audible only at the control position	Text clarified to incorporate consultation feedback
7.4.1.3 Remote Operator Centre workstations shall be set-up so that the remote operator at all times: .3 is able to operate navigation lights and sound appliances (see section 18 of the Code);	Day signals as prescribed by the COLREGS are not mentioned	Text clarified to incorporate consultation feedback
7.4.1.4 Remote Operator Centre workstations shall be set-up so that the remote operator at all times: .4 has a minimum 180° front view from the perspective of the Remotely Operated Unmanned Vessel;	A 225° front view is more suitable than 180° (aligns with IMO bridge ergonomics). There is no reference to pan-tilt-zoom camera function. Current text could leave you with poor situational awareness. The pan-tilt-zoom feature is equivalent to carrying binoculars on a manned vessel and is essential to safe navigation	Text clarified to incorporate consultation feedback
	The difference between the 180° and 360° requirement is unclear (also 5.3.3	

	which requires “unobstructed all round vision”)	
7.4.1.5 Remote Operator Centre workstations shall be set-up so that the remote operator at all times: .5 is able to monitor a 360° total field of view;	A 225° front view is more suitable than 180° (aligns with IMO bridge ergonomics). There is no reference to pan-tilt-zoom camera function. Current text could leave you with poor situational awareness. The pan-tilt-zoom feature is equivalent to carrying binoculars on a manned vessel and is essential to safe navigation	Text clarified to incorporate consultation feedback
	The difference between the 180° and 360° requirement is unclear (also 5.3.3 which requires “unobstructed all round vision”)	
7.4.1.9 Remote Operator Centre workstations shall be set-up so that the remote operator at all times: .9 is alerted when data has not been refreshed within an acceptable timeframe.	Acceptable timeframe should be defined	Acceptable timeframe will differ depending on the nature of each ROUV’s operation, equipment and risk assessment carried out for the vessel’s operations
7.4.2 A Remote Operation Centre workstation shall: .1 display all essential information required for safe remote operation at all times, even when a single or probable combination of failures has occurred; and .2 be designed so that the failure of a single connection, processor or display unit shall not result in unsafe or misleading data being displayed to the Remote Operator.	Does this cover out of date data	Out of date data may be essential information for safe operation. However, up to date data shall be available at the Remote Operation Centre workstation at all times
	Suggest this requirement is updated to require that the ROC is tolerant against potential Common Cause Failures (CCF). CCF defeats the redundancy by causing concurrent failure of redundant components. Software is a credible cause of CCF because its failures are systematic rather than random. In practice this may well mean having diverse redundant backup systems when software is involved in the primary system	The MCA notes your comment on this specific section with thanks

7.4.2.1 A Remote Operation Centre workstation shall: .1 display all essential information required for safe remote operation at all times, even when a single or probable combination of failures has occurred; and	Lacking definition of failures and information it should be limited to the function of the workstation in question	Text clarified to incorporate consultation feedback
7.4.3 Safety critical controls for a Remote Operation Centre workstation shall be: .1 designed and located to prevent accidental or inadvertent operation (e.g. dedicated levers); and .2 designed and accessible for rapid use in an emergency.	Safety critical needs definition	Text clarified to incorporate consultation feedback
7.4.4 When in use a Remote Operation Centre workstation shall, as minimum, display the following navigational and operational data at an update rate and level of detail to ensure safe operation: .1 speed; .2 heading (or track); .3 position; and .4 camera and sensor outputs.	Surely also the visual picture is also required to enable a watch to be maintained	The visual picture would be provided through display of camera outputs
7.4.4.2 When in use a Remote Operation Centre workstation shall, as minimum, display the following navigational and operational data at an update rate and level of detail to ensure safe operation: .2 heading (or track);	And track not or	Text clarified to incorporate consultation feedback
7.4.4.4 When in use a Remote Operation Centre workstation shall, as minimum, display the following navigational and operational data at an update rate and level of detail to ensure safe operation:	And track not or	Text clarified to incorporate consultation feedback

.4 camera and sensor outputs.		
7.4.6 Multiple Remote Operation Centre workstations shall be able to be operated simultaneously without causing interference during normal operations or emergency situations.	It is unclear what the intention of this is	Text clarified to incorporate consultation feedback
7.5 Connectivity between the Remotely Operated Unmanned Vessel and Remote Operation Centre	Who will verify this and is it within the scope of the certificate?	The MCA notes your comment on this specific section with thanks
7.5.1 A Remotely Operated Unmanned Vessel shall receive and respond to commands from the Remote Operation Centre and shall: .1 react in a correct and timely manner (see section 7.5.4); .2 provide real-time functionality and operations; .3 operate within the full range of intended distances between the Remotely Operated Unmanned Vessel and Remote Operation Centre; and .4 safely operate within all anticipated weather and sea state conditions	In this section it could state that the ROUV should send a 'handshake' notification, stating command received and executed. Or the operator does not know is certain (non-visible) commands have been executed	Text clarified to incorporate consultation feedback
7.5.2 Communication links between a Remotely Operated Unmanned Vessel and Remote Operation Centre shall be divided into essential and operational communications and shall: .1 not be corrupted; .2 have redundancies; .3 be designed to facilitate real-time monitoring of critical equipment health and functionality;	What types of redundancies are envisaged? Note that 4.2.4 implies that failure of the primary system is acceptable	If the primary communications system fails there shall be an available secondary system

.4 be designed so that any single or common cause failure in communication links shall not affect the safe operation of the Remotely Operated Unmanned Vessel; and .5 enable remote troubleshooting.		
7.5.2.1 Communication links between a Remotely Operated Unmanned Vessel and Remote Operation Centre shall be divided into essential and operational communications and shall: .1 not be corrupted;	This may not be achievable as corruption may not be evident but may be in place	The MCA notes your comment on this specific section with thanks
7.5.2.3 Communication links between a Remotely Operated Unmanned Vessel and Remote Operation Centre shall be divided into essential and operational communications and shall: .3 be designed to facilitate real-time monitoring of critical equipment health and functionality;	How about safe navigation?	The MCA notes your comment on this specific section with thanks
7.5.3 Data received from Remotely Operated Unmanned Vessel shall be considered in an order of priority as follows: .1 situational awareness information; .2 remote control commands for critical systems; .3 emergency and back-up system control; .4 supervision data; .5 maintenance data.	Consider list 3, 2, 1, 4, 5	Text clarified to incorporate consultation feedback
7.5.3.2 Data received from Remotely Operated Unmanned Vessel shall be considered in an order of priority as follows:	Generally safety critical systems should be capable of undertaking required actions without the need for a comms link i.e. fire suppression, bilge pumping, engine shutdown etc.	Text clarified to incorporate consultation feedback

.2 remote control commands for critical systems;	however yes in general safety commands should take priority	
7.5.4 The vessel owner/operator shall provide evidence to the satisfaction of the Certifying Authority and the Administration that: .1 the Remotely Operated Unmanned Vessel reacts in a correct and timely manner to instructions in all intended weather conditions and intended distances from the Remote Operation Centre; .2 latency and data bandwidth requirements will not exceed the connectivity capabilities in all intended weather conditions and distances from the Remote Operation Centre; and .3 latency shall not result in an unsafe condition; .4 communications and control equipment is adequately protected from electromagnetic interference (see MIN XXX); .5 alarm and emergency data from the Remotely Operated Unmanned Vessel is correctly displayed and audible at the Remote Operation Centre; and .6 connectivity and signal strength between a Remotely Operated Unmanned Vessel and Remote Operation Centre shall be monitored at a frequency appropriate to the nature of the vessel's operation and communications equipment.	Is this not covered by 7.5.1 and parts not covered should be amended in 7.5.1	Text clarified to incorporate consultation feedback
	Should we really allow operators to self-certify the performance of their control systems, surely they should be required to demonstrate these to the CA or Administration. This is vague how is the MCA going to audit the CAs on this? Also why are there two masters CA or Administration. This requirement appears to be a function of the comms bearers service level	
	Not clear who is undertaking approval? Approval is very disjointed	
	So which authority is doing the approval here? Clearly the MCA. But MCA is not staffed with sufficient expertise, to deal with the number of applications that will be forthcoming from introduction of this code	The MCA notes your opinion on this specific section
7.5.4.1 The vessel owner/operator shall provide evidence to the satisfaction of the	How do you intend to qualify this, the principle of physical testing in all weather conditions is prohibitive	The MCA notes your comment on this specific section with thanks

Certifying Authority and the Administration that: .1 the Remotely Operated Unmanned Vessel reacts in a correct and timely manner to instructions in all intended weather conditions and intended distances from the Remote Operation Centre;		
7.5.6 Key vessel functions shall be able to be remotely restored from the Remote Operation Centre.	Must define key functions	Text clarified to incorporate consultation feedback
7.5.10 A Remotely Operated Unmanned Vessel shall be under control at all times, including during switchover between data-link channels. Switchover between data-link channels shall not lead to an unsafe condition.	Consider adding “except through some exceptional circumstances, be”	The MCA notes your comment on this specific section with thanks
7.5.11.3 All commands sent to a Remotely Operated Unmanned Vessel shall be: .3 retained for a minimum of six months.	Why retained for 6 months?	Text clarified to incorporate consultation feedback
7.6.1 A risk assessment shall be carried out by the owner/operator of a Remotely Operated Unmanned Vessel to assess acceptable period(s) of loss of capacity of critical systems or connectivity with due consideration of the vessel’s intended area of operation, and shall be submitted for the approval of the Administration. The risk assessment shall, at a minimum, consider the following: .1 loss of propulsion capacity; .2 loss of steering capacity;	Where does the administration stand on the acceptability of this value, which would be expected to be sub-minute, what if the owner decides 15 min is ok? There should be an approval requirement for this	The specific value will depend on the unique systems of a ROC and ROUV. Risk assessments are individual to each vessel and use case, therefore it would not be appropriate to specify blanket minimum standards
	Can this not also be done by the CA?	The roles of Certifying Authority and Administration are clearly set out within the Code
	This is a very specific risk assessment and mitigation sub-task that is insufficient to demonstrate that the risks associated with the ROUV design have been managed to acceptable levels:	The MCA notes your comment on this specific section with thanks

.3 loss of connectivity from the Remote Operation Centre; .4 loss of connectivity from the Remote Operation Centre; .5 risks associated with connectivity loss in all Area Categories of Operation; .6 inability to re-establish connectivity between the Remote Operation Centre and Remotely Operated Unmanned Vessel .7 loss of control from the Remote Operation Centre; and all identified risks to a Remotely Operated Unmanned Vessel and appropriate safeguards. Where loss of capacity or critical systems cannot be resolved within the accepted period(s) set out in the risk assessment, the vessel shall enter a safe state appropriate to the intended conditions of operation (e.g. initiating dynamic positioning and shutting down non-essential systems, reducing speed or emitting audio and visual warnings to other water users).	- it focuses only on loss of capacity rather than the more demanding case of unannuciated malfunction (e.g. engine runaway, autopilot handover malfunction etc.) - it limits the scope of the assessment to 7 capabilities (or functions) (noting that bullet 4 is a repeat of bullet 3). There is no rationale as to why these specific capabilities have been selected. There does not appear to be a requirement to: - undertake a risk assessment of all the safety-related functions of the ROUV; and - manage their associated risks to acceptable levels - the defined risk control is to include a safety function to revert the vessel to a safe state after an allotted period of time has elapsed. This appears to preclude other mitigation strategies such as designing the system so that its safety related functions achieve suitably high levels of integrity such that functional failures are less likely to occur in the first place. As such the approach prescribed by Annex 2 is not aligned with the principles of inherently safer design which involves incorporation of inherently safer design features, where these are possible, to reduce the reliance on engineered safety systems or operational procedures, to control risk. The Annex does not explain the intention/goal behind this sub-task. As mentioned in a previous comment the	

	Annex would benefit from explicitly stating that: (a) the ROUV system must be designed to reduce the risk to people including crew, ground staff and third parties to a level acceptable to the CA. It must also be designed to reduce the risk of material loss or damage to a level acceptable to the CA (1) where any function of a ROUV is essential to, or can prejudice, continued safe operation of the ROUV, that function, and the equipment performing the function, (including equipment remote from the ROUV), shall be considered as part of the ROUV for the purposes of the validity of the certification/approval (2) each item of equipment, each system, and each installation: (i) when performing its intended function, may not adversely affect the response, operation of accuracy of any: - equipment essential to safe operation; or - other equipment unless there is a means to inform the ROUV crew of the effect (ii) must be designed to prevent hazards to the ROUV system in the event of a probable malfunction or failure (b) the design of each item of equipment, each system, and each installation must be examined, separated and in relationship to other systems to determine if:	

	α – the ROUV is dependent upon its function for continued safe operation and β – failure of a system would significantly reduce the capability of the ROUV or the ability of the ROUV crew to cope with adverse operating conditions	
	Again, MCA is holding approval to itself, yet is not staffed with sufficient numbers of experienced officials to cover requirements from UK operators	The MCA notes your opinion on this specific section
7.6.1.4 A risk assessment shall be carried out by the owner/operator of a Remotely Operated Unmanned Vessel to assess acceptable period(s) of loss of capacity of critical systems or connectivity with due consideration of the vessel's intended area of operation, and shall be submitted for the approval of the Administration. The risk assessment shall, at a minimum, consider the following: .4 loss of connectivity from the Remote Operation Centre;	Duplicated text	Text clarified to incorporate consultation feedback
7.6.2 All instances where contact between the Remote Operation Centre and Remotely Operated Unmanned Vessel is lost for longer than the accepted period(s) determined in section 7.6.1 of this Annex shall be recorded within the Official Log Book (see section 2.2 of this Annex), highlighting: .1 when the connection was re-established; .2 duration of loss of contact; .3 the method of recovery; and	Presumably only when exceeding the time found acceptable within the RA	Yes, only when exceeding the agreed time set out in the risk assessment detailed in Section 7.6.1

.4 whether any emergency procedures were carried out.		
7.6.4 A Remotely Operated Unmanned Vessel shall be fitted with a speaker system to transmit audio instructions.	Duplicated with 4.3.3, onerous requirement for small vessels	The MCA notes your comment on this specific section with thanks. The requirements for ROUVs set out in Workboat Code Edition 3 are appropriate to the risks and needs of the sector. The MCA is prioritizing a package of work to specifically address the need for proportional requirements for the smallest of ROUVs
	This appears to be one of a few examples where the Annex repeats the requirement. The group refers to 4.2.1 radiocommunication equipment and believes that the speaker system would be an addition to any fitted radiocommunications, thus if the vessel is too small for the radio, it most certainly will not have a speaker system. It should be considered that if an ROUV is being operated within visual line of sight then the circumstances should negate both requirements. VLOS aside, the group agrees that this is not practicable for the small ROUVs, and a lower size limit should be established for clarity	Text clarified to incorporate consultation feedback. The requirements for ROUVs set out in Workboat Code Edition 3 are appropriate to the risks and needs of the sector. The MCA is prioritizing a package of work to specifically address the need for proportional requirements for the smallest of ROUVs
	This is duplication of the requirement under rescue section	Text clarified to incorporate consultation feedback
7.6.5 Where a Remotely Operated Unmanned Vessel loses connectivity with the Remote Operation Centre the vessel shall display or emit “not under command” sounds and visual signals to alert other water users that the vessel is not under command and may not give way.	Contradicts the main Code, which does not require NUC lights and signals for vessels under 12m. Can you confirm this specific and new requirement for uncrewed vessels of all sizes?	This is a specific new requirement for all unmanned vessels Yes, only when exceeding the agreed time set out in the risk assessment detailed in Section 7.6.1
	Not that COLREGs exempts vessel below 12m from showing the required lights and shapes for NUC, conclude this is an additional requirement, also conclude that a vessel is not NUC until	

	the accepted time has elapsed in respect to the RA	
	The cyber requirements are in general not currently being met and these are examples should be balanced against the size of the vessel and the potential risk it poses the environment and 3rd parties. The group agrees that this is not practicable for the small ROUVs, and a lower size limit should be established for clarity	The requirements for ROUVs set out in Workboat Code Edition 3 are appropriate to the risks and needs of the sector. The MCA is prioritizing a package of work to specifically address the need for proportional requirements for the smallest of ROUVs
7.7.2 A Failure Modes and Effects Analysis (FMEA) shall be developed detailing identified hazards, potential failures and incidents, and their likely impacts. Action plans shall be developed to provide on-duty employees with the actions and equipment required to effectively resolve identified potential failures and incidents	An FMEA is not necessarily an optimal analysis approach. Agree that the analysis should account for failures but Hazop/fault tree analysis and other methods may be more suitable. Operator should be given the choice	Text clarified to incorporate consultation feedback
	This is insufficient to demonstrate that the risks associated with the ROUV system have been managed to accepted levels: - A FMEA is a bottom up, relatively 'stovepiped' analysis technique. Being a 'bottom-up' technique, it is not well suited to analysing the effects of software failures (given the large number of ways in which software failures can deviate from its intended functionality, a FMEA approach can result in an exponential number of effects to be analysed) - The FMEA appears to be limited to failure initiating only in the ROC and does not cover the full extent of the ROUV system (i.e. it does not consider all the equipment involved in performing functions that are essential to, or can prejudice, continued safe operations of the ROUV. Other such	

	equipment might include the satellite relays and the unmanned vessel itself) - In order to understand the importance/criticality of the identified effects will be necessary to undertake a top-down functional hazard analysis (or systems – theoretical process analysis) which covers the entirety of the functions of the ROUV system not just the ROC. The FMEA outputs can then be linked to the identified functional failures - the requirement does not specify a minimum standard for the development/production of the FMEA - providing action plans to employees is not aligned with the principles of inherently safer design which involves incorporation of inherently safer design features, where these are possible, to reduce the reliance on engineered safety systems or operational procedures, to control risk	
7.7.3 Critical systems shall have primary and emergency power supplies. Emergency power supplies (e.g. generators or battery systems) shall have a regular testing and maintenance programme in place.	Primary and emergency power supplies may be restrictive on small vessels. There is a clear requirement for the unmanned vessel to display appropriate lights (specifically not under command) but I did not see an explicit requirement for it to display day shapes or flags. I believe the intent should be clarified	Section 18 of the Workboat Code Edition 3 sets out the requirements for workboats in regards to displaying day shapes or flags
7.7.4 A regularly updated copy of critical systems and databases shall be available.	What does this mean, noting that where the owner has bought a vessel they may not have full access to the vessel information, you will need to prescribe a list of information to be provided How regularly?	Text clarified to incorporate consultation feedback

7.7.5 A Remotely Operated Unmanned Vessel handover procedure developed. The procedure shall include but not be limited to: .1 requirements to enable safe transfer of a vessel between workstations and Remote Operation Centres; .2 handover information when transferring vessels between Remote Operators; .3 means to clearly identify the in-command workstation or Remote Operation Centre; .4 means to ensure positive control is maintained at all times; and .5 measures to ensure that a vessel's control position is known and recorded at all times.	Provides requirements for transfer of control to different workstations or locations; however, it does not address transfer from one operator to another at the same workstation (e.g. at the end of a shift). This form of transfer of control can equally give rise to safety risks (e.g. due to inadequate handover brief, confusion due to user specific views/settings on the HMI, out-of-the-loop loss of situational awareness)	Transfer from one Remote Operator to another (e.g. at the end of a shift) is covered in: .2 handover information when transferring vessels between Remote Operators;
7.7.7 In the event of the Remote Operation Centre becoming inoperable a secondary, or back-up, Remote Operation Centre shall be available. The back-up shall: .1 be able to replicate, at a minimum, camera and sensor outputs and other relevant information for effective operation of Remotely Operated Unmanned Vessels; .2 be readily accessible; .3 have a testing programme to assess suitability of systems and personnel responses (such as emergency drills); and .4 have its systems, databases and server regularly updated (where applicable). Where the connection between the Remotely Operated Unmanned Vessel and Remote Operation Centre fails the vessel shall enter, and remain in, a	Can this be in the same building?	A secondary, or back-up Remote Operation Centre may be in the same building if there are suitable redundancies and back-ups in place (e.g. independent communication systems which would not be compromised if the primary Remote Operation Centre experiences a cyber attack)
	Note that this does not need to be a centre in the physical sense, it need only be a system, which might be portable e.g. a laptop and cell phone. Remote operating station may be a better term	The MCA notes your comment on this specific section with thanks

safe state until connection is either re-established with the Remote Operation Centre or established with a secondary or back-up Remote Operation Centre		
7.7.8 A communications link shall be present between the main Remote Operation Centre and the secondary, or back-up, Remote Operation Centre(s). The secondary, or back-up, Remote Operation Centre shall take appropriate measures (such as taking control of the Remotely Operated Unmanned Vessel) if the communications link is broken.	Must define which communication link and how would this be ascertained	Text clarified to incorporate consultation feedback
	Not sure what this is requiring, auto transfer of control is difficult, normally control must be given and then taken, it can't just appear and disappear (see the USS John S McCain incident). Transfer of control between primary and secondary is an operational manner, re-establishing control via emergency means is an emergency function	
	This implies that the second ROC has to be online at all times ready to take over, is this correct?	
7.8.1 A Remotely Operated Unmanned Vessel shall have an emergency stop button which is located on, and can be activated from, the external face of the vessel.	Should this have security and a level of integrity suitable for the intended operations?	Text clarified to incorporate consultation feedback
	Is this safe? This would make third party interference a bigger concern and there also are serious HSE hazards consider to put one vessel alongside another with a person hanging over the side in an attempt to press an 'ESOP' button, with the danger of them falling between the vessels	
	An emergency stop button on the external face of the vessel represents a single point of failure which could disable the vessel. It is the suggestions that the implications of a single point of failure be fully risk assessed before inclusion as a requirement	

	Experience shows that this is a bad requirement, it can be weather activated and allows for nuisance or hostile interference with the vessel. It may be dangerous to activate in bad weather. It then also needs to be overridable from the ROC which makes it a safety issue as it won't necessarily provide emergency stop. A number of vessels do have an accessible stop or transfer of control button for authorised persons who have boarded the vessel, it may be protected from tampering	
	This is an unwarranted and unnecessary requirement that should be opposed by all MASS operators. This requirement increases significantly and without due reason the risk of an ROUV being hijacked. It serves no good purpose, as 'remote stopping', for the ROC, is mandated below, and is entirely satisfactory for vessel safety	
7.8.2 A Remote Operation Centre shall have a clearly identifiable emergency stop button which: .1 sends a signal to command the Remotely Operated Unmanned Vessel(s) to enter a safe state; .2 halts communication and transmission of data between the Remote Operation Centre and the Remotely Operated Unmanned Vessel; and .3 is designed and located to prevent accidental or inadvertent operation (e.g. dedicated levers);	Is the e-stop being hit because there is an issue with the ROC or with the ROUV or both? Note that e-stop systems should normally be hardwired, the use of an e-stop in a control room implies that there is software control at some point within the system usually involved in transmitted the signal via the comms channel, this makes the system very hard to assure. A better system is to use a watchdog system onboard the vessel which activates on the loss of the safety word from the ROC. This is not necessarily the outcome of the e-stop process, e-stop	Text clarified to incorporate consultation feedback

.4 is designed to operate within the full range of intended distances between the Remotely Operated Unmanned Vessel and the Remote Operation Centre and within all anticipated weather and sea state conditions; .5 is designed and accessible for rapid use in an emergency; .6 is connected to a primary and secondary power source; and .7 can be overridden once the emergency or problem has been resolved. It is strongly recommended that activation of the emergency stop button sends a signal to the back-up Remote Operation Centre advising that the Remotely Operated Unmanned Vessel(s) are no longer being controlled by the primary Remote Operation Centre and that the emergency stop button has been activated.	does not necessarily mean the ROC has failed	
7.8.2.2 A Remote Operation Centre shall have a clearly identifiable emergency stop button which: .2 halts communication and transmission of data between the Remote Operation Centre and the Remotely Operated Unmanned Vessel; and	Communication should be maintained if possible Better definition is required here as this paragraph seems to suggest killing the comms link entirely which is something that you would never want to do. It appears that the section is trying to remove the ability for a remote operator to send control commands to the vessel, and it should be re-worded as such. Killing a comms link would remove all situational awareness, remove the ability to remotely record data and open up the possibility of not being able to re-establish it. We do not consider the proposal that the emergency stop button stops all communications between ROC and	Text clarified to incorporate consultation feedback

	vessel a prudent or safe function. There are very limited cases where such a measure would be advantageous, and many cases were it would introduce unnecessary risk	
	Why would you halt communication and transmission, then there is no way of monitoring or restarting the vessel. It may be sufficient to stop propulsion/steering. The proposed use of the vessel will determine the appropriate function of e-stops	
7.8.2.7 A Remote Operation Centre shall have a clearly identifiable emergency stop button which: .7 can be overridden once the emergency or problem has been resolved.	Overridden suggests the power to the stop is still energized this should be reset so it remains available once back in normal operation	Text clarified to incorporate consultation feedback
7.8.3 A Remote Operated Centre workstation shall have means to enable the Remote Operator to rapidly shut off, and re-initialise, fuel or power to the Remotely Operated Unmanned Vessel's engine(s) and shall: .1 be designed and located to prevent accidental or inadvertent operation; .2 be designed and accessible for rapid use in an emergency; and .3 have means to indicate to the Remote Operator when the shut-off has been activated.	This potentially make this a safety critical system and invokes onerous assurance requirements	The MCA notes your comment on this specific section with thanks
7.8.4 A back-up Remote Operation Centre shall be available at all times.	Duplicate with 7.7.7	Text clarified to incorporate consultation feedback
7.9.1 A Remotely Operated Unmanned Vessel may operate as either a Type 1 or Type 2	Is appropriate to expect that an ROUV can be certified to meet the requirements for a type 2 tender	A ROUV acting as a Type 2 Tender could tender stores to and from the mother vessel

tender, but is not permitted to have any persons on board. Refer to section 24 of the Code for the requirements for tenders.	The majority of experienced MASS operators need to retain a master (crew) on board for safety in certain operations. MCA needs to identify the means of continuing this process without undue bureaucracy	Annex 2 on Remotely Operated Unmanned Vessels sets out requirements purely for Remotely Operated Vessels which are Unmanned. For Remotely Operated Vessels which wish to be operated as manned then the process set out in MGN 664 shall be followed

8: Safety Management System and Contingency Measures

Section of Code	Feedback Received	MCA Position
8.2 Operating Procedures and Risk Assessments	How is GDPR relevant in connection with cyber security, the management of personal information is separate from the vessel's operation	The MCA notes your comment on this specific section with thanks
8.5 Critical Systems	Systems may be critical for safety or vessel function or both, which is being assured? Criticality may also be time dependent, time for alternative means to be engaged, time for recovery or external aid to ROUV. We agree with the principal that the vessel's systems should be broken down but then assessed for their risk to safety, mission and the environment. With proportional assurance processes applied appropriate to the risk	Critical equipment is a defined term: "Critical equipment" means any equipment or system which, if it fails, would result in the unsafe operation of the vessel, and compromise the safety of other water users, and the safety of the marine environment
8.6 Programmable Electronic Systems, Software and Version Control	This is hard to achieve, and impossible to implement, no requirements for verification are defined. LR would typically review the functions of the vessel which use software, and for those which require some assurance, we would audit the ROUV's software quality plan and software development system. Other CAs can do something different under these requirements. To date we have not seen use of any functional safety assessment by industry and few applications of formal software assurance processes. We may be able to achieve a SIL2 level of software assurance for critical parts of the system e.g. e-stop. Which in many cases is sufficient	Text clarified to incorporate consultation feedback

	The section on PES and software is insufficient to manage the risk presented by programmable elements. It is proposed that this section is totally re-written to provide a coherent description of the expected activities in order to provide assurance the contribution to risk associated with programmable elements is sufficiently managed. The terms PES and software are not defined	The terms PES and software have been defined
8.6.2 Safety Integrity Levels (SIL) shall be used for systems where levels of risk are clearly defined	A ROUV may not need to apply a SIL approach for software if they use hardwired system to put the vessel into a safe state	Text clarified to incorporate consultation feedback
	Does not appear to make sense: - SIL are one small aspect of wider systematic functional safety process deployed with development and safety assessment framework - the requirement does not define what development and safety assessment framework should be applied to assure the safety of electrical/electronic/programmable electronic (E/E/PE). As such the requirement is nonsensical. A good candidate development and safety assessment framework for adoption is IEC 61508 - a functional safety process for electrical/electronic/programmable electronic (E/E/PC) systems requires determining the level of risk associated with all functional failures, then system safety functions requirements and associated integrity requirements can be determined. SILs are used for specifying the safety integrity	

	requirements of the safety functions to be allocated to safety-related systems	
8.6.3 Programmable Electronic Systems (PES) shall: .1 be safe; .2 have functional safety3 (see MIN XXX); and .3 be designed to operate safely in all anticipated conditions and reasonably foreseeable misuse situations.	These requirements are incredibly vague and extremely onerous and potentially undermine the application of the Annex, there are very few organisations within the entire marine ecosystem who understand and functional safety has not been adopted by marine. Whilst it is entirely reasonable to expect appropriate levels of software assurance, this section of the code provides no practical application for the ROUV industry	Text clarified to incorporate consultation feedback
	With respect to this requirement, it is noteworthy that a Programmable Elements cannot be safe or unsafe in itself only in context of its role within the ROUV system (hence the need to apply a wider development and safety assessment framework such as IEC 61508 in order to understand the potential Programmable Elements contribution to risk). It therefore does not make sense to say that PES shall be safe or have functional safety. Additionally, this requirement seems to imply that safe is an absolute term which it is not. It is more appropriate to require that the contribution to risk associated with Programmable Element has been managed to acceptable levels through the demonstration that the Programmable Element has been developed in accordance with recommended good practice as set out in recognised Programmable Element development	

	standard (such as IEC 61508 part 3) within a recognised wider development and safety assessment framework (such as IEC 61508 all parts). The IMO guideline on software quality assurance and human centered design for e-navigation and ISO 17894 ships and marine technology – computer applications both refer to IEC 61508 as a reference standard for demonstrating functional safety and managing the contributions to risk associated with programmable elements	
8.6.4 In the event of a failure the affected PES shall enter, or remain in, a safe state. Auditory and visual alarms shall be activated in the affected space and at the control position(s).	Does this requirement apply to any failure or only failures that are safely related? In any case, given the large number of potential ways in which Programmable Elements can deviate from their intended functionality, it is not practically possible to comply with this requirement	If a PES fails it is correct that it shall enter a safe state.