

MARITIME COMMUNICATION PLAN

ADMINISTRATION PAGE

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ABBREVIATIONS

AIS	Automatic Identification Systems
Defra	Department for Environment, Food and Rural Affairs
ERP	Emergency Response Plan
HIT	HyImpulse Technologies GmbH
HMCG	His Majesty's Coastguard
LCC	Launch Control Centre
MCA	Maritime and Coastguard Agency
MMC	Mission Management Centre
MRCC	Maritime Rescue Coordination Centre
MSI	Maritime Safety Information
NLB	Northern Lighthouse Board
NM	Notice to Mariners
NRA	Navigational Risk Assessment
Ops Rm	Operations Room
RCC	Range Control Centre
RNW	Radio Navigation Warnings
Saxa	SaxaVord Spaceport
UKHO	UK Hydrographic Office
VHF	Very High Frequency
WZ	UK Coastal Warnings

1 INTRODUCTION

The SaxaVord Maritime Communication Plan gives detail on the communications provided by SaxaVord Spaceport (Saxa) to stakeholders starting at L-4 months and finishing with “Mission Completion”. It is tailored specifically to the suborbital flight of HyImpulse (HIT).

It includes processes for pre-launch notifications, including: Notices to Mariners (NMs); examples of Radio Navigation Warnings (RNWs); and radio communication protocol between Saxa Range Control and any vessels undertaking Range Safety or Recovery duties.

The distribution list for all organisation to be notified can be found at Appendix D.

Communications with international partners are also included as is an outline of hazard area control and monitoring.

The launch will be monitored from the Mission Management Centre (MMC). The MMC consists of:

- Range Control Centre (RCC) where tracking, telemetry, and flight termination functions are performed;
- Launch Control Centre (LCC) where the launch operator monitors launch vehicle parameters;
- Range Operations Room (Range Ops Rm) where boundary monitoring, communications and coordination functions are performed.

An intercom system within the MMC ensures personnel can communicate with each other throughout the launch operation.

Timings used are in the form of “L-” or “T-”. An “L-” time is the time to the opening of the launch window. It is usually measured in months and days but can include hours and minutes. “T-” times are the time to launch and are usually measured in hours and minutes. The time to launch will sit within the launch window. Pauses in launch countdown are common and often arise as a routine occurrence so technical aspects associated with safety can be checked before proceeding. This means a time of T-1h does not necessarily mean the launch will happen in 1 hour.

This document should be read in conjunction with the Maritime Emergency Response Plan (SAXA-UK-OPS-001-Maritime Emergency Response Plan). SaxaVord works with a Contingency Planning Working Group and has a Multi-Agency Initial Response Plan as well as an Emergency Response Plan (ERP) that includes Emergency Orders for a variety of scenarios.

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2 COMMUNICATIONS PRIOR TO LAUNCH

2.1 L – 6 months

Pre-planning call between SaxaVord and HIT to discuss the Navigational Risk Assessment (NRA), emergency response plan and communications, and provide information pertaining to the launch licence application. This call includes other maritime stakeholders.

2.2 L – 4 months

- Preliminary information sent to Maritime and Coastguard Agency (MCA);
 - Navigational Risk Assessment,
 - Communications Plan (draft),
 - Marine Emergency Response Plan (draft)
- Marine Licence submission to Marine Directorate (MD).
- Saxa delivers, via email, all information required for the UKHO as appropriate to issue information to mariners, such as national notices to mariners and navigational warnings. Information requirements are described in SAXA-UK-OPS-SOP-001 Range Launch Planner V3.0, which also includes contact details.

2.3 L – 2 months

The final version of the Communications Plan is provided to MCA, MD, Northern Lighthouse Board (NLB) and the UK Hydrographic Office (UKHO) for review. It contains additional information regarding the Range Safety Vessel(s) and the Recovery Vessel(s) that was not available at L-4 months.

The final version of the Maritime ERP is provided to MCA and His Majesty's Coastguard (HMCG) for review. It contains a more detailed update about the maritime response to an accident during the launch activity of HIT. The Maritime ERP is part of the wider ERPs of Saxa implemented for this launch activity and validate by the UK Civil Aviation Authority (CAA) through the Spaceport Licence Application (Space Industry Act 2018/Space Industry Regulation 2021).

UKHO will publish a Temporary Notice to Mariners. The Temporary Notice to Mariners is also delivered by Saxa to the following authorities/organisations:

- Sullom Voe Harbour
- Shetland Islands Council (Ferries)
- Cooke Aquaculture
- Shetland Islands Fishermen
- Shetland Shellfish Management Organisation
- Scottish Fishermen's Federation
- North Atlantic Fisheries College
- Seafood Shetland
- Unst Shellfish Ltd
- RYA Scotland

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- Fisheries Rep, Defra
- Lerwick Port Authority
- UK Technical Services Navigation, MCA
- Northern Lighthouse Board
- Seafish (online bulletin)
- Maritime Rescue Coordination Centre (MRCC) Shetland
- Offshore Energy Team, His Majesty's Coastguard (HMCG)

2.4 L –1 month

Additional local notifications and notices / adverts distributed, and spaceport website updated with specific launch details.

Minor changes to the Maritime Communications Plan and ERP are applied if needed and recirculated to the stakeholders.

2.5 L- 14 days

Neighbouring countries must be notified as and when necessary, by the Spaceport or launch operator, especially if debris may land within their waters – see Section 5 for further details.

2.6 L –7 days

RNW information is delivered, via email using template supplied by UKHO. If there is no automatic response from UKHO to confirm information received, Saxa will telephone UKHO on +44 1823 353448 (direct line).

The Temporary Notice to Mariners (Temp NM) will provide general details, with as much information as known at that stage, and will inform mariners that further notifications will be promulgated by Navigational Warnings when appropriate.

Details of the distribution list for further notifications can be found at Appendix D.

2.7 L –5 days

The RNW will be broadcast 5 days prior to launch with specific details. This can be further updated prior to launch on notification from the operator (e.g. due to weather).

3 COMMUNICATIONS ON LAUNCH DAY

3.1 Notifications to HMCG

By telephone to HMCG (+44 1595 692976): 'Range Open' with estimated time to launch.

By telephone to HMCG: 'Range Closed' once there is no longer any danger or risk to shipping and navigation.

3.2 Broadcasts

UK Coastal Warnings (known as "Whisky Zulu" or WZ) notices every 4 hours, this will be deconflicted with the HMCG Maritime Safety Information broadcasts, to ensure that HMCG broadcasts are still heard.

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3.2.1 Range Status

Saxa Coastal Radio Station to broadcast the status of the Range via VHF radio as and when it changes, the communications protocol can be found at Appendix A.

The Range statuses and their meanings are described in the Table below:

Status	Meaning	Conditions
Open	The Range is activated in accordance with the notified launch window.	The launch window has opened.
Closed	The Range is deactivated in accordance with the notified launch window.	The launch window has closed.
Clear	The Range has been cleared	- The Range is Open. - Range is clear of all hazards. - Spaceflight can be conducted.
Hold	The Range is on hold	- The Range is Open - A hazard is present within the Area. - Spaceflight is suspended.

Table 1: Range Status

The status of the Range may also change due to encroachments of the LEZ on the Land by vehicles, persons or domestic animals, and on Sea by vessels.

In the event the Range is on hold, a no go condition would be given to the Launch Operator.

3.2.2 T –1 hour

Saxa Coastal Radio Station to broadcasts Sécurité messages at regular intervals, to inform vessels in the local vicinity of ongoing operations. Details of the broadcasting authority, times and frequencies of broadcasts will be included in the ALRS Volume 3, Part 1.

Range Safety Vessel(s) utilised as part of the operation may also broadcast Sécurité messages to extend the range that they can be heard.

Recovery Vessel(s) utilised as part of the operation may also broadcast Sécurité messages to extend the range that they can be heard.

3.2.3 T –5 mins

Broadcast message declaring imminent launch of rocket. This may be via Channel 16 if the broadcast is less than 1 minute in length.

Should the Range Safety Vessel(s) register any vessel in the nearby vicinity to an area which is subject to warning or exclusion, it will hail the vessel to find out its intentions. Saxa will be listening in on shore-based VHF radio, but the Range Safety Vessel(s) will confirm that the range is aware. See Appendix A for further detail on communication with Range Safety Vessels.

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Saxa will operate positive control of the Range and require confirmation from the Range Safety Vessel(s) that there are no vessels within the Range, or that could encroach on the Range during the launch, prior to launching the rocket.

During launch day, Saxa will be listening in on shore-based VHF radio.

Should the Recovery Vessel(s) contracted by HIT be outside the VHF range of Saxa, the Range Safety Vessel(s) will confirm communication with the Recovery Vessel(s) via VHF. Satellite phone will be considered by the vessel operators if out of VHF range.

Should the Recovery Vessel(s) register any vessel in the nearby vicinity to an area which is subject to warning, exclusion or nominal impact of debris, it will inform Saxa Range Control, or the Range Safety Vessel(s) if Saxa is out of reach. The Range Safety Vessel(s) might decide to hail the vessel to find out its intentions, or to delegate this function to the Recovery Vessel if closer to that position.

3.2.4 T + 10 mins

Recovery operations at sea will be performed by HyImpulse. The Recovery Vessel(s) subcontracted by the launch operator will perform such operations upon launch completion and are responsible for required communications with vessels. HIT will have presence on board to coordinate the operations and/or will train the subcontractor accordingly. During the entire operations the Recovery Vessel(s) will maintain communications with HyImpulse LCC team via satellite enabled communications. The Recovery Vessel(s) will keep VHF communication with the Range Safety Vessel(s).

The recovery operation consists of the following core steps:

- 1) Based on the last known position, RF beacons and visual search methods are combined to identify the booster's location.
- 2) The rocket booster is visually inspected upon arrival at its location to determine its current state and the safest and highest containment recovery method.
- 3) The booster is recovered onto the deck of the vessel according to a combination of planned and launch operator and vessel crew advised recovery methodology and secured for further operations.
- 4) All possible active hazards are disarmed and made safe by trained launch operator employees, including flight termination or pyro charges, radio frequency electronics, and electrical systems.
- 5) The booster is transported to Baltasound port and transferred to a ground vehicle.

The above listed operations are expected to begin immediately after splashdown and end at approximately T + 13:00 hours, with the return of the vessel, its crew and the booster to Baltasound port. At all times, the recovery personnel are in contact with HIT control room advising on the current status of the recovery operations and receiving feedback as needed. Regular updates will be shared by HIT to Saxa personnel on shore to notify stakeholders at sea at regular intervals. The Recovery Vessel(s) will keep VHF communication with the Range Safety Vessel(s).

3.3 Mission Completion

The mission will be deemed complete once planned rocket components or debris have been fully deposited at sea or recovered, according to the conditions of the Marine Licence associated to the launch activity of HIT. HIT will confirm that there is no further or continued risk to shipping and navigation. The following should then take place:

- a) Immediate notification by telephone to HMCG of mission completion;

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- b) Immediate notification by telephone to UKHO to cancel Navigational Warnings; and
- c) Within 6 hours of mission completion, written confirmation (via email) to all interested parties (including in particular but not exhaustively, the MCA, NLB and UKHO) that any marine debris landed and remains as predicted, and that no further assessment is required.

3.4 Mission Deviation

Mission deviation – should there be any deviations to planned activities as published in the MSI or assessed in the NRA the following should take place:

- a) Immediate notification by telephone to MRCC Shetland/HMCG. Ongoing engagement with HMCG will take place to keep them updated and provide support/information as requested/required.
- b) Immediate notification to UKHO for reissue of amended MSI.
- c) Within two hours - notification by email to all other interested parties (including MCA's UK Technical Services Navigation team and HMCG, relevant General Lighthouse Authority and UKHO) of mission deviation to ensure no further risk mitigation is required.

These notifications must include detailed information regarding:

- a) Whether the unplanned debris is likely to float (surface or subsurface) or remain on the seabed;
- b) How long the debris may pose a danger;
- c) The location of the point of impact;
- d) Water depth;
- e) Whether the debris/payload will spread over a wide area; and
- f) Whether the debris/payload is considered a danger or obstruction to shipping (including fishing activities).

Further information can be found in SAXA-UK-OPS-PLN-001 "Maritime Emergency Response Plan". This document also contains a Marine Emergency Action Card.

4 HAZARD AREA MONITORING

A series of hazard areas will be used during launch to ensure the safety of mariners. The maritime hazard areas are identified by HIT through a Flight Safety Analysis (FSA) based on trajectory information, hazardous debris behaviour and the exposure and vulnerability of populations and assets. The UK CAA, as regulator, provides an independent check prior to approving these areas.

Saxa Range Control are required to monitor hazard areas that are deemed "Exclusion Zones" under the Space Industry Regulations 2021. The means of monitoring these hazard areas are describes in sections 4.1 to 4.3.

The Range is responsible for establishing the Launch Exclusion Zone (LEZ) on land around the launch site. The LEZ for this launch is contained within the notified maritime Exclusion Zone in vicinity to the launch site.

4.1 Range Safety Vessel(s)

Range Safety Vessel(s) at a minimum, will be equipped with the following:

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- VHF radio. Redundancy communications systems, such as satellite phone. VHF Channels monitored: 16, 2 and 4.
- Standard life saving equipment and firefighting equipment such as a deck wash hose or fire extinguishers.
- Medical Equipment – Offshore first aid kit and eyewash station, appropriate for the vessel and task.
- Maritime radar system
- Automatic Identification Systems (AIS) transponder

As part of the tendering process for the Range Safety Vessels the supplier will have to ensure that the crew of the vessel will be trained and familiar with all of the equipment on board the vessel, as well as being familiar with the vessels operating procedures and first aid.

As each launch will have different hazard areas, the specific locations that the Range Safety Vessel(s) will operate, will change on a launch-by-launch basis. The number of Range Safety Vessels in operation may also change due to the size and extent of these areas. The Saxa Range Control Licence Reporting Plan includes a requirement to share information on hazard area sizes and locations by L-30days. Saxa will provide final information on vessel numbers and locations at the same time.

Information for HIT launch have been updated in Appendix C.

4.2 Recovery Vessel(s)

HIT will subcontract Recovery Vessel(s) to recover planned debris from sea, depending on their mission profile. The launch operator will request requirements to the vessel operator at their discretion and depending on their recovery operations.

As part of the tendering process the supplier will have to ensure that the crew of the vessel will be trained and familiar with all the equipment on board the vessel, as well as being familiar with the vessels operating procedures and first aid.

The Recovery Vessel at a minimum, will be equipped with the following:

- VHF radio as redundant medium range communications system. VHF Channels monitored: 16, 2 and 4.
- MF/HF radio, as vessel baseline long range radio.
- Satellite communications (in the form of a satphone or satellite internet access device)
- Standard life saving equipment and firefighting equipment such as a deck wash hose or fire extinguishers.
- Medical Equipment – Offshore first aid kit and equipment appropriate for the vessel and task.
- Maritime radar system
- Automatic Identification Systems (AIS) transponder

Information for HIT launch have been updated in Appendix C.

4.3 Land Based Assets

Saxa Range Control will utilise a land-based maritime monitoring mast, fittied with radar, PTZ cameras fixed cameras and an AIS receiver, as well as this, Saxa Range Control receives an AIS feed via vesseltracker.com. Outputs from these systems are monitored from the Operations Room (Ops Rm) in the MMC. The ROM and Launch Director communicate via an intercom system, for decision making.

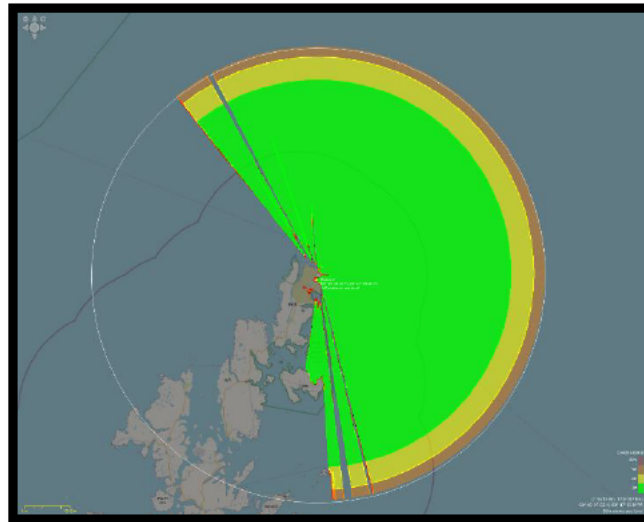


Figure 1 Maritime Monitoring Mast Radar Range

Communications between the Ops Rm and the Range Safety Vessels will be via VHF radio, with a backup means of communication available (Sat phones / Starlink). Communications between Range Safety Vessel(s) and Recovery Vessel will be via VHF radio, with a backup means of communication available (Sat phones / Starlink). A GO / NO-GO poll will be conducted within the Ops Rm, personnel operating the maritime monitoring equipment will report GO status, if the Hazard Area is clear of any vessels. The ROM will report to the Launch Director that the Range is Go for launch.

4.4 Land Based Security Team

Figure 2 shows the communications architecture for Saxa Range Control.

Saxa's security team based on the land, responsible for maintain the land based LEZ will be briefed to report any vessels in specific areas to Range Control, in particular any vessels registered within the Burrarfirth area.

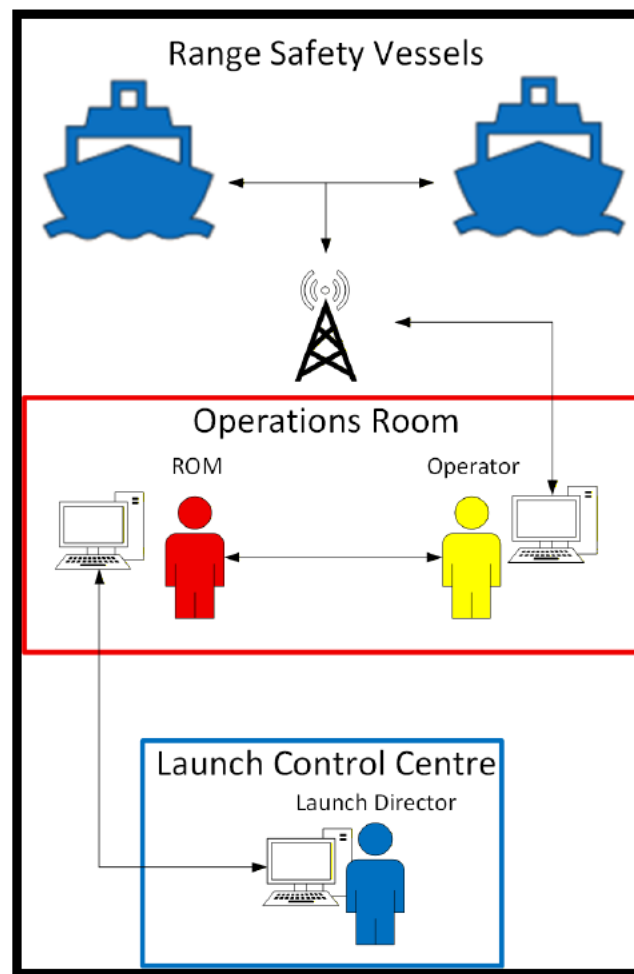


Figure 2: Comms links between Saxa, Launch Operator and Range Safety Vessel(s)

4.5 NOGO Criteria

Tolerance to incursions within the Exclusion Zone and the Warning Areas is assessed by HIT based on their Flight Safety Analysis (FSA) provided to the UK CAA.

The maritime Exclusion Zone excludes entry by any vehicle, ship, aircraft, or other craft, individual or domestic animal.

Tolerance to incursions within the Exclusion Zone and the Warning Area is assessed by HIT on the basis of the hazard-area geometry established in its Flight Safety Analysis (FSA) provided to the UK CAA; the go/no-go response to any given incursion is, however, determined deterministically from the projected track of the intruding vessel, and not from a case-by-case recalculation of risk. The ROM at Saxa will inform the Launch Director at HIT about incursions in the Warning Area and the NOGO decision will be made by the ROM in consultation with the LD.

Within the Warning Area, the presence of a vessel does not of itself constitute a no-go condition. Operations are held or stopped where the projected track of a vessel within the Warning Area indicates that it will approach the nominal impact point within a 50 km radius. A vessel within the Warning Area whose projected track does not satisfy this condition does not require operations to be held.

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Should a vessel call an emergency within any of the hazard areas, the ROM at Saxa has ultimate decision to hold or stop the countdown.

Should a vessel transport hazardous materials within any of the hazard areas, the ROM at Saxa has ultimate decision to hold or stop the countdown.

The following table provides an overview for this launch.

ID	Criteria	Response HIT	Response Saxa	Decision made by
1	Failure of Onshore Maritime Range Surveillance Capabilities (Coastal Station Radio failure).	-	Countdown hold or stop.	Saxa – ROM.
2	Weather / Sea state prevents Range Safety Vessels or Recovery Vessel from deploying or fulfilling their duties.	-	Countdown hold or stop.	Saxa – ROM.
3	Communications failure (both primary and backup failed).			
	a) between the Range Ops Room and Range Safety Vessels before liftoff	-	Countdown hold or stop.	Saxa – ROM.
	b) between the Range Ops Room and Recovery Vessel before liftoff	-	Countdown hold or stop.	Saxa – ROM.
	c) between HIT LCC and the Recovery Vessel during recovery operations	Localization procedures of the booster can continue onboard the vessel. Relay on Range Safety Vessel and/or Saxa Range Control for comms	-	HIT – LD with Saxa – ROM if required.
4	An incident / emergency is declared by a Range Safety Vessel or the Recovery Vessel becoming unavailable for duties.	-	Countdown hold or stop.	Saxa – ROM.
5	Range Safety Vessel(s) or Recovery Vessel required to respond to a Mayday call, becoming unavailable for duties.	-	Countdown hold or stop.	Saxa – ROM.
6	Equipment failure onboard			
	a) a Range Safety Vessel or the Recovery Vessel before liftoff	-	Countdown hold or stop, if the safety of operations onboard the vessel is compromised.	Saxa – ROM.
	b) the Recovery Vessel during recovery operations	Depending on type of failure, localization procedures of the booster can continue onboard	-	HIT – LD

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		the vessel but recovery operations might not start.		
7	Vessel detected within the Exclusion Zone	-	Countdown hold or stop.	Saxa – ROM.
8	Vessel about to encroach the Exclusion Zone			
8a	a) Vessel incursion before the time of liftoff	-	Countdown hold or stop depending on vessel position, speed and time in countdown	Saxa – ROM.
8b	b) Vessel incursion after the time of liftoff	No action	-	-
9	Vessel detected in the Warning Area	No action if vessel is not approaching the nominal impact points.	AIS monitoring. Information shared with HIT Launch Director (LD).	Saxa - ROM in consultation with HIT – LD.
10	Vessel about to encroach the Warning Area			
10a	a) Vessel incursion before the time of liftoff	No action if vessel is not approaching the nominal impact points.	AIS monitoring. Information shared with HIT - LD.	Saxa - ROM in consultation with HIT – LD.
10b	b) Vessel incursion after the time of liftoff	No action	-	-
11	Vessel in distress			
11a	a) In the Exclusion Zone	-	Countdown hold or stop	Saxa- ROM.
11b	b) in the Warning Area	-	Countdown hold or stop depending on vessel position, speed and time in countdown.	Saxa - ROM in consultation with HIT – LD.
12	Vessel transporting dangerous goods in large quantities in the Warning Area or approaching the Warning Area.	-	Countdown hold or stop depending on vessel position, speed and time in countdown.	Saxa - ROM in consultation with HIT – LD.

Table 2: NOGO criteria

5 COMMUNICATIONS WITH INTERNATIONAL PARTNERS

Given the scale of space launch activities, communications agreements with international partners also need to be given due consideration. The agencies below request the following communications procedures be adhered to:

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5.1 Faroe Islands

The Faroese Maritime Rescue Coordination Centre (MRCC) will initially be the point of contact in the Faroe Islands, as the station is always manned.

All notifications must be sent by email to mrcc@mrcc.fo with a copy to journal@vorn.fo. In addition, MRCC must always be notified by telephone (+ 298 35 13 00) if the briefing is urgent or otherwise has a high priority. It is desirable that all notices are given with a reasonable warning and that there is a window of +/- 14 days.

The specific information that the Faroese authorities need in connection with the individual operations is listed below.

MRCC

1. Position in and out of Faroese territory
2. Course/trajectory and necessary distance to the course.
3. Fallout area and possible safety zone.

The Environment Agency

1. Size of rockets (measurement and weight)
2. Material
3. The possibility of retrieving material from fallout.

The Faroe Islands Environment Agency can be reached via email at siggaj@us.fo

Faroese authorities will be duly informed by Saxa if directly affected by the mission profile of the launch operator, thus if the nominal impact points and the hazard areas associated with the launch activity interest the Faroe Islands EEZ.

5.2 Norwegian Coastguard

Should unplanned debris have an impact on Norway EEZ, Norwegian Coastguard (JRCC Stavanger) will be contacted via email at operations@jrcc-stavanger.no.

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APPENDIX A - COMMUNICATIONS PROTOCOL WITH RANGE SAFETY AND RECOVERY VESSELS

Saxa Range Control will confirm a communication protocol with any contracted vessels prior to launch day. This will cover, but not be limited to, any procedure words ("prowords") or actions, particularly regarding lost communications and re-establishment.

SaxaVord Spaceport is a registered Coastal Radio Station and uses the callsign Saxa Range Control.

Communications between contracted maritime vessels will be established using recognised voice and data procedures. Primary comms will be via VHF radio with telephone, SATCOM (if available) and email to back up in case of failures. VHF comms will be established via Ch 16, unless previously agreed before launch day. Channels 2 and 4 will also be used.

The table below contains prowords and their meanings as used in the table of reports.

Proword	Meaning
This is	Precedes the calling stations callsign
Over	End of transmission where additional communication is expected from another station
Out	End of transmission where additional communication is not expected from another station
I say again	Calling station is repeating a transmission or a portion of their transmission
Read Back	Calling station is requesting their transmission to be read back to them.

Table 3: : Prowords in communication protocol

Below is a table of reports, which could be used by both the Saxa Range Control Coastal Radio Station as well as contracted Range Safety Vessels. Before any reports are made, Saxa Range Control will hail the Range Safety Vessel and vice-versa using the below voice procedure.

"<Range Safety Vessel> (x2), this is, Saxa Range Control (x2)"

Where <Range Safety Vessel> is written in table, the Range Safety Vessel will state its own callsign.

No.	Report	Channel	Meaning
1	<Range Safety Vessel>, this is Saxa Range Control, switch to channel (2 / 4) over.	On Ch 16	Range Control has requested that the Range Safety Vessel changes to a working channel.
2	<Range Safety Vessel>, this is Saxa Range Control, Standby at position "#", over.	On Ch 2 / 4	Range Safety Vessel will report location either by conventional co-ords or alpha-numeric pre-defined coded locations

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3	Securitay (x3), all ships (x3), this is, Saxa Range Control (x3). For information regarding (spaceflight/rocket launch) activities switch to channel Zero Two / Zero Four, I say again, For information regarding (spaceflight/rocket launch) activities switch to channel Zero Two / Zero Four, Out.	On Ch16	Warning of WZ Notices imminent broadcast on Ch 2 or 4. If Range Safety Vessels are used as part of the operations, Saxa Range Control will promulgate messages on VHF Ch 2 whilst Range Safety Vessels will promulgate messages on Ch 4.
4	Saxa Range Control, this is <Range Safety Vessel>, ON TASK, Over.	On Ch 2 / 4	Vessel is on task and actively engaged in Range Safety Vessel duties. This can be coupled with position updates, time or any other relevant information.
5	<Range Safety Vessel> this is, Saxa Range Control report Range Status, Over. (repeated for each Range Safety Vessel)	On Ch 2 / 4	Vessels to actively sweep their assigned area using means at their disposal to ensure SOLAS principles.
6	Saxa Range Control, this is, <Range Safety Vessel> Range Clear, I say again, Range Clear, Read back, Over.	On Ch 2 / 4	Vessel will report Range Clear after visual / electronic / physical checks (as required) are complete and the assigned area is clear. If not clear, vessel may be asked to provide a brief description of the situation.
7	All ships(x3), this is, Saxa Range Control (x3), Range Open, I say again, Range Open, Out.	On Ch 16	The Range is open in line with the notified launch window.
8	Saxa Range Control, this is <Range Safety Vessel> Range Fouled, I say again Range Fouled, Read back over.	On Ch 2 / 4	Vessel will report Range FOULED at least twice if the observed area has become encroached and follow up with any further information until the situation changes.
9	All ships (x3) this is Saxa Range Control (x3) Launch countdown has begun, (time to launch) I say again, Launch	On Ch 16	Time to launch may be at 10, 5 and or 1-minute points before launch. Range Control may broadcast additional updates throughout should additional information need to be shared.

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	countdown has begun (time to launch), Out.		Range control may count through the last 5 seconds ONLY to keep the frequencies free to allow vessels to report if they need to. Time to launch is expressed as point "T" with minus and plus timings given as required.
9	All ships (x3) this is Saxa Range Control (x3) Launch countdown is on hold (at ## time), I say again, Launch Countdown is on hold (at ## sec/min/hour). Out	On Ch 16	Range Control has been advised of a delay, the timer will restart at "#" or be reset to another time, should the launch be CANCELLED. Range Control may advise further on reasons to allow vessels to manage their time.
10	All ships (x3) this is Saxa Range Control (x3) Launch cancelled, I say again, Launch Cancelled out.	On Ch 16	Launch has been cancelled for this particular day. Vessels will be advised on further actions / plans as required using telephone / email / SATCOM.
11	All ships (x3) this is Saxa Range Control (x3), Liftoff confirmed I say again Liftoff confirmed out.	On Ch 16	Vessels to remain safely ON TASK until briefed otherwise.
12	All ships (x3) this is Saxa Range Control (x3), Launch Failure, I say again, Launch Failure, advise all mariners (not to approach? Stay clear? Advise of debris?) out.	On Ch 16	Vessels to continue to observe assigned areas and to watch the rocket for any debris or other anomaly. Marine and Space Accident Investigations may require witness statements later.
13	All vessels (x3) this is Saxa Range Control (x3) Splashdown confirmed at "Location", advise all mariners)(not to approach? Stay clear? Advise of debris?) out	On Ch 16 / 2 / 4	Where "Location" is given as co-ordinates, can be a centre point with a radius expressed in a clear fashion i.e. "... radius ½ a Nautical Mile" Range Control will be monitoring rocket telemetry. Vessels will likely be visually monitoring events. SPLASHDOWN may be the whole rocket or parts or debris and there may be multiple points or a large area. Vessels involved with recovery operations will give an ETA estimation to recovery point.

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14	Saxa Range Control this <Range Safety Vessel> arrived at splashdown Over	On Ch 2 / 4	Vessel reports at SPLASHDOWN and any updates as required as to the status of any recovery operation.
15	Spaceport this is <Range Safety Vessel>, Recovery Successful / Recovery Failed I say again Recovery Successful / Recovery Failed, Read back, Over.	On Ch 2 / 4	Vessel reports safe (or otherwise) recovery and provides ETA to safe harbour. Saxa Range Control will not cease the operation until all vessels report safely alongside or otherwise off task.
16	<Range Safety Vessel> this is Saxa Range Control, Area Status Report, Over.	On Ch 2 / 4	Specific vessel or all vessels to sweep and check their assigned areas for any debris or anything that may be a hazard to navigation pre or post launch. Post launch, likely to be followed by a "Return To Base" call if and when area is clear.
17	All vessels (x3) this is Saxa Range Control (x3) RANGE CLOSED, I say again, RANGE CLOSED Out.	On Ch 16	The Range may be closed even whilst vessels are at sea. Range Control will continue to monitor communications until vessels have returned to safe harbour or report safely off task.

Table 4: Table of reports

Should the Range Safety Vessel or Recovery Vessel need to communicate with an encroaching vessel it will use the following procedure:

No.	Report	Meaning
1	<Callsign> x2, this is <Range Safety Vessel> (x2). Request working Channel (2 / 4 / other). Over.	Open communication. Encroaching vessel should return with <Range Safety Vessel>, this is <callsign> Channel (2 / 4 / other), Out". Communication will then be established on the working channel.
2	<Callsign> this is <Range Safety Vessel> Rocket launch in area bounded by...(positions) from (date and time) to (date and time). Over	This will provide the encroaching vessel with the information provided within the WZ messages.
3	<Callsign> this is <Range Safety Vessel> WARNING. Rocket launch imminent from Saxa Range Control. You are	Should encroaching vessel not change course to avoid Exclusion or Restricted Zones, a DSC message will be used to specifically warn the vessel of danger.

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	entering an Exclusion Zone over	
4	Saxa Range Control, this is, <Range Safety Vessel>, vessel X at location '#', being tracked on bearing ...degrees, on course, towards Launch Exclusion Zone/Splashdown Area. Have warned vessel X of danger from launch/splashdown, Read Back, Over NOTE: Boundary/Recovery vessel to notify Saxa Range Control of encroaching vessel name and any other identifying marks or features. ie Fishing vessel, Corsair, number LE1335	Information will need to be passed to Saxa Range Control. If the encroachment is taking place near the Launch Exclusion Zone it is likely Saxa Range Control will hear the radio transmission. Saxa Range Control will acknowledge should this be the case. Should the encroachment be at the splashdown location, the Recovery Vessel will have to relay the message either via the Range Safety Vessel, or call Saxa Range Control using other means, ie satellite phone. Vessel will report RANGE NOT CLEAR at least twice if the observed area has become encroached and followed up with any further information until the situation changes.
5	Saxa Range Control, this is <Range Safety Vessel>, RANGE CLEAR I say again, RANGE CLEAR Over.	Once clear the Range Safety Vessel will report Range Clear after visual / electronic / physical checks (as required) are complete and the assigned area is clear.

Table 5: Table of reports for encroaching vessel

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APPENDIX B CONTACT DETAILS FOR LAUNCH DAY

Contact details for HyImpulse (HIT) suborbital launch.

Contact	Email	Phone Number
SaxaVord Range Operations Manager	[Redacted]	+44 (0)1479 782 042 / [Redacted]
SaxaVord Range Operations	rangeops@shetlandspacecentre.com	+44 (0)1479 782 040
Radio Navigation Warnings (UKHO)	navwarnings@ukho.gov.uk	+44 (0)1823 353 448
HMCG	zone1@hmcg.gov.uk oelo@mcga.gov.uk	+44 1595 6929760
Faroe Islands MRCC	mrcc@mrcc.fo journal@vorn.fo	+298 35 13 00
Norwegian Coastguard (JRCC Stavanger)	operations@jrcc-stavanger.no	

Table 6: Contact details for launch day

Callsign		MMSI
Saxa Range Control		002320929
Channel	Base station Frequency	Mobile Frequency
2	160.7 MHz	156.1 MHz
4	160.8 MHz	156.2 MHz
16	156.8 MHz	156.8 MHz

Table 7: Saxa coastal radio station

APPENDIX C RANGE SAFETY AND RECOVERY VESSELS

HIT and Saxa have engaged the services of a local marine contractor for the provision of one (1) Range Safety Vessels (Saxa) and one (1) Recovery Vessel (HIT).

The Range Safety Vessel will provide surveillance coverage and interdiction along the west boundary of the Exclusion Zone.

The recovery vessel will be stationing at about 50km distance from the booster nominal impact point, to promptly commence recovery operations for planned debris.

The Recovery Vessel will be instructed not to enter the nominal impact point area until debris impact has been confirmed and the Range has issued clearance to proceed.

A more precise positioning of the vessels will be assessed closer to activities. VHF communications between the vessels will be preferred and feasible as long as the Recovery Vessel will within range. As backup communication both vessels will have a satellite phone or HF radio equipment available on board to cover a communication range beyond 72 nm.

Figure C-1 shows the indicative position of the vessels.

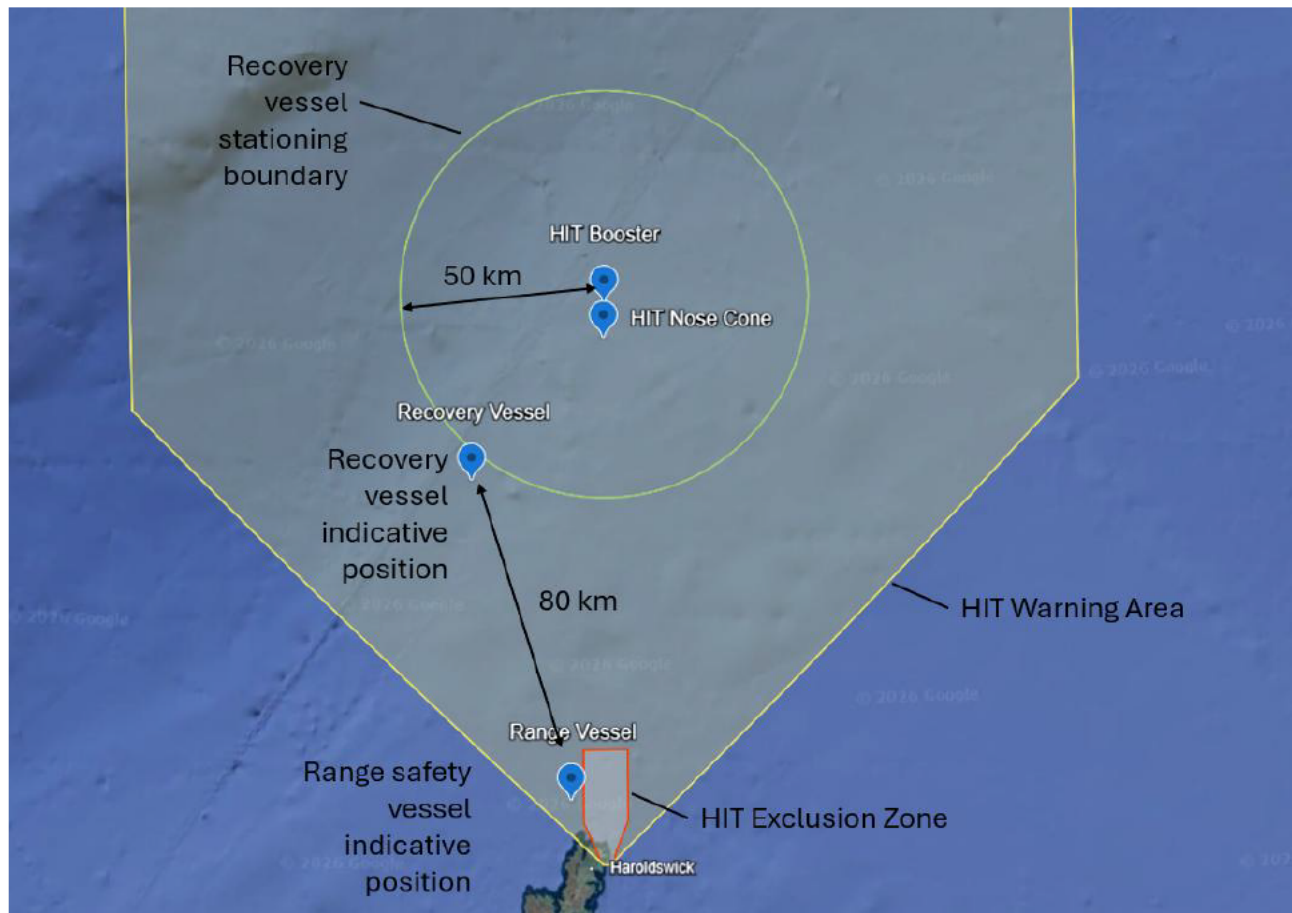


Figure C-1 Indicative positions of Range Safety Vessel and Recovery Vessel for HIT launch