Maritime Command and Staff Trainer (MCAST)

Appendix L to SoW – Safety and Environmental Management Plan (SEMP)

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Defence Equipment & Support

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CONTRIBUTED CONTENT APPROVAL

Function	Author	Role	Section	Date
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Executive Summary

The following Safety and Environmental Management Plan (SEMP) describes the management of risk and impacts associated with the Safety and Environmental Protection issues relating to the Maritime Command and Staff Trainer (MCAST) Project.

A SEMP exists for the Maritime Training Acquisition Organisation (MTAO) [1], which will cover MCAST as a constituent project. The MTAO SEMP provides engineering and safety governance and procedures above the project within the MTAO and wider Maritime Combat Systems (MCS) team. However, the MCAST solution will be utilised within the Land Domain and the MTAO SEMP calls for the use of guidance leaflets which apply to the Maritime Domain. This approach maintains continuity across the full suite of MTAO service / equipment / system offerings.

The purpose of this SEMP is to detail the specific safety and environmental management arrangements and activities in place, which drive and enable safety and environmental objectives and the generation of a MCAST safety and environmental case in accordance with (iaw):

- Defence Standard 00-056 - Safety Management Requirements for Defence Systems [2];
- Defence Standard 00-051 - Environmental Management Requirements for Defence Systems [3];
- Defence Safety Authority (DSA) 02: Defence Maritime Regulator (DMR) – Defence Maritime Regulations for Health, Safety and Environmental Protection, The Regulations [4]; and
- DSA 02: Defence Land Safety Regulator, Policy and Regulations for Health, Safety and Environmental Protection [5].

This SEMP is a ‘live’ document and requires updating throughout the system’s lifetime to include any modifications to the system of the risk management process.

This SEMP documents the safety and environmental protection activities, products, resources and governance required to deliver the Order Book Item (OBI) objectives. Where appropriate, this plan will refer to existing documentation rather than repeat it.

This SEMP has been produced to reflect the Assessment Phase of the project lifecycle and support the Full Business Case (FBC) for MCAST.

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1 Introduction

1.1 Overview

The overall responsibility for safety, environmental and sustainable development matters within the Ministry of Defence (MOD) rests with the Secretary of State for Defence (SofS). The SofS for Defence Policy Statement [6] makes it clear that safety, environmental protection and sustainable development are line management responsibilities[1].

Responsibility for the Maritime Command and Staff Trainer (MCAST) safety and environmental compliance rests with the Maritime Training Acquisition Organisation (MTAO) team who have specified compliance to the following regulations:

- Defence Standard 00-056 - Safety Management Requirements for Defence Systems [2];
- Defence Standard 00-051 - Environmental Management Requirements for Defence Systems [3];
- Defence Safety Authority (DSA) 02 – Defence Maritime Regulator (DMR) – Defence Maritime Regulations for Health, Safety and Environmental Protection [4];
- DSA 02: Defence Land Safety Regulator, Policy and Regulations for Health, Safety and Environmental Protection [5]; and
- Acquisition Safety & Environmental Management System (ASEMS) [7] incorporating:
  - Project Orientated Safety Management System (POSMS) [8]; and
  - Project Orientated Environmental Management System (POEMS) [9].

1.2 Background

An enduring and steady state capability for Battle Staff Command and Control (C2) Collective Training, Exercising, Mission Rehearsal and Assurance currently does not exist in the Royal Navy (RN) to enable Tier 2 Formation-level and above Force Generation. The Maritime Composite Training System (MCTS) has been used to support ad-hoc requirements, but it does not fulfil the RN endorsed Battle Staff requirements nor the delivery of formation level warfighting at scale and preparation for operations to support the enduring requirements for an increasingly Maritime Task Group (MTG) focussed RN.

The MCAST is a project within the Defence Operational Training Capability (Maritime) (DOTC(M)) SPARTAN Programme. The objective of the MCAST project is to deliver an independent and enduring Battle Staff synthetic training capability that underpins the Force Generation (FGen) and Force Sustainment (FSus) of agile Maritime C2 at Component, Joint and Combined level. When the DOTC(M) SPARTAN Programme is mature, MCAST will be integrated into DOTC(M) SPARTAN's Navy Synthetic Training Environment as one of several shore-based training capabilities that will be networked together along with RN Platforms benefiting from wider interoperability with, and support from, key partners while enabling the aspiration to mission rehearse at reach.

The MCAST capability will deliver a dedicated, enduring and organic synthetic training capability to enable and assure the C2 Collective Training (CT) Tier 2 / 2+ Training Requirements for all RN Battle Staffs including the 2-star Commander Strike Force (CSF), 1-star Carrier and Littoral Strike Groups (CSG and LSG), Littoral Response Groups (LRGs) and Mine-Warfare Battle Staff (MWBS). This will be delivered as a managed service.

MCAST will be delivered as a service with the majority of the solution developed and delivered from the supplier's sites or secure data centres. There will be facilities deployed to UK MOD permanent bases for the

[1] DSA01.1, Defence Policy for Health, Safety and Environmental Protection, will be withdrawn once Joint Service Publication (JSP) 815 Part 2, Defence Safety Management System, is formally published (not before April 2023).

delivery to the Training Audiences but there will not be equipment or platforms deployed into service with the Armed Forces.

MCAST will be a simulation system. Coherence with other training systems is critical to the success, the vision for maritime training and consistent with the strategic objectives in the RNs Maritime Training Strategy published in 2018 [10].

[redacted]

The system will be constructed from Commercial Off The Shelf (COTS) computing hardware and software and integrated by the service provider into a service. No physical products are expected to be designed and manufactured to deliver MCAST.

There is a requirement to be able to deploy the training solution aboard a ship or to an overseas training location. It is likely that the core computing solution will not be deployed and only the Training Audience and their user devices will be deployed. Containerisation of the deployed elements is likely to be considered to enable safe deployment.

Crown servants are not expected to maintain or manage the live MCAST service. They will participate in its delivery as members of the White Force and as Trainers and the Training Audience. There is no requirement for maintenance manuals and spare parts to be provided for use by the MOD.

1.3 Purpose and Objective

The purpose of this Safety and Environmental Management Plan (SEMP) is to outline and define the processes and activities, which aim to provide a means of managing safety and environmental issues.

To achieve the defined safety and environmental objectives of the project, this SEMP will ensure the co-ordination of resources to plan, organise, implement, monitor, review, audit and improve specified tasks.

An integrated programme of safety and environmental activities will be ensured through hazard, safety and environmental protection management documentation including the MCAST Hazard Log (HL) and Environmental Registers and Safety and Environmental Case Report (SECR).

This document outlines and records the safety and environmental management arrangements in place concerning the MCAST project and its associated equipment through life. In doing so and in compliance with the requirement presented within legislation, applicable policy (e.g. JSP 375, 418), Regulations (DSA02) and applicable Safety and Environmental Management System (SEMS) (ASEMS and the MTAO SEMP), it is expected the Authority will operate a safety and environmental management system to ensure compliance by the use of MODs ASEMS [7] where:

- The responsibilities of MOD agencies and its contractors for safety and environmental management will be identified;
- The definitions of the methods used to analyse and assess potential safety and environmental risks and impacts, to ensure that the equipment and associated systems are tolerably safe and environmentally sound to handle, use, maintain, store, transport and ultimately be disposed are recorded; and
- The guidance provided within this SEMP shall follow that outlined for safety and the environment provided in POSMS [8] and POEMS [9].

This SEMP is to be approved by the Project Safety and Environmental Committee (PSEC).

This SEMP documents the organisational structure or 'framework', processes, procedures and methodologies that enable the MOD Project Manager (PM) and the Safety and Environmental Working Group (SEWG) to direct and control the activities necessary to meet safety and environmental requirements and safety and environmental policy objectives throughout the lifecycle. This is achieved via:

- Organisation - the mechanisms put in place to deliver safety and environmental compliance; and
- Arrangements - the activities to be undertaken to ensure delivery of safety and environmental protection.

It includes the safety and environmental related timescales, milestones, targets and other relevant date related information in the form of a Safety and Environmental Programme. This plan describes how the MCAST project will:

- Construct the MCAST Safety and Environment argument;
- Assess the MCAST design and subsequent through life changes for their potential effect on the continued overall safety and environmental assurance of the equipment, as well as to ensure that the necessary mitigation measures are incorporated, and the safety and environmental argument updated;
- Assess defects and other in-service incidents for implications and take corrective action where appropriate, with early assessments based on similar simulator systems in service; and
- Audit the SEMS.

The programme shall be assessed and where necessary updated by the SEWG on an annual basis.

1.4 Scope of SEMP

This SEMP defines the safety and environmental arrangements for the MCAST through its full life. The lifecycle process for the MCAST service is based on the Concept, Assessment, Demonstration, Migration, In-Service and Termination (CADMIT) cycle. As safety and environmental protection bounds the service equipment within its scope then the lifecycle phases of the Concept, Assessment, Demonstration, Manufacture, In-Service and Disposal (CADMID) cycle are utilised. This ensures that the safety risks and environmental impacts are identified and managed for the component manufacture and disposal activities. This also aligns to the terminology and processes used within the MOD ASEMS.

1.5 Boundaries of SEMP

This SEMP is limited to the hardware components of the MCAST system and supporting equipment and the embedded firmware, operating system and hosted software applications.

1.6 Applicability

The contents of this SEMP are applicable to all personnel associated with the project throughout the lifecycle of the MCAST system, including third party contractors.

Any infrastructure, software or equipment and resources not exclusively used by the MCAST system are out of scope for this SEMP.

Any systems not covered under this SEMP are expected to be managed under the parent system SEMP if applicable to that project.

The exact boundaries of responsibility and applicability will be part of the analysis and to be agreed by SEWG.

1.7 Management Review

This SEMP will be reviewed and revised as necessary and at project approval points. The re-issue of this plan, which may be linked to the change control process, will be incorporated into the delivery schedule. This will then form part of the baseline and progress will be measured against it. The SEMP will also be subjected

to unplanned updates in line with change requests in accordance with the change control process. This ensures that documentation remains current and can be used with authority.

As a minimum this SEMP should be reviewed annually and is to be updated if there have been any significant changes in management arrangements, design of or configuration of the equipment or host site arrangements for the support of MCAST.

1.8 Information Set

Documents will be produced using Microsoft Office products, which are backwardly compatible.

The hazard information will be held in eCassandra and will be exported out to Microsoft Excel format for archival if required. This will ensure that the information set remains accessible as techniques, methodologies, and tools change.

1.9 Assumptions & Dependencies

The project will be managed in line with the Ships Operating Centre (OC) Assumptions Management Policy. The MCAST Engineering Management Plan (EMP) [11] details the project specific assumptions and dependencies and how they are managed.

There is a significant dependency on the provision of infrastructure in suitable locations to host the exercises running on MCAST. Initial options were investigated in Portsmouth Naval Base and identified the Old Iron Foundry as a potential location. Work is progressing with Defence Estates to plan refurbishment of this historic building. However, the building will not be ready for the Initial Operating Capability (IOC) of MCAST so MCAST must be designed to be independent of a particular infrastructure and instead be re-locatable to suitable infrastructure provided by MOD (or via separate contracts) at different locations. This is expected to have a significant impact on the choices made by the supplier when developing the MCAST system architecture and the safety hazards and environmental impacts imposed by an independent, transportable system.

1.10 Government Furnished Assets (GFA)

The following items are expected to be required as GFA to enable an engineered solution and are considerations for the management of safety and environmental protection:

- Physical infrastructure (indoor space) for the Training Audience to work from, with appropriate welfare facilities;
- White Force personnel via various routes including full time service personnel, Full Time Reserve Services, Contractors;
- Electrical power on the site of the exercise for Training Audience and possibly White Force personnel laptops, screens, communications, and temporary Local Area Networks;

[redacted]

- Collective Training Objectives, Training Authorisation Documents (TrAD), further requirements documents and vignettes to enable the MCAST Service Provider to design each Exercise;
- Licenses for software that is owned by MOD or licenses for use of software and services are likely to need to be made available to the MCAST capability, how these are integrated into the MCAST service will need to be addressed in the proposals and the required actions completed between MOD and industry;

- Intellectual Property Rights for certain information or solution components may be required. This will be clarified during the competitive process and then implemented during the initial part of the service delivery contract.

1.11 Lifecycle Stages and Period Covered

This document has been produced as a baseline for the Assessment Phase (AP) of the project lifecycle and directly supports the generation and review of safety and environmental protection artefacts to support the Full Business Case (FBC) process.

The AP commenced after the approval of the Outline Business Case (OBC) in November 2020. The AP includes the development of the System Requirements Document (SRD) and issue of the Invitation to Negotiate (ITN), leading to FBC submission and contract award.

The Demonstration Phase (DP) consists mainly of the Integrated Test, Evaluation and Acceptance (ITEA) of the service. The ITEA process continues in the Migration Phase (MP) which includes the delivery of a Maritime Battle Staff (MBS) synthetic exercise against an Exercise Specification (EXSPEC) developed by the Training Requirements Authority (TRA). Completion of this exercise will lead to the declaration of IOC when the MCAST service will enter the In-Service Phase.

The following durations are anticipated for each phase of the project:

- Assessment Phase, Q4 2020 – Q2 2024;
- Demonstration Phase, Q2 2024 – Q4 2024;
- Migration Phase, Q4 2024 – Q2 2025;
- In-Service Phase, Q2 2025 – Q2 2029; and
- Termination Phase, Q4 2028 – Q2 2029.

2 Description

2.1 System Description

The training environment will be a simulation of the maritime battlespace and the Training Audience will interact via simulated Command and Information Systems (CIS) with the model of entities in the maritime battlespace. The modelling and simulation will take place in multiple computers, operating on many software applications and with multiple databases and a network of systems to create the simulations.

The MCAST solution is subject to a competitive tender process with the winning contractor providing the full training service. The primary logical components of the service have been established and these are the:

- Training System;
- The Trainee Environment; and
- The Exercise Control System.

[redacted]

[redacted]

The MCAST Service is expected to include set up and strike down of the training environment and does require careful consideration of the associated Packaging, Handling, Storage and Transport (PHST). Therefore, the solution should plan for the design and selection of the appropriate transport cases for the equipment. It is expected that solid flight cases and padded storage for laptops, screens and computer systems will be used. Weight and manual handling of these elements will be a key safety consideration.

There is no requirement to utilise the Joint Supply Chain or to deploy spares or parts to areas of operation. There is no requirement for components to be stored in defence warehouses or within ship's storerooms, this reduces the burden on the supplier to specify high levels of protection and packaging.

As the system is expected to operate within a benign building environment it should be free from the problems of condensation and corrosion effects. The contractor will be responsible for storing all equipment between the major exercises and will need to transport the components between storage locations and the exercise locations. The use of secure cloud data centres is anticipated for the bulk of the computing power, these controlled environments are normally provided as a contracted-in service from specialist data centres.

[redacted]

2.2 MCAST Components

The MCAST service and supporting hardware and software is yet to be fully developed but it is anticipated that that the components making up the MCAST service will be typical for those incorporated within a training simulator and consist of COTS Information Technology (IT) equipment:

[redacted]

2.3 Safety Related Software

The software has been determined to not be safety related and hence the requirements of Defence Standard 00-055 [14] will not need to be implemented. It is recommended that the Questionnaire for Assessment of Safety Benign Software is completed as justification for the safety related software status for MCAST. This assessment is Annex A to the Defence Equipment and Support (DE&S) Safety & Environmental Protection Leaflet 08/2013 Safety Management Guidance for Software Only Projects [15]. Once complete it should be retained within the MCAST SECR (when produced).

Software will be managed as per the Annex H (Software Acquisition Management Plan (SwAMP) and Software Support Plan) of the MCAST EMP [11].

3 Organisational Roles and Responsibilities

3.1 Overall Functional Responsibilities

The Director Ships Support is accountable and responsible for the governance, resources, advice and guidance to Duty Holders, Accountable Persons and Platform Authorities in accordance with Business Delegation.

Figure 3 depicts the typical organisational hierarchy within the Equipment Authority (EA) organisation – the exact roles and responsibilities are described in more detail in Section 2 of the MTAO SEMP [1].

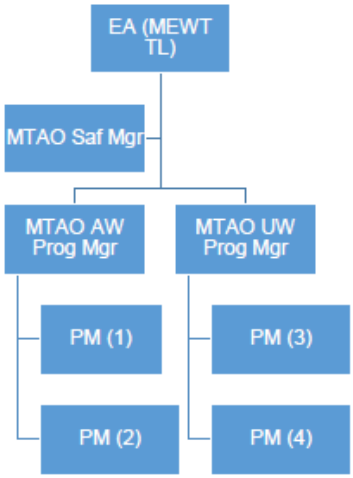

Figure 3: Typical EA Organisation

3.2 Project Safety & Environmental Management Responsibilities

The MCAST PM has overall responsibility for project deliverables and safety and environmental compliance. MTAO will lead on the functional safety and environmental management of the user community directly interfacing with the MCAST service.

The MTAO follows a strict hierarchical structure for projects over which it is responsible, including MCAST. The MCAST project will provide the required information into the MTAO SEMS. The different levels of groups managing safety and environmental aspects within the MTAO are listed below.

- PSEC;
- Safety & Environmental Committee (SEC);
- SEWG; and
- Hazard Working Groups (HWG)

3.3 MTAO Groups

PSEC - the MCAST project will provide the following items to the PSEC:

- Safety and Environmental requirements and assumptions;
- Original Equipment Manufacturer (OEM) Quality Assurance / Safety and Environment Audit Reports;
- Hazard Log;
- Environmental Features Matrix (EFM);
- SECR; and
- Project relevant As Low As Reasonably Practicable (ALARP) statements.

Any changes to maintenance requirements or scheduling are analysed for impact on safety and environmental cases. All changes to be assessed by the MCAST PM. Those with a potential Safety and Environment (S&E) implication to be referred to the PSEC who will judge whether / how the Hazard Log may need to be adjusted and whether / how the SECR may need to be reviewed.

SEC - the MCAST project will initiate appropriate meetings with the SEC and provide the following:

- SEMP;
- Notification of changes (relating to completion) of the SECR;
- Incident reports; and
- Any information relevant to Safety and Environmental audits.

SEWG - specific Safety & Environmental Working Groups may be called at ad-hoc times to cover specific items under authority of the relevant PSEC. If a SEWG requires artefacts and attendance from the MCAST project, all relevant team members will offer full compliance to assist.

The purpose of the SEWG is to provide a forum for the MCAST program as an enabler for risk reduction activities. This is achieved by ensuring effective levels of safety and environmental protection and to provide an appraisal of the Safety and Environment Case through the life of the project:

The MOD MCAST PM chairs the SEWG. The members of the SEWG are as follows:

- MOD MCAST PM;
- MCAST System Design Authority;
- Operating Authority;
- User Community;
- Host Site Authority (Various);
- Support Authority;
- Safety & Environment Manager - MCAST;
- Safety and Environmental Team - MCAST;
- Subject Matter Experts (SMEs) as required; and
- Safety and Environment Contractor.

Terms of Reference for SEWG - to provide a forum for monitoring and co-ordinating all safety and environmental management risk reduction activities associated with the project, to ensure effective levels of safety and environmental protection and provide an appraisal of the Safety & Environmental Case.

The following tasks are undertaken by the SEWG:

- To set and keep under review the project's safety and environmental protection policy and strategy;
- To set and keep under review the project's safety and environmental protection targets and objectives;
- To define the system boundaries for safety and environmental protection responsibility;
- To advise the chairperson of the MOD Safety and Environmental Committee on the safety and environmental protection responsibilities for each authority associated with the project;
- To advise the chairperson of the Safety and Environment Committee on the standards, statutory regulations, and any restrictions with which the projects must comply;
- To review, monitor, classify and allocate new equipment safety hazards and environmental impacts / priorities as they are identified;
- To carry out reviews of the project's Safety and Environmental Case and progress on achieving safety and environmental protection targets, to a predetermined programme, issuing the results to the Delegated Authority;
- To implement any control measures that are deemed necessary to reduce identified risks to ALARP;
- To ensure proper and timely availability of training and issue of documentation;

- To carry out audits of the project's Safety and Environmental Case to ensure that it is comprehensive. The audit findings should be reported to the Delegated Authority; and
- To operate a system for reviewing and monitoring safety and environmental protection performance and maintain the Safety and Environment Case.

HWG - the Hazard Identification (HazId) meeting reviews hazards presented by Suitably Qualified and Experienced Personnel (SQEP) representatives of the Equipment in question and makes appropriate recommendation to PSEC regarding the acceptance of Class C & D risks. The MCAST team will hold appropriate HazId meetings for the on-going and proactive identification of Safety Hazards. Preliminary Hazard Identification and Analysis (PHIA) meetings were held pre-ITN to identify and review hazards for MCAST. Where the HazId meeting SQEP team agrees that risks are in excess of Class C, it will recommend the PSEC refers the risk in accordance with Ships OC Leaflet 5 [16]. This will fulfil Safety Management Procedure SMP04, Preliminary Hazard Identification and Analysis, on the Safety Management Activity Diagram.

3.4 Internal DE&S Governance

Monthly reporting is conducted within DE&S. The DE&S Ships Engineering Assurance Team have advised that MCAST is currently out of scope in terms of engineering assurance. This is because a training service is being procured which is likely to be based on a solution using COTS software to deliver training at a land-based site. Therefore, MCAST is neither procuring or supporting equipment, nor is it developing new software. The MCAST EMP [11] provides details of conditions, which if satisfied, would mean MCAST is in scope for engineering assurance. Approvals of Engineering products are shown in Table 1.

Information Product	Approval by	Delegation or Licence Required	Named Individual
Safety and Environmental Management Plan	Safety Committee Chair	Safety Responsible & safety delegation holder	[redacted]
Safety and Environmental Case	Safety Committee Chair	Safety Responsible & safety delegation holder	[redacted]

Table 1: Authority to approve Information Products

3.5 Responsibilities

Generic Functional Resource responsibilities and roles are outlined in the DE&S Functional Guidance. The MCAST Responsible / Accountable / Consulted / Informed (RACI) stakeholder matrix for safety and environmental protection is shown in Table 2.

	SECR Authorisation	SEC Maintenance	Hazard Log Maintenance	EFM Maintenance	System Incident Investigation	System Safety Audit
MCAST EA	A&R	A	A	A	A	A
MCAST Program Manager	C	C	I	I	I	I
MCAST PM	I	R	R	R	R	C
MTAO / MCAST Safety and Environmental Protection (S&EP) Manager	C	C	C	C	I	R
Industry (Design Authority (DA) / Maintenance Authority (MA))	I	C	C	C	C	C
Industry S&EP Manager	I	R	R	R	I	I
Instructors / White Staff	-	C	C	C	C	C
Commanding Officer (CO) / Head of Establishment (HOE) (Functional)	I	C	C	C	I	I
CO / HOE (Geographic)	I	C	C	C	C	I
Base Services	I	C	C	C	I	I
Independent Safety and Environmental Auditor (ISEA)	C	-	-	-	I	I

Table 2: RACI Matrix

3.6 Independent Safety and Environmental Auditor

An Independent Safety or Environmental Auditor is a requirement of the MTAO SEMP [1]. The appointment of an Independent Safety and Environmental Auditor (ISEA) for MCAST will be undertaken by the Design or Operating Authorities, should the need arise throughout the system's lifetime.

3.7 Interfaces

This SEMP is subordinate to the MTAO SEMP [1] and describes the arrangements put in place to manage the safety and environmental responsibilities associated with MCAST system.

Any high-risk hazards identified will be escalated to the MTAO Safety Environmental Management Committee (SEMC) for review and endorsement.

The project will be subject to audit annually by the MTAO Safety and Environment Assurance Team or where deemed necessary.

Monitoring of the material state requires direct interface with the user for information on defects, Operational Defects (OPDEF), maintenance status etc. These are reported in accordance with (iaw) standard MOD Safety and Environmental Management system processes. Implications of any issues raised will be discussed at the regular SEWG meeting.

A separate Interface Management Plan (IMP) [17] has been drafted by the project team to highlight the expected key digital and physical interfaces for MCAST and to inform industry during the competition phase. It is expected that the winning bidder will provide Interface Control Definition (ICD) documents with their

system to meet system and security accreditation. The interface to infrastructure will be covered in a separate Infrastructure Plan prior to Contract Award.

Interfaces will be required between (this is an initial list that will be developed further):

- The core MCAST simulation system and the MCAST network;
- The MCAST network and JMNIAN;
- The MCAST network and the Training Audience;
- The MCAST network and the White Force;
- The Training Audience and OPCIS;
- OPCIS and the MCAST network;
- Defence Secure Speech Services and MCAST;
- MCAST Gateway and DOTC(M) SPARTAN Gateway to other training or simulation systems;
- MCAST system for reporting and the Defence Learning Environment (for training performance recording);
- MCAST and the Defence Simulation Centre for Environmental, Geographical, and other data libraries; and
- JMNIAN interface to other systems (that are required for MCAST).

4 Requirements

4.1 Safety Requirements

The following set of safety requirements have been identified within the scope of the project from the MCAST Statement of Work (SoW) [18]:

- To identify all Safety Hazards;
- Assess Risks posed by identified Hazards;
- MCAST is to be supported by a safety argument that demonstrates that risks have been reduced and are managed to ALARP and are tolerable or generally acceptable; and
- All environmental impacts have been identified and subject to the Best Practicable Environmental Option (BPEO).

Furthermore, sections 6.3.1 and 7.4 of the MCAST SRD [19] relate to safety management.

4.2 MOD Regulations: Safety and Environmental Protection

Applicable MOD Safety and Environment Protection Regulations and Standards are:

- Defence Standard 00-056 [2] prescribes all Safety Management requirements for defence and provides guidance as a means of ensuring compliance in the enablement of Products, Services and / or Systems (PSS). Evidence of compliance will need to be demonstrated utilising the Defence Standard 00-056 Compliance Matrix [2]. The compliance matrix should be presented as an Annex to the MCAST SECR;
- Defence Standard 00-051 [3] identifies requirements for environmental management of PSS by a Contractor and sets out how MOD expects the Contractor to demonstrate and provide assurance that these requirements have been met;
- DSA01.1 Defence Policy for Health, Safety and Environmental Protection [6] is the amplification of the Secretary of State's Policy Statement for Health, Safety and Environmental Protection (HS&EP). Its purpose is to articulate the Secretary of State's requirements;
- DSA02-DMR – Defence Maritime Regulations for Health, Safety and Environmental Protection [4];
- JSP 850 Infrastructure and Estate Policy, Standards and Guidance [20] contains Building Performance Standards. It sets a series of reference designs for specific defence infrastructure and benchmark capital and operational costs for the planning and delivery of MOD infrastructure. It is designed to be used by MOD staff and industry;
- JSP 375 Management of Health and Safety in Defence [21] provides the MOD organisation and arrangements required primarily by the Health & Safety at Work Act etc.1974 (HSWA);
- JSP 418 Management of Environmental Protection in Defence [22] is intended as the lead Departmental publication for the management of environmental protection in defence;
- JSP 604 The Defence Manual for Information Communication Technology (ICT) [23] defines the policy requirements and comprehensive practical guidance for undertaking the provision of ICT services and systems across defence;
- Additional to the MOD regulations imposed by the MTAO on the service contractor, the MOD will invoke its own safety and environmental systems based on:
    - POSMS [8], part of ASEMS [7], is concerned with the safety management processes and procedures as adopted by DE&S and their associated contractors. See SMP01 to SMP12;
    - POEMS [9], as part of ASEMS [7], provides guidance on addressing MOD and government environmental policy including sustainability and stakeholder management. See POEMS Environmental Management Procedures EMP01 to EMP08.

4.3 Statutory Safety Requirements: Legislation

It is likely that the MCAST service will be procured as COTS, as such, it is required to comply with UK Safety Legislation, including but not limited to:

- The Health and Safety at Work etc. Act (HSWA) 1974 [24];
- The Workplace (Health, Safety and Welfare) Regulations 1992 [25];
- The Control of Noise at Work Regulations 2005 [26];
- The Control of Substances Hazardous to Health (COSHH) Regulations 2002 [27];
- The Health and Safety (Display Screen Equipment) Regulations 1992 [28];
- The Manual Handling Operations Regulations 1992 [29];
- The Lifting Operations and Lifting Equipment Regulations 1998 [30];
- The Provision and Use of Work Equipment Regulations 1998 [31];
- Reporting of Injuries, Diseases and Dangerous Occurrences Regulations (RIDDOR) 2013 [32];
- The Personal Protective Equipment at Work Regulations 1992 [33]; and
- The Control of Lead at Work (CLAW) Regulations 2002 [34].

4.4 Environmental Requirements

The following set of environmental requirements have been identified from the MCAST SoW [18] and applicable MOD policy and regulation (DSA02-DMR – Defence Maritime Regulations for Health, Safety and Environmental Protection [4]):

- Identify Environmental Aspects and Impacts;
- Assess the Environmental Risk;
- Manage Environmental Risks to the BPEO iaw the requirements of DSA02 [4];
- To comply, as far as reasonably practicable, with applicable regulation;
- To comply, as far as reasonably practicable, with MOD standards; and
- Use of a suitable ISO14001:2015 [35] compliant Environmental Risk and Impact Classification Criteria and POEMS [9].

4.5 Statutory Environmental Requirements: Legislation

The MCAST equipment is being procured as COTS, as such it is required to comply with UK Environmental Legislation including but not limited to:

- The Environmental Protection Act 1990 [36];
- Environment Act 1995 [37];
- Control of Pollution Act 1974 [38];
- The Hazardous Waste (England and Wales) Regulations 2005 [39];
- The Waste Electrical and Electronic Equipment Regulations 2013 [40];
- The Persistent Organic Pollutants (Amendment) (European Union (EU) Exit) Regulations 2020 [41];
- The Waste Management Licensing (Amendment) Regulations 1995 [42];
- The Environmental Protection (Disposal of Polychlorinated Biphenyls and other Dangerous Substances) (England and Wales) Regulations 2000 [43];
- The Pollution Prevention and Control Act 1999 Order 2000 [44];
- The Waste Management Regulations 1996 [45];
- The Waste Management (England and Wales) Regulations 2006 [46];
- The Waste Management (Miscellaneous Provisions) (England and Wales) Regulations 2007 [47];
- The Environmental Damage (Prevention and Remediation) (England) Regulations 2015 [48];
- Climate Change Act 2008 [49];
- The Environmental Permitting (England and Wales) Regulations 2016 [50];

- The Environmental Permitting (England and Wales) (Amendment) Regulations 2018 [51]; and
- The Restriction of the Use of Certain Hazardous Substances in Electrical and Electronic Equipment Regulations 2012 [52].

4.6 Post Brexit Requirements

The UK Conformity Assessed (UKCA) marking is a new UK product marking that is used for goods being placed on the market in Great Britain (England, Wales and Scotland). It covers most goods which previously required the Conformité Européenne (CE) marking. The technical requirements ('essential requirements') that must be met and the conformity assessment processes and standards that can be used to demonstrate conformity are largely the same as they were for the CE marking.

The UKCA marking came into effect on 1 January 2021. However, to allow businesses time to adjust to the new requirements, it is still currently possible to use the CE marking until 31 December 2024 in most cases. There are some applications where the new UKCA marking is required on goods being sold in Great Britain immediately from 1 January 2021. The CE marking is only valid in Great Britain (GB) for areas where GB and EU rules remain the same. Product areas covered by the UKCA marking which could impact MCAST are:

- Electromagnetic Compatibility;
- Radio Equipment;
- Personal Protective Equipment;
- Low Voltage Electrical Equipment; and
- Restriction of Hazardous Substances.

Equipment which was fully manufactured, CE marked and ready to place on the market before 1 January 2021 can still be sold in Great Britain with a CE marking even if covered by a certificate of conformity issued by a UK body before 1 January 2021.

Therefore, UKCA marking may be a consideration for COTS items or project specific items that may be manufactured in UK as evidence that equipment has been manufactured to a safe standard.

The MCAST project team will need to monitor the update of UK legislation post BREXIT and the introduction of the various EU exit amendments that will come into being. The Defence Legislation Support Tool (DLST) [53] should be utilised to monitor this activity.

5 Safety and Environmental Protection Management Strategy

5.1 Overview

The strategy for the management of MCAST equipment safety and environmental protection reflects the low degree of complexity associated with the ubiquitous COTS equipment that forms the base of the system.

The equipment will be assessed and reviewed as one unit.

All persons undertaking safety and environmental specific roles will be SQEP. Their training records and proof of competency may be requested by the authority at any time.

5.2 Safety and Environmental Management Provision

The safety and environmental activities will be coordinated on behalf of the MOD PM by the MTAO / MCAST team.

Safety and Environmental Exemptions are not expected for MCAST due to the system being based on standard COTS hardware and software. It is also anticipated that any host site will be fully compliant with all current regulations.

5.3 MCAST Safety and Environmental Assessment

Given that MCAST will comprise COTS IT equipment and software and the environment in which it is installed and operated will be current regulation compliant it is anticipated that there will be no significant or unusual hazards. Therefore, a qualitative safety and environment assessment based on Preliminary Hazard Identification (HazId) and Environmental Impact Screening and Scoping (EISS) workshops (HWG) for this stage of the project and design maturity will be undertaken. This is sufficient and proportionate.

5.4 High Level Safety & Environmental Considerations for the Proportionate Approach

The simulated training of a Maritime Task Group and Battle Staff is far safer than any live training. [redacted] which substantially reduces the hazards to personnel. The proposed defence sites are currently kept up to date with the current standards for all site personnel and visitors. The key safety considerations at this stage of the project are:

- Travel to and from the site;
- Logistics of the equipment ready for use;
- Use of equipment through exercise; and
- Safely transporting the equipment for storage.

Simulated training has significantly lower impacts on the environment than any live training with a group of warships, support ships and accompanying aircraft. The main environmental impact for the MCAST project will be incurred in the following places:

- Transport to and from training locations for all persons involved;
- Additional electrical loading to power new electronics and hardware;
- Higher loads on the pre-existing facility energy consumption which covers heating and electricity to host people at the site; and
- Any disposal of hardware at the end of the contract due to breakage or becoming obsolete.

The Training Audience will experience a largely benign office environment, although stressors will be included within the training simulations to prepare them for operating in a warfare environment. They will be working with Display Screen Equipment so guidance on workstation ergonomics should be followed, although the

temporary nature of some exercises may influence this, particularly in terms of light weight non-rotating and non-adjustable seating.

It is anticipated that the solution will be delivered through servers located in secure data centres where the maximum efficiency can be extracted for the computing power required.

[redacted]

5.5 Safety and Environment Case Strategy Justification

The regulations to comply with and the associated guidance for the production of the Safety and Environment Case, as issued by the DMR, will be DSA02-DMR – Defence Maritime Regulations for Health, Safety and Environmental Protection [4].

The details for the strategy of the Safety and Environmental Case and subsequent reports are contained within DSA02-DMR [4] under Safety and / or Environmental Case(s) (304) and Safety and / or Environmental Case Reports (305). These state that the Safety and Environmental Case / Reports should be produced and maintained in accordance with the following:

- Defence Standard 00-56 [2];
- ASEMS Part 1 Chapter 4 [7]; or
- BRd 167 Chapter 2 [56].

The MTAO SEMP [1] also calls for the utilisation of the Ships OCs' S&EP Organisation and Arrangements (O&A) Leaflet 9 [57] which requires a proportionate, compelling, comprehensive and valid argument to be presented within the subsequent Safety and Environmental Case Report.

Therefore, to align and retain continuity with other MTAO simulation packages the S&EP strategy will be conducted as per the policy and guidance directed by ASEMS (POSMS and POEMS).

As a minimum for this stage of the project lifecycle the following is to be undertaken:

- This SEMP will be maintained and edited to reflect the safety case and environmental case strategy implemented;
- A Safety and Environmental Working Panel (SEWG / HWG) to convene a Preliminary HazId function with the output produced following the directions within POSMS Safety Management Procedure (SMP) and an EISS produced following the directions within POEMS Environmental Management Procedure (EMP). This will include the production of the preliminary eCassandra Hazard Log and preliminary Environmental Features Matrix; and
- Production of a preliminary SECR to record and support the MCAST safety and environmental case strategy with record of the initial assumptions, dependencies, route for risk assessment, process and procedures and initial findings. This will include the MCAST Forward Action Plan (FAP) to ensure that the safety and environmental elements of the project are effectively managed.

The Risk Assessment, once completed and signed off by the MCAST Team Leader (TL), is to be retained and reviewed iaw this MCAST SEMP.

6 Safety and Environmental Assurance: Through-Life

Hazards and Environmental Impacts should be identified and assessed as soon as possible in the acquisition cycle of a project, to identify and minimise the risk of unforeseen events to the downstream user. The hazards and impacts identified will need to be managed and, therefore, the MCAST SOR can be updated to ensure that they are captured, and management plans and actions put in place to minimise the associated risk and impact.

This through life approach aims to ensure that where possible, potential adverse effects are removed from the equipment and services during the Design phase. Failing this, the potential effects are mitigated by management and control arrangements.

6.1 Safety and Environmental Delivery Plan

The key activities that are required to manage safety and environmental requirements for MCAST are:

- Determination of the equipment's operating environment;
- Identification of key stakeholders;
- Identification of the applicable MOD Regulations;
- Identification of applicable legislation;
- Production of this SEMP iaw POSMS [8] and POEMS [9];
- Conduct of an initial HazId and EISS for MCAST;
- Production of an eCassandra Hazard Log;
- Production of a POEMS compliant EFM;
- Conduct of a final risk assessment and environmental final impact priorities with determination of a requirement to conduct Environmental Impact Management (EIM);
- Endorsement of the eCassandra HL and EFM;
- Production of the Safety and Environmental Case report of the project based on the derived Safety and Environment Case Strategy for MCAST; and
- Produce the In-Service Operational SECR.

Continuing support of the safety and environment management of MCAST will be through:

- Periodical review and update of the MCAST Safety and Environmental documentation through life;
- Through life review of the eCassandra HL and the EFM as determined by this SEMP;
- Production of a Safety and Environmental Audit Plan;
- Production of Safety and Environmental Audit Reports; and
- Ensuring Disposal Records are supplied iaw POSMS [8], POEMS [9].

All safety and environment documentation will be provided to the SEWG and stakeholders as deemed necessary by the SEWG. The SEWG will advise the MTAO PSEC of items of vital importance requiring action.

6.2 Design Phase: Management Initiation and Stakeholder Consultation

MCAST is a new concept with safety and environmental requirements built in when first initiated from the SOR [19]. The key safety and environmental protection requirements derived are:

- 5.2.3 - The system shall have a comprehensive core staff induction process;
- 5.5.7 - The system shall provide and maintain reference documentation to enable effective through-life operation of the capability;
- 7.1.1 - All IT infrastructure shall comply with MOD standards;
- 7.1.2 - To provide infrastructure that is compliant with all relevant legal aspects;

- 7.1.3 - To provide infrastructure that is compliant with all relevant Environmental aspects;

[redacted]

- 7.4.1 - The System shall compile a Safety and Environmental Management Plan that complies with Def Stan 00-051 and 00-056;
- 7.4.2 - The System shall maintain an MCAST Health and Safety Case;
- 7.4.3 - The System shall appoint a Safety representative to perform a Health and Safety inspection at each exercise location; and
- 7.4.5 - The System shall ensure that all personnel comply with the national regulations and legislation for companies operating within the countries where the System is to be delivered.

There are also a number of requirements placed against the host site infrastructure manager. These have been included for visibility and demarcation of project scope and boundaries:

- 6.1.7.3 - To provide facilities for the storage and disposal of refuse and waste with provision for recycling and appropriate access;
- 6.3.1.1 - To provide first aid facilities;
- 6.3.1.2 - To provide firefighting equipment; and
- 6.3.1.3 - Ability to isolate all electrical power, including emergency backups.

The following will be defined during the early phases of the project lifecycle:

- Scope (across Defence Lines of Development (DLoD));
- Boundaries and Assumptions (across DLoD);
- Stakeholder and Project Responsibilities;
- Statute Standards and Legislation;
- Regulators and Regulatory Authorities; and
- The role of SQEP in project safety and environmental compliance and in particular the SEWG.

The purpose of the SEWG is to provide a forum for the MCAST project to manage risk reduction activities to ensure effective levels of safety and environmental protection and provide an appraisal of the Safety and Environment Case through the life of the project. The SEWG is a focal point where project stakeholders can share knowledge and specific SME experience. Therefore, the SEWG acts in facilitating:

- a forum where safety and environmental responsibilities can be coordinated to better manage issues;
- access to decision makers with SME knowledge and experience;
- competent oversight of the Safety and Environmental Case, ensuring its maintenance, review, and annual revision; and
- an Audit trail via meeting minutes showing suitable advice has been sort in dealing with safety and environmental issues.

ASEMS [7] provides a suite of forms which support the output of the processes required under the requirements of POSMS [8] and POEMS [9]. These should be used to record the supporting safety and environmental protection evidence for MCAST.

6.3 Operational Phase: In-service System and Equipment

To ensure the management of safety and environmental issues up to and during the in-service phase of the project, the delivery team will produce the following outputs:

- Inputs to the MCAST SECR to include:
  - Identification of competency and training requirements;
  - Identification of Emergency and Contingency arrangements;
  - Identification of limitations of use and assumptions;
  - Identification of requirements for the storage and transportation of the equipment; and

  - Identification of Maintenance and Inspection Schedule.
- Perform a hazard identification and analysis (based on design specification):
  - To identify any areas crucial to user safety and environmental requirements;
  - To provide the scope, limitations, and boundaries of the SEMP;
  - To identify and collate evidence which will form the basis of the SECR;
  - To engage the proportionate effort required to produce an effective SECR;
  - To select or eliminate further options for analysis;
  - To initiate hazard analysis; and
  - To initiate the HL.
- A HL will be produced in the eCassandra format as an output of the HazId process. The HL will be included within Annex A of the SECR;
- Conduct an EISS and produce an EFM with potential further EIM based on the Final Impact Priorities identified on production of the EFM;
- A SECR will be produced to summarise the arguments and evidence of the Safety and Environment Case and presents the argument that the equipment and associated systems meet performance standards as a 'snapshot in time'. Inputs to the SECR include:
  - Justification that the safety and environmental requirements have been meet and the residual risks are ALARP;
  - Justification that Environmental Impacts are being minimised, as far as reasonably practicable;
  - A record of operational activities at the time of writing which shows activities can be undertaken safely and in an environmentally responsible way;
  - Arguments which justify the safety and environmental performance of the system and that the processes assessed were found to be appropriate and accurate in supporting the belief that system safety and environmental compliance were found to be tolerable;
  - Environmental Supportive Evidence; the Safety and Environmental Contractor will perform an EISS exercise, undertaken with stakeholders that form a SQEP; and
  - Environmental Standards, Effects and Risk Registers; production and maintenance of a Safety and Environmental Standards Register outlining statute legislation and regulatory requirements and an Environmental Impact / Risk Register, which identifies the list of environmental comparators to be considered within the safety and environmental argument presented.
- A Safety and Environmental Audit plan will be produced and published to all MCAST stakeholders for approval. A SQEP independent auditor will carry out audits. The safety and environmental audit plan will layout proposed future audits. Audit reports will be produced for each audit that will identify any non conformities raised at the time of audit; and
- Produce a safety and environmental management progress report that will capture any issues raised on audit reports and other issues identified during the life of the system.

6.4 Disposal / Termination Phase

The Project will ensure eventual and through life disposal safety risks are addressed in the SECR. Defining the procedures to be followed for the safe management of all disposal risks iaw POSMS [8] (SMP 03 & 13) and the POEMS [9], JSP 440 The Defence Manual of Security [54] and the Defence Logistics Framework.

During the disposal / termination phase, it will be necessary to:

- Update the SEMP to outline safety and environment activities to be conducted at the disposal / termination phase;
- Update the MCAST Disposal Plan; and
- Produce a SECR to cover the disposal / termination phase.

The conduct of these activities is not included in the scope of this document but will be contained within the future project Disposal Plan.

6.5 Maintenance

There is no requirement for MOD staff to maintain the hardware, software or user access devices. The service provider will be responsible for all maintenance needed to sustain the service.

The MCAST system will be a computer simulation involving many software applications, data bases, data feeds, networks and gateways. All of these need to be almost continually monitored and adjusted to manage security and performance of the system. This might be considered to be maintenance and will be carried out by the Service Provider / Contractor as part of the service.

The system will undergo periodic software patching, updates, upgrades and configuration changes. This will be an almost continuous activity and matches the requirements of a digital service. The Technology Enhanced Learning (TEL) ruleset in JSP 822 [58] has been copied across from the Government Digital Services ruleset and will be applied. This expects continuous monitoring and support from a suitably experienced team of system administrators and software developers.

Network routers, hubs and gateways will be an integral part of the system and will need continuous monitoring, configuration of port settings and lists of threats and allowed traffic. These will be managed as part of the service by the contractor, along with the accompanying security activities (including encryption, password and account management).

The OPCIS hardware and screens or projectors that the Training Audience interface will be maintained in the sense of regular updates and patching of software to maintain security and configuration control. This is again expected to be a continuously monitored activity, much of which is automated. Beyond this there is no expectation of maintaining the laptops or desktop computers.

The hardware used by the Training Audience will need regularly cleaning in the post COVID-19 environment. This needs to be a standard procedure within the set-up, daily operating procedures and close-out procedures for each exercise. It is not yet clear whether this cleaning activity will be carried out by the contractor or the training staff, or even the Training Audience.

[redacted]

Part 4 of the MCAST Integrated Logistic Support Plan (ILSP) [59] provides details of the initial maintenance strategy for the service.

6.6 Training

Training is a key pillar of the competency for safety and environmental protection for all personnel involved with MCAST activities including design, installation, training, operation, repair, maintenance and disposal. The details of MCAST training for the Training Audience and the White Force will be recorded here.

6.7 Communications Plan

There is a requirement for a communications plan, detailing the processes for delivery of in-service data and build state definition. This is yet to be developed for MCAST.

6.8 Certification Plan

Annex G (Certification Plan) of the MCAST EMP [11] details MCAST certification requirements. The following offers certification considerations for safety and environmental protection.

It is anticipated that the equipment / service provider will provide internal safety assurance measures and governance that can be presented to the MOD in a Safety and Environmental Case Report. This could be by evidence of CE / UKCA marking and certificates of conformity to standards applied to the equipment design and manufacturing processes. The primary concerns will be Electrical Safety, Electromagnetic Interference (EMI) with other systems and equipment, and Health and Safety at Work for the Training Audience and White Force.

It is not anticipated that excessive noise, vibration or motions will present a hazard to the users but noise and vibration data for the MCAST equipment will need to be recorded. This could be an issue if a standalone generator is part of the deployable solution to meet the power needs of the system. A noise survey may be required during system acceptance trials to determine if the noise levels recorded exceed the mandatory action levels.

COSHH will be managed through the collection of any hazardous substance safety data sheet but the use of the hazardous substance must be subject to a COSHH assessment.

The MCAST service will not be a facility requiring type approval and certification for road use. Any use of a vehicle to transport the system, or forming part of the system, will require selection of vehicles that are already type approved for the relevant purpose. The system is not expected to move on roads or across the ground during operation.

The MCAST service will not fly or require any Airworthiness certification. Elements of the system may need to be air portable, if this is the case, appropriate standards will be specified for the transport containers. Use of standard air transport containers would be expected. The system will not require to be air dropped or to be used whilst airborne. The system is not expected to be deployed on board any aircraft or flying system. Airworthiness certification is, therefore, not applicable.

The MCAST service will not form part of a ship or floating system. As such it does not require Naval Authority Group safety certification for seaworthiness or maritime safety. [redacted]

The use of a standalone generator to provide additional power may be subject to Environmental Licensing and will be assessed as the project design and power requirements develop.

6.9 Change Management

Change management is yet to be fully declared for MCAST. Any design change is to be highlighted by the design authority and will be forwarded to the SEWG to review its impact on safety and integrity of the MCAST system or any Environmental impact.

Where this causes a change in the Safety and Environment Case, the affected documents will be up issued and circulated as appropriate.

6.10 Configuration Management

Details of the configuration management for MCAST can be found in Annex I (Configuration Management Plan) of the MCAST EMP [11].

The service provider will be responsible for all configuration of the software, hardware, data and configuration settings of appliances. Each exercise will be slightly different and require adjustments to the configuration of users, environmental data, entities within the simulation and tasks or actions. The White Force will assist in the setting of the configurations for each exercise and these configurations will also respond to the actions of the Training Audience.

In general, the suite of software and computer hardware will be set up by the service provider. It may include load balancing features such as virtual servers and virtual clients and is likely to be located in at least one secure cloud data centre. Network configuration settings will be managed by the provider and will include all cryptographic elements, passwords, port settings and firewalls. Computer hardware will vary over time and is likely to be changed for each major exercise.

[redacted]

The Training Audience includes participants with different roles, permissions and access to data. Each exercise simulation will be set up for the Training Audience to meet specific Collective Training Objectives (CTO). These CTOs will drive the configuration of the simulation and probably also the range of software applications that are included.

Over the life of the service the MCAST configuration will change significantly. It does not need to be at a particular baseline for any specific exercise. It will need to be controlled and managed to ensure stability for the big set-piece exercises. However, each of these exercises is a project within its own right, running for an extended period within the contract, with different design, test and assurance activities prior to the Exercise going 'live'. It is desirable that the contractor sees the service as a live and evolving entity with many configuration states.

6.11 Accident, Emergency and Contingency Reporting

All accidents or near misses (as defined in RIDDOR 2013 regulations [32]) are to be reported by the MCAST personnel, both Training Audience and White Force. The means of reporting is yet to be determined.

The MCAST / MTAO team will review all Accident Reports for their potential impact on safety.

Where this causes a change in the Safety and Environment Case, the affected documents will be up issued and circulated as appropriate.

All host site accident, emergency and contingency reporting will be conducted iaw MOD standard procedures. Where these impact on the safe operation of MCAST, they will be reported to the appropriate MOD authority.

6.12 Defect Reporting

All defects are to be highlighted by the equipment authority and will be reviewed for their impact on safety and environment management. The defect reporting process is yet to be confirmed for MCAST but could adopt the S2022 reporting process as detailed in Book of Reference (BR) 1313 [60]. Although this BR details the reporting arrangements for surface warships, hence an independent defect reporting procedure may need to be developed including safety or environmental protection related defects which may impact the safety of personnel or impact to the environment.

Where this causes a change in the Safety and Environment Case documents or deviations from the agreed safety and environment management system, actions will be agreed by the SEWG and relevant documentation raised or up issued and re-circulated as appropriate.

6.13 Audit Planning

Audits will be carried out as required by MTAO iaw their SEMP [1].

6.14 Defence Lines of Development

The Safety and Environment (S&E) implications on Training, Equipment, Personnel, Information, Doctrine and Concepts, Organisation, Infrastructure and Logistics will be addressed during S&E assessment activities and recorded in the SECR.

7 Hazard Management

Def Stan 00-056 [2] defines:

- a hazard as the potential to cause harm, e.g., a physical situation or state of a system, often following from some initiating event that may lead to an accident;
- the safety and environmental management system as the organisational structure, processes, procedures, and methodologies that enable the direction and control of the activities necessary to meet safety and environmental requirements and policy objectives; and
- Risk Management as being the systematic determination, based on Tolerability Criteria as to whether a risk is Broadly Acceptable or Tolerable and ALARP, and whether any further risk reduction is necessary.

The purpose of Risk Management is to support decisions to implement sufficient and appropriate measures to reduce the likelihood of accidents occurring and / or minimising the resultant consequences. Risk Management is a tool to help generate a robust argument, supported by evidence, that identified hazards or potential accidents have been successfully mitigated through meeting safety requirements.

7.1 Process

Hazard identification and risk analysis relating to MCAST will be conducted using the criteria laid out within the ASEMS [7], POSMS [8] and, specifically, the following processes:

- SMP04 - Preliminary Hazard Identification and Analysis;
- SMP05 - Hazard Identification and Analysis;
- SMP06 - Risk Estimation;
- SMP07 - Risk and ALARP Evaluation;
- SMP08 - Risk Reduction; and
- SMP09 - Risk Acceptance.

7.2 The Role of the Hazard Log

The HL will be a ‘live’ document that is a continually updated record of all hazards, accident sequences and accidents identified and associated with MCAST.

It will initially record the findings of the Preliminary Hazard Identification and Analysis and be used through the development of the project to identify and define the residual risk associated with the MCAST service so that this can be managed and transferred to the appropriate authority when required.

The HL will be subject to periodic review at an interval of no greater than three years.

7.3 Hazard Log Tools

The HL will be produced within the boundaries of the project and will be created in the eCassandra tool.

In eCassandra, the HL is kept under configuration control and access to data suitably controlled by a dedicated administrator. Individuals will be identified for appropriate levels of access and updates commensurate with the delegation to that individual.

The MCAST SEWG will be responsible for the development, upkeep and endorsement of the HL and will provide a Status Record to the Secretary of the SEMC meeting when requested.

7.4 The ALARP Principle

The principle of ALARP will be used to define a range of tolerable risk. Above the upper limit of range, the risk is intolerable (Classification A) and cannot be justified on any grounds except in exceptional

circumstances[2]. Below the lower limit, the risk may be considered acceptable (Classification D) with no requirement for a detailed ALARP argument, although further risk reduction measures are to be implemented where practicable. In the ALARP region (Classification B and C), the risk will be reduced so far as it is reasonably practicable (the risk must be weighed against the cost in terms of time, money and the practicality of averting it). At the same time, the equipment must fulfil the intended operating role. Figure 4 provides a diagrammatic representation.

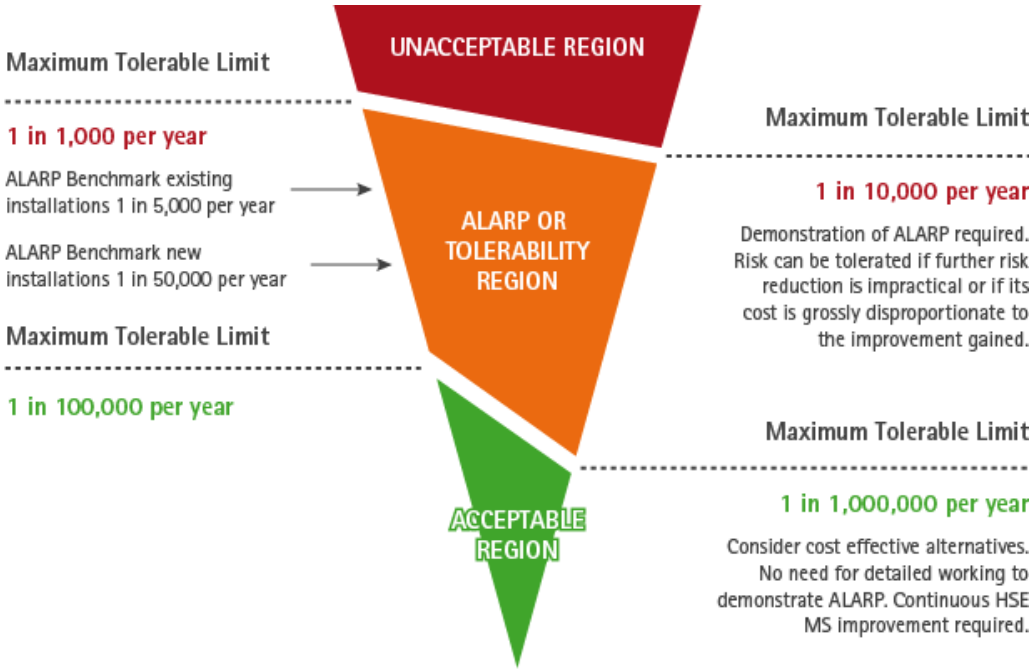

Figure 4: ALARP Hazard and Tolerable Risk Assessment

ALARP status is defined as:

- All Risks classified as intolerable (A) will require design action to eliminate the hazard or reduce its risk;
- Risks classified as B, in the upper ALARP region, shall require suitable risk reduction measures to be incorporated unless those measures are impracticable or grossly disproportionate, cost-wise with respect to the benefit gained;
- Risks classified as C, in the lower ALARP region, shall be deemed tolerable if the cost for risk reduction exceeds the improvement gained; and
- Hazards classified as tolerable (D) will require no further action unless some measures are identified which reduces the risk further without imposing any significant penalty on cost or practicality.

With respect to the Risk Class criteria, the UK HSWA 1974 [24] requires that any safety risk must be reduced So Far As Is Reasonably Practicable. The UK Health and Safety Executive (HSE) consider that this will be achieved if the risks are reduced to a level that is ALARP.

7.5 Safety Risk Classification Matrix

Tolerability Criteria provides the means for categorising risks as Unacceptable, Tolerable or Broadly Acceptable and should be based on either a quantitative scale, qualitative scale or a combination of both.

[2] MOD, DE&S Safety and Environmental Protection Leaflet 02/2011 ALARP In a Military Equipment Capability Context, Issue 2.0, March 2013 states 'Exceptional circumstances are where failure to conduct an activity presents a greater risk to safety or national security than ceasing the activity. Begin investigation of potential safety improvements.'

The MTAO SEMP [1] calls for the hazard and risk process to be conducted in accordance with the Ships OC Safety & Environmental Protection Organisation And Arrangements Statement Leaflet 5 End to End Safety Risk Management Process [16]. Annex D of Leaflet 5 is the Risk Classification Matrix (RCM) and has been developed for the risk assessment and subsequent risk classification for ships in the UK Defence arena.

The tolerability criteria for the MOD Maritime domain are as follows:

- **A** (Intolerable) - Cannot be tolerated, shall not be accepted unless there are exceptional reasons for the activity to take place. Must be managed in accordance with DE&S Safety and Environmental Protection Leaflet 03 / 2011 – “Equipment Safety and Environmental Protection (SEP) Risk Referral” [61];
- **B** (Undesirable) - Can be tolerated, a full safety justification and ALARP argument must be provided to justify the risk. Any residual Class B risks shall be authorised by the Project Safety Committee and accepted by the Operating Duty Holder or other 2* Accountable Person;
- **C** (Tolerable) - Can be tolerated provided an ALARP status is reached. The record of ALARP status is to be recorded in the Hazard Log. Class C Risks shall be agreed by a SQEP panel and accepted by the Delivery Duty Holder or other 1* / OF5 Accountable Person;
- **D** (Broadly Acceptable) - Can be tolerated. A proportional ALARP Statement is to be recorded in the Hazard Log. Class D Risks shall be agreed by a SQEP panel and accepted by the nominated Accountable Person.

8 Environmental Impact Management

8.1 Process

Environmental impacts and priorities relating to MCAST will be identified and assessed using the criteria laid out within the ASEMS [7], POEMS [9] and, specifically, the following:

- EMP04 – Environmental Impact Screening and Scoping (EISS) and Impact Priority Evaluation;
- EMP07 – Environmental Impact Management; and
- EMP08 – Operational Controls.

The EISS activity shall be conducted where practicable for all CADMID lifecycle stages including concept, assessment, demonstration, manufacture, (installation), in-service and disposal.

Figure 5 shows potential environmental aspects (including inputs and outputs) linked to each lifecycle stage.

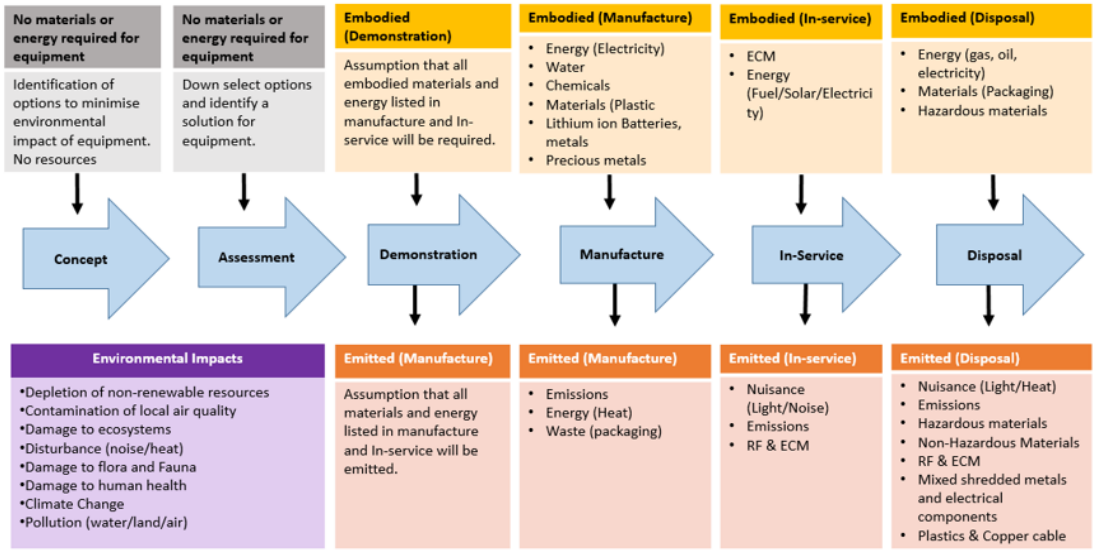

Figure 5: Environmental Impact Input / Outputs

The EISS activities include:

- Identification of activities, environmental aspects and impacts;
- Assessment of the environmental impact significance;
- Consideration of potential environmental risks;
- Consideration of opportunities to implement operational controls; and
- Determination and justification of the final environmental impact priority scores.

All of these activities will be conducted iaw the following POEMS guide; EMP04 Environmental Impact Screening and Scoping Section 4.2.

The findings of the assessment will be recorded on an appropriately tailored EFM, which will be recorded in an Annex to the MCAST SECR.

8.2 Best Practicable Environmental Option

BPEO is a term used to demonstrate that the environmental impacts associated with an asset have the least environmental damage, as well as meeting legislative and practicability constraints, at acceptable cost. It is the mechanism by which due regard to the protection of the environment should be demonstrated for an asset, including those not governed by applicable regulations or standards.

The environmental risk and impacts associated with MCAST equipment will be managed in such a way, whereby the levels of risk associated with adverse impact or environmental damage is minimised. All environmental aspects and impacts identified during the assessment process should be managed and mitigated as far as reasonably practicable to achieve the BPEO.

In addition, to demonstrate the BPEO, the asset should adopt Best Available Techniques (BAT) defined as the available techniques which are the best for preventing or minimising emissions and impacts on the environment [62].

This will be achieved via the adoption of the BPEO to control the risk:

- Compliance with statutory environmental requirements, regulations and legislation is achieved;
- Environmental protection will be achieved and maintained by a process of aspect and impact identification, analysis, management, and continuous review of environmental risks;
- Environmental assessments and appraisals will demonstrate that all potential risks and impacts to the environment are managed effectively;
- Environmental cases and appraisals (embodied within the SECR) will provide the objective justification that the level of environmental impact assessment is managed using the BPEO;
- Environmental assessments will cover where applicable the storage, operation, training, transportation, maintenance, and disposal of MCAST equipment and systems during peacetime, operational training, Transition to War (TTW) and hostilities as far as is reasonably practicable; and
- Disposal consideration shall include through life disposal of consumables and unplanned disposal of complete equipment.

8.3 Environmental Management and Assessment Core Principles

The management of environmental protection shall also be conducted in accordance with the Institute of Environmental Management and Assessment Core Principles [63]:

- Polluter Pays Principle - The polluter pays principle is enacted to make the party responsible for producing pollution responsible for paying for the damage done to the natural environment;
- Precautionary Principle - Is the approach to innovations which have the potential for causing harm (to the environment). It emphasises that caution, pausing and review should be considered prior to the implementation of innovative ideas that may be (environmentally) damaging;
- Innovation Principle - Promotes smart, future-oriented regulation and policies designed to encourage innovation activities that can deliver socially and environmentally beneficial progress;
- Proximity Principle - Is the principle that environmental damage should as a priority be rectified at source. The main purpose is to tackle environmentally harmful effects as soon as possible before they have spread or caused long-term damage;
- Pollution Prevention - Is the principle for reducing the amount of waste that is created and released into the environment. Implementation of such processes reduces the severity and / or number of hazards posed to both public health and the environment;
- The Integrated Approach - Promotes a holistic and interconnected approach to managing environmental systems through a goal-oriented and strategic process;

- Transparency & Inclusivity - Is the principle that multi-level and multi-sector stakeholder engagement, accountability and empowerment should underpin environmental policy development, including involvement of citizens in decision making; and
- Sustainable Development - Is the principle that the needs of the present generation should be met without compromising the ability of future generations to meet their own needs.

9 Acronyms / Abbreviations

Acronym / Abbreviation	Description
ALARP	As Low As Reasonably Practicable
ASEMS	Acquisition Safety & Environmental Management System
AW	Above Water
BAT	Best Available Techniques
BPEO	Best Practicable Environmental Option
BR	Book of Reference
CADMID	Concept, Assessment, Demonstration, Manufacture, In-Service and Disposal
CADMIT	Concept, Assessment, Demonstration, Migration, In-Service and Termination
CCU	Certificate of Clearance for Use
CE	Conformité Européenne
CIS	Command and Information Systems
CLAW	Control of Lead at Work
CO	Commanding Officer
COSHH	Control of Substances Hazardous to Health
COTS	Commercial Off The Shelf
CSF	Commander Strike Force
CSG	Carrier Strike Group
CT	Collective Training
CTO	Collective Training Objectives
C2	Command and Control
DA	Design Authority
DE&S	Defence Equipment and Support
Def Stan	Defence Standard
DLoD	Defence Lines of Development
DLST	Defence Legislation Support Tool
DOTC(M)	Defence Operational Training Capability (Maritime)
DP	Demonstration Phase
DMR	Defence Maritime Regulator
DSA	Defence Safety Authority
EA	Equipment Authority
EFM	Environmental Features Matrix
EIM	Environmental Impact Management
EISS	Environmental Impact Screening and Scoping
EMI	Electromagnetic Interference

Acronym / Abbreviation	Description
EMP	Engineering Management Plan
EMP	Environmental Management Procedure
EU	European Union
EXSPEC	Exercise Specification
FAP	Forward Action Plan
FBC	Full Business Case
FGen	Force Generation
FSus	Force Sustainment
GB	Great Britain
GFA	Government Furnished Assets
HazId	Hazard Identification
HL	Hazard Log
HOE	Head of Establishment
HS&EP	Health, Safety and Environmental Protection
HSE	Health and Safety Executive
HSWA	Health and Safety at Work Act
HWG	Hazard Working Group
ICT	Information Communication Technology
ICD	Interface Control Definition
ILSP	Integrated Logistic Support Plan
IOC	Initial Operating Capability
ISEA	Safety and Environmental Auditor
IT	Information Technology
ITEA	Integrated Test, Evaluation and Acceptance
ITN	Invitation to Negotiate
JMNIAN	Joint Multi-National Information Assurance Network
JSP	Joint Service Publication
LRG	Littoral Response Group
LSG	Littoral Strike Group
MA	Maintenance Authority
MBS	Maritime Battle Staff
MCAST	Maritime Command and Staff Trainer
MCS	Maritime Combat Systems
MCTS	Maritime Composite Training System
MEWP	Maritime Electronic Warfare Programme

Acronym / Abbreviation	Description
MEWT	Maritime Electronic Warfare and Training
MOD	Ministry of Defence
MP	Migration Phase
MTAO	Maritime Training Acquisition Organisation
MTG	Maritime Task Group
MWBS	Maritime-Warfare Battle Staff
O&A	Organisation and Arrangements
OBC	Outline Business Case
OBI	Order Book Item
OC	Operating Centre
OEM	Original Equipment Manufacturer
OPCIS	Operational Communications Information System
OPDEF	Operational Defects
PHIA	Preliminary Hazard Identification and Analysis
PHST	Packaging, Handling, Storage and Transport
PM	Project Manager
POEMS	Project Orientated Environmental Management System
POSMS	Project Orientated Safety Management System
Prog Mgr	Programme Manager
PSEC	Project Safety and Environmental Committee
PSS	Products, Services and / or Systems
RCM	Risk Classification Matrix
RACI	Responsible / Accountable / Consulted / Informed
RF	Radio Frequency
RFA	Royal Fleet Auxiliary
RIDDOR	Reporting of Injuries, Diseases and Dangerous Occurrences Regulations
RN	Royal Navy
S&E	Safety and Environment
S&EP	Safety and Environmental Protection
Saf Mgr	Safety Manager
SEC	Safety & Environmental Committee
SECR	Safety and Environmental Case Report
SEMC	Safety Environmental Management Committee
SEMP	Safety and Environmental Management Plan
SEMS	Safety and Environmental Management System

Acronym / Abbreviation	Description
SEP	Safety and Environmental Protection
SEWG	Safety and Environmental Working Group
SME	Subject Matter Experts
SMP	Safety Management Procedure
SofS	Secretary of State for Defence
SoW	Statement of Work
SQEP	Suitably Qualified and Experienced Personnel
SwAMP	Software Acquisition Management Plan
TEL	Technology Enhanced Learning
TL	Team Leader
TRA	Training Requirements Authority
TrAD	Training Authorisation Documents
TTW	Transition to War
UK	United Kingdom
UKCA	UK Conformity Assessed
UPS	Uninterruptible Power Supplies
UW	Under Water

Table 3: Acronyms & Abbreviations

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