ALGA
AUSTRALASIAN LAND + GROUNDWATER ASSOCIATION

Voluntary Code of Practice

September **2025**

Australian National Unexploded Ordnance (UXO) Industry

Document Control

In accordance with the Australian Competition and Consumer Commission (ACCC) Guidelines for developing effective voluntary industry codes of conduct. The code shall be reviewed annually (or as agreed by the UXO working group) to ensure the standards incorporated meet identified objectives and current community expectations and that it works effectively.

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Executive Summary

This Voluntary Code of Practice (VCOP) sets out nationally agreed best practices for the Australian Unexploded Ordnance (UXO) industry. Developed by a working group of experienced practitioners under the auspices of the Australasian Land and Groundwater Association (ALGA) and its UXO Special Interest Group (SIG), the VCOP aims to promote consistent, competent, and safe practices across UXO-related activities, whether on Defence land, private property, or in coastal waters. Members of the ALGA UXO SIG can be found on the ALGA website, **ALGA UXO SIG**.

The VCOP complements, but does not replace, the Defence UXO Management Manual (DUXOMM). It recognises and adopts DUXOMM content as best practice where appropriate and provides practical implementation strategies tailored to Defence, civilian, and commercial contexts.

The document provides structured guidance across the core areas:

- Risk and project management for UXO operations
- Roles and responsibilities between Defence and industry
- Qualifications and capability requirements for UXO personnel
- Remediation, clearance, and environmental safety standards
- Procedures for managing explosive ordnance materiel (EOM)
- Guidance for firefighting in UXO-affected areas
- Additional content addressing underwater UXO operations, quality assurance, and continuous improvement.

The VCOP is reviewed regularly to ensure alignment with Commonwealth policy, community expectations, and emerging operational requirements.

Importantly, this is a voluntary code. While it carries no legal mandate, it represents the collective commitment of the Australian UXO industry, through the ALGA UXO SIG, to uphold the highest standards of professionalism, safety, and integrity. It is intended as a reference for UXO contractors, landholders, regulators, and government agencies engaged in UXO-related activities nationwide.

Foreword

The Australian Unexploded Ordnance (UXO) industry was first established in 1989. Since then, a number of specialist companies have emerged, providing critical safety services to industry, government, and private landholders across potentially UXO-contaminated land and coastal waters.

Traditionally, Australian UXO companies have operated under international best practice or in alignment with Defence standards. With the establishment of the Department of Defence's National UXO Office, Defence has released mandatory doctrine that applies to UXO works on the Defence estate and, where contracted, off the estate.

In response to the unique and evolving nature of UXO operations in Australia, a national working group was formed in 2022. Comprising industry leaders and senior professionals, the group developed this Voluntary Code of Practice (VCOP) to provide guidance, consistency, and accountability across the sector.

This document is presented as a voluntary code of practice. It does not carry legislative or regulatory force, and compliance is not legally mandated. Rather, it serves as an industry-led framework developed by practitioners to promote consistency, accountability, and safety across UXO-related activities. It is distinct from formal codes of practice issued under statutory authority, which may create legal obligations or standards enforceable in law. This voluntary code reflects a collective commitment to uphold best practices and foster responsible conduct across the UXO industry in Australia.

The code identifies areas in which the industry adopts the content of the Defence UXO Management Manual (DUXOMM) and outlines how the sector supports and implements its guidance for both Defence and non-Defence projects.

We acknowledge and thank those who contributed their time, expertise, and commitment to developing this code and to ensuring the industry remains safe, collaborative, and fit for the future.

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Terms and Definitions

The following terms and definitions are primarily derived from the Defence UXO Management Manual (DUXOMM) and other open-source information from the global UXO industry.

Abandoned explosive ordnance (AXO)

Explosive ordnance that has not been used during an armed conflict, that has been left behind or dumped by a party to an armed conflict, and which is no longer under the control of the party that left it behind or dumped it. Abandoned explosive ordnance may or may not have been primed, fuzed, armed or otherwise prepared for use. See discarded military munitions (DMM).

As Low As Reasonably Practicable (ALARP)

A standard management principle for reducing a risk level to where the cost (time, effort and money) involved in reducing the risk level further would be grossly disproportionate to the benefit gained.

Ammunition

See munition.

Armed

This occurs when all the safety devices and features incorporated in the fuze have been eliminated or are not functioning so that the fuze has completed its arming sequence but has not been subjected to sufficient or proper forces required to begin the fuze firing sequence.

Australasian Land and Groundwater Association (ALGA)

ALGA has a broad base of members, including landowners, property developers, industry, consultants, scientists, contractors, regulatory agency staff, government, the legal profession, laboratory staff, researchers and academics. The core focus of this Association is to advance the protection, restoration, and responsible management of land and groundwater, safeguarding human health and the environment across Australasia.

Blank

A cartridge case or cloth bag containing propellant, normally gunpowder, without a projectile. Note: It produces a loud noise on firing when used in training, signalling or salutes.

Bomb

An aerodynamically shaped metal container, usually fin-stabilised, filled with high explosive, smoke, incendiary or chemical composition designed to be dropped from an aircraft then to explode or otherwise operate in a specific manner. It is also used to describe ammunition for mortars.

Buried

For the purpose of this publication and all references therein, the term 'buried' refers to explosive ordnance (EO) and/or unexploded ordnance (UXO) that is wholly or partially covered by earth, debris or any other material that stops the item being positively identified. (Also see sub-surface).

Business as usual (BAU)

Refers to the normal conduct of business.

Calibre

1. The diameter of the bore of a weapon measured in inches or millimetres, excluding the depth of the grooves.
2. The diameter of a projectile across the body.

Cartridge

Ammunition, ready for firing, wherein the propelling charge(s), its primer with or without the projectile with its fuze, are assembled in one unit for handling and firing.

Clearance

The removal of UXO from the surface or subsurface to a pre-established depth.

Cleared area

A defined area cleared by removing or destroying all specified explosive ordnance hazards to a specified depth.

Client

The department, organisation or entity, whether Commonwealth, Defence or non-Defence, for whom the UXO project is being conducted.

Client's manager

The Client's management team member is responsible for delivering the UXO project with the UXO contractor, UXO consultant, and other service providers.

Commonwealth land

Land owned or occupied by the Commonwealth or a Commonwealth authority. It does not include land leased by the Commonwealth unless that lease is subject to a condition that Defence may use the land for defence purposes or the conduct of defence operations or practices.

Defence

Australian Government Department of Defence.

Defence area (DA) (2016-)

Any area of land, sea or air declared to conduct Defence operations or practices. A DA is declared under Defence Regulations 2016 and is published as a Legislative Instrument. See Defence Practice Area (DPA).

Defence controlled land

Land where Defence controls access by the general public for Defence purposes or the conduct of Defence operations or practices.

Defence personnel

Means all Australian Public Service employees in the Department of Defence, Defence locally engaged employees, Defence civilians, Defence members and the equivalents from other Defence organisations on exchange to Defence.

Defence practice area (DPA) (1952-2016)

Any area of land, sea or air declared to conduct Defence operations or practices. A DPA is declared under Defence Force Regulations (DFR) 1952 part XI by the Minister for Defence and notified in the Commonwealth of Australia Gazette. See Defence Area (DA).

Defence registers of sites affected by UXO

The central repository maintained by Defence that contains known or recorded areas of possible UXO-affected land. The boundaries of possible affected areas are indicative only.

Defence training area (DTA)

Any area that is owned or leased by the Commonwealth specifically for the purpose of conducting Defence training. A DTA may contain a variety of ranges within its boundaries.

Defense

United States Department of Defense.

Deflagration

Subsonic combustion that usually propagates through thermal conductivity (hot burning material heats the next layer of cold material and ignites it).

Demilitarisation

The act of disassembling munitions for the purpose of recycling, reclamation, or reuse of components. Also, rendering munitions innocuous or ineffectual for military use. The term encompasses various approved demilitarisation methods such as mutilation, alteration, or destruction to prevent further use for its originally intended military purpose or to avoid future fear and alarm.

Demolition

Destruction of structures, facilities or material by use of fire, water, explosives, mechanical or other means.

UXO desktop study (DTS)

A formal desktop assessment that is undertaken to identify the potential for UXO to exist in a given area.

Destruction

The process of final conversion of munitions and explosives into a state whereby they can no longer function as designed.

Detection

The locating of subsurface objects using geophysical search equipment.

Discarded military munitions (DMM)

Military munitions that have been abandoned without proper disposal or removed from storage in a military magazine or other storage area for the purpose of disposal. See abandoned explosive ordnance (AXO).

Disposal

The removal of scrap and waste products together with surplus or redundant stock through destruction, dumping, sale or other action.

Disposal site

An area authorised for the destruction of munitions and explosives by detonation and/or burning.

Electromagnetic induction (EMI)

A geophysical technology used to induce a magnetic field beneath the Earth's surface, which in turn causes a secondary magnetic field to form around nearby objects (both ferrous and nonferrous), that have conductive properties.

EMPTY

Describes the final condition of munitions packaging (MP) which is to be returned to the supplier. A suitable process must be undertaken to ensure that the condition is met. See Free From Explosives (FFE).

Energetic material

A substance or mixture of substances that, through chemical reaction, is capable of rapidly releasing energy.

Environment

This includes:

1. ecosystems and their constituent parts, including people and communities; and
2. natural and physical resources; and
3. qualities and characteristics of locations, places and areas; and
4. heritage values of places including those on the Register of the National Estate; and
5. the social, economic and cultural aspects of a thing mentioned in 1, 2 or 3.

Explosive

A solid or liquid substance, or a mixture of substances, that, by means of an intrinsic chemical reaction, is capable of producing an explosion. More precisely, a substance or mixture that, when subjected to appropriate external influences, can rapidly release energy in the form of hot gases and heat.

Explosive charge

1. A given quantity of explosive, either in bulk or contained within a device for example a bomb, projectile, mine, or similar, or used as a propellant.
2. A quantity of explosive prepared for demolition purposes.

Explosive ordnance (EO)

All munitions containing explosives, nuclear fission or fusion materials and biological and chemical agents. This includes bombs and warheads; guided and ballistic missiles; artillery, mortar, rocket and small arms ammunition; all mines, torpedoes and depth charges, demolition charges; pyrotechnics; clusters and dispensers; cartridge and propellant actuated devices; electro-explosive devices; clandestine and improvised explosive devices; and all similar or related items or components explosive in nature.

Note: For the purpose of this manual, EO only refers to conventional munitions. IED (Improvised explosive devices) and clandestine devices are specifically excluded from the remit of this manual.

Explosive ordnance disposal (EOD)

The detection, identification, field evaluation, rendering safe and final disposal of unexploded explosive ordnance. It may also include the rendering safe and/or disposal of explosive ordnance, which may have become hazardous by damage or deterioration.

Explosive ordnance disposal (EOD) procedures

Any particular course or mode of action taken by qualified explosive ordnance disposal (EOD) personnel to render safe, disassemble, neutralise or dispose of EO, improvised explosive device (IED) or any hazardous material associated with an EO incident.

Explosive ordnance materiel (EOM)

The general term to describe any material that forms, or has formed, part of an item of explosive ordnance (EO). EOM refers to all by-products resulting from the functioning of munitions. This includes, but is not limited to, fragments of exploded/destroyed military munitions, shell casings, projectiles (including expended ejection munitions), fuze remnants, mortar tails, practice munitions, inert training munitions. EOM can be described in two different states depending on the stage in which it exists in the EOM remediation process. Uncertified EOM (UEOM) refers to EOM that has not undergone the Free From Explosives (FFE) process and has not been certified as FFE. Certified EOM (CEOM) refers to EOM that has undergone the FFE process and has been certified as FFE. EOM does not include EO packaging and EO packing materials (see munitions packaging (MP)).

Explosive ordnance materiel (EOM) remediation

Describes the location, collection, consolidation and storage of EOM, and the subsequent process to ensure that there is no residual explosive or energetic material remaining in or on EOM, prior to onward disposal into the appropriate waste stream.

Explosive remnants of war (ERW)

Unexploded ordnance and abandoned explosive ordnance.

External service providers

Contractors, consultants and professional service providers employed by Defence. For the purpose of this manual, the terms "external service provider", "contractor", "consultant" and "professional service provider" may be used synonymously where the context allows.

False alarm

A false alarm in the context of geophysics is when a declared EO or UXO detection location does not correspond to an actual EO or UXO location based on the results of the investigation.

Field validation survey (FVS)

A field assessment (using visual and/or detection methodologies) of the levels of EO and UXO (including EOM) contamination in a given area.

Fired

A munition that has undergone its firing sequence.

Fragment/fragmentation

1. The action of breakup of a projectile or hard cased munition filled with an explosive substance, after it is suitably initiated; or
2. The metallic fragments from the fractured casing of ordnance, brought about by initiation of the explosive filling, and projected at high velocities over considerable distances. This is known as primary fragmentation. Secondary fragmentation refers to rocks, debris or incidental items projected by an explosion which were not part of the bomb itself.

Free From Explosives (FFE)

Describes the condition of any EO or EOM that has undergone an appropriate verification process confirming the absence of explosives or other energetic materials capable of presenting an explosive hazard. Items classified as FFE may still contain non-explosive dangerous goods (NEDG).

Fuze

A device that initiates an explosive train.

Fuzed

A munition containing a fuze.

Geographical (geospatial) information system (GIS)

An information system used to determine and represent the geographic location and attributes of natural or man-made features and boundaries on the Earth. It includes statistical data and information derived from sources such as remote sensing, mapping, and surveying technologies, as well as mapping, charting, geodetic data, and related products.

Geophysical anomaly

An object or feature that deviates from the naturally occurring geological background and produces a detectable response when surveyed using UXO detection equipment.

Gradiometer

A magnetometer for measuring the rate of change of a magnetic field.

Ground penetrating radar (GPR)

A system that employs pulsed radio waves to penetrate the ground and detect subsurface targets by measuring the distance and direction of radio waves reflected back to the system.

Grenade

An item containing a filling of explosive, smoke or other material designed to be thrown by hand, dropped from aircraft or projected by a small arms weapon or from a grenade discharger.

Hazard reduction (operation)

The process involving the removal and destruction of UXO, EO, EOM, and other range-related debris (such as target fragments, munitions packaging, and crating materials) to maintain or improve safety, or to prevent the accumulation of such materials from hindering or preventing the continued use of the range for its intended purpose. Hazard reduction does not include the removal, treatment, or remediation of chemical residues or munitions constituents present in environmental media.

High explosive (HE)

An explosive which normally detonates rather than deflagrates or burns. High explosives are further divided into a variety of classes depending upon their sensitivity to initiation.

Impact area (IA)

Defined areas, within a DPA or DA, in which target areas are located. IA are to be as large as reasonably practicable in order to accommodate the needs of live fire manoeuvres. May also be designated as High Explosive Impact Areas (HEIA).

Incendiary

A burning compound or metal used to produce intense heat.

Inert

An item that resembles EO but does not contain explosive, pyrotechnic or other types of energetic or hazardous material.

Live fire

Any discharge, release, detonation or firing of ammunition/ordnance.

Low explosive

An explosive substance which decomposes rapidly through combustion with the evolution of heat and flash and generates a large quantity of gaseous products.

Magnetometer

An instrument for measuring the intensity and direction of magnetic fields.

Malfunction

Any failure of an item of explosive ordnance (EO) to function as designed when fired, launched or otherwise activated, or the functioning of explosive components during a non-functional test.

Misfire

The failure of a weapon, munition or other device to fire or explode as or when expected due to a fault in the firing system, initiator, propellant or other charge.

Mortar

An indirect fire weapon, usually muzzle loading, with a rifled or smooth bore that transfers recoil energy to the ground through a baseplate.

Munition

A complete device (e.g. missile, shell, mine, demolition store, etc.) charged with explosives, propellants, pyrotechnics, initiating or composition material for use in military operations, including demolitions.

Munitions constituents (MC)

Any materials originating from munitions (UXO, AXO/DMM, etc.) including explosive and non-explosive materials, and emission, degradation, or breakdown elements of such ordnance or munitions.

Munitions packaging (MP)

Refers to all containers and packaging associated with the storage and transport of munitions. MP is not considered EOM.

Non-Defence training area (NDTA)

Any land not owned or under lease by the Commonwealth where the Australian Defence organisation is required to obtain landowner/manager permission and/or an environmental clearance certificate in order to use that land to undertake training activities that may or may not include live fire. See training area.

Net explosives quantity (NEQ)

The total explosives content of an ammunition, unless it has been determined that the effective quantity is significantly different from the actual quantity. It does not include such substances as white phosphorus, war gases or smoke and incendiary compositions unless these substances contribute significantly to the dominant hazard of the hazard division concerned.

Neutralise

1. The permanent or temporary disruption of a firing train, whereby a device or item will no longer function as designed, i.e. the item may still be in a hazardous state and still be capable of some kind of energetic event.
2. To make harmless anything contaminated with a chemical agent.

Non-explosive dangerous goods (NEDG)

Items that are related by function to explosives and which are used for somewhat similar purposes as certain types of explosives. Note: The processes for the management of NEDG are contained in eDEOP 101 – Department of Defence Explosives Regulations (Ref F).

Non-munition scrap

Refers to all range items that are non-munition in nature. This covers barbed wire, angle iron pickets, discarded range infrastructure, etc.

Off Defence Estate

Land that is not owned, occupied or controlled by Defence. This may include areas that are under the control of other Commonwealth agencies, State or Territory agencies or in private ownership. This may also include areas in which the Commonwealth has previously disposed of a legal interest or areas in which the Commonwealth has never had a legal interest.

On Defence Estate

Land that is owned, occupied or controlled by Defence. This includes land that is occupied by Defence under a lease and/or permissible occupancy arrangements.

Personal protective equipment (PPE)

Protective clothing or equipment that provides workers with protection from a particular hazard in a work area.

Post project report (PPR)

A detailed and comprehensive report detailing the timing; the methodology, technology and resources used, the cost (if appropriate) and the outcomes of a specific activity or project.

Project

An undertaking that organises human, material, and financial resources to complete a distinct scope of work, defined by specific requirements and constrained by cost and time, with the aim of achieving beneficial change measured through quantitative and qualitative objectives.

Projectile

An object, projected by an applied exterior force and continuing in motion by virtue of its own inertia, e.g., a bullet, shell or grenade.

Propellant

An explosive which, by controlled burning, provides the gas pressure required to give motion to a projectile or missile.

Pyrotechnics

A mixture of chemicals which when ignited undergoes an exothermic reaction producing light, heat, smoke, sound or gas, and may be used to introduce a delay into a firing system because of its known burning time. The term excludes propellants and explosives.

Quality assurance (QA)

Planned and systematic actions implemented to ensure confidence that goods and services meet the specified contractual quality requirements. QA is intended to verify that management and operational procedures are appropriate and capable of achieving the required outcomes.

Quality control (QC)

That component of Quality Management which focuses on inspecting the finished product, or significant components of it, to ensure it meets the required quality.

Quality management (QM)

A series of coordinated activities designed to direct and control the quality of outcomes achieved.

Range

Any area of land, sea, or air used for Defence live-firing weapons practices, tests or operations.

Render safe

The separation of all essential firing train components such that there is no further possibility of an event occurring.

Residual risk

In the context of explosive ordnance (EO), residual risk refers to the level of risk that remains after all reasonable efforts have been made to identify, define, and remove both the presence and suspicion of explosive ordnance.

Risk

Effect of uncertainty on objectives.

Round

A complete assembly of a projectile (with or without fuze), the propelling charge in a cartridge case, and the means of igniting the propelling charge.

Service

A noun referring to either the Royal Australian Navy (RAN), the Australian Army or the Royal Australian Air Force (RAAF).

Services

A collective noun referring to the Royal Australian Navy (RAN), the Australian Army and the Royal Australian Air Force (RAAF).

Small arms munition (rounds)

Ammunition for small arms, i.e. all ammunition of less than 20 mm calibre, and all gauges of shotgun cartridges.

Spatial data

Information that contains the spatial attribution of latitude, longitude and elevation above a datum.

Subsurface

As used in reference to UXO and EO, subsurface refers to any UXO or EO that is buried, either partially or completely, beneath the surrounding ground surface, making it impossible to positively identify or to place disposal charges in a position that ensures the store’s complete destruction. (Also see buried).

Subsurface UXO clearance

A clearance of all UXO items that have been defined as subsurface.

Surface UXO clearance

A clearance of all UXO items that are entirely or partially exposed on the surface.

Target area

Areas within a designated impact area where UXO producing munitions are to be directed. Target areas are designed, located, and approved by Range Siting Boards. Target areas are intended to minimise widespread UXO contamination by containing it in areas as small as reasonably practical in order to reduce long-term environmental impacts. May also be designated as high explosive target areas (HETA).

Training area (TA)

Any area of land, sea, or air that may be designated for any military manoeuvres or simulated wartime operations involving planning, preparation and execution, carried out for the purpose of training and evaluation. It may be a combined, joint or single-Service exercise or activity depending on participating organisations. A TA may contain a variety of ranges within its boundaries. TA are part of Commonwealth owned or leased land (See Non-Defence Training Area (NDTA)).

Training Area Capability Manager (TACM)

The Training Area Capability Manager (TACM) is responsible for providing the Operational Authority with the capability requirements for their allotted TA.

Training Area Management Authority (TAMA)

The Training Area Management Authority (TAMA) is responsible for the development and management of the Defence estate; this is currently vested in Deputy Secretary Security and Estate.

Training area standing orders (TASO)

A set of mandatory instructions established to ensure the safe, efficient, and sustainable operation of the training area. Training Area Standing Orders (TASO) constitute lawful general orders for members of the Australian Defence Force (ADF) and represent reasonable directions for Australian Public Service (APS) employees, as well as other government and civilian agencies.

Unarmed

Describes the condition in which all safety devices and features within the fuze are intact and functioning correctly, thereby preventing initiation of the arming sequence. In this condition, the fuze is safe for handling, storage, and transportation.

Unexploded explosive ordnance (UXO)

Explosive ordnance which has been primed, fused, armed or otherwise prepared for action, and which has been fired, dropped, launched, projected or placed in such a manner as to constitute a hazard to operations, installations, personnel or material and remains unexploded either by malfunction or design or for any other cause.

For the purpose of this manual, the term 'UXO' is used to describe UXO, discarded military munitions (DMM), abandoned explosive ordnance (AXO) and explosive remnants of war (ERW) where contextually appropriate.

Un-Fired

A munition that has NOT undergone its firing sequence.

Un-Fuzed

A munition NOT containing a fuze.

Unit

A military element whose structure and composition are formally established by a competent authority, such as through a table of organisation and equipment. It constitutes a distinct component of a larger organisation.

UXO assessment survey

A survey conducted to identify, evaluate, and document the following aspects, including but not limited to:

1. Whether an area is contaminated or affected by UXO;
2. The boundaries and extent of the affected area;
3. The density and distribution of UXO, including the locations and characteristics of Impact Areas within the affected zone; and
4. The residual depths, types, and characteristics of UXO and inert ordnance-related items present within the affected area.

UXO Technician (UXOT) at a minimum

Refers to the role of a UXOT, UXO Technician Supervisor (UXOTS) or UXO Site Manager (UXOSM).

UXO avoidance

The activity whereby a UXO Escort (UXOE), normally equipped with a metal detector or magnetometer, precedes a survey or similar party to ensure the path they take or the location at which they are to conduct intrusive sampling is free from anomalies which may or may not be UXO. Any anomalies detected are avoided rather than investigated.

UXO remediation/clearance

An activity to locate, remove and appropriately dispose of all UXO, EO and EOM of a specified size from the surface and to a specified depth below the surface within the specified boundaries of an area.

Voluntary Code of Practice (VCOP)

This VCOP sets out nationally agreed best practices for the Australian UXO industry.

Waste

Materials or products that are unwanted or have been discarded, rejected or abandoned. Waste includes materials or products that are recycled, converted to energy, or otherwise disposed of.

Note: Materials and products that are reused (for their original purpose and without reprocessing) are not waste because they remain in use.

Acronyms

ADF	Australian Defence Force
AGC	Advanced Geophysical Classification
ALARP	As Low As Reasonably Practicable
APS	Australian Public Service
ALGA	Australasian Land Groundwater Association
AXO	Abandoned Explosive Ordnance
BAU	Business As Usual
BMP	Bushfire Management Plan
CEOM	Certified Explosive Ordnance Materiel
CSA	Canadian Standards Authority
DA	Defence Area
DCARM	Director/Directorate of Contamination Assessment, Remediation and Management
DDESB	Department of Defence Explosives Safety Board (USA)
DFSW	Direct fire support weapon/s
DGM	Digital geophysical mapping
DGPS	Differential global positioning system
DGS	Digital geophysical survey
DIP	Defence Infrastructure Panel
DMM	Discarded military munitions
DPA	Defence Practice Area
DRA	Detailed unexploded ordnance risk assessment
DTA	Defence Training Area
DTS	Desktop unexploded ordnance study
DUXOMM	Defence Unexploded Ordnance Management Manual
ECC	Environmental Clearance Certificate
EHMP	Environmental and Heritage Management Plan
EIA	Environmental Impact Assessment
EMI	Electromagnetic induction
EMP	Environmental Management Plan
EMS	Environmental Management Strategy
EO	Explosive ordnance

EOD	Explosive ordnance disposal
EODCC	Explosive Ordnance Disposal Control Centre
EOM	Explosive ordnance materiel
EPBC Act	Environment Protection and Biodiversity Conservation Act 1999
ERW	Explosive Remnants of War
FFE	Free From Explosives
FVS	Field validation survey
GIS	Geographical (or geospatial) information systems
GPR	Ground penetrating radar
GPS	Global positioning system
HE	High Explosive
HEIA	High explosive impact area
HETA	High explosive target area
HIA	Heritage Impact Assessment
HRO	Hazard reduction operation
IA	Impact Area
ID	Infrastructure Division
IED	Improvised explosive device
ILUA	Indigenous Land Use Agreement
JLC	Joint Logistics Command
JEOS	Joint Explosive Ordnance Support
JSA	Job Safety Analysis
JSEA	Job Safety and Environmental Analysis
MC	Munitions Constituents
MP	Munitions Packaging
NDTA	Non-defence training area
NEDG	Non-explosive dangerous goods
NEQ	Net explosive quantity
NUXOP	Defence National Unexploded Ordnance Program
PD	Project Director
PM	Project Manager
PMCA	Project Manager and Contract Administrator
PPE	Personal protective equipment
PPR	Post Project Report
QA	Quality Assurance

QM	Quality Management
QMP	Quality Management Plan
SDMP	Spatial Data Management Plan
SFAIRP	So Far As Is Reasonably Practicable
SMP	Safety Management Plan
SOP	Standard Operating Procedure
SOR	Statement of Requirements
SOW	Scope of Work
SWMS	Safe Work Method Statement
TA	Training Area
TACM	Training Area Capability Manager
TAMA	Training Area Management Authority
TASO	Training area standing orders
TOI	Target of interest
UEOM	Uncertified Explosive Ordnance Materiel
USACE	United States Army Corps of Engineers
UTM	Universal Transverse Mercator
UXO	Unexploded ordnance
UXOC	Unexploded Ordnance Consultant
UXOE	Unexploded Ordnance Escort
UXOFA	Unexploded Ordnance Field Assistant
UXOSM	Unexploded Ordnance Site Manager
UXOT	Unexploded Ordnance Technician
UXOTS	Unexploded Ordnance Technician Supervisor
UXOPM	Unexploded Ordnance Project Manager
VCOP	Voluntary Code of Practice
WHS	Work Health and Safety

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1. Introduction

This Voluntary Code of Practice (VCOP) is to show how the UXO industry will align its own best practices with the Defence Unexploded Ordnance Management Manual (DUXOMM), and where it will go beyond or differ from it. The DUXOMM can be found via the following link: **DUXOMM**.

The purpose of this VCOP for the Australian UXO industry is to define and document nationally agreed best practices by:

1. Identifying, by chapter, where the VCOP adopts or diverges from the guidance contained in the Defence Unexploded Ordnance Management Manual (DUXOMM).
2. Outlining, by chapter, the industry's implementation strategy to support and align with the DUXOMM.
3. Providing, by chapter, supplementary information and guidance that will assist industry in applying the implementation strategy.

1.1 Adoption / Acknowledgement Statement

This VCOP adopts the DUXOMM Chapter 1 Introduction in its entirety.

1.2 Implementation Strategy

Organisations who have nominated to align with the VCOP and who will comply with its requirements when delivering UXO works on and off the Defence estate for the Government and private entities are listed on the ALGA website: **ALGA UXO SIG**.

Organisations and landowners contracting UXO companies to conduct work off the Defence Estate are advised to engage contractors who have agreed to comply with the VCOP.

The Defence Infrastructure Panel (DIP) 2022–2027 provides access to professional services for UXO work conducted on the Defence Estate. Contact details for companies available under the panel can be found via the following link: **Defence Infrastructure Panel**.

2. The Commonwealth Policy

2.1 Introduction

The Commonwealth Government has developed a national policy for managing land in Australia affected by unexploded ordnance (UXO), titled the *Commonwealth Policy on the Management of Land in Australia Affected by Unexploded Ordnance* (the Commonwealth Policy). Issued on 1 February 2018, the policy is administered by Defence on behalf of the Commonwealth.

Aim

The aim of this chapter is to detail how Defence complies with its responsibilities under the Commonwealth Policy, **Policy and Action from Defence | Unexploded Ordnance**.

2.2 Adoption / Acknowledgement Statement

This voluntary code of practice (VCOP) adopts the DUXOMM Chapter 2, including Annexes 2A and 2B, Commonwealth Policy, in its entirety.

2.3 Implementation Strategy

The VCOP supports the DUXOMM by ensuring that the Commonwealth's policy position is understood and by keeping the Defence National Unexploded Ordnance Program (NUXOP) informed of all UXO works.

Industry will report and provide the following:

- Location of works
- Types of UXO and EOM encountered
- ALARP certification for UXO-cleared areas

Defence maintains a record of sites confirmed or reasonably suspected to be affected by UXO. Defence aims to keep this information current and updates the record whenever new data becomes available. However, the record may not always be fully accurate and is intended as a broad guide. The UXO interactive mapping application can be accessed via the following link:

Interactive Mapping Application | Defence UXO Map

Where a project or landowner is affected by UXO and wishes to have this mapping reviewed, they may consult a professional UXO company to conduct a desktop UXO study. The results of the desktop study may be refined further through a technical survey; these practices will be introduced later in this code.

Where the results of a desktop UXO study differ from those in the interactive mapping application, the study's results and recommendations should take precedence and the details should be passed to Defence to update and retain records.

3. Defence Roles and Responsibilities

3.1 Introduction

Although the incidence of unexploded ordnance (UXO) due to ammunition malfunction is low relative to the number of munitions fired, injuries have been caused by UXO, which have functioned long after firing.

Aim

The aim of this chapter is to define the Defence roles and responsibilities for the management of land affected by UXO. This includes land On Defence Estate, land which Defence intends to divest, and land Off Defence Estate.

3.2 Adoption / Acknowledgement Statement

This voluntary code of practice (VCOP) adopts the DUXOMM Chapter 3 Defence Roles and Responsibilities Chapter in its entirety.

3.3 Implementation Strategy

The VCOP supports the DUXOMM by ensuring it will manage land affected by UXO in line with the chapter both on and off the Defence Estate.

3.4 Supplementary VCOP Information

All UXO related activities carried out by industry will be recorded and provided to the NUXOP Manager.

UXO related activities may include:

- UXO remediation or hazard reduction activities
- EOM hazard reduction activities

Off Defence Estate, Defence has a responsibility to comply with the requirements of the Commonwealth Policy on the Management of Land in Australia Affected by Unexploded Ordnance (the Commonwealth Policy).

4. UXO Risk Management

4.1 Introduction

The hazard of unexploded ordnance (UXO) and other related materials known to be, or suspected of being, affected by UXO exists around Australia. This UXO contamination arises from past military training activities, including storing or disposing of munitions. When undertaking activities in potential UXO-affected areas, the risks that UXO poses to those activities should be managed.

Aim

This chapter aims to guide considerations for managing UXO's risks when conducting activities in potential UXO-affected areas.

4.2 Adoption / Acknowledgement Statement

This voluntary code of practice (VCOP) adopts the DUXOMM Chapter 4 UXO Risk Management, including Annexes 4A, 4B and 4C in its entirety.

4.3 Implementation Strategy

The VCOP supports the DUXOMM by ensuring it will manage UXO risk in line with the chapter both on and off the Defence Estate.

5. UXO Project Management

5.1 Introduction

Effective planning and management are essential to achieving desired outcomes of UXO projects. Central to this is accurately identifying the requirement for a UXO project, determining the appropriate project type, and ensuring the project is suitably designed, managed, and controlled.

Note: *Commercial UXO companies are generally not approved to conduct explosive demolition of UXO. As such, final disposal of UXO requiring explosive demolition will be conducted by Defence Personnel.*

Aim

The aim of this chapter is to outline the project roles that may be required to enable the effective planning and management of UXO projects, and outline project stages.

5.2 Adoption / Acknowledgement Statement

This voluntary code of practice (VCOP) adopts the DUXOMM Chapter 5 UXO Project Management in its entirety.

5.3 Implementation Strategy

The VCOP supports the DUXOMM by ensuring it will manage UXO projects in line with the chapter both on and off the Defence Estate.

6. UXO Projects

6.1 Introduction

When undertaking unexploded ordnance (UXO) projects, it is important to adhere to the required minimum standards to achieve the project outcomes in a safe, efficient and appropriate manner. The applicable standards depend on the type of UXO project being undertaken.

Aim

The aim of this chapter is to outline different UXO project types and methodologies and articulate the minimum standards for undertaking these UXO projects.

This chapter is not intended to limit methods for addressing UXO risks; it is intended to provide guidance on the most commonly used methods.

6.2 Adoption / Acknowledgement Statement

This voluntary code of practice (VCOP) adopts the DUXOMM Chapter 6, including Annexes 6A, 6B, 6C, 6D, 6E (1 - 7), 6F (1 - 4), 6F1 (1 - 3), 6F2 (1 - 6), 6F3, and 6F4 (1 - 14) UXO Projects, in its entirety.

6.3 Implementation Strategy

The VCOP supports the DUXOMM by ensuring it will undertake UXO projects in line with the chapter (stated in 6.2) both on and off the Defence Estate.

6.4 Supplementary VCOP Information

Disposal Of Other Materials

The DUXOMM does not provide guidance on the management of contamination arising from explosive ordnance (EO) munitions constituents (MC), and instead, refers to the Defence Contamination Management Manual.

Hazardous waste, including contaminated soils, is regulated by states and territories within their respective jurisdictions. Each state or territory has its own laws and policies, which UXO projects must comply with. Projects must also obtain any relevant permits, licences, or registrations covering the transport, storage, treatment, and disposal of hazardous waste. For information on managing the disposal of wastes (other than EOM) applicable to the state or territory where the UXO project is located, refer to the relevant Environmental Protection Authority (EPA) website listed below:

- **Australian Capital Territory - EPA**
- **New South Wales - EPA**
- **Northern Territory - EPA**
- **Queensland - Department of Environment, Tourism, Science and Innovation**
- **South Australia - EPA**
- **Tasmania - EPA**
- **Victoria - EPA**
- **Western Australia - Department of Water and Environmental Regulation**
- **Western Australia - EPA**

7. EOM Management

7.1 Introduction

Explosive ordnance material (EOM) remediation involves locating, identifying, collecting, consolidating, and storing EOM, followed by processes to ensure that no residual explosive or energetic material remains before the EOM is disposed of via the appropriate waste stream.

Aim

The aim of this chapter is to describe EOM remediation and set out the minimum standards for undertaking EOM remediation.

7.2 Adoption / Acknowledgement Statement

This voluntary code of practice (VCOP) adopts the DUXOMM Chapter 7 including Annexes 7A (1 - 4), 7B (1 - 2), and 7C (1 - 2) Explosive Ordnance Material in its entirety.

7.3 Implementation Strategy

The VCOP supports the DUXOMM by ensuring it will undertake EOM Remediation in line with the chapter (stated in 7.2) both on and off the Defence estate.

8. UXO/EOM Qualifications, Experience and Capability Requirements

8.1 Introduction

The potentially hazardous nature of unexploded ordnance (UXO)/explosive ordnance materiel (EOM) projects dictate that it is critical, from both an operational and ‘duty-of-care’ perspective, that the personnel conducting these projects are appropriately qualified and experienced.

Meeting the qualification, experience and competence requirements detailed in this chapter is mandatory for projects conducted both on and off the Defence Estate.

Aim

The aim of this chapter is to outline the minimum qualifications, experience and competence required by UXO contractors conducting UXO projects in Australia both on and off the Defence Estate.

8.2 Adoption / Acknowledgement Statement

This voluntary code of practice (VCOP) adopts the DUXOMM Chapter 8: UXO/EOM Qualifications, Experience and Capability Requirements, in its entirety.

8.3 Implementation Strategy

The VCOP supports the DUXOMM by ensuring it will undertake EOM Remediation in line with the chapter (stated in 8.2) both on and off the Defence estate.

8.4 Supplementary VCOP Information

Training and Competency Records

Individuals should maintain evidence of their qualifications and experience, for example in a logbook, detailed CV, or similar. Employers must verify this evidence as part of their due diligence when assigning personnel to specific roles. Additionally, employers should maintain training and competency records that clearly indicate each individual’s roles and any locally issued authorities that enhance their capabilities for a particular project or timeframe.

Explosive Ordnance Disposal Qualifications

Within Australia UXO Contractors do not currently carry out explosive ordnance disposal, this task is left to the Australian Defence Force (ADF) or specialised Police Units, depending on the location. This allows the UXO Technician (UXOT) role, described in this chapter, to be filled by personnel other than former Military EOD Technicians that have completed an Advanced EOD Course or equivalent.

Both the United Nations International Mine Action Standards (IMAS) Test and Evaluation Protocol (TEP) 09.30/01/2022 Conventional explosive ordnance disposal) EOD) competency standards, and the Department of Defense Safety Board (DDESB) Technical Paper (TP) 18, Minimum Qualifications for Unexploded Ordnance Technicians and Personnel, Chapter 3, UXO Technician Level 1 course (UXOT-1), outline the requirements for civilian accreditation in EOD.

United Nations International Mine Action Standards

Civilian accredited courses in EOD at Levels 1, 2, 3 and 3+ as described in the United Nations International Mine Action Standards (IMAS) Test and Evaluation Protocol (TEP) 09.30/01/2022 Conventional explosive ordnance disposal (EOD) competency standards and associated publications are acceptable competencies for fulfilling UXO contractor roles as shown in Table 2.

The EOD course content and relevant competencies for each level should be documented on the participant's certificate or made available for inspection, so that further training or adjustments to suit the Australian area of operations can be undertaken and recorded.

It is generally understood that the EOD Level 1 and 2 courses and associated competencies are packaged together by training organisations. This combination meets the 200-hour minimum explosive safety training requirement detailed in the DUXOMM. With the required experience shown in Table 2, an IMAS EOD Level 2 operator may fill the role of a UXOT, subject to written authorisation from the contracting company, once due diligence on the individual's certification and experience has been carried out.

The IMAS EOD Qualifications are described as follows,

- **Level 1 (EOD):** qualification enables the trained holder of the qualification to locate, expose and destroy in situ and in a controlled environment (such as a technical survey and/or clearance site), single items of mines and specific ERW on which the individual has been trained. Level 1 operators shall only be licensed to destroy these specific items.
- **Level 2 (EOD):** In addition to Level 1 skills, enables the holder to determine when it is safe to move and transport specific items of ordnance, as authorised in writing by a Level 3 operator or above. Level 2 operators may also conduct the simultaneous disposal of multiple items using line mains or ring mains. This qualification extends only to the specific EO items on which the individual has been trained. Tasks in all environments require written authorisation from a Level 3 operator or above.
- **Level 3 (EOD):** In addition to the skills of a Level 1 and 2 qualifications, a Level 3 qualification enables the holder to conduct render-safe procedures and demolitions up to 50 kg net explosive quantity (NEQ) on a wide range of specific types of explosive ordnance for which the individual has been trained. A Level operator may authorize, in writing, a Level 2 operator to conduct tasks in a range of environments and to make decisions on safe movement of EO.
- **Level 3+ (EOD):** In addition to Level 1, 2, and 3 skills, Level 3+ is for specialist EOD operators trained to address specific hazards beyond routine mine action tasks. Competency modules, included in TEP 09.30/01/2014, comprise:
  - Advanced explosive theory.
  - Aerial bombs EOD.
  - Armoured fighting vehicle (AFV) clearance.
  - Basic chemical EOD.
  - Bulk demolitions.
  - Guided weapons.

The Level 3+ qualification shall clearly indicate the specialist training received by each individual, whether within core or specialist competencies.

United States of America Department of Defense Explosives Safety Board.

The Department of Defense Safety Board (DDESB) Technical Paper (TP) 18, Minimum Qualifications for Unexploded Ordnance Technicians and Personnel, Chapter 3**,** provides detail for a civilian accredited UXO technician level 1 course (UXOT-1). This course meets the 200-Hr minimum explosive safety training requirement detailed in the DUXOMM. When combined with the experience shown in Table 1, a UXOT-1 may fulfill the role of a UXOT as described in this chapter, subject to written authorisation from the contracting company, once due diligence has been carried out on the individual's certification and experience.

Table 1 provides a general guide for assessing the minimum qualifications, experience and competence of industry personnel conducting UXO projects in Australia.

Table 1 VCOP UXO EOM Minimum Qualifications

Role	Aus Defence*	IMAS	DDESB
UXOPM	EOIR**	Level 3 / Level 2***	UXOT-1/UXOT-2***
UXOSM	Advanced EOD*	Level 3 plus****	UXOT-3
UXOT	EOIR	Level 3 / Level 2***	UXOT-1/UXOT-2***
UXOTS	Advanced EOD*	Level 3 plus****	UXOT-3
UXOFA	As per Chapter 8.21	As per Chapter 8.21	As per Chapter 8.21
UXO Escort	As per Chapter 8.21	As per Chapter 8.21	As per Chapter 8.21

* Meaning ADF, UK and equivalents

** ADF EOIR 4-week course

*** Level 2 IMAS and DDESB UXOT-1 must have been qualified for 1 year and have 3 months logged experience

**** Level 3 plus IMAS must include Advanced Explosive Theory (FFE training)

Personnel Conducting Underwater UXO Operations

Underwater UXO operations can be split into various scopes of work from:

- Simple diving tasks involving use of Self-Contained Underwater Breathing Apparatus (SCUBA).
- Complex diving tasks involving the use of Surface Supplied Breathing Apparatus (SSBA).
- Underwater survey using shipborne or towed sensors.
- Use of Remotely Operated Vehicle (ROV) or Autonomous Underwater Vehicles (AUV) for both survey and disposal / recovery of UXO.

This VCOP only deals with occupational diving as part of UXO operations.

Occupational Diving

Occupational diving is defined as: "Diving in the course of employment (irrespective of whether diving is the principal function of employment or merely an adjunct to it) and comprising all diving work carried out as part of a business; as a service, for research, or for profit."

Diving Standards and Training

All occupational diving within Australia is based on AS/NZS 2299.1 and 2299.2, and AS 2815 (Parts 1–6). These include:

- AS/NZS 2299.1: Occupational Diving Operations
- AS/NZS 2299.2: Occupational Diving Operations (Scientific Diving)
- AS 2815 series: Australian Standard for Occupational Diver Training

The AS 2815 Standards were developed by the SF/17 Diving Committee of Standards Australia in conjunction with Australian and international diver training authorities. They define the minimum acceptable competency standards for the various levels of occupational divers and diving supervisors.

AS 2815 Standards were developed by the SF/17 Diving Committee of Standards Australia in conjunction with Australian and international diver training authorities. They define the minimum acceptable competency standards for the various levels of occupational divers and diving supervisors.

AS 2815 training and certification of occupational divers, is published in six parts:

- Part 1: Occupational SCUBA diver (AS 2815.1)
- Part 2: Surface supplied diver to 30m (AS 2815.2)
- Part 3: Surface supplied diving to 50m (AS 2815.3)
- Part 4: Closed bell diving (AS 2815.4)
- Part 5: Dive supervisor (AS/NZS 2815.5)
- Part 6: Restricted occupational SCUBA diver (AS/NZS 2815.6)

Qualification requirements

All UXO diving operations must be supervised by a suitably qualified Diving Supervisor. If the diving supervisor is not UXO-qualified, the project team must also include a UXO Technical Specialist (UXOTS) to provide direct support during diving operations.

Personnel conducting the physical diving operations as part of a UXO project must hold the qualifications required for a UXO Technician (UXOT). They must also maintain relevant, current diving credentials, such as a valid Australian Diving Accreditation Scheme (ADAS) qualification, and ideally have completed the underwater component of the RAN Diving School Explosive Ordnance Disposal training (or an equivalent foreign qualification).

Experience and Competency Requirements

Personnel conducting diving operations as part of a UXO project must:

- Have the experience necessary for that particular UXO position
- Have appropriate commercial accredited diving experience
- Be able to demonstrate, with supporting documentation, competency and experience in the following tasks:
  - Conducting surveys and assessments of underwater UXO.
  - Removing underwater UXO where it can be done safely.
  - Monitoring and inspecting sites cleared of underwater UXO.

Capabilities

By meeting the qualifications, experience, and competency requirements outlined above, personnel are capable of performing underwater operations in support of UXO project outcomes. The UXO-specific tasks they can perform depend on their qualification and competence as a UXO Technician (UXOT), UXO Technical Specialist (UXOTS), or UXO Supervisor/Manager (UXOSM).

Further Guidance

Underwater UXO operations introduce a range of increased operational and risk requirements. The Canadian Standard Authority (CSA) publishes a standard for '*Unexploded Explosive Ordnance (UXO), Munitions, and Police Explosive Diving* (CSA Z275.6:16). This standard mirrors the Diving Standards and Training levels expressed in AS/NZS 2299.1 and 2, and AS 2815 (Parts 1 - 6). It is recommended that this document is followed for all diving operations involving UXO underwater work.

CSA Z275.6:16, Unexploded explosive ordnance (UXO), munitions, and police explosive diving

Other Guidance

The Geneva International Centre for Humanitarian Demining (GICHD) works towards reducing risk to communities caused by explosive ordnance and has developed A Guide to Survey and Clearance of Underwater Explosive Ordnance. Refer to the following link:

A Guide to Survey and Clearance of Underwater Explosive Ordnance (gichd.org).

The guide provides a collection of current policy and best practices used in the survey and clearance of underwater explosive ordnance. It includes specific case studies with examples and analysis. The document is not intended to be a comprehensive database of policies and practices, rather it provides national authorities and mine action organisations with guidance to better understand the issues and complexities of underwater explosive ordnance (EO) survey and clearance operations.

It uses a simple categorisation method of 3 categories and the equipment and training requirements for each category

Dredging in Sediments Containing UXO

The United States Corps of Engineers has published a guide to dredging in sediments containing UXO. While this guide is specific for use in the United States, it should be considered in any underwater project conducted in areas suspected of containing UXO. Refer to the following link:

Guide to Dredging in Sediments Containing UXO

9. Guidance for Firefighting in UXO Affected Areas

9.1 Introduction

Unexploded ordnance (UXO) is explosive ordnance that has been primed, fused, armed, or otherwise prepared for action, and has been fired, dropped, launched, projected, or placed in such a manner as to constitute a hazard to operations, installations, personnel, or materiel, and remains unexploded either by malfunction, design, or for any other cause.
The known or potential presence of UXO presents a risk to the safe and effective management of bushfires.

Aim

The aim of this chapter is to provide guidance for conducting firefighting activities in UXO affected areas.

9.2 Adoption / Acknowledgement Statement

This voluntary code of practice (VCOP) adopts the DUXOMM Chapter 9 including Annex 9A (1 - 3), Guidance for Firefighting in UXO Affected Areas in its entirety,

9.3 Implementation Strategy

The VCOP supports the DUXOMM by following the guidance in this chapter during activities conducted both on and off the Defence estate.

10. Quality Control / Quality Assurance

To be added in line with DUXOMM amendments in subsequent review.