Policy Framework

To Sustainably Dispose of Destroyed Firearms and Ammunition Components in the Caribbean

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IMPACS
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EXECUTIVE SUMMARY

This policy framework document is intended to support Caribbean states in the final stage of the life-cycle management of firearms and ammunition, i.e., the disposal of their remnants following destruction. Even after destruction by an approved method, states are left with potentially large quantities of waste material, which may be hazardous and therefore subject to restrictions for its final disposal.

The Caribbean Region has been afflicted by high levels of violent crime involving firearms and in 2020 the CARICOM states plus the Dominican Republic agreed on the Caribbean Firearms Roadmap to work collectively for a safer Caribbean region by reducing the quantities of illicit firearms and ammunition in the region by 2030. Progress in the destruction of firearms and ammunition has created significant stocks of remnants that must be disposed of in a safe, economic and environmentally benign manner.

This policy framework identifies the main international legislation, regulations and standards applicable in the region, for firearms control, ammunition management and protection of the environment. Many of these international agreements and treaties place legal obligations on states, whilst others include political commitments by state governments. The policy framework also refers to documents that provide advice and guidance on international best practice in firearms control and ammunition management. The available processes and technologies for the destruction of firearms and ammunition described in the policy framework are drawn from these international best practice documents.

A key aspect of the policy framework is to seek a common understanding and agreement between states on the level of destruction required to deem the destroyed firearms and ammunition as "remnants." It then seeks to draw together environmentally acceptable options for states to use for the final disposal of these remnants. The economic realties of provision of the industrial facilities to conduct the final disposal operations (and indeed some of the destruction processes) suggests that regional cooperation should be pursued and the policy framework identifies some ways to work to this end, making recommendations for the immediate-, medium- and longer-terms.

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1 INTRODUCTION

1.1 The final disposal of the remnants of firearms and ammunition is the last stage of their respective life-cycles and presents a complex problem in the Caribbean Region. Within the region the actions of any state have the potential to affect neighbouring states, so international cooperation and coordination of legislation and regulations is highly desirable. With the support of regional states, the **Caribbean Community (CARICOM) Implementation Agency for Crime and Security (IMPACS)**, the **United Nations Regional Centre for Peace Disarmament and Development in Latin America and the Caribbean (UNLIREC)** and the **Mines Advisory Group (MAG)** have come together to develop a policy framework to address the final disposal of remnants of destroyed firearms and ammunition stored in the region.

1.2 Remnants of firearms and ammunition are classified as solid waste, often as hazardous waste, not least due to the potential environmental impacts if they are not disposed of correctly. Furthermore, different states may have differing standards for the extent of destruction required before the firearms and ammunition can be reclassified as remnants, which will have implications for the safety and security requirements in storage. This policy framework is not intended to be prescriptive, but to provide guidance and facilitate cooperation between regional states to reduce the quantities of firearms, ammunition and their remnants, to make the region safer and more secure, whilst minimising any adverse environmental impact.

1.3 In addition to the legislative and regulatory complexity, the final disposal stage for remnants of firearms and ammunition entails considerable planning, coordination and logistical support for the task to be carried out efficiently and effectively, with the minimum possible environmental impact. In response to these issues, a number of Caribbean states requested support in developing solutions for the disposal, recycling, re-use or donation of destroyed firearms and ammunition remnants currently being stored in their storage facilities.

1.2 Methodology. This policy framework has been developed over a period of six months with the involvement of regional states and international stakeholders. A questionnaire was circulated to states to establish a baseline of current activities and elicit information on specific national and regional needs. The questionnaire was divided into two parts, covering the regulatory framework for firearms and ammunition and that for environmental protection. The questionnaires were followed up by visits to Barbados and Trinidad and Tobago, which included discussions with government officials and university academics, plus site visits at industrial facilities. A planned visit to a third state had to be cancelled at short notice, due to unforeseen circumstances. The findings of these activities were drawn together into a paper by MAG and discussed at a regional workshop held in Port-of-Spain, Trinidad and Tobago, in December 2024. States and participating organisations used these findings as the basis for wide-ranging conversations on what they require as individual states and in terms of regional cooperation to move quickly to dispose of stocks of firearms and ammunition remnants, without adverse impact on the environment. This document draws on all of the above to provide a policy framework for the region and individual states to plan and deliver these outcomes.

2 BACKGROUND

2.1 The vision for the Caribbean Firearms Roadmap[1] is *"a safer Caribbean, achieved by addressing the issue of illicit proliferation of firearms and ammunition. The Roadmap serves as a guiding document for commonly agreed levels of performance at the strategic, policy and operational levels."* The Goals of the Roadmap are:

- Goal 1: Reinforce regulatory frameworks governing firearms and ammunition.
- Goal 2: Reduce the illicit flow of firearms and ammunition into, within and beyond the region.
- Goal 3: Bolster law enforcement capacity to combat illicit firearms and ammunition trafficking and their illicit possession and misuse.

[1] A Roadmap for Implementing The Caribbean Priority Actions on the Illicit Proliferation of Firearms and Ammunition across the Caribbean in a Sustainable Manner by 2030 (Oct 2020) https://www.unlirec.org/en/publicacion/caribbean-firearms-roadmap/.

- Goal 4: Systematically decrease the risk of diversion of firearms and ammunition from government- and non-government-owned arsenals.

This policy framework supports the overall vision and the four goals of the Roadmap. In particular it contributes to **Target 4.3**, which is to *"Prevent the re-circulation of illicit firearms and ammunition and their potential supply to unauthorised users"* by the destruction of firearms and ammunition and the disposal of their remnants. The Caribbean Firearms Roadmap supports the Sustainable Development Goal (SDG) 16 on peace and security, in particular target 16.4 of a significant reduction of illicit arms flows by 2030 to help combat all forms of organised crime.

2.2 The Caribbean Region has been afflicted by high levels of violent crime, including a higher homicide rate than many other regions of the world. Over 70% of homicides in the Caribbean Region involve the use of firearms, compared with 30% of global homicides.[2] These statistics reinforce the necessity of reducing the quantities of firearms and ammunition in circulation within the Caribbean Region.

2.3 Since 2010, the fifteen CARICOM Member States and the Dominican Republic have destroyed more than 65,000 firearms and more than 65 tonnes of ammunition independently or with the support of regional and international partners. The main methods of destruction utilised by states include cutting by hydraulic shears/rotating discs/chop saws for firearms and open burning and open detonation for small arms and light weapons (SALW) and ammunition.

2.4 Under the Caribbean Firearms Roadmap, states have also made a long-term commitment to prevent the re-circulation of illicit firearms and ammunition and their potential supply to unauthorised users **(Target 4.3)** by destroying surplus, seized, obsolete and/or confiscated firearms, ammunition and/or explosives in keeping with national and international guidelines and international frameworks **(Action 4.3.1)**.

[2] https://www.unodc.org/documents/data-and-analysis/gsh/Booklet2.pdf

2.5 Despite the positive track record on destruction and the political commitment under the Roadmap, Caribbean states face significant legal, technical, and logistical challenges in the final disposal of destroyed weapons and ammunition components. Many of these challenges are addressed throughout this policy framework, but a fundamental issue is to reach a common agreement on what level of destruction of firearms and ammunition is required before they are considered to be "remnants," i.e., have been rendered "permanently inoperable" from their original intended use. Some states rely on the destruction levels described in *MOSAIC 05.50*[3] and *IATG 10.10*[4], whilst others require the destruction "to a molecular level," meaning that techniques such as smelting to permanently change the metallurgical form of the remnants is required. An acceptable understanding between states on what constitutes a remnant (as opposed to still a firearm or ammunition) is critical, as the regulations for storage, transfer between states for further processing, and the final method of disposal are different if the items can be treated as "solid waste." Even at this point, some metals used in the manufacture of firearms and ammunition (including alloying components) may present environmental hazards and thus the solid waste may have to be treated as hazardous waste. The lack of clarity on what constitutes remnants means that some states continue to store them in the secure facilities that are required for firearms and ammunition. This has impacts on operating costs, including capacity for storing any additional firearms and ammunition confiscated by the state authorities.

2.6 Environmental protection must be considered at all stages of the destruction and disposal process. Remnants may contain potential pollutants and many of the potential methods for their disposal create environmental damage. State authorities should conduct environmental impact assessments routinely within the life cycle management of firearms and ammunition to facilitate plans for destruction and disposal processes that will minimise damage to the environment.

[3] The Modular Small Arm-control-implementation Compendium module 05.50 "Destruction: Weapons." https://disarmament.unoda.org/convarms/mosaic.

[4] The International Ammunition Technical Guidelines module 10.10 "Demilitarisation and destruction and logistic disposal of conventional ammunition." https://unsaferguard.org/un-saferguard/guide-lines.

2.7 Nothing in this policy framework is intended to undermine the initiative of any state of the region or its capacity to formulate and implement innovative solutions that are not included in this policy framework. This is especially true if those innovative solutions are more environmentally responsible and more tailored to the specific context of a state than the recommendations proposed.

3 PURPOSE

3.1 The purpose of this paper is to present a comprehensive policy framework for the sustainable and safe final disposal of destroyed firearms and ammunition remnants for Caribbean states, with specific focus on CARICOM Member States and the Dominican Republic. The intent is not to be prescriptive, but to provide a desired end-state, which aligns with international standards and norms and include practicable and actionable steps, which regional states may select according to their national circumstances.

3.2 All activities in security, peacebuilding and disarmament should be conducted with protection of the climate and environment as key factors. Crucial to the success of the policy framework will be supporting states to identify and mitigate potential risks associated with the final disposal of destroyed firearms and ammunition components, including the environmental and health risks, as well as security requirements. The policy framework supports states in ensuring that the disposal methods incorporate environmental and social safeguards to protect ecosystems and communities. This will help to foster regional collaboration to harmonise final disposal practices, sharing resources and expertise.

3.3 Principles. This policy framework is therefore guided by the following principles:

3.3.1 Effective, Secure and Safe Firearms and Ammunition Management. The final stage of life cycle management for firearms and ammunition is the disposal process, which follows destruction processes that render a firearm or ammunition ineffective from its original design and function. This is crucial to minimise diversion of firearms and ammunition and the possibility of unplanned explosion at munition sites.

3.3.2 Sustainability. Implementation of this policy framework will contribute *inter alia* to the following SDGs:

- SDG 9 – Build resilient infrastructure, promote inclusive and sustainable industrialisation and foster innovation, by investing in advanced technologies that help lower carbon emissions.
- SDG 11 – Make cities and human settlements inclusive, safe, resilient and sustainable, by removing firearms, ammunition and their remnants from the region.
- SDG 12 – Ensure sustainable consumption and production patterns, by achieving environmentally sound management of chemicals and waste throughout the life cycle and sustainably reducing waste generation, through prevention, reduction, recycling and reuse.
- SDG 14 – Conserve and sustainably use the oceans, seas and marine resources for sustainable development, by reducing the disposal of waste into the Caribbean Sea.
- SDG 16 – Strengthen the means of implementation and revitalize the global partnership for sustainable development, by mobilising existing and additional resources to enable states to fulfil their official development assistance commitments.

3.3.3 Cost Effectiveness. The processes described are intended to be accessible to regional states by providing efficient and cost-effective technological solutions.

3.3.4 Innovation. There are aspirations for innovation in the fields of climate, peace and security.

3.3.5 **Interdisciplinarity.** The policy recognises that sustainable disposal solutions in the Caribbean Region are not solely the preserve of the security and arms control sector, but should consider operations, processes and regulatory frameworks in other fields, including environmental administration and regulation, and the solid waste management industry.

3.3.6 **Public-Private Partnership.** The cost of waste disposal facilities suggests that partnership between public and private sectors is necessary for the implementation of this policy framework. The requirement is driven by the public sector, with the private sector encouraged to invest in the facilities and technologies required to carry out the processes.

3.3.7 **Regionality.** Regional cooperation and regional strategies that support the effective and sustainable disposal of destroyed weapons and ammunition remnants in the Caribbean Region. It supports the development of, and promotes existing examples of, regional best practice in support of national level implementation. This regional approach will ensure greater collaboration and ownership to these processes by all implementing states.

4 SCOPE

4.1 The scope of this policy framework covers the final disposal of remnants of firearms and their associated ammunition following a destruction process. It includes firearms and ammunition that have come into the hands of the national authorities by all means, i.e., surplus weapons and ammunition held by government agencies, legitimate privately-owned items handed in to the authorities for disposal, and/or items seized or confiscated by the authorities.

4.2 Although the policy framework briefly covers the methods by which firearms and ammunition are destroyed to make them unusable, it focuses on the final disposal of the remnants. The accepted methods and techniques for the destruction of firearms

and ammunition are detailed in the Modular Small-arms-control Implementation Compendium (MOSAIC) for firearms and the International Ammunition Technical Guidelines (IATG) for ammunition. This policy framework refers to these methods and techniques, but does not provide full detail.

4.3 In line with the Caribbean Firearms Roadmap, this policy framework covers firearms (which is the largest category of Small Arms and Light Weapons (SALW)), their ammunition, as well as related parts and components. The Caribbean Firearms Roadmap focuses on preventing the illicit proliferation of firearms and ammunition. Although some of the destruction and disposal techniques described in this policy framework might also apply to larger calibre ammunition (e.g., artillery shells, aircraft munitions), the focus of the policy framework is on firearms, as these are the most likely to be held legally and illicitly and/or diverted from state stockpiles.

4.4 It is an essential requirement of state governments to ensure the safety and security of weapons and ammunition that are legitimately held by state defence, security and law enforcement agencies, or other authorised users. Thus strong national regulatory frameworks are required to identify who may legitimately own or hold firearms and ammunition, the required licences and training required, and the basic requirements to ensure that firearms and ammunition are properly accounted for, managed and securely stored.

5 DEFINITIONS

5.1 The following definitions are taken principally from *IATG 01.40* or *MOSAIC 01.20,* which each provide the glossary of terms, definitions and abbreviations for ammunition and weapons respectively. In a few cases there are minor variations in the wording of the definitions between these sets of documentation, but they do not have material differences. Therefore, for the purposed of this policy framework the definitions

and stated source should be relied upon. States may vary definitions in their national regulations if required.

Ammunition: *A complete device, (e.g., missile, shell, mine, demolition store etc.) charged with explosives, propellants, pyrotechnics, initiating composition or nuclear, biological or chemical material for use in connection with offence, or defence, or training, or non-operational purposes, including those parts of weapons systems containing explosives. [IATG 01.40]*

Demilitarisation: *The complete range of processes that render weapons, ammunition and explosives unfit for their originally intended purpose (NOTE 1: Demilitarisation not only involves the final destruction process, but also includes all transport, storage, accounting, and pre-processing operations that are equally critical to achieving the result). [IATG 01.40]*

Destruction: *The process of final conversion of weapons, ammunition and explosives into an inert state so that the item can no longer function as designed. [IATG 01.40]*

Explosive: *Solid, gas or liquid substance or mixture of substances which, by intrinsic chemical reaction is capable of producing an explosion. [IATG 01.40]*

Explosive Ordnance: *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; 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. [IATG 01.40]*

Firearms: *Any barrelled weapon which will, or is designed to, or may be readily converted to expel a bullet or projectile by the action of an explosive, except antique firearms manufactured before the 20th Century or their replicas or any other weapon or destructive device such as any explosive, incendiary or gas bomb, grenade, rocket, rocket launcher, missile, missile system, or mine. [CIFTA]*

Light Weapon: *Any man-portable lethal weapon designed for use by two or three persons serving as a crew (although some may be carried and used by a single person) that expels or launches, is designed to expel or launch, or may be readily converted to expel or launch a shot, bullet or projectile by the action of an explosive. [MOSAIC 01.20]*

Munition: *A complete device charged with explosives, propellants, pyrotechnics, initiating composition, or nuclear, biological or chemical material for use in military operations, including demolitions (c.f. ammunition). [IATG 01.40]*

Parts and components: *Any element or replacement element specifically designed for a small arm or light weapon and essential to its operation (NOTE: Includes barrel, frame or receiver, slide or cylinder, bolt or breech block, and any device designed or adapted to diminish the sound caused by firing). [MOSAIC 01.20]*

Recycling: *The process of further dismantling, repurposing or reusing materials derived from the destruction of firearms and ammunition for non-military or civilian applications. [The Oxford Dictionary defines "Recycle" as: v.tr. return (material) to a previous stage of a cyclic process, esp. convert waste to reusable material.]*

SALW: *Small arms and light weapons (see separate definitions).*

Small Arm: *Any man-portable lethal weapon designed for individual use that expels or launches, is designed to expel or launch, or may be readily converted to expel or launch a shot, bullet or projectile by the action of an explosive (NOTE 1: Includes, inter alia, revolvers and self-loading pistols, rifles and carbines, sub-machine guns, assault rifles and light machine guns, as well as their parts, components and ammunition. NOTE 2: Excludes antique small arms and their replicas). [MOSAIC 01.20]*

6 OVERVIEW OF LEGISLATION, REGULATIONS AND STANDARDS

6.1 The legislation, regulations and standards applicable to the disposal of firearms, ammunition and their remnants is a vast topic, which cannot be fully addressed in this policy framework. However, it is important for states to identify the legally binding international instruments and treaties which they have signed and ratified and bring those requirements into their national legislation and regulations. States may have signed other international treaties and conventions that are politically binding, but not legally binding under international law, such as the PoA *(see 6.2.2 below)*. Other international standards, guidelines, and best practices compilations may be considered as guidance and best practice, which may be used to inform national legislation and regulations.

6.2 **International Frameworks for Firearms Control and Ammunition Management.** The following international treaties, conventions and instruments should be taken into account when considering the issues of disposal of firearms, ammunition and their remnants in the Caribbean Region. States are encouraged to study the details of these documents and ensure that their national legislation and actions are in compliance with any legal obligations that they have committed to undertake within those normative frameworks. The content of this policy framework should always be interpreted in line with the international legal obligations of each state. Nothing in this policy framework should be interpreted in contrast with relevant international legal obligations of each state.

6.2.1 *The Arms Trade Treaty (2013) (ATT).* The ATT aims to reduce human suffering caused by illegal and irresponsible arms transfers, improve regional security and stability, as well as to promote accountability and transparency

by state parties concerning transfers of conventional arms. It includes relevant provisions on national control systems (**Article 5**), import (**Article 8**) and diversion (**Article 11**).

6.2.2 *The Programme of Action to Prevent, Combat, and Eradicate the Illicit Trade in Small Arms and Light Weapons (2001) (PoA).* The PoA was adopted by the UN General Assembly in 2001 as a politically binding instrument to provide commitments and actions by which all UN Member States could reduce human suffering caused by the illicit trade in small arms and light weapons and to enhance the respect for life and the dignity of humans through the promotion of a culture of peace. It covers all steps of the life cycle of firearms and ammunition, including their final disposal.

6.2.3 *Global Framework for Through-life Conventional Ammunition Management (2024).* UN Member States adopted this new international instrument containing political commitments to prevent diversion, illicit trafficking, and misuse of ammunition; mitigate and prevent unplanned explosions at munition sites; ensure the safety and security of conventional ammunition throughout its life-cycle from the point of manufacture; and contribute to lasting peace, security and sustainable development. The Global Framework covers all types of ammunition: from small-calibre to the largest conventional ammunition.

6.2.4 *The Protocol Against the Illicit Manufacturing of and Trafficking in Firearms, Their Parts and Components and Ammunition, Supplementing the United Nations Convention Against Transnational Organized Crime (2001) [Firearms Protocol].* The Firearms Protocol is a legally binding treaty which has been signed and ratified by the majority of CARICOM states and the Dominican Republic. It was introduced to promote, facilitate and strengthen cooperation among states to prevent, combat and eradicate the illicit manufacturing of and trafficking in firearms, their parts and components and ammunition. It is concerned with illicit trafficking, but it specifically allows state to state transfers, including in the interests of national security.

6.2.5 *The Inter-American Convention Against the Illicit Manufacturing of and Trafficking in Firearms, Ammunition, Explosives, and Other Related Materials (1997) [CIFTA].* This legally binding convention has been signed and ratified by the majority of CARICOM states and the Dominican Republic. It acknowledges the urgent need to prevent, combat, and eradicate the illicit manufacturing of and trafficking in firearms, ammunition, explosives, and other related materials and the importance of strengthening international law enforcement support to achieve this.

6.2.5 *Roadmap for Implementing The Caribbean Priority Actions on the Illicit Proliferation of Firearms and Ammunition across the Caribbean in a Sustainable Manner by 2030 [Caribbean Firearms Roadmap] (2020).* The vision and goals of the Caribbean Firearms Roadmap are stated at **paragraph 1.1** above. All CARICOM Member States plus the Dominican Republic have committed to implementing the Roadmap.

6.3 **International Environmental Protection Instruments.** Environment is being progressively recognised as a value worthy of protection by the international community. Its protection is central to a series of hard and soft legal instruments and frameworks, including:

- The United Nations Framework Convention on Climate Change (1992) and the Paris Agreement (2015), Convention on Environmental Impact Assessment in Transboundary Context (1991) and the 2005 World Summit Outcome (especially paragraphs 48-56).
- Conventional and customary International Humanitarian Law (IHL) and International Human Rights Law (IHRL) (HRC Resolution A/HRC/48/L.23/Rev/1 and UNGA Res A/76/L.75).
- The Declaration of the United Nations Conference on the Human Environment (Stockholm Declaration, 1972)) and the Rio Declaration on Environment and Development (Rio Declaration, 1992).
- Relevant sustainable development goals, including, but not limited to, Goal 13 on Climate Action.

- Relevant regional instruments and frameworks, including the Outcome Document of the Fourth International Conference on Small Island Developing States (which includes references to environment, climate change and SALW).
- Recent international documents that acknowledged the link between arms control, disarmament, environmental protection, and climate change, including UNGA Resolution A/RES/79/45 and Outcome Document of the Fourth United Nations Conference to Review the Progress Made in the Implementation of the Programme of Action to Prevent, Combat and Eradicate the Illicit Trade in Small Arms and Light Weapons in All Its Aspects.

Furthermore, there are numerous standards that have been developed by the International Organization of Standardization (ISO) and others that provide data to support nations in the reduction of pollutants in the air, ground and water. Due to the complexity of environmental protection, it is not feasible to list all pollution control standards here, suffice to say that when considering the technologies and processes for destruction of firearms and ammunition and the subsequent disposal of the remnants, environmental pollution and the requirements to minimise the quantity and effects of pollutants must be taken into consideration and appropriate international environmental standards should be implemented. These ISO standards are readily available via the Internet[5]. In addition, the European Union (EU) has excellent guidance on pollution control, e.g., Directive 2008/1/EC of 15th January 2008 concerning integrated pollution prevention and control, which address different approaches to control emissions into the air, soil and water. Further information on international standards for the environment and supra-national (EU) environmental legislation is outlined in IATG 10.10.

6.3.1 Deep Sea Dumping. Ammunition and explosives are considered to be hazardous or industrial waste and are banned under the remit of the following international treaties:

- The London Convention on the Prevention of Marine Pollution by Dumping of Wastes and Other Matter, 29 December 1972;
- The 1996 Protocol to the London Convention on the Prevention of Marine Pollution by Dumping of Wastes and Other Matter (Amended 2006); and

[5] https://www.iso.org/standards.html (accessed 7 Mar 2025)

- The Convention for the Protection of the Marine Environment of the North-East Atlantic (1998) (also known as the OSPAR Convention).

Nations that have signed and ratified the above treaties and conventions are prohibited from deep sea dumping of ammunition and explosives, and other states are encouraged not to use deep sea dumping as a disposal method. The UN will not support or fund any firearms or ammunition disposal activities that utilise deep sea dumping.

6.4 **International Movement and Disposal of Hazardous Waste.** The *Basel Convention on the Control of Transboundary Movements of Hazardous Wastes and Their Disposal (1989) [The Basel Convention]* has the overarching objective to protect human health and the environment against the adverse effects of hazardous wastes. Its scope of application covers a wide range of wastes defined as "hazardous wastes" based on their origin and/or composition and their characteristics. Which items are classified as hazardous are detailed in the various Annexes to the convention, including explosives and many metals that are used in firearms and ammunition. The Convention gives some leeway for nations to interpret the information provided and in some cases the quantities of restricted metals, or the explosive residues remaining after destruction of ammunition may enable an interpretation that the waste does not have to be treated as hazardous. However, unless states are able to definitively assert that the waste products are non-hazardous, the requirements of the Basel Convention should be applied. Nevertheless, the Basel Convention does not **preclude** movement of hazardous waste between states; it controls the methods and suggests the documentation required to enable such international transfers.

6.5 **International Guidelines for Small Arms and Light Weapons and Ammunition.** Aware of the dangers of the illicit trade, misuse and proliferation of weapons and conventional ammunition, the UN has developed a library of information on managing the safety and security of weapons and ammunition. Other supra-national organisations have developed guidance material based upon the two overarching UN guidelines for weapons and ammunition, which are, respectively, the Modular Small-arms-control Implementation Compendium (MOSAIC) and the International Ammunition Technical Guidelines (IATG). MOSAIC and IATG provide information for management of weapons and ammunition across the life-cycle and may be used by states as a template for development

of national regulations for the life-cycle management of weapons and ammunition. For the purposes of this policy framework the two modules of particular importance are *MOSAIC 05.50 Destruction: Weapons and IATG 10.10 Demilitarization, destruction and logistic disposal of conventional ammunition.* These are covered in greater detail in **section 7** below. The Organisation for Security and Cooperation in Europe (OSCE) has produced a particularly useful *"Best Practice Guide on National Procedures for the Destruction of Small Arms and Light Weapons"*[6] which states may find useful as a reference.

7 THE ENVIRONMENTAL CONTEXT

7.1 Protection of the environment is a vital element of the policy for disposal of firearms and ammunition and their remnants. The existential threat of climate change to the international community – particularly the risks it poses to the survival and sustainability of small island developing states, their people, and their ecosystems – creates a critical imperative to minimise the environmental impact of human activities and strengthen protection efforts. Furthermore, 'the widespread, rapid and adverse impacts of climate change continue to pose increasing risks'[7] to Caribbean states 'efforts to achieve sustainable development,' including in the field of tourism, based upon the climate and the beauty of the natural environment, as well as agriculture and fishery. Extreme weather has afflicted the region frequently over the years, especially hurricanes and other tropical storms, so any industrial disposal methods must be designed to minimise effects on the environment, in order that the effects of climate change are not exacerbated. Furthermore, regional states have experienced adverse effects of climate change due to the limited freshwater resources in some states and the threat of rising sea levels and increased land erosion.

[6] https://www.osce.org/files/f/documents/b/9/492949.pdf.

[7] Draft outcome document of the fourth International Conference on Small Island Developing States (https://sdgs.un.org/sites/default/files/2024-05/n2409990.pdf)

7.2 In the context of disposal of firearms and ammunition remnants, environmental protection is relevant and important, both because of the direct effects of the items themselves and the potential effects on the environment of the selected disposal methods. Many regional states have a solid waste management authority that oversees and enforces national legislation and regulations for disposal processes, whether conducted by public sector organisations, or private industry.

7.3 Any industrial facility used for the destruction of firearms and ammunition or disposal of remnants should comply with state and regional standards for control of pollution of the air, ground and water. Thus suitable particulate filters should be incorporated to clean exhaust gases prior to release into the atmosphere. Even semi-industrial systems, such as small arms ammunition burn tanks could be modified to collect gaseous emissions and pass them through filtration systems before release. Similarly, any method using water, solvents or other fluids which may become contaminated, should incorporate methods of collecting those fluids for appropriate industrial disposal.

7.4 The limited availability of industrial disposal facilities in the Caribbean Region necessitates the export by many states of solid waste for recycling or disposal. Since most of the implementing states are parties to the Basel Convention (1989), a global treaty that regulates the move and disposal of hazardous waste, the type of solid waste and its classification according to the Convention can cause some challenges to the legal movement of waste material. The presence of arsenic and lead in many weapons and ammunition systems requires particular consideration before export is authorised.

7.5 Since 2010, the solid waste industry has made improvements and efficiencies in processing metallic solid waste. Key to this has been pre-sorting and accounting of metals prior to sending overseas for recycling, which has increased the price for scrap metal and allowed the procurement of more modern processing equipment.

7.6 Environmental considerations should be addressed at all stages of the life cycle management of firearms and ammunition, including the end-of-life stages. As part of this process, the state authorities responsible for firearms and ammunition destruction and disposal should undertake an environmental impact assessment to inform the decision-making process for the destruction stage and the ultimate disposal of remnants. The environmental impact assessment should be undertaken early enough in the life cycle to allow planning decisions on storage and transportation to be included, as limitations in these areas may impact on the available methods of destruction and disposal. States have obligations under international law to assess predictable transboundary pollution, with a corresponding duty to minimise its impact. Allied to this, the environmental impact assessment will support obligations to assess and prevent risks to life and other human rights, required under international human rights law.

7.7 In addition to the measures and concerns outlined above, it is important to highlight how environmental aspects and climate change induced phenomena impact measures of ammunition management. In 2024, MAG produced a short working paper on *"Mainstreaming Climate and the Environment in Weapon and Ammunition Management"*[8] which provides states with advice and guidance on inclusion of these topics in their life cycle management plans for firearms and ammunition.

[8] https://www.maginternational.org/media/filer_public/56/11/56117c0e-ae5f-40d3-8b96-f0351830f208/climate_case_study.pdf (accessed 7 Mar 2025).

8 DISPOSAL PROCESSES AND AVAILABLE TECHNOLOGIES

8.1 **The disposal of remnants is the final stage of the life-cycle management of weapons and ammunition.** In order to safely dispose of remnants, it is essential that the weapons and ammunition are no longer usable and that they will present no danger, either to those involved in the disposal process or to the wider population. States are encouraged to ensure, once the decision has been made to destroy firearms and ammunition, that they are destroyed in accordance with international best practice as described in **MOSAIC 05.50** and **IATG 10.10**, summarised in the following paragraphs. States should pay particular attention to the potential environmental impact of their chosen destruction and disposal methods, which should have been identified in the environmental impact assessment earlier in the life cycle and reviewed and updated at the time that destruction and disposal are actually undertaken.

8.2 **Destruction of Firearms.** *MOSAIC 05.50 Destruction: Weapons* provides guidance on the available processes and technologies for destruction of SALW (or firearms). There is no need to reproduce the entire contents of that module, suffice to say that it provides guidance across the spectrum of reasons for destroying weapons, whether those which are obsolescent/obsolete or surplus to government requirements; those which are voluntarily relinquished as part of a weapons collection programme; or those illicitly held weapons, which have been recovered by police, security or other state agencies, whether or not they have been identified as being involved in criminal activities. Key to the destruction process is that the firearms (and their associated components) shall be rendered permanently inoperable as a result of the destruction process.

8.2.1 Crucial to an effective destruction process is the development and authorisation of a comprehensive plan. The first element of this is to identify the types and quantities of firearms to be destroyed and, importantly, to maintain accurate records of those weapons, both while awaiting destruction

and of those that have been destroyed. Further information on the planning process for a weapons destruction programme can be found at **clause 6** of *MOSAIC 05.50*, including Information Requirements, Risk Management and Safety considerations.

8.2.2 Accurate accounting and record keeping for firearms is vital. In order to secure the stockpile, whether part of the state's national holdings or confiscated items, it is essential to maintain an accurate account by type and quantity. Legally supplied and held firearms will bear a unique serial number allocated by the manufacturer. This may be supplemented in national legislation with an import number. These numbers should be held within the firearms account and regular stock-checks should be conducted to identify any discrepancies between the account and the physical stockholdings. Firearms confiscated by state authorities, may have had their manufacturers' serial number removed and those manufactured by improvised processes are unlikely to have a serial number. However, in order for state authorities to precisely identify a firearm, such as in the case where a firearm may be linked to a particular crime or criminal, there should be a nationally determined methodology to uniquely identify any firearms recovered by law enforcement or security organisations. Any forensic or ballistic matches to firearms should also be linked to that identification number, whether the manufacturers' serial number or a national identifier. By maintaining the link between the unique identifier and the weapon, it may be possible to link criminal cases, even after the destruction of the weapon and final disposal of its remnants.

8.2.3 **Annex B** to *MOSAIC 05.50* summarises the destruction techniques and technologies for firearms. Various techniques are available, however there are cost, training, effectiveness and environmental factors that should be taken into account before choosing which technique/technology is used. In **Annex A** to this document is a summary table derived from *MOSAIC 05.50* which summarises the techniques and technologies available along with the advantages and disadvantages of each. The recommended methods of destruction of weapons are:

- Cutting with a minimum of three cuts to the main body of the weapon and cutting of the component parts by use of hydraulic shears, oxy-

acetylene or plasma systems or rotating disc.

- Shredding, whereby the metal body and component parts are shredded into thin strips and cannot be reassembled.
- Smelting, where industrial furnaces are used to melt down the metallic components, following which the recovered metal may be sold or recycled.

8.3 **Destruction of Ammunition.** The hazards presented by explosives create additional safety concerns during the disposal of ammunition. *IATG 10.10* provides general information on the demilitarisation and destruction and logistic disposal of conventional ammunition. The module summarises the international legislation, instruments and agreements concerning the disposal of large quantities of ammunition and explosives, both on military operations and in post-conflict and peacetime scenarios. The module addresses the technical factors to be considered when planning the disposal of ammunition, before summarising the technology and techniques available to states to carry out demilitarisation, destruction and disposal of ammunition. *IATG 10.10* covers the full spectrum of conventional ammunition, including small arms ammunition, pyrotechnics, mortar systems through to heavy artillery ammunition and guided weapons. The focus of this policy framework is firearms and the associated ammunition, plus some pyrotechnic items, however there may be a need in the Caribbean Region to dispose of larger calibre ammunition that is surplus to requirements, beyond its safe life, or unsafe for any other way. The principles, planning and processes detailed in *IATG 10.10* are applicable to all ammunition types, but selection of the destruction technique may vary depending on the particular ammunition nature. Advice should be obtained from suitably qualified and experienced personnel during the planning stage.

8.3.1 As with destruction of firearms, the destruction of ammunition requires comprehensive planning. Due to the hazards of an explosion during the destruction process there are additional safety considerations to be taken into account and increased safety areas surrounding the destruction site may be necessary.

8.3.2 Due to the presence in ammunition of chemical substances, it is particularly important to prevent any form of pollution origination from its destruction. In fact the nature of explosives is that they comprise compounds or mixtures,

which when subjected to a suitable stimulus undergo a violent chemical decomposition with the evolution of heat and gas. The gaseous products will depend upon the chemical composition of the different types of explosives, but at a minimum will include carbon dioxide and, most likely, a much wider range of pollutant gases. Therefore, whichever industrial destruction method is chosen, a suitable air filtration system should be incorporated to reduce the level of pollutant gases released into the atmosphere to below permissible maxima, as determined by nations according to their applicable pollution control standards. Should the destruction method use solvents or water techniques that will leave contaminated fluids, there must be methods of containing those fluids for safe subsequent disposal.

8.3.3 As with firearms, accounting for ammunition is of vital importance. Ammunition manufactured by reputable companies will have an identifier, known as a lot or batch number, to identify specific production runs. These lot and batch numbers are of particular importance in determining the safe-life of the ammunition for storage, and stockpile management more generally. They are particularly important when incidents occur, so that a particular lot or batch may be identified as having a potential safety concern. Ammunition recovered from illicit stocks may not have a lot or batch number, and even if it does, the storage conditions cannot be guaranteed, so the safety in storage of such ammunition cannot be guaranteed. As a general rule, any unsafe ammunition should be disposed of immediately and other surplus stock according to age, i.e., the oldest first, with the caveat that ammunition of unknown provenance may be given a higher priority for destruction. As with firearms, recording lots or batches of ammunition used in a criminal incident is good practice, so that links to other criminal cases may be made, even after the ammunition has been disposed of.

8.3.4 **Annex B** to this paper includes a table summarising the disposal methods for ammunition, consolidating information extracted from *IATG 10.10*. The Annex is intended as an aide memoire only and the full detail contained in *IATG 10.10* should be consulted when planning ammunition destruction operations.

8.4 **Legal Status of Destroyed Firearms and Ammunition.** A key aspect that states must determine for themselves is the legal status of destroyed weapons and ammunition and the related remnants. A regional agreement on such a definition may ease some of the issues relating to transfer of remnants for ultimate disposal. For firearms and ammunition, a basic premise should be that, following the destruction process, the items can no longer be used for or re-engineered to fulfil their original function. Lack of clarity about the legal status of firearms or ammunition remnants and the security requirements for their handling has created some regional difficulties in terms of engagement with private sector waste management entities. Reaching a regional understanding on how remnants should be categorised is discussed further in **paragraph 10.2** below.

8.4.1 The exact definition of a destroyed firearm will vary from type to type, but in basic terms, a weapon should be cut in a minimum of three places and any critical components, such as breech block, bolt, firing pin, etc. should be rendered permanently inoperable. This may entail further cutting, abrasion or smelting.

8.4.2 The key element for destruction of ammunition is to ensure that there is no explosive remaining that could either be re-used or leave a residual explosive hazard. For disposal of small arms ammunition and some pyrotechnics the use of a rotary kiln to "cook-off" the propellant contained in the cartridge cases is generally considered to be the optimal method. If the process is properly conducted, nothing more than trace levels of propellant should remain, which do not pose an explosive hazard. The metal cases and the bullets can be recovered, separated and sold as scrap for recycling. Larger calibre ammunition will require different destruction techniques, but the principles outlined in *IATG 10.10* remain the same.

8.5 **Storage of Firearms and Ammunition Remnants.** If the destruction of firearms and ammunition has been properly conducted in accordance with one or more of the methods described in *MOSAIC 05.50* of *IATG 10.10*, the remnants should not constitute a hazard in terms of their potential future use as weapons. Nevertheless, the waste metal and other components recovered may still be deemed as hazardous waste under the terms of the Basel Convention. The conditions for storage of remnants must therefore be given appropriate safety and security consideration. This cannot be prescriptive as

different national legislation and different metallic components within the remnants will determine the exact storage requirements. The hazardous nature of the items should lead to measures that abide by environmental protection principles. In all cases, there may be a financial value to the remnants, so it is in the interest of the national authority to ensure that accurate accounts are kept of the quantity and, where appropriate, value of the stored remnants.

8.5.1 The effect of salinity in the atmosphere of many Caribbean islands can have a detrimental effect on the quality of recovered metals, due to the enhanced rate of corrosion, so consideration may be given to covered or environmentally protected storage. This, however, comes with a cost, thus reducing any potential income for sales of remnants. Therefore, as far as possible, the final disposal method should be planned before the destruction takes place and the time that remnants remain in storage should be minimised.

8.6 **Economics and Regional Cooperation.** Some of the technologies and equipment used for destruction of firearms and ammunition are extremely expensive. In order to obtain a return on investment in such equipment, an adequate through-flow of firearms and ammunition for disposal may be required. Clearly for many Caribbean states it would not be viable to purchase equipment solely for their own usage. Similarly, environmental protection measures might appear excessively expensive for individual states. Regional cooperation, perhaps including joint funding and joint projects or programmes, may be an appropriate and sustainable way forward. The details of how regional cooperation may be enacted should not be underestimated, as there are numerous technological, logistical and (perhaps most importantly) legal issues that would need resolution.

9 METHODS OF FINAL DISPOSAL OF WEAPONS AND AMMUNITION REMNANTS

9.1 The following paragraphs outline the methods for the final disposal of the remnants of firearms and ammunition. It is therefore a prerequisite that the remnants of firearms and ammunition have been totally demilitarised to a point at which they can no longer present a safety or security risk. States must have a suitable assurance process to confirm the status of the remnants prior to sending them for final disposal. This has obvious safety issues for the disposal of ammunition remnants, but for all remnants the security factor must be considered to ensure that they cannot be recovered and re-engineered. Additionally, prior to the final disposal of remnants any requirement to retain items for evidential purposes such as in criminal proceedings must be addressed.

9.2. **Burial.** Some states use burial in secure locations as a method of disposal of remnants of firearms and ammunition. This is "Landfill" disposal of waste and should not be encouraged, as it causes environmental contamination. Even after destruction there may be traces of potentially contaminating chemicals remaining and the metals used in the manufacture of the casings, bullets etc. (e.g., arsenic, lead) can also be environmentally damaging. Provided that the remnants have been through a suitable destruction process to render them unusable for their intended purpose, then there should be no need to treat them as a security concern and other methods for their end-of-lifecycle disposal should be used.

9.3 **Encapsulation.** Encapsulation is a method whereby firearms which have been dismantled or rendered inoperable are placed in barrels or other containers and then buried or encased. This method should not be used if there is any question that the firearms could be retrieved, re-engineered and returned to circulation. Encapsulation should never

be used for ammunition, due to the potential explosion hazard. For remnants, the use of a suitable container may alleviate some of the pollution concerns, but if there is any long-term degradation of the container, contamination of the environment may occur over time. This may be further alleviated by encasement of the container in concrete (see below).

9.4 **Encasement.** This is a method of rendering firearms or ammunition remnants permanently inoperable by encasing them in a solid material, such as concrete or resin. This technique ensures that the disposed items cannot be accessed, re-used or re-assembled. A number of states in the Caribbean use encasement as a method of disposal, often encasing remnants in the concrete foundations of new government buildings or roads. Advice should be sought from a structural engineer before consideration of this technique as part of a construction project, to ensure that the metal used and its configuration is not going to adversely affect the quality of the concrete or detract from the effectiveness of any reinforcing bars included in the design. Encasement is an effective method of disposal, but unless used as part of a construction project will have a physical impact on the environment, which may have long-term consequences not identified at the outset.

9.5 **Smelting.** Smelting is the use of industrial furnaces to melt the metal (whether firearms themselves, or the remnants of firearms or ammunition), collect the molten metal and cool it so that it can be handled and subsequently re-used. Smelting is a recommended method for disposal of remnants of firearms and ammunition, as it completes the total destruction of the items and renders them into a different physical form. The high energy input required to get the furnace up to temperature is a downside, but this may be offset by the sale of recovered metal for recycling and re-use. Smelting is the preferred method of disposal of remnants.

9.6 **Public Art.** The use of firearms remnants for public art is a recognised final disposal method. Although it is most appropriate for demonstration of reconciliation following conflict, in the Caribbean context, it may be appropriate as part of a demonstration of the quantity of illicit weapons that have been withdrawn from circulation and denied to criminal organisations. It is only suitable for small quantities of destroyed firearms and requires careful selection of a suitable artist – including appropriate security arrangements.

Additionally, the metallurgy of weapons and remnants must be considered to ensure that members of the public are not exposed to potential toxins such as lead or arsenic which may be present.

9.7 **Export Sales.** Providing the requirements of the Basel Convention are properly observed, sale of remnants may be a legitimate method of disposing of remnants. Some Caribbean states already have export arrangements in place. The export of remnants may bring about valuable foreign investment, but the value of the sales will be dependent upon the quality of metal, how well it is sorted and the quantity available. Export sales is a recommended method of disposal of remnants, subject to compliance with international law and conventions.

9.8 **Permanent Deactivation.** Deactivation is a recognised method of disposal of firearms, rendering the firearm permanently inoperable, but preserving its appearance. Deactivation allows weapons to be held by owners, including collectors and museums, without the need for a licence, or could also be stipulated as part of a peace agreement to enable firearms to be used to create public art. Deactivation should only be undertaken and verified by authorised entities and a certificate of deactivation issued.

10 A REGIONAL FRAMEWORK

10.1 The particular circumstances of each state in the Caribbean Region are different and so there is not a single solution that can be applied across the whole community. All CARICOM Member States plus the Dominican Republic have signed up to the Caribbean Firearms Roadmap, which includes the target to *"Prevent the re-circulation of illicit firearms and ammunition and their potential supply to unauthorised users."* This requires all states to commit to national programmes for removal of illicit firearms

and ammunition, including the final disposal of remnants. However, the size of many states and the quantities of weapons and ammunition for disposal suggest that regional cooperation would be beneficial and economically preferable. States have indicated a willingness to cooperate and it is suggested that consideration is given to the negotiation of a Memorandum of Understanding (MoU), whether on a regional basis or amongst smaller groupings to commit to mutual actions. To facilitate cooperation and negotiations on potential future MoUs, consideration may be given to establishing an inter-governmental forum at which firearms and munitions destruction and disposal could be discussed. This may be a formal working group established under CARICOM.

10.2 Differing definitions in national legislation of what constitutes a firearm (or weapon), ammunition and what degree of destruction is required to reclassify them as "remnants" may complicate the movement of items between states. Thus to benefit from any regional economies of scale for the provision of industrial disposal facilities and equipment, states will have to agree either to common definitions and, where necessary, amend their national legislation accordingly, and/or to enter into agreements or MoUs that would facilitate ease of transfer of firearms or ammunition, in order to complete the destruction and disposal process in a neighbouring state. An additional factor in agreeing the definition of remnants is that any private sector operator of disposal equipment, e.g., smelters, compactors, etc., may require assurance that their equipment will not be damaged as part of the process. Thus, engagement with the private sector at an early stage may prove beneficial in identifying suitable and available facilities to carry out these tasks.

10.3 Protection of the environment is vital to the long-term prosperity of the Caribbean Region to protect the environment, reduce the impact of climate change and promote tourism, for the sustainable development of the region. Therefore, destruction and disposal methods that have minimum negative impact on the environment should be selected. It is thus recommended that all states commit to the prohibition of the following methods:

- Burial or Landfill.
- Deep Sea Dumping.
- Encapsulation.

10.4 Furthermore, states are encouraged to commit to the inclusion of environmental protection measures in all destruction and disposal operations. This would include air pollution filtration systems for any industrial facility involved in the destruction of firearms and ammunition or the disposal of remnants, and contaminated fluid collection and disposal systems, where appropriate. Open Burning/Open Detonation (OBOD) do have a potential negative environmental impact and should be discouraged from use for logistic disposals. However, in some cases the urgency to dispose of unsafe items, especially ammunition, may require OBOD to be used, as safety considerations may take priority. Even so, a Small Arms Ammunition (SAA) Burning Tank may be modified to collect and filter the gaseous emissions, thus reducing harmful emissions.

10.5 During the planning stages of destruction and disposal operations, states should conduct a full environmental risk assessment to demonstrate that they are taking all possible measures to minimise environmental damage. Such an assessment must be comprehensive, including an assessment of the fossil fuels that may be consumed in the transportation of remnants for disposal in other parts of the world. For example, some states have indicated that they transport waste to China and Vietnam for disposal, whereas a regional smelting capability may reduce the overall emissions of greenhouse gases.

10.6 Regional agreement on what level of destruction is required to deem a firearm or ammunition item permanently inoperable would be beneficial in terms of movement of remnants between states for disposal. It would also assist states in assessment of the security provisions required during the storage of weapons, ammunition and remnants. Such agreement may facilitate the decision-making process on when to carry out destruction operations, as it may be more economical to destroy items early, in order to save expenditure on maintaining large secure storage facilities. Should a regional definition be agreed upon, it would be necessary for each individual state to amend their own national legislation and regulations to legitimise the definition.

10.7 The ability of individual states to conduct destruction of firearms and ammunition locally is desirable. Therefore, the availability of equipment such as hydraulic shears and rotating disc cutters for weapons or rotary kilns for ammunition in each state is desirable. However, smaller states may not have sufficient need to make it economically viable to procure and maintain this equipment (and maintain the training standards for the users), so regional cooperation on sharing of such equipment should be considered.

10.8 Currently there is only one identified industrial smelter in the region (in Jamaica), with a second (in Belize) due to commence operation during 2025. The smelting capacity is not only available for disposal of firearms and ammunition remnants, so it is important that those states which operate smelters declare how much available capacity they have to offer to other states. A regional cooperation forum may be useful in the matching of available capacity with individual states' disposal requirements. Should the smelting capacity within the region be insufficient to meet demand, consideration may be given to international cooperation and assistance to increase capacity and/or identify facilities outside the region that may have spare capacity. An environmental impact assessment will be necessary to identify the financial costs and environmental footprints for all options to facilitate the decision-making process.

10.9 A number of states possess weapons destruction equipment, such as hydraulic shears, rotating disc cutters etc. The maintenance of such equipment and training of operators should be continuous, as the efficiency, effectiveness and safety are compromised if these matters are not addressed. If they are not used at close to capacity, it is easy for maintenance and training to be given a lower priority, which can lead to a reduction in capability due to loss of operator skills and/or equipment failure. Often these pieces of equipment are transportable and it may prove more cost-effective to transport the equipment around the region than to move the weapons to the equipment. Again, a regional cooperation forum may facilitate a match of capacity against requirement and help determine the most cost-effective solution to match capacity, requirement and location.

10.10 The recommended method of destruction of SAA, and rendering the remnants as scrap and available for recycling, is the use of a rotary kiln. It is unclear whether there is available capacity of rotary kilns in the region. These items are not cheap, and require a high level of maintenance and operator training. Consideration may be given to procurement of equipment to be available to all regional states. Various issues would have to be addressed, such as whether a static facility would be preferable, in which case states would have to agree to common regulations for movement of SAA requiring destruction. Alternatively, a mobile facility that could be moved from state to state would have additional costs. Having access to a regional SAA destruction capacity by rotary kiln is desirable, but a full cost-benefit analysis (CBA) is required to determine how this capability should be delivered.

10.11 An alternative to the use of rotary kilns for destruction of small calibres of ammunition and small pyrotechnic articles, is the use of burn tanks. These are inexpensive, can be fabricated locally and have relatively low operator training requirements. There are burn tanks available in many regional states. However, unless the gaseous emissions are captured and passed through suitable particulate filters, which adds both complexity and cost, there is a greater environmental impact.

11 RECOMMENDATIONS

11.1 The recommendations in this section are not intended to be prescriptive, but to provide states with options for steps which they can take to move towards the overall aim of a reduction in the quantities of illicit firearms and ammunition in circulation in the region in an environmentally friendly way. They are broadly separated into immediate-, medium- and long-term actions, although the division between these periods is not rigid and some states may be able to move at greater speed for some aspects. These recommendations have been discussed at other points in the policy framework, but are summarised below.

11.2 **Immediate-Term (up to one year).** As part of the Mid-Term Review of the Caribbean Firearms Roadmap, states should give high priority to the immediate implementation of the following:

- Formally measure and record the environmental impact of current processes for destruction of firearms and ammunition and disposal of their remnants.
- If not already in place, introduce the requirement for national authorities to undertake environmental impact assessments into the life cycle management of firearms and ammunition.
- Introduce national policies to ban landfill disposal of firearms, ammunition and their remnants.
- Introduce national policies to ban Deep Sea Dumping for disposal of firearms, ammunition and their remnants. This may require longer-term legislation changes to confirm in perpetuity.
- Confirm that all firearms and ammunition under government control are stored in safe and secure facilities. Commit to improvement of storage facilities where necessary.
- Confirm that all firearms and ammunition under government control are properly accounted for (including serial numbers, lot/batch numbers etc. where possible).
- States should identify what firearms and ammunition destruction and/or remnant disposal facilities and equipment they have in place. Where these facilities and equipment are not utilised 100% of the time, states are encouraged to declare spare capacity to support other states' destruction and disposal activities.
- Identify the quantities of firearms and ammunition requiring destruction.
- Identify the quantities of remnants requiring final disposal.
- Make plans and commence destruction and final disposal activities. These plans should identify the frequency at which destruction and disposal activities take place.
- Conduct a CBA for the potential procurement of a regional rotary kiln capability for destruction of SAA.

11.3 **Medium-Term (one to five years).** The following activities may take longer to complete:

- Develop and adopt legislation, regulatory frameworks and SOPs to prioritise environmentally sustainable destruction and disposal.
- Assess the impact of climate change and related phenomena on risks of diversion and unplanned explosions.
- Formulate national legislation and regulations to confirm national bans on Landfill and Deep-Sea Dumping for disposal of firearms, ammunition and/or remnants.
- Phase out the use of other destruction and disposal methods that have negative environmental impact, e.g., OBOD, except where necessary for immediate safety reasons.
- Introduce standards for reduction and limitation of gaseous and particulate emissions into the atmosphere. Require industrial facilities to incorporate suitable particulate filters.
- Improve standards for prevention of ground and water contamination and require industrial facilities to collect and correctly dispose of contaminated water, solvents and other fluids.
- Formulate national legislation to confirm the safety and security status of remnants of firearms and ammunition following an approved destruction method. This aspect is vital with respect to movement of potentially hazardous waste under the Basel Convention.
- Engage with private industry to identify facilities which may be used to support disposal of remnants.
- Match regional capacity of destruction and disposal facilities with nationally identified quantities for disposal of firearms, ammunition and remnants.
- Enter into bilateral (or multilateral) MoUs to facilitate transportation of firearms, ammunition or remnants for destruction or disposal in states which have sufficient industrial capacity.
- Consider the facilities and equipment requirements to support destruction and disposal operations in the Caribbean Region and identify potential sources of funding and assistance.

11.4 Long-Term (2030 and beyond):

- Converge national legislation to introduce regional standards for prevention of pollution of air, soil and water resulting from destruction and disposal activities.
- Converge national definitions of what constitutes "Remnants" following destruction of firearms and ammunition. This will enable easier transfer of remnants between states for disposal.
- If agreed during the medium-term, implement a regional solution to cooperation in the provision and operation of destruction and disposal facilities exploiting any funding sources identified to increase regional capacity.

12 CONCLUSION

12.1 This policy framework is intended to support Caribbean states in their efforts to combat the illicit trafficking and proliferation of firearms and ammunition which fuel armed violence in the region. Many states have stocks of firearms and ammunition awaiting destruction and final disposal of their remnants. The situation provides complex legal and regulatory challenges, not least because of the necessity to protect the environment. The policy framework provides information on some of the main legal and regulatory instruments for firearms control and environmental protection. States may have obligations under international law, or may have made political commitments with respect to these matters and the policy framework seeks to outline the available processes for destruction of firearms and ammunition and the final disposal of remnants that comply with both arms control and environmental best practice.

21.2 The policy framework is a regional initiative and encourages cooperation between states to support one another by sharing resources and offering spare industrial capacity, where available, to neighbouring states to bring about a reduction in the quantities of firearms and ammunition in the region, whilst protecting the environment. A series of recommendations, divided between the immediate-, medium- and long-terms is included to encourage states to work towards their commitments in the Caribbean Firearms Roadmap.

LIST OF ANNEXES

A. Summary of Firearms Destruction Methods.

B. Summary of Ammunition Destruction Methods.

C. Suggested Methods for Final Disposal of Scrap Firearms and Small Arms Ammunition Remnants.

D. Abbreviations and Acronyms.

ANNEX A

Summary of Firearms Destruction Methods

Technique	Description	Advantages	Disadvantages	Capital Costs	Operational Costs	Environmental Concerns	Destruction Efficiency/ Safety Concerns	Staff Skill Levels
(a)	(b)	(c)	(d)	(e)	(f)	(g)	(h)	(i)
Burning	Destruction of SALW by Open Burning using kerosene	Cheap and Simple Highly visible and symbolic Limited training requirements	Labour intensive Environmental pollution Not particularly efficient Visual inspection is essential, but difficult.	Nil	Minimal (fuel and staff costs)	Moderate and will be fuel dependent	Some weapons in the centre of the burning stack may not be destroyed if the burn stack is not correctly constructed	Low
Cement	Cast weapons into cement blocks	Cheap and simple Limited training period	Recovery possible, but very labour intensive to achieve High landfill requirements High transport requirements to landfill Final accounting difficult	Minimal	Minimal (< US$ 1)	Moderate as the concrete encased weapons require subsequent land burial.	Low	Low
Crushing by AFV	The use of AFVs to run over and crush/deform the SALW	Cheap and simple Highly visible and symbolic Limited training requirements	Not particularly efficient Visual inspection essential	Minimal (dependent on availability of AFV)	Minimal (fuel and staff costs)	Minimal	Not a very efficient way of destruction as useable parts remain.	Low
Cutting (Bandsaw)	The use of industrial bandsaws to cut SALW into unusable pieces	Limited training period Simple	Labour intensive Minimum of 3 cuts per weapon, dependent on type Inefficient	$400 - $1,000	Minimal (< US$ 5)	Low Emissions from electric generator.	120+ seconds per weapon Saw operator at risk from industrial accident	Low
Cutting (Hydraulic Shears)	The use of hydraulic cutting and crushing systems ***Recommended technique***	Limited training requirements Technology readily available High destruction rates possible using automation Environmentally benign	Medium initial capital costs Equipment requires transportation to affected country	$25,000+	Minimal (< US$ 5)	Low Emissions from electric generator.	10 - 30 seconds per weapon Operator at risk from industrial accident	Low

(a)	(b)	(c)	(d)	(e)	(f)	(g)	(h)	(i)
Cutting (Hydro-abrasive technology)	The use of hydro abrasive cutting technology	Limited training requirements Technology readily available Medium destruction rates possible using automation	Medium initial capital costs Equipment requires transportation to affected country Not yet used for high destruction rates, only as concept demonstrators	$50,000+	Minimal (< US$ 5)	Moderate Emissions from electric generator Waste water treatment requirements	60+ seconds per weapon Operator at risk from industrial accident	Medium
Cutting (Oxy-acetylene or plasma)	The use of high temperature cutting technology to render the SALW inoperable ***Recommended technique***	Established and proven method Cheap and simple Limited training requirements Equipment available worldwide Maintenance free	Labour intensive (One operative can process 40 weapons per hour) Risk of small functioning components (bolts etc) not being destroyed Relies on supply of industrial gases	$1,000 - $5,000	Minimal (< US$ 2)	Low Emissions from electric generator Gaseous products from cutting torch	60+ seconds per weapon Operator at risk from industrial accident and burns	Moderate
Cutting (Rotating disc)	The use of hand-held rotating disc cutting systems ***Recommended technique***	Limited training requirements Technology readily available High destruction rates possible using automation Environmentally benign	Medium initial capital costs Equipment requires transportation to affected country	$200 – $5,000	Minimal (< US$ 2)	Low Emissions from electric generator.	60+ seconds per weapon Saw operator at risk from industrial accident	Low
Deep Sea Dumping	The dumping at sea in deep ocean trenches of SALW **Not authorised under UN auspices**	Traditional technique Efficient	Constraints of London Convention **Not supported by UN programmes**	Minimal	High (Shipping Costs)	**Banned by treaty.** *Deep sea dumping of weapons is not banned, but is subject to the constraints of the London Convention 1972.*	Very efficient as weapons difficult to recover	Moderate
Detonation	The destruction of SALW by detonation using serviceable high explosives to induce sympathetic detonation	Highly visible and symbolic Destruction guaranteed if sufficient donor explosive used	Labour intensive Environmental pollution Requires highly trained personnel Expensive in terms of donor explosive	Low	High due to costs of explosives	Moderate due to the gaseous products of detonation.	Moderate risk if EOD qualified staff used High if non-EOD staff used.	High (EOD Skills)

(a)	(b)	(c)	(d)	(e)	(f)	(g)	(h)	(i)
Shredding	The use of industrial metal shredding technology ***Recommended technique***	Highly efficient Limited training requirements Technology readily available High destruction rates possible using automation Environmentally benign	High initial capital costs Equipment requires transportation to affected country	Very High	Minimal (< US$ 1)	Low, if industrial system meets appropriate environmental standards.	Very efficient 1,000+ per hour	Medium
Smelting and Recycling	The use of industrial steel smelting facilities to melt down complete processed weapons ***Recommended technique***	Limited training period Simple Cheap and efficient Limited preprocessing Minimal labour required Highly visible and symbolic Destruction guaranteed Some costs recovered by sale of scrap	Requires suitable industrial facility Limited preprocessing required	Very High	Minimal (< US$ 1)	Low, if industrial system meets appropriate environmental standards.	Very efficient 1,000+ per hour	Moderate
Welding for Art	The use of weapons, with working parts removed or made inoperable, as part of a work of art	Highly visible and symbolic Cost recovery through sale	Limited destruction rates Requires talented staff High preprocessing requirements	Nil	High (Artist's time)	Nil	Nil	High

ANNEX B

Summary of Ammunition Destruction Methods

Technique	Description	Advantages	Disadvantages	Environmental Concerns	Destruction Efficiency/ Safety Concerns
(a)	(b)	(c)	(d)	(e)	(f)
Deep Sea Dumping	The dumping of ammunition in deep water at sea in coastal or international waters. **Banned by international treaty and therefore not authorised under UN auspices.**	Nil	Banned by international treaty for some States. Long-term environmental impact of decaying ammunition on seabed is unknown.	**Banned by treaty.** *Deep sea dumping of ammunition is prohibited under the OSPAR Convention, the London Convention 1972 or the London Protocol 2006 on the dumping of waste at sea for those nations that are States parties to the conventions and protocols.*	Previous shallow water dumping has led to pollution and dangerous munitions being washed ashore or being caught in fisherman's nets.
Disposal by Landfill	The shallow or deep burial of ammunition and explosives. **Banned by international treaty and therefore not authorised under UN auspices.**	Nil	Long-term environmental impact of decaying ammunition on the ground and water table is unknown. Possibility of ammunition being recovered by criminals. **Will not be supported by UN programmes.**	Restricts future use of land for development.	Potential long-term risks of spontaneous explosion due to degradation of safety mechanisms and chemical deterioration of the propellant and explosive content.
Demilitarisation/ Destruction	The physical destruction of ammunition, or the use of industrial processes to demilitarize ammunition and recover raw materials for reuse and recycling.	Proven technologies exist. Guarantees destruction or demilitarization. Can be environmentally benign. Can make effective use of recovery, reuse and recycling of components and materials. Several organisations are fairly advanced in developing mobile demilitarization facilities.	Can be expensive, however, with rental options available, this technology should become more acceptable to donors due to environmentally benign filtering and purification techniques. The idea that these programs can be self-financing is unproven because, despite much effort, there will be some cost.	Open Burning/Open Detonation (OBOD) (see below) can pose environmental risks (however, may be the only feasible option for disposal of unsafe ammunition).	OBOD can pose environmental risks (however, may be the only feasible option for disposal of unsafe ammunition).

(a)	(b)	(c)	(d)	(e)	(f)
Manual Disassembly	Uses human resources, usually on a process line, to physically remove components and breakdown ammunition using simple hand tools.		Labour intensive Obvious degree of risk	Low	Risk of accidents with personnel in vicinity
Mechanical Breakdown	Use of technology to physically remove components and breakdown ammunition (Technology includes: band saw; guillotine; cracker mill; rock crusher; punch; hydraulic press; and lathe).	Potentially removes personnel from immediate hazard, if suitable remote technology is used	Expensive equipment High training requirements	Low	Effective breakdown to enable recycling Potential for accidents during breakdown operations
Mechanical Disassembly	Use of technology to pull apart, de-fuze or remove primer.	Potentially removes personnel from immediate hazard, if suitable remote technology is used	Expensive equipment High training requirements	Low	Effective breakdown to enable recycling Potential for accidents during breakdown operations
Mechanical Removal	Uses hydraulic press, water-cooled mechanical cutting or similar technique to remove cast explosive such as RDX, HMX.	Effective for removal of High Explosives from shells.	Only suitable for 'straight walled' ammunition. Requires removal of ogive and base/boat-tail by cutting	Moderate. Potentially expensive environmental protection measures required.	Not suitable for SAA
Robotic Disassembly	Usually used for the conversion of small arms ammunition from military to civilian use. May be used for guided missiles containing cluster munitions.	Potential economic benefit of sale of ammunition for civilian use.	Expensive technology that requires very large quantities and economies of scale to be cost effective.		
Cryo-fracture	This involves freezing the ammunition body in liquid nitrogen to make it more brittle and hence easier to crack open by mechanical breakdown.		Expensive. Requires highly skilled operators.	Moderate. Potentially expensive environmental protection measures required.	
Hydro-abrasive cutting	The use of abrasive entrained in, or directly injected into, high pressure water jets to cut open ammunition.		Expensive. Only suitable for large economies of scale. Requires highly skilled operators.	High. Requires a waste water collection and treatment facility to prevent ground water pollution.	

(a)	(b)	(c)	(d)	(e)	(f)
Explosives Removal					
Hot steam/water melt out	Hot water or steam is used to melt out TNT and TNT derivative (TNT/RDX) fillings, which melt at approximately 80°C. Can also be used for white phosphorus ammunition if the process is all done under water.	Recovered explosive may be reprocessed and used in commercial blasting explosives	This technique is not suitable for RDX filed munitions, as RDX melts at 206°C. The ammunition body will require further processing as a thin residue of explosive will remain.		Potential for detonation for HE other than TNT.
Water jet washout	High pressure water is focused on the explosive, which is then washed out of the ammunition body using a rotating nozzle.	Suitable for RDX and PBX28 ammunition.		Requires a waste water treatment facility to prevent ground water pollution.	
Solvent Washout	Uses a solvent that will easily dissolve the explosive, which is then extracted and reprocessed. (e.g. Methyl alcohol, methylene chloride, acetone or toluene).		Large quantities of solvent are required. Expensive.	Recovery of solvent required to prevent pollution.	It is best considered when high value explosive such as HMX needs recovering for re-use.
Physical Destruction					
Open Burning (OB)	Usually used for the destruction of propellants and pyrotechnic compositions. Unconfined high explosives may also be destroyed by burning, but only in small quantities to reduce the risk of burning to detonation.			Potential for significant environmental impact, producing harmful chemicals. OB is generally done on concrete pads or specially designed burning trays (metal pans) to improve operational efficiency.	When using OB techniques on high explosives, the danger area has to be calculated the same as for the explosives being destroyed by detonation – high explosives do not always react as expected.
Open Detonation (OD)	Use of serviceable explosive as donor charges to destroy surplus or unserviceable ammunition by sympathetic detonation.	It allows for the destruction of ammunition without the need for special equipment	Large 'danger areas' are required to ensure safety from blast and fragmentation. Production is weather and time dependent (normally restricted to daylight hours) Labour intensive. Requires trained personnel (the level of training should not be under-estimated).	Environmental impact through noise, air and ground pollution (harmful chemicals produced), geology (water table and ground-shock).	Possibility of ammunition being thrown out of a poorly planned/laid demolition pit, resulting in it not being destroyed, hence requiring further Explosive Ordnance Disposal (EOD) clearance.

(a)	(b)	(c)	(d)	(e)	(f)
Rotary Kiln incineration	This is the controlled thermal destruction of ammunition within a high temperature (>500°C) oven that rotates.	Proven technology that is among the most efficient destruction systems available. Dependent on design it can destroy ammunition of <20mm calibre or an explosive filling of less than 1kg with no pre-processing required.		It must be operated in parallel with a pollution control system to treat the exhaust gases.	Transportable versions are approximately 33% of the cost of static systems yet have up to 70% of the capability albeit with lower explosive limits which restricts them to small arms ammunition, detonators, primers, fuzes, propellant and pyrotechnics.
Fluidised bed incineration	The waste is pumped as a slurry onto hot silicon oxide (sand) particles, which act as a liquid because of the high temperature.		Only suitable for the incineration of explosive waste and not complete munitions. It is a specialised system that is only really suitable for those States with excessively large stockpiles. (>100,000 tonnes).		Can cause problems if trying to dispose of pyrotechnics. This method is NOT suitable for the disposal of pyrotechnics as the metal contents will form eutectic salts and these will reduce "fluidity."
Car bottom furnace	Usually used in combination with a rotary kiln furnace and heated through a heat exchanger. Used to remove trace explosive contamination from munition parts after explosive removal, although it can deal with small calibres in limited quantities. A larger version is sometimes referred to as a Hot Gas Decontamination Facility.				Supports demilitarization rather than being a system in its own right.
Contained Detonation chamber	Effectively uses open detonation techniques within a protected structure, which has an integral pollution control system.	Ammunition of up to, and including 155mm calibre, can be destroyed in the appropriate chamber.	Expensive	Requires an integral pollution control system to treaty exhaust gases.	Production rates are limited but is a useful system for States with smaller stockpiles of ammunition that do not justify capital investment in explosive removal technology.

(a)	(b)	(c)	(d)	(e)	(f)
Hot Detonation chamber	Destruction of explosives, propellants and munitions by 'cook-off' in a heated detonation chamber. The explosive material is destroyed through either burning, deflagration or detonation (dependent on the type of ammunition).	No additional donor charges are necessary.	Expensive	Operation temperature is around 500°C.	High capacity, automatic process from loading to emptying with low energy consumption.
Moving Bed Reactor	HE munitions are heated in a vertical chamber containing over 50 tonnes of constantly moving and re-circulating 25cm diameter steel balls. The steel balls present a mass to the blast wave, the kinetic energy of which is then absorbed because of the mass and dissipated because of all the interstitial boundaries. The steel balls also trap the fragmentation.	Proven technology concept (Developed for smaller calibre ammunition (105mm) (2002) and new technology for large calibre ammunition (155mm) (2010).	Expensive		

ANNEX C

Suggested Methods for Final Disposal of Scrap Firearms and Small Arms Ammunition Remnants.

Type of Scrap	Technique	Description	Advantages	Disadvantages
(a)	(b)	(c)	(d)	(e)
Weapons	Export to recycle.	Separate into base components i.e. wood, plastics, metal. Ensure pieces are non-recoverable weapons (small size).	If metal scrap export exists, then the system is in place.	Legality of exporting weapons scraps.
Weapons	Smelter.	Industrial smelter that recycles metal.	If a country already has a smelter for commercial purposes then you could add the scrap.	If not already present, it would not be cost effective to open and operate for scrap weapons.
Weapons	Use as reinforcement steel.	Encasement of scrap in cement within a 55- gallon oil drum and use the drum as a security barrier within public buildings. Can paint unit logos on the drums.	Uses the scrap metal as reinforcement steel with the concrete, makes the barrier heavier. Difficult to recover scrap.	Accountability of scrap (if needed).
Small Arms Ammunition Casing	Export to recycle.	Find an exporter of metals and sell.	If metal scrap export exists, then the system is in place.	Legality of exporting ammunition casings.
Small Arms Ammunition Casing	Smelter.	Industrial smelter that recycles metal.	If a country already has a smelter for commercial purposes then you could add the scrap.	If not already present, it would not be cost effective to open and operate for scrap weapons.
Small Arms Ammunition Casing	Pulverize then sell.	Using a hammer mill the casings could be shredded to tiny powder like pieces which would then be sold as scrap.	No resemblance of ammunition casings.	Investment of hammer mill machines. Legality of exporting pulverized casings.

ANNEX D

Abbreviations and Acronyms

AFV	Armoured Fighting Vehicle
CARICOM	Caribbean Community
CBA	Cost-Benefit Analysis
CIFTA	The Inter-American Convention Against the Illicit Manufacturing of and Trafficking in Firearms, Ammunition, Explosives, and Other Related Materials
EOD	Explosive Ordnance Disposal
EU	European Union
HE	High Explosive (Detonating Explosive)
HMX	A type of HE for military use
IATG	International Ammunition Technical Guidelines
ISO	International Organization for Standardization
MOSAIC	Modular Small-arms-control Implementation Compendium
MOU	Memorandum of Understanding
OB	Open Burning
OBOD	Open Burning/Open Detonation
OD	Open Detonation
OSCE	Organisation for Security and Cooperation in Europe
OSPAR	Convention for the Protection of the Marine Environment of the North-East Atlantic
PBX	Polymer Bonded Explosives – A type of military HE with a reduced risk of accidental initiation (known as “Insensitive Munitions”)
PoA	United Nations Programme of Action on SALW
RDX	A type of HE for military use
SAA	Small Arms Ammunition
SALW	Small Arms and Light Weapons
SDG	Sustainable Development Goal(s)
TNT	Tri-nitro toluene – A type of HE for military use
UN	United Nations

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