



**Prifysgol Cymru**  
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Trinity Saint David

## **Risk Assessment & ALARP Justification (Individual Written Report)**

*ACDB 5013 Safety & Hazard Assessment  
Level 5 Ordnance, Munitions and Explosive Engineering  
School of Applied Computing*

**Elias James**

## Table of Contents

|                                                 |           |
|-------------------------------------------------|-----------|
| <b>1. Risk Assessment</b>                       | <b>2</b>  |
| <b>2. ALARP Justification</b>                   | <b>9</b>  |
| 2.1 Introduction                                | 9         |
| 2.2 Hazards                                     | 9         |
| 2.3 Controls                                    | 10        |
| 2.3.1 Industry Good Practice                    | 11        |
| 2.3.2 New and Emerging Technology Consideration | 11        |
| 2.4 Maintaining ALARP Status                    | 11        |
| 2.5 Conclusion                                  | 12        |
| <b>3. References</b>                            | <b>13</b> |

## 1. Risk Assessment

# General Risk Assessment Form

Reference Number: 4815162342

### PART 1: Description

Site: Salisbury Plain

Work Area: field near Devizes

Bldg. No: N/A

Assessor's Name(s): Elias James

Review  
Date: (no  
later than)  
06/2030

Change No: (if applicable)  
\*\*\*\*\*

Related Risk Assessments:

Related Instructions (e.g. SOPs):

Description of Task/Process: Fire control system trial – Firing a high explosive CT40 round from an AJAX vehicle.

### PART 4: Sign Off

When all additional controls are in place, the risk levels will be as low as is reasonably practicable.

Assessor's Signature: King Charles III, PM Sir Keir Starmer, General Sir Roland Walker,

Date: 20/06/2026

Manufacturing Manager's Signature (or equivalent): James Bond, Duke of Wellington, Defence Secretary Dan Jarvis.

Date: 25/06/2026

| PART 2: Risk Assessment        |                                                            |                                                                          |          |             |                     |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |          |             |            |
|--------------------------------|------------------------------------------------------------|--------------------------------------------------------------------------|----------|-------------|---------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------|-------------|------------|
| Identified Hazard              | Persons at Risk                                            | Effects                                                                  | Severity | Probability | Existing Risk Level | Additional Controls                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | Severity | Probability | Final Risk |
| <b>Heat induced Risks</b>      |                                                            |                                                                          |          |             |                     |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |          |             |            |
| Heat, deflagration, detonation | Those in contact with barrel/case<br>People around vehicle | In-bore detonation due to excess heat                                    | 5        | 2           | 10                  | <ul style="list-style-type: none"> <li>Maximum rate of fire.</li> <li>Cool-down intervals between firings.</li> <li>Employ a temperature sensor on the barrel to monitor barrel temperature.</li> <li>Ensure ammunition is stored and used in specific temperature limits.</li> <li>Avoid use of ammunition exposed to excessive temperatures</li> <li>Agreed wait times before opening the breach.</li> <li>Clearly defined misfire drills.</li> <li>Plan your firing, start low intensity and ramp up.</li> <li>Controlled access to firing area.</li> </ul> | 5        | 1           | 5          |
|                                | Those in contact with barrel/case                          | Contact with metal case / hot barrel causing burns                       | 2        | 4           | 8                   | <ul style="list-style-type: none"> <li>No person zones during and after firing (e.g. 5m radius).</li> <li>Hot surface markings and warnings.</li> <li>Heat resistance gloves and overalls for crew handling cases or near the system.</li> <li>Defined cooling time before handling ejected cases or the barrel.</li> <li>Use manual handling equipment to pick up a metal case instead of direct contact (e.g. tongs, grips).</li> </ul>                                                                                                                      | 2        | 2           | 4          |
|                                | Crew in AJAX cabin                                         | Heat build-up from continuous firing slowly increases cabin temperature. | 3        | 3           | 9                   | <ul style="list-style-type: none"> <li>Vehicle HVAC system fully operational.</li> <li>Monitor cabin temperatures and abort if temperature is excessive.</li> <li>Limit crew duration inside the cabin during firing.</li> <li>Introduce rest and a rota for the crew in the cabin.</li> </ul>                                                                                                                                                                                                                                                                 | 2        | 2           | 4          |

|                                     |                                     |                                                                                                      |   |   |    |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |   |   |   |
|-------------------------------------|-------------------------------------|------------------------------------------------------------------------------------------------------|---|---|----|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---|---|---|
|                                     |                                     |                                                                                                      |   |   |    | <ul style="list-style-type: none"> <li>Ensure adequate fume extraction and good airflow.</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |   |   |   |
| <b>Physical Hazards</b>             |                                     |                                                                                                      |   |   |    |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |   |   |   |
| Falling objects                     | Those surrounding vehicle           | Cartridge case ejection impacting personnel surrounding vehicle                                      | 3 | 4 | 12 | <ul style="list-style-type: none"> <li>Establish exclusion zone around ejection area.</li> <li>Vehicle orientation planned to direct away from personnel areas.</li> <li>Pre-firing brief explaining ejection hazards.</li> <li>Clear marking of ejection hazard.</li> <li>Helmets and eye protection for personnel operating close to vehicle.</li> </ul>                                                                                                                                                                                                                                     | 2 | 1 | 2 |
|                                     | Those surrounding vehicle           | Rounds dropped during the loading of the tank. Impacting people below or causing shock to detonation | 4 | 2 | 8  | <ul style="list-style-type: none"> <li>Trained and authorised ammunition handlers only.</li> <li>Exclusion zones beneath loading activity.</li> <li>Adequate lighting during loading procedures.</li> <li>PPE for loading personnel – Helmets, boots and gloves for added grip.</li> <li>Nonslip surfaces around loading area.</li> </ul>                                                                                                                                                                                                                                                      | 3 | 1 | 3 |
|                                     | Personnel on top of vehicle         | People falling off vehicle sustaining injuries to head (2.7m fall)                                   | 4 | 3 | 12 | <ul style="list-style-type: none"> <li>Appropriate access ladders and steps where needed.</li> <li>Anti slip surfaces.</li> <li>Three points of contact maintained when climbing or ascending.</li> <li>Portable working platform/ladders is practical when extended periods of loading or maintenance.</li> <li>Working at height risk assessment.</li> <li>Three points of contact maintained when climbing or ascending.</li> <li>No climbing in adverse weather conditions.</li> <li>Limit unnecessary access to roof of AJAX.</li> <li>PPE – helmet and anti-slip soled shoes.</li> </ul> | 3 | 1 | 3 |
| <b>Munition storage and quality</b> |                                     |                                                                                                      |   |   |    |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |   |   |   |
| Munition quality                    | Crew in AJAX and surround personnel | Poor munition quality from manufacturer meaning munitions containing large voids withing HE          | 5 | 2 | 10 | <ul style="list-style-type: none"> <li>Obtain munition only from approved manufacturers.</li> <li>Ensure certificate of conformity and batch traceability.</li> <li>Implement regular visual inspections.</li> <li>Reject batches with known void issues.</li> </ul>                                                                                                                                                                                                                                                                                                                           | 5 | 1 | 5 |

|                  |                                 |                                                                                                                                            |   |   |    |                                                                                                                                                                                                                                                                                                                                                                                                                                          |   |   |   |
|------------------|---------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------|---|---|----|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---|---|---|
|                  |                                 | Munition causes barrel to detonate upon firing                                                                                             |   |   |    | <ul style="list-style-type: none"> <li>Periodic manufacturer audits.</li> </ul>                                                                                                                                                                                                                                                                                                                                                          |   |   |   |
| Munition storage | AJAX and loading personnel.     | Degradation of munition due to poor storage.                                                                                               | 5 | 3 | 15 | <ul style="list-style-type: none"> <li>Store within specified temperature/humidity limits.</li> <li>Avoid prolonged exposure to sunlight and high heat.</li> <li>Routine stock inspections</li> <li>Stock rotation – first in, first out.</li> <li>Immediate removal and/or safe disposal of degraded munitions.</li> <li>Appropriate packaging and shock protection during transport.</li> </ul>                                        | 5 | 1 | 5 |
|                  | AJAX crew and nearby personnel. | Diurnal cycling of fill causing in bore detonation                                                                                         | 5 | 2 | 10 | <ul style="list-style-type: none"> <li>Avoid large temperature fluctuations – controlled, indoor storage.</li> <li>Allow time for stabilisation to ambient firing temperature before firing.</li> <li>Regular enhanced checks for rounds exposed to extreme temperatures.</li> <li>Complete restriction of use for munitions exposed to prolonged outdoor storage or those that experienced extreme temperature fluctuations.</li> </ul> | 5 | 1 | 5 |
|                  | AJAX crew                       | Shock and impact from vehicle and handling causing cracking of HE fill leading to adiabatic heating on firing leading to in bore explosion | 5 | 3 | 15 | <ul style="list-style-type: none"> <li>Use shock absorbing packaging and restraints.</li> <li>Minimise drop risk.</li> <li>Use a vehicle specifically designed to reduce vibration.</li> <li>Inspect munition for damage indicators after transport.</li> <li>Restricted and trained personnel only to handle munitions.</li> <li>Reduce unnecessary munition movements.</li> </ul>                                                      | 5 | 1 | 5 |
|                  | Loading and AJAX crew.          | Premature initiation during handling.                                                                                                      | 5 | 3 | 15 | <ul style="list-style-type: none"> <li>Safe ammunition handling training.</li> <li>Loading only when cleared to do so.</li> <li>Regular safety drills.</li> <li>Only handled by trained and competent handlers.</li> <li>Enforce arming and loading sequences.</li> <li>Clear points for checking safe operation or authorisation steps.</li> </ul>                                                                                      | 5 | 1 | 5 |

|                 |                                                |                                                                                                        |   |   |    |                                                                                                                                                                                                                                                                                                                                                                                                                                                  |   |   |   |
|-----------------|------------------------------------------------|--------------------------------------------------------------------------------------------------------|---|---|----|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---|---|---|
|                 |                                                |                                                                                                        |   |   |    | <ul style="list-style-type: none"> <li>Minimise exposure to unnecessary handling.</li> </ul>                                                                                                                                                                                                                                                                                                                                                     |   |   |   |
| <b>Chemical</b> |                                                |                                                                                                        |   |   |    |                                                                                                                                                                                                                                                                                                                                                                                                                                                  |   |   |   |
| Toxicity        | AJAX crew and people within immediate vicinity | Inhale hot toxic after firing leading to burning lungs and toxics effects potentially including cancer | 3 | 3 | 9  | <ul style="list-style-type: none"> <li>Use in vehicle HVAC filtration system.</li> <li>Ensure bore evacuation system is working and operational.</li> <li>Limit rapid firing to reduce gas accumulating.</li> <li>Monitor air quality with clear stop criteria.</li> <li>Respiratory protection if rapid firing and needed.</li> <li>Crew rotation for longer firing periods.</li> </ul>                                                         | 3 | 1 | 3 |
|                 | AJAX crew/ range staff                         | Inhale/absorb/ingest when cleaning causing toxic effects to personnel                                  | 3 | 4 | 12 | <ul style="list-style-type: none"> <li>No dry brushing encouraging aerosolising of debris.</li> <li>Approved cleaning techniques and chemicals/substances only.</li> <li>Appropriate PPE – Gloves, overalls, goggles, respiratory protection when required.</li> <li>Hand washing available after cleaning.</li> <li>No eating/drinking whilst cleaning.</li> <li>Appropriate safe disposal of contaminated materials after cleaning.</li> </ul> | 2 | 1 | 2 |
|                 | Personnel within surrounding area              | Environmental pollution – ends up in water supply leading to toxic effects                             | 3 | 3 | 9  | <ul style="list-style-type: none"> <li>Conduct firing only in approved ranges.</li> <li>Coordinated impact areas with contamination management.</li> <li>Avoid firing near water sources.</li> <li>Appropriate handling and disposal of cartridge cases.</li> <li>Follow all MOD and HSE environmental legislation.</li> </ul>                                                                                                                   | 3 | 1 | 3 |
|                 | Personnel within immediate vicinity            | Reignition of propellant gases after exiting barrel causing burns                                      | 3 | 2 | 6  | <ul style="list-style-type: none"> <li>Exclusion zones around the barrel.</li> <li>Clearly defined safe arc of fire.</li> <li>Personnel in the immediate vicinity aware of hazards and prepped on safety procedures.</li> <li>Supervision of personnel by competent supervisor.</li> <li>Flame retardant clothing (NOMEX) for people needed within the vicinity of firing.</li> </ul>                                                            | 2 | 1 | 2 |

| Vibration/Noise |                                              |                                                                                                                                                                          |   |   |    |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |   |   |   |
|-----------------|----------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---|---|----|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---|---|---|
| Vibration       | AJAX crew and personnel surround vehicle     | Heavy Vibration causing physical deformation to CTA Shell resulting in no obturation leading to hang fire. Next shell is fired into hang fire causing barrel detonation. | 5 | 3 | 15 | <ul style="list-style-type: none"><li>• Ensure ammunition is stored and transported in appropriate packaging.</li><li>• Minimise exposure to excessive shock and vibration before loading.</li><li>• Conduct vibration surveys before trial confirming vibration levels remain within ammunition limits.</li><li>• Inspect ammunition for damage before loading.</li><li>• Implement misfire and hang fire procedures – confirm chamber is empty before firing again.</li></ul> | 5 | 1 | 5 |
|                 | AJAX crew                                    | Excess vibration leading to damaged electrical wires that can result in shock/electrocution.                                                                             | 4 | 3 | 12 | <ul style="list-style-type: none"><li>• Wiring is routed and secured.</li><li>• Use vibration resistant connector and mounting.</li><li>• Pre- and post-trial inspection of wiring and connectors.</li><li>• Continuity and resistance testing.</li><li>• Stop trial and withdraw vehicle if electrical fault identified.</li></ul>                                                                                                                                             | 3 | 2 | 6 |
|                 | AJAX crew                                    | Vibration causing damage to exhaust seals leading to monoxide build up in cabin.                                                                                         | 4 | 3 | 12 | <ul style="list-style-type: none"><li>• Pre- and post-trial inspection of exhaust system.</li><li>• Preventative maintenance of worn seals etc.</li><li>• Carbon monoxide detectors within vehicle cabin.</li><li>• HVAC systems within cabin and fully operational.</li><li>• Emergency evacuation procedures and alarms.</li></ul>                                                                                                                                            | 4 |   | 4 |
| Noise           | AJAX crew and personnel surround the vehicle | Noise – hearing loss<br>Extreme noise from both normal and abnormal operation leading to hearing loss                                                                    | 3 | 4 | 12 | <ul style="list-style-type: none"><li>• Mandatory use of hearing protection within the vehicle and immediately surrounding personnel.</li><li>• Use crew intercom systems to limit the need for removing hearing protection.</li><li>• Limit duration of crew exposure.</li><li>• Regular hearing tests for regularly exposed crew.</li></ul>                                                                                                                                   | 2 | 2 | 4 |

### Part 3: Risk Assessment Matrix

| Risk Matrix |                                                                      |   |        |          |            |        |          |
|-------------|----------------------------------------------------------------------|---|--------|----------|------------|--------|----------|
| Severity    | Multiple fatalities >5                                               | 5 | 5      | 10       | 15         | 20     | 25       |
|             | Fatalities <5                                                        | 4 | 4      | 8        | 12         | 16     | 20       |
|             | Severe life threatening injuries requiring immediate hospitalisation | 3 | 3      | 6        | 9          | 12     | 15       |
|             | Serious non-life threatening injuries requiring medical treatment    | 2 | 2      | 4        | 6          | 8      | 10       |
|             | Minor injuries requiring first aid treatment                         | 1 | 1      | 2        | 3          | 4      | 5        |
| Frequency   |                                                                      |   | 1      | 2        | 3          | 4      | 5        |
|             |                                                                      |   | Remote | Unlikely | Occasional | Likely | Frequent |

| Assessment to evaluate the suitability of control measures. |                             |                                                                                       |
|-------------------------------------------------------------|-----------------------------|---------------------------------------------------------------------------------------|
| Key                                                         | Risk = Severity x Frequency |                                                                                       |
|                                                             | 12 - 25 Intolerable         | The risk is too high, the activity should cease until control measures are improved.  |
|                                                             | 4 - 10 Tolerable if ALARP   | The level of protection from the activity is only acceptable when the risks are ALARP |
|                                                             | 1 - 4 Broadly Acceptable    | The level of protection for the activity is considered acceptable                     |

| Frequency Rating For Risk Matrix |                  |                                                   |                         |
|----------------------------------|------------------|---------------------------------------------------|-------------------------|
| Frequency                        | Frequency Rating | Occurrence During Operational Life                | Frequency P/A           |
| Frequent                         | 5                | Likely to occur a number of times a year          | $F > 10$                |
| Likely                           | 4                | Likely to occur a few times in the plant lifetime | $10 > F > 10^{-1}$      |
| Occasional                       | 3                | Could occur in the plant lifetime                 | $10^{-1} > F > 10^{-3}$ |
| Unlikely                         | 2                | Unlikely to occur                                 | $10^{-3} > F > 10^{-5}$ |
| Remote                           | 1                | Highly unlikely but may exceptionally occur       | $10^{-5} > F > 10^{-7}$ |

## 2. ALARP Justification

### 2.1 Introduction

The objective of this section is to demonstrate that the risks associated with AJAX and falling objects during a CT40 firing trial have been reduced to a level that is As Low as Reasonably Practicable (ALARP). The assessed hazards in this section are:

- Ejected cartridge case when firing striking personnel in the surround area of the vehicle.
- CT40 rounds being dropped during loading operations.
- Personnel falling from AJAX during loading, inspection or maintenance operations.

These hazards were identified as part of the Risk assessment in Part 1 of this assignment due to their potential to cause injuries to the tank crews, ammunition handlers and any personnel on the range during the firing trial. As these are necessary operations to conduct the firing trial it is therefore necessary to implement appropriate controls to minimise the probability and severity of harm.

ALARP or as it is sometimes called So Far As Is Reasonably Practicable (SFAIRP) is implemented by the Health and Safety Executive (HSE) and the Health and Safety at Work Act 1974 (HSWA74) [1]. It is a fundamental principle of UK health and safety legislation and risk management [1]. Section 2 [1] of the HSWA74 states “It shall be the duty of every employer to ensure, so far as is reasonably practicable, the health, safety and welfare at work of all his employees”. This goes on to require that risks are reduced until the cost, time and effort required to implement further controls would be grossly disproportionate to the additional risk reduction achieved [2]. This also highlights that risk can rarely be eliminated and instead the employers and duty holders must show that all reasonably practicable measures have been put into place so that the residual risk is tolerable [1], [2]. Applicable to this application the Ministry of Defences (MOD) JSP 815 – Defence Safety Management System Framework purpose is to define the duty of care responsibilities to MOD personnel and outlines that using safety control measures such as ALARP can prevent acute ill-health issues [3].

### 2.2 Hazards

**CT40 cartridge case is ejected out of the side of the turret at speed during firing.**

|                                  |                                                                                                                                                                                                                                          |
|----------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Initial Risk -</b>            | Severity – 3 / Severe life-threatening injuries requiring immediate hospitalisation.<br>Probability – 4 / Likely                                                                                                                         |
| <b>Possible Consequences -</b>   | The ejected cartridge case may strike personnel standing within the ejection zone causing bruising, cuts, fractures and concussions. If cartridge case directly hit someone in the head, then could result in permanent injury or death. |
| <b>Why control is required -</b> | <b>Controls</b> are needed to prevent personnel from entering the area of the cartridge ejection. This hazard is predictable and foreseeable and occurs during normal firing operation and can therefore be managed.                     |

**CT40 rounds could be dropped during loading of AJAX and cause injury or shock to detonation.**

|                                |                                                                                                                                                                                                   |
|--------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Initial Risk -</b>          | Severity – 4 / Fatalities <5<br>Probability – 2 / unlikely                                                                                                                                        |
| <b>Possible Consequences -</b> | A dropped CT40 round may strike personnel below the loading position and cause crush injuries, head injuries, fractures and soft tissue damage. Although it is unlikely, impact damage from being |

dropped could also cause the ammunition to detonate causing severe injuries and death to personnel around AJAX.

**Why control is required -** Controls are required due to manual handling of heavy munitions at height. Human error slips and trips and inadequate handling techniques can increase the likelihood of a dropped round. Therefore, controls are needed to reduce the likelihood of dropping rounds and the consequences if a drop occurred.

#### **Personnel / AJAX crew falling off AJAX (2.7m)**

**Initial Risk -** Severity – 4 / fatalities <5  
Probability – 3 / occasional

**Possible Consequences -** Falls from the roof or sides of AJAX could cause sprains, fractures, head injuries, cuts or fatality. The severity and likelihood could be increased if there are hard ground surfaces, equipment being carried or adverse weather conditions.

**Why control is required -** Controls are required as climbing into and working on top of the vehicle is a necessary action during maintenance, loading and inspections. This is classed as working at height under health and safety legislation and therefore measures must be implemented to prevent falls and reduce their likelihood.

### **2.3 Controls**

The controls selected for these falling object hazards were chosen using the hierarchy of risk control with preference to engineering and administrative controls that limit exposure to hazards before relying on personal protective equipment (PPE) as per JSP 815 and HSAWA74 guidance [1], [3].

#### **Cartridge Case Ejection**

For this hazard the main control was establishing clearly defined exclusion zones around the ejection area during firing. These were supported by safety briefings, warning signs, vehicle orientation and mandatory head and eye protection. These controls prevent personnel from being exposed to the hazard in the first instance and this should be standard practice during firing trials. An additional control considered was the installation of a cartridge ejection point deflector. However, this was rejected as it would need vehicle modification that could interfere with AJAXs operation or maintenance and would most likely provide any added benefit to an exclusion zone that would remove personnel from the hazard area.

#### **Dropped CT40 Rounds When Loading**

For this hazard, the main control is training ammunition handlers and them using approved handling procedures and conducting the activity with adequate lighting, PPE and surrounding exclusion zones for excess personnel. By doing this the probability and the potential severity of the hazard are significantly reduced. A mechanical lifting aid/loading system was considered but ultimately rejected as the cost, actual practical advantages and then additional maintenance needed would be disproportionate to the small reduction in risk that it would achieve.

#### **Personnel falling from AJAX**

For this hazard, appropriate access ladders, anti-slip surfaces, and a requirement to maintain three points of contact whilst climbing were selected to reduce the probability of a fall. This was further controlled by limiting access to the roof for only essential activities and restricting climbing in adverse weather conditions which could exasperate the hazard. Portable working platforms were

also introduced for prolonged periods of working at height where practical. Additionally, as this would be a working at height activity according to the HSE a working at height risk assessment would need to be carried out. A permanent guard rail around the roof of AJAX was also considered however this was rejected due to it requiring the vehicle to undergo extensive modification and therefore would be costly and potentially interfere with Ajax's operation. Therefore, making the risk reduction limited comparative to the cost.

### **2.3.1 Industry Good Practice**

The controls selected for hazards in this risk assessment are compliant with recognised UK legislation, Defence policies and general industry good practice. The HSAWA74 as stated above requires employers to ensure SFAIRP with regards to the health, safety and general welfare of their employees and any others that would be affected by their activities [1]. This is further backed up by the Management of Health and Safety at Work Regulations 1999 that require risk assessments to be carried out to ensure employee safety and implement preventative and protective measures [4].

As personnel in these activities are required to have access to the roof of AJAX, the Work at Height Regulations 2005 is relevant and must be adhered to [5]. These regulations require any work at height to be planned, supervised and carried out by competent personnel using appropriate equipment if necessary. The controls such as anti-slip surfaces, working platforms and general safe systems of work align with these regulations.

Also, within the defence industry, risk management and ALARP principles are mandated by JSP 815 and the explosive handling and safety regulations of JSP 482 [3], [6]. Further direction is also given by the JSP 375 Management of Health and Safety in Defence which covers legal health and safety obligations and the everyday management of health and safety within the defence industry [7].

### **2.3.2 New and Emerging Technology Consideration**

Several emerging technologies as controls were considered such as automated loading systems for the ammunition, wearable fall-detection devices and drone/robotic maintenance inspectors. These however, despite reducing manual handling and stopping personnel from being at risk were considered to not be reasonably practicable. As well as a significant high cost these systems such as automated loading systems would require vehicle integration, additional training and add extensive maintenance and only provide limited risk reduction when comparing to controls such as exclusion zones and competent personnel. In the future however technologies like this may become viable if costs reduce.

## **2.4 Maintaining ALARP Status**

Maintaining ALARP status requires continuous review of the activities and its implemented controls. After the trial any accidents, incidents or near misses should be investigated so that lessons can be learnt and improvement can be made. Any equipment, signage, and the anti-slip surfaces for example should be inspected and maintained to make sure of their effectiveness. The risk assessment should also be regularly reviewed following any changes to equipment or procedures or any legislation or regulation changes. As well as periodically reviewed every year for example. Finally, any developments or emerging technologies should be monitored to determine whether any rejected controls are now reasonably practicable to apply.

## **2.5 Conclusion**

The identified hazards in this risk assessment have been reduced by implementing carefully considered controls and ALARP justification and are consistent with legislation and defence good practice. Other controls were considered but ultimately rejected where the additional costs, effort or operational impacts to AJAX were grossly disproportionate to the safety benefit. The risks are therefore considered tolerable and ALARP subject to ongoing review.

### 3. References

- [1] UK Government, *Health and Safety at Work Act 1974*. 1974. Accessed: Jul. 12, 2026. [Online]. Available: <https://www.legislation.gov.uk/ukpga/1974/37/contents>
- [2] Health and Safety Executive, 'Reducing Risks: Protecting People - HSE's decision making process', Health and Safety Executive, Sudbury, Suffolk, 2001. Accessed: Jul. 12, 2026. [Online]. Available: [https://assets.publishing.service.gov.uk/media/6634988fcf3b5081b14f30cd/IQ8.10.J\\_Document\\_9\\_Health\\_and\\_Safety\\_Executive\\_\\_Reducing\\_risks\\_\\_protecting\\_people\\_\\_HSE\\_s\\_decision-making\\_process\\_\\_2001.pdf](https://assets.publishing.service.gov.uk/media/6634988fcf3b5081b14f30cd/IQ8.10.J_Document_9_Health_and_Safety_Executive__Reducing_risks__protecting_people__HSE_s_decision-making_process__2001.pdf)
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- [4] UK Government, *The Management of Health and Safety at Work Regulations 1999*. 1999. Accessed: Jul. 12, 2026. [Online]. Available: <https://www.legislation.gov.uk/uksi/1999/3242/contents>
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- [7] Ministry of Defence, 'Management of Health and Safety in Defence (JSP 375 Directive and Guidance)', Ministry of Defence, JSP 375, 2024. Accessed: Jul. 12, 2026. [Online]. Available: [https://assets.publishing.service.gov.uk/media/66fd298c3b919067bb482a90/Management\\_of\\_health\\_and\\_safety\\_in\\_defence\\_\\_JSP\\_375\\_Directive\\_and\\_Guidance\\_.pdf](https://assets.publishing.service.gov.uk/media/66fd298c3b919067bb482a90/Management_of_health_and_safety_in_defence__JSP_375_Directive_and_Guidance_.pdf)