Ministry of Defence

HS&EP Ajax Noise and Vibration Review

Director Health, Safety and Environmental Protection

December 2021

Conditions of Release

1. This information is Crown Copyright and the intellectual property rights for this report belong exclusively to the Ministry of Defence (MOD). No material or information contained in this report should be reproduced, stored in a retrieval system or transmitted in any form outside MOD establishments except as authorised by the MOD.

2. This information is released to highlight lessons identified and make recommendations to prevent reoccurrence.

Contents

1. Introduction

1. Ajax is a family of network-enabled armoured vehicles intended to meet the Army's requirement to operate effectively in the digital battlespace. It will replace the in-service Combat Vehicle Reconnaissance (Tracked) (CVR(T)) fleet which is over 40 years old and suffers capability and obsolescence issues. The CRV(T) Out of Service Date was originally 2014, but has since been extended to 2023.

2. In this report 'Ajax' refers to the Armoured Cavalry programme covering a family of six armoured vehicles. 'AJAX' refers to the individual variant. The 6 variants are:

- AJAX - turreted version fitted with 40mm cannon;
- ARES - armoured personnel carrier;
- ATHENA - command and control;
- ARGUS - engineer reconnaissance;
- ATLAS - recovery vehicle;
- APOLLO - repair vehicle.

3. Ajax is being developed and manufactured by General Dynamics Land Systems UK (GDUK), the prime contractor, supported by GD European Land Systems, GD Mission Systems and other second party sub-contractors.

4. The Ajax Noise and Vibration Review was commissioned by the MOD Permanent Under Secretary (PUS) following reports of potential harm associated with noise and vibration during the trialling of the Ajax family of vehicles.[1] The purpose of the Review was:

a. validating the chronology and timeline of events concerning safety issues within the Ajax programme (vehicle vibrations and concerns about potential hearing damage to military personnel);

b. assessing whether the correct health and safety procedures were followed regarding the actions taken in response to the issues with the programme, and determining whether judgements, decisions and mitigations were appropriate and proportionate; and

c. making recommendations for the future of the programme, and relating to past actions, if required.

5. The Review was conducted by an internal team between 21 June and 14 July 2021 led by the MOD Director of Health, Safety and Environmental Protection (HS&EP) who is responsible for HS&EP Functional Leadership across Defence. The Review Team was divided into three cells, focusing on

[1] The Terms of Reference are included at Annex A.

corporate governance, the Defence Equipment and Support (DE&S) response and the Army response.

6. The principal focus of the Review was the period between December 2019 and 25 June 2021, although the Review took into consideration any relevant information which predated December 2019. Since July 2021, this report has undergone thorough fact-checking and a Maxwellisation process.

7. The Review Team engaged widely, including with DE&S, the Army, the Defence Science and Technology Laboratory (Dstl), the MOD Head Office, and GDUK senior leadership to ensure a full and deep review of the facts. The Review Team examined documents and made enquiries with relevant personnel via email and telephone. The Review Team also conducted interviews with relevant post holders within the Ajax programme. Due to COVID-19 restrictions, interviews were largely conducted virtually.

8. The Director HS&EP and other members of the Review Team visited the Armoured Trials and Development Unit (ATDU) at Bovington Camp in June 2021 to speak to members of the Ajax trials team and inspect an ARES vehicle and associated communication equipment.

9. The Review was not set up to determine individual responsibility or fault and was not concerned with apportioning blame at any stage. The Review found areas for improvement that are pertinent to both the Ajax programme and the wider acquisition process within Defence. This report, and its recommendations, aim to prevent a reoccurrence in future trials and development activity and to reduce the risk of harm to service personnel in the future development of Armoured Fighting Vehicles.

10. The Review did not seek to examine other parts of the Ajax programme except where critical linkages were identified. There are ongoing disputes with GDUK in relation to noise and vibration. Legal analysis of contractual obligations and performance were not within the Review Team's competence or remit and therefore any views expressed in this report about such matters are not based on any legal analysis.

11. The findings, conclusions and recommendations within this report reflect the professional judgement of Director HS&EP based on the evidence available to him during the short period of the Review.

2. Programme Governance and Capability Management

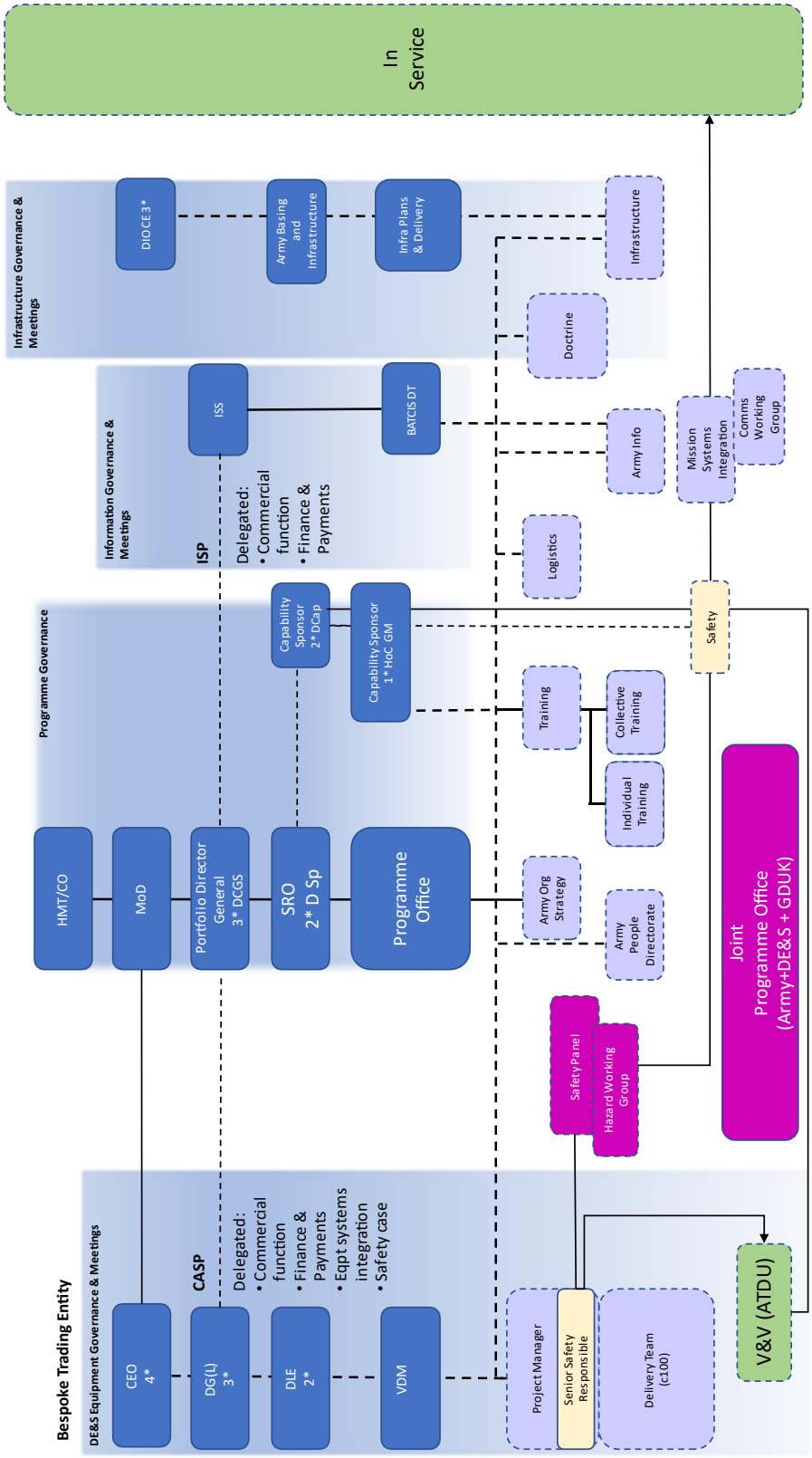

Figure 1: Ajax Programme Governance

12. This section outlines the Ajax programme governance as set out by the Ajax Programme Team to the Review. Figure 1 was provided to the Review by the Ajax Programme Team and was not generated by the Review. Throughout the report, the use of posts refers to roles rather than individuals, and it should be noted that postholders typically change every two to three years.

13. The Senior Responsible Owner (SRO) is appointed and directed by the Chief of the General Staff (CGS) (on behalf of PUS) with the Programme Mandate to deliver the capability requirements.[2] The SRO is personally accountable to PUS and, in line with the Osmotherly Rules for Major Projects, Parliament. The MOD Defence Major Projects Portfolio (DMPP) Sponsor Group supports and holds to account SROs for projects in the Government Major Projects Portfolio (GMPP), with the Executive Committee of the Army Board (ECAB) as the Sponsor Group at Army Command level.

14. The SRO is accountable for ensuring that the Ajax programme meets its objectives, delivers the projected outcomes and realises the required benefits, whilst also providing the leadership and strategic direction by maturing the risk/opportunity profile of the programme.

15. The SRO chairs the Ajax Programme Board. The Programme Team hold various other Defence Lines of Development or project activity sub-working groups as required.

16. Within Army Command, the Portfolio Director and Army Portfolio Office provide assurance reviews across the Ajax programme, and both the ECAB and DMPP Sponsor Group hold reviews as part of the second line of assurance.[3]

17. **Performance reporting.** MOD programmes in the GMPP report quarterly to the Infrastructure and Projects Authority (IPA) on their delivery performance. Within Army Command, programme information is captured on the Project On-Line system. Information for DMPP and GMPP Programmes is also reported quarterly on the Portfolio Management Reporting System (PMRS).

18. The IPA provides external independent assurance of GMPP programmes and publishes the Government Annual Report, including transparency reports to support public accountability. The Major Projects Review Group, co-chaired by the Cabinet Office PUS and Treasury DG Public Finance, also scrutinises Major Project delivery.

19. Alongside reporting quarterly via the PMRS system, SROs and their Project/Programme Teams engage with Head Office, largely through the Defence Portfolio and Approvals Secretariat and the Finance and Military Capability team, to enable Head Office to offer both challenge and support to major programmes and agree approval routes.

---

[2] From early 2020 the PUS now appoints all SROs not the single-Service Chiefs.

[3] See HMT Orange Book

20. **Capability Management.** The Command Acquisition Support Plan is the principal mechanism within the Acquisition System by which the Commands direct and fund DE&S to acquire equipment, logistics support and services, thereby enabling Commands to deliver military capability.

21. The Programme Office is the information hub of the Ajax programme, coordinating all information, communication, monitoring and control activities. It provides support to the SRO by carrying out delegated management activities and providing specialist advice and support led by the Programme Director.

22. The Battlefield and Tactical Communications and Information Systems (BATCIS) Delivery Team is responsible for the development, fielding and sustainment of a range of tactical communications and information equipment and are part of Defence Digital reporting to Commander UK Strategic Command. BATCIS is responsible for providing the Government Furnished Equipment (GFE) Combat Mk II headset used on Ajax.

23. **Safety Management**. Army manage safety through a role delegation. CGS delegates safety management to his deputy (DCGS), as the safety champion. DCGS, through the ECAB, directs the conditions to establish a positive safety culture throughout the Army ensuring the Chain of Command is not stifled in its ability to empower and delegate by allowing Commanders to manage risk through the Safety & Environmental Management System detailed within Army Command Standing Order (ACSO) 1200.

24. Army Director Capability (DCap) owns Capability Safety Management on behalf of DCGS and manages this through ACSO 1201 (Land Equipment Safety management).

25. Commanding Officer Armoured Trials and Development Unit (CO ATDU) is the Delivery Duty Holder (DDH) and is part of the Capability Directorate. Through the Duty Holding construct, the DDH escalates risk to DCap, as Operating Duty Holder (ODH). CGS is the Senior Duty Holder (SDH). A MOD Duty Holder is accountable for mitigating risk to life to as low a level as is reasonably practicable and to a level that is tolerable for those involved in the activity and anyone affected by it, including the public.[4]

26. The Chain of Command is distinct from the Duty Holding construct. Within the Chain of Command, CO ATDU reports to Head Ground Manoeuvre, who reports to DCap.

27. For the Demonstration phase of the acquisition process, the safe operating envelope is provided by the Senior Safety Responsible (SSR) in DE&S. DE&S manage safety through a delegated responsibility that leads the DE&S CEO to assign DG(Land) an Executive Safety Responsible (ESR) delegation, which is then sub-delegated to Director Land Equipment (DLE), and

[4] For a full description of the Duty Holding Construct, see DSA 01.1 Chapter 3, Paragraph 18.

then from DLE to individual posts, including the SSR. The ESR delegation is a 'delivery team leader style' delegation that outlines key responsibilities for the management and delivery of Safe by Design equipment and is not as prescriptive as the SSR/Safety Responsible delegation held by DE&S safety personnel. An SSR has been appointed for Ajax.

28. **Safety Cases**. The Part 1 Safety and Environment Case (SEC) sets out the safety capability requirements.

29. ATDU operated under a Part 2 SEC and Safety Advice Letters (SAL). The Part 2 SEC sets out the Safe by Design requirements. It was jointly signed by GDUK and DE&S, to confirm the capability was Safe by Design. It was not signed by Army, as the vehicles in use by ATDU had not yet been formally transferred to MOD. The Part 2 SEC was supported by SALs, which are specific to individual activities – thus, every ATDU activity had its own SAL.

30. Household Cavalry Regiment (HCR) operated under a Part 3 SEC, because they were conducting work on vehicles from the first capability drop of vehicles to MOD. The Part 3 SEC covers the ‘safe to operate’ requirements. DE&S sign the Part 3 SEC to confirm that the equipment is Safe by Design, and the Army sign it to confirm they will operate the equipment safely.

31. **Safety and Environment Panel**. The Safety and Environmental Panel (SEP, sometimes referred to as the Joint SEP (JSEP)) consists of a joint construct, including Army, DE&S, relevant Subject Matter Experts and GDUK personnel. The SEP determine the As Low As Reasonably Practicable and tolerable argument for the capability and ensure residual risk is sufficiently controlled. The SEP has instigated additional control measures including Limitations of Use and control measures contained within Safety Notices via Email (SNvE). The aim of the SEP is to provide a forum for monitoring and coordinating all safety and environmental management issues and risk reduction activities to ensure effective levels of safety are achieved and maintained.

32. The Hazard Log Working Group is a sub-group of the SEP analysing hazard data and determining both control measures and pre/post control hazard categorisations. The Hazard Log Working Group then provide a recommendation to the SEP for acceptance/rejection. The Hazard Log Working Group is conducted as a joint working group.

33. **Joint Programme Office (JPO)**: The concept for the JPO originated from the 2018 contract Recast agreement and IPA/DMPP recommendations as a Joint Project Support Office to be based at GDUK’s Merthyr Tydfil site, to act as a bridge between DE&S and GDUK, focussing on the analysis of risks and issues.

3. Project Timeline

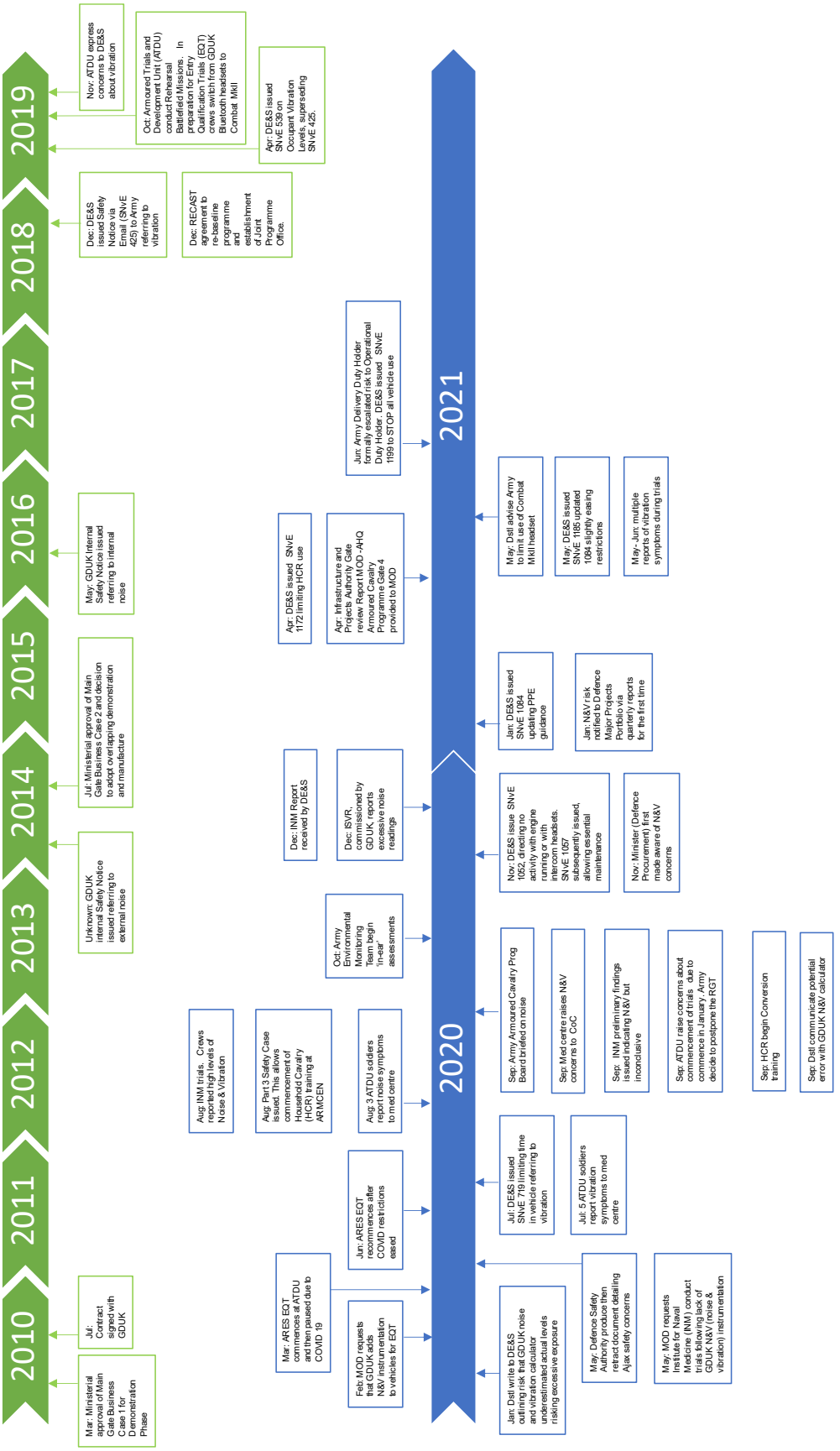

Figure 2: AJAX Programme Timeline

34. This section establishes a chronology of events based upon documents reviewed and interviews conducted by the Review Team.

35. The approval of Main Gate 1 Business Case (MGBC) occurred in March 2010. This established a Planning Assumption for Service Entry as Q1 2017, with 50% confidence. The contract with GDUK was signed in July 2010. The contract stated that "*the system shall conform to all applicable UK and EU legislation at the time of entry into service*", and in terms of noise and vibration, this defined the Control of Noise at Work Regulations 2005 and the Control of Vibration at Work Regulations 2005 as the formal noise and vibration specifications for the platform.

36. The Main Gate 2 Business Case in July 2014 reduced the size of the programme due to budgetary pressures. On 1 September 2014, the contract was signed with GDUK to provide overlapping demonstration and manufacture phases. This approval enabled MOD to contractually lock in £600m of efficiency savings and secure a further £125m real cash discount negotiated on the assumption of a 2014 commitment. The rationale was that committing to manufacture in 2014 would de-risk delivery by incentivising GDUK to invest early in production. It should be noted that the agreed demonstration phase subsequently slipped without a corresponding slip in the manufacture phase and this further exacerbated the challenge of the concurrent manufacture and demonstration phases.

37. The first internal GDUK safety notice seen by the Review relating to external noise was issued in 2014. A second GDUK safety notice was issued in 2016 relating to internal noise. The notices stated that extant occupational safety, health and environmental risk controls adequately mitigated any residual risk.

38. In December 2018, the programme was recast. 'Recast' refers to 15 months of negotiations to settle significant contract re-baselining activity between MOD and GDUK, which settled legacy issues linked to delays to the project. It also achieved a mutually agreed new technical baseline. It resulted in the establishment of the JPO between MOD and GDUK. The intention was to stand this up in 2020 but this was delayed due to COVID-19. It was subsequently established as a virtual team.

39. The first formal safety notice relating to either noise or vibration from within the MOD was SNvE 425 in December 2018, issued by DE&S as a result of service personnel crew motion sickness reported in GDUK trials. It advised of high levels of vibration on early Ajax platforms, with long-term exposure potentially giving rise to Hand Arm Vibration (HAV) and Whole Body Vibration (WBV). The SNvE directed users to the GDUK noise and vibration calculator to calculate the maximum safe exposure time on the vehicle for given conditions (such as speed and terrain). This guidance was renewed in SNvE 539 in April 2019. Whilst mandating that the risk should be controlled in the short-term using the noise and vibration calculator, both SNvEs stated the longer-term action should be "*design upgrade to reduce vibration*" which would have been the responsibility of GDUK. The Review saw no evidence of any engineering

solutions being installed during the period soldiers were exposed to potentially excessive noise and vibration in Ajax vehicles.

40. Rehearsal Battlefield Missions began in October 2019 on the ARES variant. In preparation for Entry Qualification Trials (EQT), the crews switched from using the Bluetooth headsets provided by GDUK to the GFE in-service Combat Mk II headset. The Combat Mk II is not classed as personal protective equipment (PPE). EQT are the first stage of the wider Reliability and Growth Trials (RGT) process. The RGT see the vehicle go through increasingly strenuous or complex battlefield missions to test its reliability and build confidence in its abilities.

41. It was during these rehearsal missions that concerns over the level of vibration, as a result of Army personnel operating the vehicle for a significant period for the first time, began to be raised within the programme, particularly between November 2019 and February 2020. It was noted that the WBV limit was exceeded on the first three days of the trial. ATDU called for vibration monitoring equipment to be installed on all Ajax platforms, and for an engineering solution to be found rapidly. Qualitative data was provided by ATDU to DE&S on vibration issues and, as a result, on 11 December 2019, GDUK acknowledged the issue and the need to instrument the platforms to measure actual noise and vibration levels. However, the Review saw no evidence that instrumentation was installed in the platforms by GDUK to measure noise and/or vibration.

42. In January 2020, Dstl raised concerns to DE&S that there was a risk that the GDUK noise and vibration calculator underestimated the actual levels of noise and vibration and therefore UK Armed Forces personnel could be exposed to excessive levels of both. Between December 2019 and March 2020, the SEP considered the issue of noise and vibration and the validity of the noise and vibration calculator with the commitment to collect user feedback on noise and vibration in a realistic environment in upcoming trials. In February 2020, ATDU raised concerns via the Chain of Command, recommending postponing the beginning of EQT, arguing that the mitigation strategies were inappropriate due to the GDUK data provided via the noise and vibration calculator being unverified. However, whilst this concern was raised through the Chain of Command by the DDH, it was not formally raised through the duty holding construct to the ODH.

43. Use of the GDUK noise and vibration calculator continued and the trials began on 9 March 2020. Crew members were empowered to cease trials activity if they were concerned that they were experiencing vibration related symptoms. After consultation, ATDU were content with this approach which enabled the SAL to be issued by DE&S. Trials were paused on 23 March 2020 due to the COVID-19 pandemic.

44. In March 2020, the Defence Safety Authority (DSA) commenced a document-based review resulting in a report entitled “Serious Safety Concerns with AJAX” on 4 May 2020. The written report was retracted by DSA due to concerns over evidence quality and lack of consultation on 7 May 2020.

45. The EQT recommenced on 22 June 2020 after COVID restrictions were eased. On 9 July, four ATDU soldiers reported to Bovington Medical Centre with potential vibration symptoms. This is the first verified instance of potential vibration symptoms. A fifth soldier reported to the medical centre on 10 July. As a result of concerns surrounding vibration arising from the trials, SNvE 719 was issued on 13 July 2020. In order to address HAV or WBV health risks, SNvE 719 limited the length of time occupants could operate or remain in the vehicle when mobile in any 24-hour period. The SNvE reported that GDUK was conducting further vehicle trials to inform their noise and vibration calculator through application of a wider data set.

46. On 14 August 2020, three ATDU soldiers reported to the Bovington Medical Centre with potential Noise Induced Hearing Loss symptoms. This marks the first verified instance of noise symptoms.

47. In August 2020, the Part 3 Safety Case was signed and allowed the commencement of the HCR's training, which began in September 2020. Training was therefore being done concurrently with trialling of the vehicles.

48. From 10 to 30 August 2020, DE&S commissioned the Royal Navy's Institute of Naval Medicine (INM) to conduct trials on ARES vehicles due to the lack of noise and vibration instrumentation installed by GDUK. On 10 September, the preliminary findings were issued to DE&S, indicating noise and vibration issues, but were inconclusive. This initial report *"suggested a drop of max speed to 20kph from 30kph to further reduce the risk".* This was not done.

49. On 14 September 2020, Bovington Medical Centre staff formally raised noise and vibration crew concerns to the ATDU Chain of Command.

50. On 18 September 2020, Dstl raised further concerns that there was an error with the GDUK noise and vibration calculator that meant crews were exposed to significantly higher levels of noise than previously thought.

51. On 24 September 2020, ATDU raised concerns to the Chain of Command that the RGT due to commence on 28 January 2021 should be postponed until a root cause analysis of noise and vibration issues had been conducted and, as a result, on 24 September, the Army then directed that the RGT be postponed. From 21 September to 6 November 2020, the HCR conducted conversion training on Capability Drop 1 vehicles.

52. Comparative Noise Trials were held at ATDU between 2 and 6 November 2020. The trial concluded that noise issues only previously associated with earlier ARES models were present on the production model.

53. Based on the results of the Comparative Noise Trials, an immediate ban on the dynamic use of the Ajax vehicles was put in place. SNvE 1052, which directed zero activity when vehicle engines were running or with intercom headsets for all Ajax vehicles, was published to all units by DE&S on 9 November 2020. On 12 November 2020, SNvE 1057 was issued, superseding

SNvE 1052 and addressing issues of excessive noise with Combat Mk II headsets. It enabled essential maintenance whilst wearing hearing protection, not intercom headsets.

54. The office of the Minister of State for Defence Procurement (Min(DP)) was informed orally by DE&S on 9 November 2020 that trials had been suspended due to concerns related to excessive noise. The concerns were described as late discovery events. Thereafter Min(DP) and his office asked to be kept updated on developments. The Review saw no evidence that concerns around noise and vibration were shared with Ministers before November 2020.

55. On 16 November 2020, GDUK contracted the Institute of Sound and Vibration Research, which is part of the University of Southampton and independent of GDUK and MOD, to manage trial data. They reported on 7 December 2020 that there was excessive noise. This report led to the imposition of additional limitations of time exposure and speed. This appears to be the first time that GDUK externally acknowledged the issue of noise on Ajax vehicles.

56. The INM issued their full report on 10 December 2020. The report concluded that exposure to noise and vibration inside ARES was likely to exceed the exposure action values for noise and vibration as specified in the Control of Noise at Work Regulations 2005 and Control of Vibration at Work Regulations 2005. It also stressed that exposure to WBV was of particular concern – the exposure limit value might have been exceeded in approximately one hour in the worst-case scenario. Finally, the report recommended that hearing protection must be worn inside the ARES vehicle during transit, and that a further assessment of noise exposure "*at the ear*" should be conducted, to consider the attenuation of headset devices and any additional exposure from communications noise. Crew members were advised to wear suitable hearing protection whenever the vehicle was idling or in transit, and a means to reduce WBV, such as suspension seats, should be sought.

57. SNvE 1084 was issued by DE&S on 4 January 2021, superseding SNvE 1057 and clarifying what types of hearing protection were to be used, providing crews/maintainers with specific stock numbers for ear defenders.

58. In February 2021, trials recommenced under a DE&S SAL. SNvE 1172 was issued in April 2021, covering limited use of ARES vehicles by HCR to facilitate vehicle refamiliarization. It mandated the use of dual hearing protection and prohibited use of the vehicle outside of strict parameters. On 19 May 2021, SNvE 1185 was issued. It superseded SNvE 1084 and allowed limited use of the Combat Mk II headset for internal communication on static Ajax vehicles.

59. On 16 June 2021, ATDU raised concerns to the Duty Holding Chain, stating they were no longer satisfied that MOD had a safe and assured system for operating the Ajax vehicle, due to new instances of soldiers reporting symptoms connected to operating the vehicle. SNvE 1199 was issued by DE&S

on 25 June 2021, mandating an urgent STOP to all vehicle use. All MOD-controlled mobility activity, including trials, was stopped, due to further reports of noise exposure to soldiers based at ATDU, including trials at the independent Millbrook proving grounds. On 25 June, Min(DP) was informed of renewed safety concerns regarding personnel and that therefore all MOD-controlled mobility activity had been halted.

60. As of 9 December 2021, it has been determined that 310 individuals have been exposed to noise and vibration from Ajax vehicles. Of these:

- 238 have returned to duty with no health impact;
- 17 remain under specialist outpatient care, some of whom are expected to return to duty with no health impact;
- 4 individuals have been discharged, some of whom were for reasons related to hearing loss;
- 11 individuals have been recommended for long term restrictions on noise exposure, potentially requiring a limitation in their military duties. 7 of these individuals had pre-existing problems with their hearing before working on Ajax. 4 individuals developed hearing problems whilst working on Ajax;
- 40 declined assessment or have so far been unable to attend.

61. While we cannot yet establish a causal link, it is possible that that Ajax may have contributed to the current hearing loss. None of the individuals exposed to Ajax have had a change in medical grading or have been medically discharged due to vibration.

4. Root Cause Analysis and Findings

Overview

62. Noise and vibration in the Ajax family of vehicles have both electrical and mechanical origins from the following broad sources:

a. Track, suspension and running gear, in particular the tension and sprocket design/track interface.

b. Engine and its mounting into the vehicle.

c. Quality issues associated with, but not limited to, inconsistent routing of cabling, lack of bonding and weld quality; all of which can lead to potential electromagnetic compatibility issues with communication equipment. As witnessed during trials, insecure components and bolting within the vehicle can also lead to noise and vibration, and again this was noted by ATDU crews.

d. Headset performance and integration (noise only).

63. The hierarchy of hazard control is a system used to mitigate exposure to hazards. Within the hierarchy, hazard controls should be applied in order of effectiveness, which is elimination, then substitution, followed by engineering controls, then procedural controls, and lastly the use of PPE.

64. As such, the primary mechanism for managing both noise and vibration within the Ajax programme is through design and engineering mechanisms, before they reach the end user.

65. Residual noise is primarily managed by reducing levels through attenuation provided by PPE. Residual vibration is primarily managed by system adjustment, then procedural controls including managing exposure times.

Ajax Programme Trials Root Cause Analysis

66. The purpose of this root cause analysis is to determine why the Ajax programme failed to adequately control the noise and vibration to below harmful levels during the trials of the vehicle.

67. **Causal Factor:** *the Ajax vehicles received from General Dynamics UK for trials at ATDU were inherently noisy and came with vibration.*

68. It was a contractual requirement that GDUK design and build vehicles that complied with the Control of Noise at Work Regulations 2005 and the Control of Vibration at Work Regulations 2005 and could be operated safely.

69. Evidence of compliance with the requirements of the contract was provided to DE&S, subjected to Verification and Validation, and was used as part of the Part 2 Safety Case argument presented in late 2019. This evidence also provided the basis for the issue of the SAL that supported trials activity by ATDU.

> **Finding 1:** There is no separate MOD standard or regulation for noise and vibration levels in new land equipment and the requirements in the Control of Noise at Work Regulations 2005 and the Control of Vibration at Work Regulations 2005 did not provide sufficient detailed definition for the design of a complex military capability. Evidence of compliance with legislation was subjected to the Verification and Validation process by DE&S but in the case of land equipment this is not further controlled through independent certification by the DSA as it is in the Air and Maritime domains.
>
> **Recommendation 1:** The DSA through the Defence Land Safety Regulator (DLSR) should establish how best to regulate the development of new land equipment either through certification or through the introduction of a specific regulation.

70. **Causal Factor:** *The Safety Case relied on underestimated calculated noise and vibration levels and DE&S and Army did not initially recognise that the noise and vibration was causing potential harm, and associated symptoms should be reportable internally.*

71. Under the Control of Noise at Work Regulations 2005, the Lower Exposure Action Value for noise at the ear of a user is 80 dB(A) and the Upper Exposure Action Value is 85 dB(A). The Exposure Limit Value is 87 dB(A).[5] Maximum noise levels on Ajax platforms have consistently been in the region of 117db(A).

72. Both DE&S and Army relied on the GDUK noise and vibration calculator, which was derived from a relatively small data set, primarily supplied by GDUK and did not include all sources of noise and vibration relevant to individual exposure.

> **Finding 2:** Programme staff in DE&S and Army did not have the necessary experience and knowledge to deeply understand the management of noise and vibration. The Environmental Monitoring Team based in Field Army represent the Army's capability to measure noise and vibration and have considerable expertise in this area. However, since the demise of the Army Personnel Research Establishment Farnborough and the Army Noise and Vibration Working Group, the Army lacks a focal point for noise and vibration issues. It is notable that Army questions in this area were directed back into the project team in DE&S and into Dstl rather than to the expertise

[5] https://www.hse.gov.uk/noise/employers.htm

available within the Army. The cessation of the Army Noise and Vibration Working Group in 2018 may have contributed to this.

Recommendation 2.1: Army should improve understanding of the internal specialist health advice and support available to capability staff.

Recommendation 2.2: Army should re-establish its Noise and Vibration Working Group in order to support the management and understanding of noise and vibration risks.

Finding 3: DE&S was overly reliant on underestimated calculated data from the GDUK noise and vibration calculator rather than using instrumentation to measure actual values.

Recommendation 3: Future trials of all armoured vehicles should have appropriate real time instrumentation of platforms and individuals for measurement and recording of noise and vibration exposure will be essential to ensure that any activity is stopped before potentially harmful levels are reached.

73. **Causal Factor:** *In calculating the noise levels at the ear, the complex interplay between the Ajax vehicles, the headsets and the Computer and Information Services (CIS) architecture of the platform and the effect this would have on reducing the noise attenuation performance of the Combat Mk II headset was not adequately taken into account.*

74. Integration of the CIS architecture (including GFE headsets) was specified in the contract and was a GDUK responsibility.

75. Concerns over the performance of the Combat Mk II headset in regard to communications-related systems requirements were recorded by DE&S as early as 2017 in the Contracted System Requirements Document. It was evident to the Review Team that confusion existed between DE&S and Defence Digital over responsibility for verifying that GDUK had integrated the Combat Mk II onto the Ajax platform with regard to the System Requirement for noise exposure.

76. The Part 2 Safety Case is based on the evidence provided by GDUK which in turn was based on the Combat Mk II headset providing sufficient attenuation. The performance of the Mk II headset continues to be investigated.

77. Overall, vehicle sources of noise and vibration, CIS equipment and PPE characteristics of headsets were not seen as a holistic “system of systems” from the outset.

Finding 4: CIS integration issues contributed to the increase in noise levels experienced by users. The failure to identify issues with the integration of the CIS architecture onto the platform (including headsets) increased the noise burden experienced by individuals, and these factors

were not taken into account when calculating exposure using the GDUK noise and vibration calculator. The confusion over the responsibility for verifying integration between Defence Digital and DE&S in this area hampered early identification of issues.

Recommendation 4: At the outset of the programme and throughout its duration, all programmes should define who has responsibility for the integration and performance of GFE within the platform.

78. **Causal Factor**: *Safety risk in terms of noise and vibration was not being systematically managed within the Army trials, with ineffective risk escalation mechanisms.*

79. Management of safety risk was focussed in two areas: management of risk on the platform during trials and management of programme risk to the delivery of the programme. Both were linked and discussed at various stages in the Safety Panel meetings but managed in different ways. Risk to delivery of the programme centres on the SRO and programme management team; risk to trials teams was managed through the Duty Holding Chain and centred on the Army Capability Directorate.

80. Significant expertise exists in Dstl and they were engaged to provide advice to DE&S. Dstl were members of the JSEP and a review of the minutes confirms their attendance at some, but not all, meetings. It is recognised that DE&S were balancing advice from Dstl against that received from other sources, notably GDUK. Ultimately, they continued to rely on the GDUK noise and vibration calculator.

81. The number of Suitably Qualified and Experienced Personnel available to consider safety aspects of the programme in both DE&S and GDUK was identified in Ajax PMRS reports as being a programme constraint. It was later noted in PMRS in Autumn 2020 that while the size of the teams had increased, it had not had the desired impact; safety case preparation and issues were still being dealt with in a sequential rather than concurrent manner due to capacity constraints.

Finding 5: The management, reporting and escalation of safety risk is fragmented across the Ajax programme. The Overall Project Risk Register is managed by DE&S, Army manage a subset of Programme Risks and the JSEP is responsible for reviewing specific safety risks and hazards. This inhibits the effective management, reporting and escalation of risk.

Recommendation 5: Safety risk governance, for this and future complex projects, should be revised to ensure that the status of all safety risks is considered by a single appropriate forum chaired by the SRO.

Finding 6: The Ajax programme did not have sufficient or senior enough professional health and safety expertise to ensure safety risk in terms of noise and vibration was being systematically managed within the trials.

Recommendation 6: The Ajax programme and future land programmes should ensure that it has sufficient suitably qualified and experienced senior health and safety professionals to support the programme and that these health and safety professionals are included in all key programme meetings.

82. **Causal Factor**: *In managing risk, opportunities were missed by leadership in DE&S and the Army at critical stages of the programme to prevent potential harm from noise and vibration.*

83. From 2018 onwards, instances of noise and vibration were not reported through a single coherent system, potentially impeding the ability to investigate and build a trend-based picture of noise and vibration. Overall, noise and vibration incidents do not appear to have been reported at the scale that we might now have expected with hindsight and reporting appears to be primarily by ATDU crews rather than GDUK crews:

a. ATDU reporting of noise and vibration incidents to the Army Incident Notification Cell (AINC) was ineffectual. Army incident report forms (Form 510) were not completed. Rather, incidents were batch reported to AINC, resulting in only 12 incidents (9 individuals) being reported to AINC by November 2020.

b. There were 23 reports in DRACAS (the reporting system operated by GDUK) from the trials by ATDU between December 2018 and May 2021, involving 16 instances of vibration, 6 instances of noise and one instance of noise and vibration. There are no reports from GDUK crews.

c. 75 instances of noise and vibration related events reported by ATDU personnel that resulted in symptoms or potential injury between June 2020 and June 2021 were recorded in a spreadsheet maintained by ATDU.

d. JSEP meetings, between December 2019 and March 2020, include evaluation of accidents, occurrences and near misses. Whilst incidents involving minor cuts, twisted ankles, personnel being struck by objects, and trapped fingers were raised at these JSEP meetings, there is no mention in these minutes of any potential noise and vibration injuries.

84. Reports of noise and vibration from ATDU were balanced against firm assertion and reporting from GDUK crews that they had not experienced these issues. Therefore, DE&S and Army were presented with conflicting and contradictory data on the cause, effect and presentation of noise and vibration issues. However, there was sufficient evidence available from a range of sources to suggest that noise and vibration issues existed and should be addressed.

85. The SRO informed the Review Team that he was orally made aware during the programme board on 2 September 2020 of an emerging concern over noise. The ODH informed the Review Team that he was first made aware of noise and vibration issues in September 2020.

86. Whilst leaders can only act on the information they have, based on the evidence at points (a) to (f) below, there was an increasingly clear picture of noise and vibration issues within the programme:

a. In December 2019, ATDU communicated concerns in increasingly stronger terms through the Chain of Command. This included statements such as:

    - *"I think we must push an engineering solution rapidly. We cannot be in the business of a Chernobyl style approach of known hazard exposure and then medical checks. That is not a proactive or defendable position in 2020... This is the chance to fix such an endemic issue."*

    - "*We will, in part, knowingly expose soldiers to what we believe to be excessive vibration*."

b. In January 2020, Dstl, who had provided expert advice to the programme since 2018, raised concerns with DE&S regarding noise and vibration on the Ajax platform including the risk that GDUK's noise and vibration calculator underestimated actual levels, potentially leading to excessive exposure.

c. In February 2020, CO ATDU wrote to the Army Capability Directorate:

    - "*As the Duty Holder I do not recommend conducting the trials under the current safety advice and controls for the following reasons: 1) The mitigation strategy of using unverified GD data and calculator is unethical and does not constitute safe practice/conduct. 2) Use of the in-service calculator and health monitoring regime may not be appropriate as the hazard appears to exceed that of in-service platforms – this is not safe practice/conduct and does not constitute a satisfactory duty of care. 3) I do not have confidence in the GD track record of providing timely, effective and thorough safety information*."

    - The Review believes that concerns were voiced in such a way that the level of concern from ATDU was clear and should have resulted in further escalation and more effective action.

However, it is acknowledged that ATDU later confirmed they were content with mitigations and controls that were put in place prior to trials beginning.

d. In March 2020, DE&S provided a SAL to empower the Army to continue with the trials despite the expert advice it had received in January 2020 from Dstl (above) and their concerns about the validity of the noise and vibration calculator.

e. In July 2020, five ATDU soldiers reported with potential vibration symptoms.

f. In August 2020, three ATDU soldiers reported with potential noise related symptoms.

87. While alone these events might not have been sufficient to call a halt to trials, the cumulative body of evidence was. The desire by DE&S and Army to move the programme forward, coupled with the continued belief in the GDUK noise and vibration calculator, led both DE&S and the Army to ask for more data rather than trust the input from experts and users and take definitive action.

88. The trials progressed with mitigating controls (largely limiting vehicle use through SNvEs) that have since proven to be insufficient, whilst pursuing data to corroborate (or otherwise) crew reporting of potential symptoms through various investigations.

89. In parallel, there was initially no formal investigation of the reported noise exposure cases and the splitting of the crews further complicated the picture.

Finding 7: DE&S did not accurately reflect expert opinion from Dstl and others on the risk to Ajax crews from noise and vibration in the advice they provided to Army. This enabled activity to continue when it should have been stopped or paused until stronger controls were put in place.

Recommendation 7: DE&S should strengthen the way it assesses and responds to expert advice. In doing so, it should consider the cumulative impact of this advice, and record how it was considered, by whom and what action was taken.

Finding 8: The potential under-reporting of noise and vibration cases, the ability to investigate both individual cases and any trend, and the effectiveness of escalation via duty holding in the Army was impacted by the absence of an effective unified reporting, investigation and learning system.

Recommendation 8.1: Army health and safety reporting, analysis and escalation processes need to be reviewed and made more robust to ensure that all health and safety incidents and near misses are reported,

analysed and where necessary escalated in a timely manner to allow effective action to be taken where appropriate.

Recommendation: **8.2**: The Army should implement a process for trials that provides the means to report confirmed injuries and near misses (symptoms or exposure) in real time, and that enables escalation of emerging issues to the appropriate risk holder. This process could include early adoption of the Defence Unified Reporting and Lessons System (DURALS) system which has been in development by the Army on behalf of Defence since 2019.

Recommendation 8.3: The Army should accelerate its plans to reinstate an internal investigation capability to enable formal safety investigations independent of the Chain of Command to be undertaken.

Critical Linkages to the Noise and Vibration Issues

90. The purpose of the following analysis is to determine why the Ajax programme failed to adequately control the noise and vibration to below potentially harmful levels via the wider governance process, at the SRO level and above.

91. **Underlying Factor:** *Ajax was developed with concurrent demonstration and manufacture.*

92. Far from being a modified Military Off-the-Shelf (MOTS) programme the Ajax programme was in practice spearheading a range of world-leading technologies and hence required significant testing in the demonstration phase to raise the Systems Readiness Level before moving on to the manufacturing phase. The department should have used the demonstration phase to validate and verify modelling and simulation predictions.

93. The IPA Gateway Review identified in 2017 that the concurrent scheduling of demonstration, testing and production may result in unplanned additional retrofit and re-testing which could result in delay.

Finding 9: The MGBC 2 decision to run concurrent demonstration and manufacture phases added significant complexity by requiring all parties to manage the demonstration, manufacture, fielding and support of six different vehicles at eventually four build standards/capability drops. This is not what teams are used to managing and it was clearly evidenced to the Review Team that the decision to move away from the understood capability lifecycle process had led to confusion, disagreement, frustration and in some cases paralysis of decision making across the Ajax programme. The approach is not appropriate for such a complex and bespoke platform and increased the number of personnel potentially exposed to noise and vibration due to the concurrency of the Reliability Trials and training on Drop 1 vehicles.

Recommendation 9: Concurrent demonstration and manufacture should be avoided for projects unless the key user requirements can genuinely be met by MOTS equipment at a high Systems Readiness Level. The inherent safety risks associated with concurrent demonstration and manufacture should be carefully considered before this approach is adopted.

Finding 10: There is not yet a short-term pathway to resolve the noise and vibration issues. Whilst these issues need to be resolved as quickly and practicably as possible, the department also needs to take a long-term view and focus on the root cause of both aspects, which undoubtedly will require re-engineering of components and systems within the Ajax platform.

Recommendation 10: DE&S and GDUK should maintain the collaborative 'One Team' ethos, including the JPO construct. Collaborative working with industry and finding win-win solutions is important for all projects, not just for Ajax. Project Teams should engage with senior leadership, especially in the contractor (at CEO level) at an earlier stage when safety issues emerge.

Finding 11: The platform must be Safe by Design, and the risks need to be clearly understood, assessed and managed at the appropriate level. It is recognised that information may need to be gathered to inform any potential engineering solutions, and to test them once installed. This will require putting people back into the Ajax vehicle at some stage to acquire this data.

At the Demonstration phase, the vehicle may not have been proven Safe by Design. The purpose of the trial is to verify that the vehicle is Safe by Design. However, when Army does put people back into the Ajax platform it needs to do so with the confidence that the design is being tested in a way that is not causing actual harm to those undertaking the trials. This confidence level needs to be significantly higher than it has historically been and based on appropriate in-vehicle and/or on-body measurement of data for both noise and vibration. Army leadership needs to demonstrate to the crews that their feedback has been heard and that MOD values their safety and welfare; and as such it has invested in robust changes that will protect them from further harm.

Recommendation 11: The same as Recommendation 3

94. **Underlying Factor***: The consideration of safety is missing within the Assurance and Approvals Process for projects within MOD.*

95. The MGBC 2 submission failed to identify the inherent safety risks of integrating demonstration and manufacturing. Unlike the Finance, Commercial, Legal, Economic and Project Delivery Functions, the HS&EP Function is not embedded into the Head Office assurance, scrutiny or approvals process for Category A or Head Office approved projects. Similarly, the HS&EP Function is

not consulted on Category B-D projects in the Defence Organisations. Safety issues are not always recognised explicitly and are bound up in cost/schedule and performance trade-offs.

96. The first written submission alerting Min(DP) to the noise and vibration issue was a submission on 13 November 2020, sent directly to the Minister from DE&S. This was then followed by a further notification of the issue on 24 November 2020, as part of a Defence Portfolio and Approvals Secretariat (DPAS) ministerial submission regarding the approval of new In-Service Date and Initial Operating Capability dates. Subsequently DE&S provided further information to Min(DP). The SRO and Programme Team provided more detail to DPAS via the approvals and DMPP teams. The issue was formally reported in DMPP quarterly reports for 2020/21 Q3 and Q4 recognising noise and vibration as a materialised risk that was being thoroughly investigated.

Finding 12: The focus throughout the Ajax programme was predominantly on performance, cost and time (PCT envelope) and safety considerations were only lightly touched upon. The 2014 scrutiny report supporting MGBC 2 had specific sections for Military Capability, Affordability, Schedule, Commercial and Risks, but provided no details on Safety. The Key User Requirements did not call out Safety Requirements explicitly.

Recommendation 12.1: All ministerial submissions should have a mandatory safety section forcing a consideration of the safety impact of any departmental strategic decision.

Recommendation 12.2: There should be a mandatory safety section within the management section of Business Cases, with reference to the development of the safety case and key safety risks.

Recommendation 12.3: Director HS&EP should become a member or adviser of the Head Office Investment Approvals Committee (IAC) and DMPP Sponsor Group. Resources should be provided to establish an acquisition scrutiny cell within HS&EP Directorate to support this role.

97. **Underlying Factor***: Capacity of key project management individuals including SROs, Capability Sponsors and Duty Holders*

Finding 13: The pressure placed on key individuals including SROs, Capability Sponsors and Duty Holders as a result of the concurrent delivery of multiple major programmes has been a consistent theme in IPA reporting and limits the available capacity for these individuals to manage all safety critical activities under their remit.

The SRO raised concerns over the complexity of his portfolio in 2019 whilst negotiating his formal Letter of Appointment. A decision was taken in spring 2020 by the DMPP Sponsor Group and Army Command that this portfolio of programmes was too large; the SRO was relieved of one major

programme. However, the SRO remained accountable for both the Armoured Cavalry and Armoured Infantry programmes which were both graded as Amber/Red at that time, with successful delivery in doubt due to major risks in a number of key areas. Similar pressure is encountered in the Capability Sponsor area (which is responsible for the Part 3 Safety Case and represents the ODH for trials activity).

Recommendation 13.1: Ensure that SROs and senior project leaders have the appropriate capacity and resource to successfully deliver a programme. HM Treasury and Cabinet Office guidance is that SROs are committed to spending no less that 50 percent of their time per major programme.

Recommendation 13.2: The HS&EP Function should be represented at the senior, professionally qualified level in each programme to support the SRO to ensure suitable safety decisions are being made within the programme management system.

Finding 14: Churn is impacting decision making and accountability in major projects. Since the approval of the MGBC 1 in 2010 the Armoured Cavalry Programme has had five SROs, each of which have had a tenure length of approximately two to three years. There has been an equally high turnover in key capability posts such as DCap and the key posts supporting the development of the Part 3 Safety Case and the safety oversight of trials activity. Within DE&S, the team leadership within Land Equipment Operating Centre changed hands three times as did the post charged as Senior Safety Responsible within the project.

Recommendation 14: MOD should review key post tenure and succession planning to minimise the impact of churn on major programme safety case management, with view to retaining senior project leaders in post for either the duration of the project, or a 5-year minimum tenure.

98. **Underlying Factor***: The level of third-party assurance of the project by the Defence Land Safety Regulator was not adequate.*

99. DLSR regulations mandate the use of a safety case and its structure, but they are not involved in safety case approvals, nor is there any form of certification for bespoke military platforms. These issues were also identified in the recent DSA Jackal Service Inquiry.

100. Most of the activity in the Land domain is regulated by the UK's statutory regulators and not MOD, as there are fewer Derogations, Exemptions or Disapplications than in other domains. As a result, a high proportion of safety-related incidents and injuries in the Land domain occur outside MOD regulated areas.

Finding 15: The level of assurance from the Defence Land Safety Regulator (DLSR) appears to be well below the scale in the Air and Maritime domains.

Recommendation 15: The DSA through the Defence Land Safety Regulator should be resourced to provide Third Line of Defence safety assurance/certification of land environment capability, modelled on the high-quality standard set by the Military Aviation Authority.

5. Conclusion

101. Nothing in this Review detracts from the fact that GDUK has designed and built what MOD maintains is thus far a vehicle which is not fit for purpose and does not meet the contracted specification. The root cause that allowed a vehicle to cause potential harm to Army personnel through noise and vibration during the trials process was not a failure of a single individual or Defence Organisation. It was a complex combination of the Armed Forces' relationship to harm and weaknesses in MOD's acquisition system. The impact of Covid was also felt, both delaying trials and making communication more difficult.

102. From a cultural perspective, the Army did not believe it was potentially causing harm to people, especially from vibration, as it was tacitly expected that soldiers can and should endure such issues. Society and the law expect MOD to do better and requires it to have systems in place that protect its people from harm.

103. Within the acquisition system, safety is not viewed as an equal partner to cost, schedule and military capability, and the culture in MOD does not currently ensure safety is considered within strategic decision-making.

104. To have confidence that the events covered in this report will not be repeated, culture change needs to be progressed in the two areas above.

6. Annexes

A. AJAX REVIEW TERMS OF REFERENCE
B. LIST OF RECOMMENDATIONS
C. GLOSSARY

ANNEX A

AJAX REVIEW – TERMS OF REFERENCE

Objective

1. The Permanent Secretary has directed that there should be a review of the process relating to the Ajax programme, with the purpose of:

a. **validating the chronology and timeline of events** concerning issues with the programme (vehicle vibrations and concerns about hearing damage of military personnel);
b. assessing whether **correct Health and Safety procedures were followed** regarding the actions taken in response to the issues with the programme, and determining whether judgements, decisions and mitigations were appropriate and proportionate; and
c. **making recommendations** for the future of the programme, and relating to past actions, if required.

Principles

2. The purpose of the review is to provide a single, validated, version of events relating to issues arising with the Ajax programme, and to make recommendations both relating to past actions, and on moving the programme forwards. The review will be guided by the following key principles:

a. **The focus of the review should be on actions taken, and on the reporting of those actions, regarding vibrations and noise.** It will not seek to review other parts of the programme except where there are critical linkages.
b. **The review team should engage widely**, with DE&S, the Army, MOD Head Office and General Dynamics, to ensure a full and deep investigation. All parties will be expected to engage wholly and actively with the review process, and provide access to any and all relevant information.

Approach

3. The review will be conducted as a sprint, reporting to the Permanent Secretary by Friday 09 July 2021. The principal focus of the review should be the period between December 2019 and the present day, although the review should also consider any relevant information which predates December 2019.

a. **Weekly check-ins.** The review team should update the Permanent Secretary weekly on progress. These updates should be verbal and should not detract the review team's attention away from work on the review itself.
b. **Mid-Point**. The initial findings of the review should be shared informally with the Permanent Secretary at the mid-way point of the review.

Governance

4. The findings of the review will be provided directly to the Permanent Secretary.

5. The review will be led by the Director of Health, Safety and Environmental Protection, who has relevant experience, but does not currently work closely with the Ajax programme.

ANNEX B

REVIEW RECOMMENDATIONS

Recommendation 1: The DSA through the Defence Land Safety Regulator (DLSR) should establish how best to regulate the development of new land equipment either through certification or through the introduction of a specific regulation.

Recommendation 2.1: Army should improve understanding of the internal specialist health advice and support available to capability staff.

Recommendation 2.2: Army should re-establish its Noise and Vibration Working Group in order to support the management and understanding of noise and vibration risks.

Recommendation 3: Future trials of all armoured vehicles should have appropriate real time instrumentation of platforms and individuals for measurement and recording of noise and vibration exposure will be essential to ensure that any activity is stopped before potentially harmful levels are reached.

Recommendation 4: At the outset of the programme and throughout its duration, all programmes should define who has responsibility for the integration and performance of GFE within the platform.

Recommendation 5: Safety risk governance, for this and future complex projects, should be revised to ensure that the status of all safety risks is considered by a single appropriate forum chaired by the SRO.

Recommendation 6: The Ajax programme and future land programmes should ensure that it has sufficient suitably qualified and experienced senior health and safety professionals to support the programme and that these health and safety professionals are included in all key programme meetings.

Recommendation 7: DE&S should strengthen the way it assesses and responds to expert advice. In doing so, it should consider the cumulative impact of this advice, and record how it was considered, by whom and what action was taken.

Recommendation 8.1: Army health and safety reporting, analysis and escalation processes need to be reviewed and made more robust to ensure that all health and safety incidents and near misses are reported, analysed and where necessary escalated in a timely manner to allow effective action to be taken where appropriate.

Recommendation: **8.2**: The Army should implement a process for trials that provides the means to report confirmed injuries and near misses (symptoms or exposure) in real time, and that enables escalation of

emerging issues to the appropriate risk holder. This process could include early adoption of the Defence Unified Reporting and Lessons System which has been in development by the Army on behalf of Defence since 2019.

Recommendation 8.3: The Army should accelerate its plans to reinstate an internal investigation capability to enable formal safety investigations independent of the Chain of Command to be undertaken.

Recommendation 9: Concurrent demonstration and manufacture should be avoided for projects unless the key user requirements can genuinely be met by MOTS equipment at a high Systems Readiness Level. The inherent safety risks associated with concurrent demonstration and manufacture should be carefully considered before this approach is adopted.

Recommendation 10: DE&S and GDUK should maintain the collaborative 'One Team' ethos, including the JPO (JPO) construct. Collaborative working with industry and finding win-win solutions is important for all projects, not just for Ajax. Project Teams should engage with senior leadership, especially in the contractor (at CEO level) at an earlier stage when safety issues emerge.

Recommendation 11: The same as Recommendation 3

Recommendation 12.1: All ministerial submissions should have a mandatory safety section forcing a consideration of the safety impact of any departmental strategic decision.

Recommendation 12.2: There should be a mandatory safety section within the management section of Business Cases, with reference to the development of the safety case and key safety risks.

Recommendation 12.3: Director HS&EP should become a member or adviser of the Head Office Investment Approvals Committee (IAC) and DMPP Sponsor Group. Resources should be provided to establish an acquisition scrutiny cell within HS&EP Directorate to support this role.

Recommendation 13.1: Ensure that SROs and senior project leaders have the appropriate capacity and resource to successfully deliver a programme. HM Treasury and Cabinet Office guidance is that SROs are committed to spending no less that 50 percent of their time per major programme.

Recommendation 13.2: The HS&EP Function should be represented at the senior, professionally qualified level in each programme to support the SRO to ensure suitable safety decisions are being made within the programme management system.

Recommendation 14: MOD should review key post tenure and succession planning to minimise the impact of churn on major programme safety case management, with view to retaining senior project leaders in post for either the duration of the project, or a 5-year minimum tenure.

Recommendation 15: The DSA through the Defence Land Safety Regulator should be resourced to provide Third Line of Defence safety assurance/certification of land environment capability, modelled on the high-quality standard set by the Military Aviation Authority.

ANNEX C

GLOSSARY

AINC – Army Incident Notification Cell
ATDU – Armoured Trials and Development Unit
BATCIS – Battlefield and Tactical Communications and Information Systems
CGS –Chief of the General Staff
CIS – Computer and Information Services
CVR(T) - Combat Vehicle Reconnaissance (Tracked)
DCap – Army Director Capability
dB(A) – A-weighted decibels
DDH – Delivery Duty Holder
DE&S – Defence Equipment and Support
DLSR – Defence Land Safety Regulator
DMPP – Defence Major Projects Portfolio
DPAS – Defence Portfolio and Approvals Secretariat
DSA – Defence Safety Authority
Dstl – Defence Science and Technology Laboratory
ECAB - Executive Committee of the Army Board
EQT – Entry Qualification Trials
GDUK – General Dynamics Land Systems UK
GFE – Government Furnished Equipment
GMPP – Government Major Projects Portfolio
HAV – Hand Arm Vibration
HCR – Household Cavalry Regiment
IAC - Investment Approvals Committee
IPA – Infrastructure and Projects Authority
JPO – Joint Programme Office
JSEP – Joint Safety and Environment Panel
MGBC – Main Gate Business Case
Min(DP) – Minister of State for Defence Procurement
MOTS – Military Off The Shelf
ODH – Operating Duty Holder
PMRS – Portfolio Management Reporting System
PPE – Personal Protective Equipment
PUS – Permanent Under Secretary
RGT – Reliability and Growth Trials
SAL – Safety Advice Letter
SEC – Safety and Environment Case
SEP – Safety and Environment Panel
SNvE – Safety Notice via Email
SRO – Senior Responsible Owner
WBV – Whole Body Vibration