



Protector briefing: 2021 update

PROTECTOR: THE UK'S NEXT GENERATION ARMED DRONE

This updated briefing provides a critical overview of the UK's next generation armed drone / unmanned aerial vehicle (UAV), Protector, beginning by considering the reasons behind its acquisition and its core capabilities. The briefing then reviews some of the key issues involved in the programme, focusing on the associated costs, benefits and risks, and then on the ethical, legal, human rights and safety concerns involved in the decision to allow Protector to fly in UK airspace. Given the significant controversies around the UK's armed drones programme, all these aspects need to be subject to public and parliamentary discussion now so prudent decisions can be made.

Introduction: What is Protector?

- Former Prime Minister David Cameron announced in October 2015 that the UK's then 10 Reaper drones would be replaced by a fleet of up to 26 new armed drones. This new aircraft, which is named SkyGuardian by its US manufacturer, General Atomics, has been renamed 'Protector' by the UK, apparently for public relations reasons.¹ The announcement claimed that Protector was needed, "in order to equip UK intelligence agencies and British Armed forces with the capabilities they need to keep the streets of Britain safe." In addition to the increase in the size of the fleet, Protector will also have "a greater range and endurance", and be "autonomy enabled", thus "substantially enhancing the UK's global Intelligence Surveillance and Reconnaissance (ISTAR) capability."²

¹ UK Ministry of Defence, 'New investment in counter terrorism for UK Armed Forces', 4th October 2015, <https://www.gov.uk/government/news/new-investment-in-counter-terrorism-for-uk-armed-forces>

² Ibid.; Ministry of Defence, *Annual Report and Accounts 2019 to 2020*, <https://www.gov.uk/government/publications/ministry-of-defence-annual-report-and-accounts-2019-to-2020>

- The government is rapidly pushing ahead with plans to enable large UAVs—including Protector—to fly freely within UK airspace as part of its ambitious Airspace Modernisation Strategy.³ The UK's currently operational Reapers are scheduled to be withdrawn from service in the mid-2020s. The first of an initial batch of 16 Protector deliveries is scheduled to begin between 2021 and 2024 to ensure what the Ministry of Defence (MoD) calls a "seamless transition" from Reaper.⁴
- According to General Atomics, following initial testing, the first Protector drone (UK1) will be delivered to the MoD in the summer of 2021, "but will remain in the US to complete the Royal Air Force's test and evaluation program."⁵ A General Atomics-owned SkyGuardian, on which Protector is based, will be shipped to the UK in summer 2021 to enable "capability demonstrations" and participation in a maritime exercise.⁶
- Protector is set to enter service with the RAF in mid-2024, and currently has an operational end date of 2038. Protector will need to be flown in segregated airspace in the UK during its 'initial operating capability', which is set to begin in late 2023. By the time Protector reaches its 'full operational capability', which is slated to happen in October 2025, the MOD hope that on-board technology enabling Protector to safely detect and avoid other air users will have been approved.⁷
- Key upgraded capabilities of Protector over Reaper include: the ability to fly for up to 40 hours; a 50% payload increase over Reaper so it "can carry an even more deadly mix of sensors and weapons"; the ability to use the UK's Skynet satellite system for communication; and the capability to take off and land automatically via satellite.⁸ The MoD's intention is that "UK and global operations" for Protector will "be the norm" with the aircraft able to "self-deploy, rather than being ferried to an emerging area of operations".⁹
- Unlike Reaper, Protector has been built to international airworthiness standards. This is because the MoD's overall goal is for Protector to be integrated into national and international airspace so that segregation is unnecessary. The MoD are keen for Protector to be certified by airspace regulators so it can be used over the UK and its waters as well as for NATO intelligence-gathering missions in eastern Europe, and beyond.¹⁰ Proponents of Protector see its successful integration into non-segregated airspace as an opportunity for the UK to take the lead globally in the use of beyond visual line-of-sight (BVLOS) unmanned aircraft and enabling the development of military, government and commercial uses of UAVs.
- Allowing Protector to be flown within British airspace would allow the UK to establish a training school for its own personnel. This opens the possibility that other nations now acquiring large military UAVs could utilise such

Key upgraded capabilities of Protector over Reaper include a 50% payload increase over Reaper so it "can carry an even more deadly mix of sensors and weapons"

3 UK Drone Watch, <https://dronewars.net/uk-drone-watch/>

4 Craig Hoyle, 'UK details Reaper transition plan as Protector advances', Flight Global, 30th July 2019, <https://www.flightglobal.com/news/articles/uk-details-reaper-transition-plan-as-protector-advan-459992/>

5 General Atomics, GA-ASI Completes First Protector Unmanned Aircraft, 28th September 2020, <https://www.ga-asi.com/ga-asi-completes-first-protector-unmanned-aircraft>

6 GA-ASI Plans to Demonstrate Maritime Capability in UK, General Atomics, 3 Feb 2021, <https://www.ga.com/ga-asi-plans-to-demonstrate-maritime-capability-in-uk>

7 Squadron Leader, Stu Watkinson 'Transforming the Royal Air Forces' RPAS Capability' <https://dronewars.net/wp-content/uploads/2020/12/FOI2020-11381.pdf>

8 Dominic Nicholls, 'RAF's new drone to battle terrorists: killing machine which can be entirely operated from UK', Daily Telegraph, 30th August 2019, <https://www.telegraph.co.uk/news/2019/08/21/rafs-new-drone-battle-against-terrorists-automated-killing-machine/>

9 Squadron Leader, Stu Watkinson 'Transforming the Royal Air Forces' RPAS Capability' <https://dronewars.net/wp-content/uploads/2020/12/FOI2020-11381.pdf>

10 Dominic Nicholls, 'RAF's new drone to battle terrorists: killing machine which can be entirely operated from UK', Daily Telegraph, 30th August 2019, <https://www.telegraph.co.uk/news/2019/08/21/rafs-new-drone-battle-against-terrorists-automated-killing-machine/>

training facilities since there is a shortage of space on the US Air Force's training courses for operators of armed drones.¹¹ The RAF's own aircrew will be trained to use Protector from 2022 until 2023 in the US whilst the UK's training infrastructure is developed.¹²

Protector acquisition: costs and risks

- In 2016 the approved budget for the new Protector programme was £816.2 million. However, a November 2019 letter from Sir Stephen Lovegrove (permanent secretary at the MoD) to the Commons Public Accounts Committee, outlined that Protector costs had increased by 40% to £1.14 billion, a cost overrun of £325 million.¹³ Reasons for the increase include: costs associated with a delay in 2017/8 to save money in that financial year; a decision to include a new primary sensor, foreign exchange costs and other general programme cost increases.¹⁴ The letter also confirmed that the programme was running more than two years late.¹⁵
- In addition, Sir Stephen Lovegrove's letter outlined that the most significant risk to the Protector programme is personnel shortages. Writing on the issue, *The Times'* Defence Editor, Lucy Fisher explained that both the USAF and the RAF face problems with recruiting and retaining armed drone operators.¹⁶ Difficulties are attributed to several factors, including worries about the potential mental health issues associated with operating these systems; fatigue from long shifts and heavy workload; and concern about the ethical and legal controversies associated with the use of armed drones. The UK currently operates 9 Reaper drones and is set to acquire 16 or more Protector drones. The new aircraft is set to require '75+ Three-person Crews' (the pilot, sensor operators and mission intelligence co-ordinators).¹⁷ Overall, this means a dramatic increase in personnel requirements for Protector over Reaper.
- In September 2019, a contract for £100 million was announced for the Test and Evaluation of Protector.¹⁸ In July 2020 the MoD signed a deal with General Atomics for the first three Protector aircraft for £65 million.¹⁹ That same month, Protector was given an improved amber rating by the government's annual Infrastructure and Projects Authority major projects report. This rating means that "successful delivery" of the Protector project "appears feasible but significant issues already exist, requiring management attention. These appear resolvable at this stage and, if addressed promptly, should not present a cost/schedule overrun."²⁰

A November 2019 letter from the Permanent Secretary at the MoD to the Commons Public Accounts Committee outlined that Protector costs had increased by 40% to £1.14 billion, a cost overrun of £325 million

11 Beth Stevenson, 'US Reaper pilot shortage prompts UK to consider sovereign training capability', Flight Global, 30th June 2016, <https://www.flightglobal.com/news/articles/us-reaper-pilot-shortage-prompts-uk-to-consider-sove-426827/>

12 Squadron Leader Stu Watkinson 'Transforming the Royal Air Forces' RPAS Capability' <https://dronewars.net/wp-content/uploads/2020/12/FOI2020-11381.pdf>

13 Sir Stephen Lovegrove, 'Protector Programme Accounting Officer Assessment', Ministry of Defence, 5th November 2019, https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/854362/20191105_-_Meg_Hillier_Protector_AOA.pdf

14 UK Ministry of Defence, *The Defence Equipment Plan 2018: Financial Summary*, 18th March 2019, https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/788481/20190318-EP18_v3.pdf

15 Sir Stephen Lovegrove, 'Protector Programme Accounting Officer Assessment', Ministry of Defence, 5th November 2019, https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/854362/20191105_-_Meg_Hillier_Protector_AOA.pdf

16 Lucy Fisher, 'Stress of killing from afar creates shortage of MoD drone operators', *The Times*, 13th January 2020 <https://www.thetimes.co.uk/article/stress-of-killing-from-afar-creates-shortage-of-mod-drone-operators-0fnm36r6t>

17 See MoD FoI response 4 November 2020, <https://dronewars.net/wp-content/uploads/2020/12/FOI2020-11381.pdf>

18 Craig Hoyle, UK signs £100m Protector test and evaluation deal, *FightGlobal*, 12 September, <https://www.flightglobal.com/military-uavs/uk-signs-100m-protector-test-and-evaluation-deal/134304.article>

19 Andrew Chuter, 'UK orders first three Protector drones from General Atomics', *Defense News*, 15th July 2020, <https://www.defensenews.com/global/europe/2020/07/15/uk-orders-first-three-protector-drones-from-general-atomics/>

20 Infrastructure and Projects Authority, *Annual Report on Major Projects 2019-20*, https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/899401/IPA_AR_MajorProjects2019-20.pdf

Flying Protector in UK airspace: safety and other concerns

- The MoD would like Protector to be able to fly unsegregated in UK airspace so it can be deployed “across the full spectrum of operations”, including for: domestic security purposes such as surveillance; training personnel; and being available to civil authorities for contingencies and emergencies.²¹
- The operation of unmanned aircraft within the UK is governed by the Air Navigation Order (ANO) 2016, which is regulated by the Civil Aviation Authority (CAA). Evidence from a FOI request made by Drone Wars shows that the MoD first began discussing with the CAA how Protector can meet the requirements of the ANO in January 2016. These discussions included a variety of senior RAF officers, MoD officials, the Military Aviation Authority (MAA) and General Atomics.²² However, it quickly became clear that there were significant problems and differences of perspective between the MoD and the CAA.
- The CAA argue that the ability to visually see and avoid other aircraft is the bedrock of air flight safety. Without a pilot on-board, large unmanned aircraft like Protector, operating BVLOS, do not have this ability. General Atomics and other UAV manufacturers are developing so-called ‘detect-and-avoid’ (DAA) technology to try to electronically replicate the task, but such equipment is largely untried and untested. It is far from clear at this stage if the CAA and other airspace regulators will accept this technology as a substitute for a human pilot.
- To avoid conflict and communication difficulties between the defence community and the regulator, it seems it was decided that the MoD and General Atomics would communicate with the MAA who would then in turn deal with the CAA. In March 2020, Richard Moriarty, Chief Executive of the CAA, wrote to Anneliese Dodds MP, stating that “requests for information regarding decisions to allow Protector to fly within UK airspace should be referred to the MoD...it is the MAA, rather than the CAA, who regulate Protector.”²³ While it may suit the MoD and defence manufacturers to deal with the MAA (an agency wholly owned by the MoD) rather than the CAA, it is vital that the final decision on whether it is safe to fly Protector in UK airspace lies with the independent regulator - the CAA.
- In response to the confusion, in July 2020 Baroness Stern asked the government to identify who will give the final authorisation on whether Protector drones are permitted to fly within UK domestic airspace. In response, Baroness Goldie stated that “final authorisation” for Protector to fly within UK airspace rests with the CAA, adding that, “the RAF’s Aviation Duty Holder is responsible for ensuring the aircraft is operated safely in

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The RAF's Protector RG Mk1 is based on the new generation MQ-9B SkyGuardian and will operate in non-segregated civilian and international airspace. It has been designed to the same stringent airworthiness standards as manned aircraft, will have a detect and avoid system and be certified by the UK Military Aviation Authority (MAA).

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General Atomics advert portraying Protector flying over London

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21 UK Ministry of Defence, ‘£100m boost for cutting-edge Protector aircraft’, 11th September 2019, <https://www.wired-gov.net/wg/news.nsf/articles/100m+boost+for+cuttingedge+Protector+aircraft+11092019161000?open>; Mark Hookham, ‘RAF killer drones to fly in UK’, The Times, 2nd October 2016, <https://www.thetimes.co.uk/article/f748bfb8-881d-11e6-8242-d338f8b15268>

22 Chris Cole, ‘Revealed: internal discussions between MoD and regulators on flying Predator drones in UK’, Drone Wars UK, 12th February 2018, <https://dronewars.net/2018/02/12/revealed-internal-discussions-between-mod-and-regulators-on-flying-predator-drones-in-uk/>

23 Letter from Richard Moriarty to Anneliese Dodds MP, 10th March 2020

accordance with Military Aviation Authority regulations.” Responses to other parliamentary questions also reveal that once Protector has achieved full operational capability it will “conduct live firing training within existing UK Air Weapons Ranges”.²⁴

- Accountability for safety processes are key as large drones frequently crash. Data collated by Drone Wars reveals that over 250 large military drones within the same NATO classification as Protector have crashed in the past decade - twice a month on average. This alone raises serious questions about whether Protector drones should be flown in UK airspace.²⁵
- The technology that might enable Protector to fly unsegregated within UK airspace is unproven and appears unlikely to be ready during the first two years of Protector's operation.²⁶ As part of a 'Plan B', the MoD has thus put forward an Airspace Change Proposal (ACP) covering an area around RAF Waddington in Lincolnshire where the Protector drones will be based.²⁷ The ACP is intended to provide a space where Protector can be flown whilst the on-board DAA technology is being tested and developed.
- In order for its ACP to be accepted by the CAA, the MoD is conducting a public consultation with key local stakeholders in 2021. After this the MoD will need to meet the CAA's other regulatory criteria to guarantee approval. The CAA is set to make its decision on the MoD's ACP in September 2022.²⁸
- General Atomics sees the UK as a key gateway to opening up airspace in Europe and around the globe for its drones. In September 2020 General Atomics completed the first flight of Protector.²⁹ General Atomics is also conducting simulations in the Netherlands using SkyGuardian with the aim of integrating it into European airspace. The decision to allow Protector to fly in UK airspace is thus potentially worth billions of dollars to the company, with existing or potential customers for SkyGuardian and its maritime variant including Australia, Belgium, India, Japan and Taiwan.³⁰
- In January 2019, General Atomics contracted BAE Systems to help facilitate the integration of Protector into UK airspace. BAE have said that it will support General Atomics through its experience of testing UAVs and “shaping the regulatory environment through participation, dialogue and strong relationships with UK and European regulatory authorities.”³¹ Scrutiny of the decision-making process around the integration of Protector into UK air space is extremely important and there must be greater transparency than there has been so far.



24 Baroness Stern, Written Questions, 10th June 2020, <https://members.parliament.uk/member/2475/writtenquestions#expand-1202100>

25 Chris Cole, 'Military drone crash data undermines MoD case to fly Protector drones in UK', Drone Wars UK, 9th June 2019, <https://dronewars.net/2019/06/09/military-drone-crash-data-undermines-mod-case-to-fly-protector-drones-in-uk/>

26 MOD Local Authorities Engagement Letter, <https://airspacechange.caa.co.uk/PublicProposalArea?pID=142>

27 Civil Aviation Authority, 'Enabling Remotely Piloted Air System Operations Out of RAF Waddington', 3rd February 2020, <https://airspacechange.caa.co.uk/PublicProposalArea?pID=142>

28 Ibid.

29 General Atomics, 'GA-ASI Completes First Protector Unmanned Aircraft', <https://www.ga-asi.com/ga-asi-completes-first-protector-unmanned-aircraft>

30 Airforce Technology, 'GA-ASI signs FMS to deliver MQ-9B SkyGuardian RPAS to Belgium', 21st August 2020, <https://www.airforce-technology.com/news/ga-asi-fms-mq-9b-skyguardian-rpas-belgium/>; The Times, Beijing anger as US approves \$600m drone sale to Taiwan, 5th November 2020, <https://www.thetimes.co.uk/article/beijing-anger-as-us-approves-600m-drone-sale-to-taiwan-710bbsn7c>; NLR, 'Facilitating MALE RPAS integration in non-segregated European airspace', 4 Dec 2019, <https://www.nlr.org/news/facilitating-male-rpas-integration-in-non-segregated-european-airspace/>

31 General Atomics, 'GA-ASI Hosts Industry Showcase Highlighting UK Partners', 24th January 2019, <http://www.ga.com/ga-asi-hosts-industry-showcase-highlighting-uk-partners>



In July 2018, General Atomics flew a SkyGuardian drone into the UK to put on display at the Fairford Air Show

- In addition to safety concerns, there are significant privacy and civil liberties issues regarding the use of military UAVs within the UK. Opinion polls have shown that the public are worried about the domestic presence of aerial drones. A 2018 NESTA study of public attitudes to drones found that “safety, privacy and accountability concerns dominate” discussion of the issue.³² Although the military tends to be highly trusted by the British public, the controversial nature of military drones, in particular their use for surveillance and intelligence gathering, as well as for lethal targeted killing operations, is likely to undermine public support.³³
- Whilst, as former Policing Minister Damian Green stated in 2013, “covert use [of drones] by a public authority likely to obtain private information...would be subject to authorisation under the Regulation of Investigatory Powers Act [RIPA] 2000”, a number of lawyers, researchers and campaigners have criticised RIPA for its lack of safeguards concerning surveillance.³⁴
- It is also important to note that parallel developments regarding opening unsegregated airspace to large UAVs are occurring in the US. This included a proposal, subsequently withdrawn after government officials raised concerns, to fly a General Atomics SkyGuardian drone (the basis of the UK's Protector) over San Diego in Summer 2020.³⁵

32 Richard Duffy, *Understanding the public perception of drones*, Nesta, 24th May 2018, <https://www.nesta.org.uk/blog/public-perception-of-drones/>

33 PWC, *Forces for change 2017*, <https://www.pwc.co.uk/government-public-sector/assets/forces-for-change-2017.pdf>

34 Chris Jones, 'Drones: the UK debate and its implications for the EU', *EU Law Analysis*, 28th May 2014, <http://eulawanalysis.blogspot.com/2014/05/drones-uk-debate-and-its-implications.html>

35 David Hambling, 'Secret General Atomics Drone Flights Over San Diego Raise Surveillance Concerns', *Forbes*, 2nd July 2020, <https://www.forbes.com/sites/davidhambling/2020/07/02/secret-drone-flights-over-san-diego-raise-surveillance-concerns/?sh=4aa8c5bd3d6b>; Jesse Marx, 'Drone Test Flight Moved Out of San Diego Following Safety Concerns', *Voice of San Diego*, 26th October 2020, <https://www.voiceofsandiego.org/topics/news/drone-test-flight-quietly-moved-out-of-san-diego-following-safety-concerns/>

Unanswered questions

The UK's potential acquisition and deployment of Protector raises significant questions and concerns across several areas which Drone Wars UK will continue to examine. We urge parliamentarians, the public and civil society groups to join us in scrutinising this issue. It is vital that questions are raised so that the full costs and risks of this programme can be weighed against the alleged benefits, and to promote openness, transparency and accountability in relation to government policy on the use of armed drones.

Safety concerns

- Protector's initial flights are to take place out of RAF Waddington in Lincolnshire, which is surrounded by housing and small businesses. Data shows that a significant number of UAV accidents happen during the take-off and landing phase. How will the government address the significant safety concerns regarding the proposed flights of Protector drones in and around RAF Waddington? Will the government consult with air users, such as British Airline Pilots' Association, on large drones being introduced into the UK?
- What assessment is being made of the impact of Protector flights on local people in and around the geographical area covered by the Airspace Change Proposal initiated by the MoD?
- Will a thorough public evaluation of the effectiveness of detect and avoid technology, including its safety implications, be carried out prior to any certification of Protector to fly in UK airspace?

Transparency and oversight

- Will the government and the CAA ensure that the decision on whether to allow Protector to fly in UK airspace is made in an open, transparent and accountable fashion?
- What role, if any, does the Department for Transport have regarding decision-making on Protector?
- The introduction of large drones flying BVLOS in the UK involves significant airspace changes and will have significant societal impacts. Will the government ensure that an effective regulatory regime is built to address public concerns about large drones and allow the public some say in regulating drones flying over their heads?

Information rights and privacy

- Will the government commit to public notification of any use of Protector within the UK under Military Aid to Civil Authority procedures?
- What safeguards and controls are being put in place to regulate and oversee the use of Protector during any domestic surveillance operations in the UK?
- What measures will the Information Commissioner's Office take to ensure that the public's information rights and privacy are protected as drone usage expands in the UK?

Future operations

- What is the whole-life cost of the Protector project i.e. the combined costs of purchasing, operating, and decommissioning the aircraft?
- Will Protector be operated in part by RAF crews based in the US in the same way that Reaper currently is?
- The MoD has stated that Protector is 'autonomy-enabled'. What exactly does this mean and what do they intend to do with this capability?

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