



## BRIEFING PAPER

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# The defence capability review: equipment

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## Summary

This briefing paper provides a simple overview of the vessels, land equipment and aircraft of the UK armed forces. It is not intended to present a complete account of all the equipment of the armed forces but simply an introduction to current and planned capabilities and an explanation of what they do.

The paper has been written for the debate *The Government's review of defence capability* in Westminster Hall on 19 October 2017. An accompanying debate pack is also available to MPs from the Library.

The context of the debate is:

### **A national security capability review**

The Government announced in July 2017 that the National Security Advisor will conduct a national security capability review.<sup>1</sup> The Government last conducted a major review of its defence capabilities for the 2015 Strategic Defence and Security Review (Cm 9161) which was published in November 2015. The next SDSR is due in 2020 but there have been calls for the SDSR to be refreshed in light of Brexit, which the SDSR did not discuss.<sup>2</sup>

The Government has said relatively little about the review, although the Defence Secretary said in late September: "as the dangers we identified in our 2015 Defence Review intensify, we are reviewing our national security capabilities to ensure our investment remains as joined-up, effective and efficient as possible".<sup>3</sup> It is unclear when or in what format the defence capability review will be published.

### **Pressure on the defence budget**

The [Defence Equipment Plan 2016](#), published on 27 January 2017, lays out a £178bn spending plan for the next decade to 2025-26. The National Audit Office said in response "the risks to the affordability of the Ministry of Defence Equipment Plan are greater than at any point since reporting began in 2012". The NAO particularly highlighted the £24.4bn of new commitments added to the equipment plan by the 2015 SDSR and expressed reservations about the ability of the MOD to make the planned efficiency savings required to fund the plan:

It is worrying to see that the costs of the new commitments arising from the Review considerably exceed the net increase in funding for the Plan. The difference is to be found partly by demanding efficiency targets. There is little room for unplanned cost growth and the MoD must actively guard against the risk of a return to previous practice where affordability could only be maintained by delaying or reducing the scope of projects.<sup>4</sup>

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<sup>1</sup> "[Strategic Defence and Security Review implementation](#)", Cabinet Office, 20 July 2017

<sup>2</sup> See for example Malcolm Chalmers "[Still international? Towards a post-Brexit SDSR](#)", RUSI briefing papers, 11 May 2017

<sup>3</sup> "When it comes to defence, Britain is not stepping back - we're stepping up, says Sir Michael Fallon", *The House* magazine, 29 September 2017

<sup>4</sup> "[The Equipment plan 2016-2026](#)", National Audit Office press release, 27 January 2017

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The NAO added that the equipment plan is vulnerable to changes in foreign exchange rates, noting that approximately £18.6bn is to be paid in US dollars.

Pressure on the defence equipment budget, including from foreign exchange rates, combined with the mini-review, has prompted a flurry of reports in the media speculating as to 'where the axe might fall'.

### **Purpose of this briefing paper**

This briefing paper is intended to serve as an aid to those needing an introduction to the different types of major equipment platforms operated by the UK armed forces, be they frigates, tanks or combat aircraft. Focus has been given to the more prominent current and planned front-line capabilities and as such, it is not intended to provide a complete account of all of the equipment of the armed forces.

Equipment numbers, unless otherwise stated, are taken from Defence Statistics' annual publication [UK Armed Forces Equipment and Formations 2017](#), which gives numbers as of 1 April 2017. This also gives 'in service' numbers which, Defence Statistics notes, varies across equipment types and between Services. Full details can be found in the publication and associated excel documents.

Further resources:

- [The National Security Strategy and Strategic Defence and Security Review](#), Cm 9161, November 2015
- [SDSR 2015 factsheets](#), January 2016
- [The 2015 SDSR](#), House of Commons Library briefing paper, CBP7462, 12 January 2016
- [The 2015 SDSR: a primer](#), House of Commons Library briefing paper, CBP7235, 19 November 2015
- [Future capabilities of the UK's armed forces](#), House of Lords Library briefing paper, LLN2016-0071, 21 December 2016
- [National Audit Office](#) publications on defence
- [UK Armed Forces Equipment and Formations 2017](#), Ministry of Defence, 6 July 2017

# 1. The Royal Navy

- 64 surface vessels
- 10 submarines
- 9 Royal Fleet Auxiliary vessels<sup>5</sup>

The Navy's surface fleet consists of destroyers, frigates, mine counter-measure ships, landing platform docks and landing platform helicopters, offshore patrol vessels, inshore patrol vessels and survey ships.

They can be called upon to perform a wide-range of tasks, including counter-piracy and counter-smuggling operations; humanitarian and disaster relief; anti-submarine warfare; air defence for a carrier group; mine-hunters and fishery protection to name a few.<sup>6</sup>

The number of vessels in the Royal Navy has been on a downward trajectory for many years. In 2010 there were 71 ships in the Royal Navy's surface ship fleet. Now there are 64.

The 2010 SDSR made major cuts to the Royal Navy's fleet including the withdrawal of the Navy's two aircraft carriers, a reduction in the combined frigate/destroyer fleet from 23 to 19, and the retirement of 3 Royal Fleet Auxiliary vessels amongst other reductions. The 2015 SDSR also made significant changes to the frigate programme. The [National Shipbuilding Strategy](#) (September 2017) published a thirty year shipbuilding forecast outlining the procurement timetable for the Navy's fleet.

This section provides a short introduction to ships and submarines of the Royal Navy and Royal Fleet Auxiliary.

## **Aircraft carriers: not yet in service**

The Navy has not operated an **aircraft carrier** since 2010. The 2010 SDSR withdrew HMS Ark Royal from service and converted her sister ship, HMS Illustrious, into a helicopter carrier (because the MOD also cut the Harrier fleet, leaving the carrier with no fixed-wing combat aircraft) before being herself withdrawn from service in March 2014.

The first of two new aircraft carriers, **HMS Queen Elizabeth**, will be formally accepted into the Royal Navy in late 2017 after conducting initial sea trials. She will begin flying trials with the new Lightning II aircraft in autumn 2018 with a view to be able to provide an initial Carrier Strike capability – to deploy with combat aircraft – from December 2020.<sup>7</sup> The second carrier, **HMS Prince of Wales**, is slated to begin sea trials in 2019. A full operating capability is not expected until 2026. The overall cost of the carrier programme is £6.2 billion.<sup>8</sup>

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<sup>5</sup> Figures as of 1 April 2017, "[UK Armed Forces and Equipment Formations 2017](#)", Ministry of Defence, 6 July 2017 with the exception of the submarines, which was 11 at the time of the Formations bulletin but has been reduced to 10 with the decommissioning of HMS Torbay, a Trafalgar-class submarine.

<sup>6</sup> The [Royal Navy's website](#) provides a full list of operations and locations it is currently involved in.

<sup>7</sup> [PQ10200](#), 9 October 2017

<sup>8</sup> HC Deb 6 November 2013 c251-254

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The Public Accounts Committee examined [Delivering Carrier Strike](#) on 11 October 2017.

The new carrier's role is not just to project air power – via Lightning II combat aircraft – but also support littoral (coastal) operations by delivering air power and rotary support (helicopters). Notably they are not designed to carry amphibious craft (craft that enable Royal Marines, for example, to land on a beach).<sup>9</sup> The Carriers are expected to remain in service for 50 years.

When deployed, a Carrier Strike Group is likely supported by a number of elements including Destroyers (to provide air defence), frigates (to provide anti-submarine warfare capability) a submarine and associated support vessels.<sup>10</sup>

### **Frigates and destroyers: 19**

These are multipurpose vessels designed to operate autonomously for extended periods.

Successive governments have reduced the frigate/destroyer fleet. The 2010 SDSR reduced the fleet to the current 19 by retiring four Type 22 frigates. The 2015 SDSR re-committed to a fleet of 19 with the possibility of increasing frigate numbers in the 2030s. Members have discussed at length whether 19 is sufficient to fulfil all the tasks expected of them.

The primary role of Navy's six-strong fleet of **Destroyers** is to protect the fleet from air attack – they provide air defence to a carrier group – as well as carrying out a wide range of other tasks. The last of the six-strong **Type 45 Daring** class entered service in 2009. The Defence Committee has examined problems with the propulsion systems of the Daring-class.<sup>11</sup> The last of the Type 42 destroyers, which the Type 45 replaced, was decommissioned in 2013.

**Frigates** are often described as the workhorses of the fleet and fulfil many roles, with just over half the fleet specifically roled for anti-submarine warfare (to locate, identify and destroy enemy submarines) to protect a carrier group and the strategic nuclear deterrent. The current 13-strong fleet of **Type 23 frigates** are divided between Portsmouth and Devonport.

In the 2010 SDSR the Government committed to replacing the 13 Type 23 frigates on a one-to-one basis with the new, yet to be built **Type 26** frigates. However the 2015 SDSR said only 8 of the proposed 13 Type

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<sup>9</sup> Rear Admiral Graeme Mackay, Director Carrier Strike, oral evidence to Public Accounts Committee, 11 October 2017.

<sup>10</sup> The Director of Carrier Strike, Rear Admiral Graeme Mackay, described a sovereign carrier strike group as including two destroyers, two ASW frigates, a submarine and associated elements to the Public Accounts Committee in oral evidence on 11 October 2017. Note the use of the word sovereign – interoperability means naval vessels from Allies may form a carrier strike group. The current destroyer fleet already perform such a function for Allies. HMS Defender provided air defence for the French aircraft carrier Charles de Gaulle in late 2015: "[British warship set to support French carrier group on ISIL mission](#)", Ministry of Defence, 18 November 2015

<sup>11</sup> Defence Committee, [Restoring the fleet: naval procurement and the national shipbuilding strategy](#), 21 November 2016, HC 221 2016-17

26 frigates would be procured. Instead, five lighter frigates, which have become known as the **Type 31e**, would be built and begin entering service from 2023, as the Type 23 frigates leave service. Steel was cut on the first Type 26 in summer 2016 and is expected to enter service in the mid-2020s.

The National Shipbuilding Strategy, published in September 2017, confirmed the build of the Type 26 and the timetable for the new Type 31 frigates.

### **Amphibious assault ships: 3**

Three Royal Navy ships provide an **amphibious assault** capability (delivering troops and equipment from sea).<sup>12</sup> These are also known as Landing Platform Docks/Helicopters. **HMS Ocean** is currently the largest warship in the Navy's fleet and is a dedicated helicopter carrier. HMS Ocean will leave service in 2018 and the Navy has no plans to directly replace her.

**HMS Bulwark** and her sister ship, **HMS Albion**, have a crew of around 350 and can deliver 256 troops (Royal Marines) ashore by air and sea together with vehicles and combat supplies. Bulwark, Albion and Ocean are all based at Devonport.<sup>13</sup>

HMS Albion was placed in a state of 'extended readiness' in 2011 in her home base of Devonport while HMS Bulwark was deployed. The two ships swapped in 2017 with Albion returned to service in July 2017 as the very high readiness amphibious assault ship.<sup>14</sup> HMS Bulwark entered 'extended readiness' in 2017 which she will remain in until her Upkeep (when she is renovated ahead of returning to service) in 2021.<sup>15</sup> The Navy said the majority of Bulwark's Ship's Company will transfer to Albion.<sup>16</sup> It took over two years for Albion to be readied for service.<sup>17</sup> HMS Albion and HMS Bulwark are expected to remain in service until 2033 and 2034 respectively.<sup>18</sup>

BBC Newsnight reported in early October 2017 that both Bulkwark and Albion could be taken out of service early.<sup>19</sup>

### **Mine counter-measures vessels: 15**

There are 15 **mine counter measure** vessels (MCMV) in service, eight Hunt class based in Portsmouth and seven Sandown class based in Faslane. Four MCMV are based permanently in the Gulf – crews rotate on board.

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<sup>12</sup> The RFA's Bay-class also provide an amphibious landing capability.

<sup>13</sup> The 2010 SDSR placed one of either Bulwark or Albion at extended readiness, meaning she remains in port. HMS Albion was placed in extended readiness in 2011 and is expected to resume operations in 2017, when HMS Bulwark will go into extended readiness. [HC Deb 23 February 2013 c18](#); "Lion awakens as HMS Albion prepares to enter the water again". Navy News, 9 March 2016

<sup>14</sup> "[HMS Albion welcomed back into the fleet by royal guest](#)", Royal Navy, 21 July 2017

<sup>15</sup> "[HMS Bulwark update](#)", Royal Navy, 17 March 2017

<sup>16</sup> "[HMS Bulwark update](#)", Royal Navy, 17 March 2017

<sup>17</sup> "[HMS Albion comes back to life](#)", Royal Navy, 5 December 2014

<sup>18</sup> [PQ106958](#), 16 October 2017; [HC Deb 6 November 2008 c678W](#)

<sup>19</sup> "[Royal Navy could lose 'fight on beaches' ships in planned cuts](#)", BBC News, 5 October 2017

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Their primary task is to keep the sea lanes, and the strategic nuclear deterrent, safe from unexploded ordnance. They have specially designed plastic hulls to protect them from sea-mines. Four are deployed in the Gulf and another, on six month deployments, to one of the two NATO Mine Counter-Measures Squadrons either around the coasts of Northern Europe or the Mediterranean.

The out of service date for all the vessels was provided in December 2010: the Hunt class will progressively go out of service from 2019 to 2023 and the Sandown class from 2023 to 2026.<sup>20</sup> SDSR 2015 laid out a Joint Force 2025 plan which states a future fleet of 12 Mine Hunters.

The Navy is looking at unmanned and autonomous mine clearance capability options and is working with France on a £117 million Maritime Mine Counter Measures (MMCM) programme.<sup>21</sup>

The Times reported in September 2017 that the fleet number might be reduced to 13 in the coming year.<sup>22</sup> There has been no official announcement by the Ministry of Defence.

### **Offshore patrol vessels: 4**

Three of the four **River-class** Offshore Patrol Vessels (OPV) are dedicated to fisheries protection around the UK and when they were purchased in 2012 they had an expected service life of eleven years.<sup>23</sup> HMS Tyne, Severn and Mersey were purchased in 2012 having previously operated under lease by the Royal Navy. The fourth in the class, HMS Clyde, is based in the South Atlantic in the Falkland Islands and will leave service in 2017.<sup>24</sup> All four will be decommissioned by 2019. HMS Severn will be decommissioned on 27 October 2017.

Five new Offshore Patrol Vessels, described as batch-2 River-class, are under construction. The first of which, HMS Forth, is shortly expected to enter service. The other four are Trent, Medway, Medway and Spey. They will provide fisheries protection in UK waters, in the South Atlantic (Falkland Islands) and be able to deploy to the Mediterranean and Caribbean. They all have a helicopter flight deck. All five will enter service by 2021 with a total cost of £635 million.<sup>25</sup>

### **Rest of surface fleet**

The rest of the surface fleet is made up of ice patrol and survey ships (5) and inshore patrol vessels (18) including the Faslane fast patrol boat squadron and The Royal Navy's Gibraltar Squadron.

Survey vessels may be used for other purposes than purely survey. For example, both HMS Enterprise and HMS Richmond rescued hundreds of migrants while deployed to the Mediterranean to support the EU's operation to counter migrant smugglers.

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<sup>20</sup> [HL Deb 7 December 2010 cWA24](#)

<sup>21</sup> ["UK and France begin build of unmanned mine clearance craft"](#), Ministry of Defence, 20 October 2016

<sup>22</sup> "Warships and battlefield training to be axed in defence cuts" The Times, 7 September 2017

<sup>23</sup> PQ HL2074, 11 October 2016

<sup>24</sup> HL Deb 24 March 2015 c1320

<sup>25</sup> [PQ71204](#), 25 April 2017

### Royal Fleet Auxiliary: 9

The **Royal Fleet Auxiliary** consists of 9 vessels, three fewer than in 2016 because of the early withdrawal from service of forward repair ship RFA Diligence (retirement brought forward from 2020, no direct replacement<sup>26</sup>) and the two remaining small fleet tankers RFA Black Rover and RFA Gold Rover.

The current fleet includes:

- 2 x tankers (RFA Wave Knight and RFA Wave Ruler)
- 3 x fleet replenishment ships (RFA Fort Victoria, an auxiliary oiler replenishment vessel), and RFA Fort Austin an RFA Fort Rosalie, which are Auxiliary Fleet Support helicopter carrying vessels
- 3 x landing ship dock (RFA Cardigan Bay, Lyme Bay and Mounts Bay, which can deliver troops from sea)
- 1 x primary casualty receiving ship (RFA Argus)

The MOD is awaiting delivery of four new, doubled hulled Tide-class tankers to replace the single-hulled (and now all out of service) Rover class. They are known as the Military Afloat Reach and Sustainability (MARS) tankers and the first, Tidespring, should enter service before the end of 2017 with all in service by the end of 2018.<sup>27</sup> The MOD says they are on course to coming in at £45 million under the approved budget of £595 million.<sup>28</sup>

The MOD intends to compete internationally the contract for new Fleet Solid Support Ships, expected to be delivered from the mid-2020s.<sup>29</sup> These vessels, like the MARS tankers, are not considered warships and therefore do not need to be built in the UK.

### Submarines: 10<sup>30</sup>

The Navy's submarine fleet consists of four **Vanguard**-class nuclear submarines that carry the UK's strategic nuclear deterrent and seven hunter-killer nuclear powered submarines.<sup>31</sup>

The new **Astute**-class boats are replacing the retiring **Trafalgar**-class. Three of the new Astute class are now in service (Astute, Ambush and Artful).

The combined submarine fleet of ballistic nuclear submarines and attack nuclear submarines had been held consistently at 11 in the last few years. However HMS Torbay, a Trafalgar-class submarine, was decommissioned in July 2017, leaving three Trafalgar-class submarines in service. The fourth Astute-class submarine, Audacious, launched in early 2017 but has yet to enter service. At the most recent time of

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<sup>26</sup> [Navy FOI2016-08591](#), 7 October 2016

<sup>27</sup> PQ HL2076, 11 October 2016

<sup>28</sup> [PQ71204](#), 25 April 2017

<sup>29</sup> [National Shipbuilding Strategy](#), Ministry of Defence, 6 September 2017, para 64

<sup>30</sup> The MOD's UK armed forces equipment and formations 2017 gives a figure of 11

<sup>31</sup> Commons Library briefing paper [Replacing the UK's nuclear deterrent: Progress of the Dreadnought class](#), 19 June 2017, CBP8010, provides detailed analysis of the plans to renew Trident.

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asking, the MOD declined to give planned out-of-service dates for Trafalgar and in-service dates of Astute.<sup>32</sup>

HMNB Clyde will be the Navy's submarine centre of specialisation from 2020 and is home to all the Vanguard-class and the incoming Astute-class. The remaining Trafalgar-class submarines are in Devonport.

### Box 1: Withdrawn ships

- 2011: HMS Ark Royal (aircraft carrier); HMS Cornwall, HMS Chatham, HMS Campbell, HMS Cumberland (Type 22 frigates); HMS Gloucester, HMS Manchester (Type 42 destroyer); RFA Largs Bay (landing ship); RFA Bayleaf (support tanker); RFA Fort George (fleet replenishment ship)
- 2012: HMS York, HMS Liverpool (Type 42 destroyers)
- 2013: HMS Edinburgh (Type 42 destroyer)
- 2014: HMS Illustrious (aircraft carrier then from 2010 helicopter carrier)
- 2015: RFA Orangeleaf (fleet support tanker)
- 2016: RFA Black Rover (fleet support tanker), RFA Diligence (forward repair ship)<sup>33</sup>
- 2016: RFA Gold Rover (fleet Support tanker)<sup>34</sup>

Some of these ships have been replaced – for example with new Type 45 destroyers – or will be replaced with the new RFA Tide-class tankers. There are no plans for a one-to-one replacement for HMS Ocean or RFA Diligence.

The following ships are to be withdrawn from service:

- 2017: HMS Severn (offshore patrol vessel)<sup>35</sup>
- 2018: HMS Ocean
- 2019: HMS Clyde, HMS Mersey<sup>36</sup>
- 2023 - 2035: Type 23 frigates, one per year
- 2033: HMS Albion
- 2024: HMS Bulwark<sup>37</sup>

Information on the crew numbers for each class of vessel was given in response to tabled question in 2014 and can be found online: [PQ21034](#), 28 October 2014.

### Further reading

Joint Doctrine Publication 0-10 [Maritime Power](#) defines maritime power, explains the attributes of maritime power and explains what terms like littoral or amphibious warfare mean. The fifth edition was published in October 2017.

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<sup>32</sup> [PQ439](#), 26 June 2017

<sup>33</sup> Dates for 2012 to 2017 provided in [PQ68186](#), 20 March 2017; dates for 2010 and 2011 compiled from various sources including HC Deb 25 April 2013 c1271W

<sup>34</sup> RFA Gold Rover was taken out of service in March 2017

<sup>35</sup> HMS Severn will be decommissioned on 27 October 2017

<sup>36</sup> [PQ71203](#), 24 April 2017

<sup>37</sup> [PQ106958](#), 16 October 2017; [HC Deb 6 November 2008 c678W](#)

## 2. RAF fixed-wing aircraft

The 2015 SDSR committed to an expanded combat aircraft fleet supported by transport and surveillance aircraft for the RAF.

This section focuses on front-line fixed-wing aircraft fleets, so combat, ISTAR, transport and tanker aircraft. Helicopters (rotary-wing) are examined in section 4.

### Combat aircraft: 199

There are currently two offensive combat aircraft in use by the UK Armed Forces today. They are the Typhoon (Eurofighter) and Tornado GR4. The Typhoon was designed as an air-to-air combat aircraft although it is being progressively upgraded to provide a ground attack capability. The Tornado GR4 is primarily a ground attack aircraft. Tornado will leave service in 2019 and will be replaced by the new, yet to enter service, Lightning II F35 Joint Strike Fighter.

The 2015 SDSR committed to an additional Lightning II squadron and two additional Typhoon squadrons.

**Typhoons** are the most common type of fixed-wing platforms with 137, of which 92 are in service.<sup>38</sup>

Typhoon provides the Quick Reaction Alert Force in the UK, based at RAF Coningsby and RAF Lossiemouth, and in the Falkland Islands.

Typhoon is primarily used for air-defence but some aircraft are being enhanced under the Typhoon Future Capability Programme to provide an air-to-surface (bombing) capability, including a new Active Electronically Scanned Array radar. Typhoon have carried out bombing missions in Libya in 2011 and on Operation Shader in Iraq/Syria. Former Defence Minister Mark Francois said the tranche 3 variant of the Typhoon (with the new radar) will be “one of the most capable and effective combat aircraft in the world”.<sup>39</sup>

Typhoon is also known as Eurofighter, a reflection of its development as a joint venture by Germany, Italy, Spain and the UK. Typhoon first entered in service 2003 in three tranches. BAE Systems announced in mid-October 2017 plans to reduce the Typhoon final assembly production rates, leading to 750 job losses at its plants in Warton and Samesbury, Lancashire.<sup>40</sup>

The 2015 SDSR announced plans to add two Typhoon squadrons to the current five front-line squadrons and Typhoon will remain in service until 2040 rather than the pre-SDSR expectation of 2030. The two additional Typhoon squadrons will be formed from Tranche 1 aircraft which had

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<sup>38</sup> The UK Armed Forces Equipment and Formations 2017 defines in service as “all aircraft in active fleet management, which can include aircraft in storage (to preserve airframe hours). Aircraft which are in the process of disposed of are excluded.”

<sup>39</sup> HC Deb 10 October 2017 c171

<sup>40</sup> Members debated the implications of BAE’s announcement of nearly 2000 jobs across the UK in a debate on [10 October 2017 c167-179](#)

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been expected to retire. They will operate purely as air defence aircraft.<sup>41</sup>

The RAF's **Tornado** fleet will retire in 2019.

The RAF's new combat aircraft is the **Lightning II** F35 Joint Strike Fighter. It will be operated jointly with the Royal Navy and will fly from both land bases and from the two new Queen Elizabeth-class aircraft carriers. Lightning II is the UK designation for the US-led F35 Joint Strike Fighter programme. It is a multirole fifth generation aircraft.

In the 2015 SDSR the Government explicitly committed to buying 138 Lightning II aircraft over the life of the programme. 42 aircraft will be in service by 2023 with 24 available to be embarked on the new aircraft carriers. At the time of writing the UK has taken delivery of 12 aircraft with two more expected by the end of 2017.<sup>42</sup>

The F35 comes in three variants. The UK originally committed to the F35 B variant, the Short Take-Off and Vertical variant (STOVL), then switched to Carrier variant in the 2010 SDSR, before reverting in 2012 to the B variant. However questions have been raised as to whether the Government might opt in future years for the A-variant, which would not be able to fly from the aircraft carriers. Ministers have committed to the first 48 aircraft to be the B variant but have said "The decision on the variant of subsequent tranches of Lightning will be taken at the appropriate time".<sup>43</sup>

The US-led F35 programme has been beset with problems. Most recently the [Defence Committee](#) heard evidence from reporters and defence experts about some of these issues, including the cost and the implications of changes to the foreign exchange rate on the overall cost to the UK of the aircraft. The Public Accounts Committee has opened an inquiry into [Carrier Strike](#) which will examine Lightning II, based on the National Audit Office's report [Delivering Carrier Strike](#), published in March 2017, and written evidence by the NAO to the committee.

The UK has been working with France to develop two full-scale **unmanned combat air system** (UCAS) technology demonstrators by 2025.<sup>44</sup>

### ISTAR

ISTAR platforms are those which provide Intelligence, Surveillance, Targeting, Acquisition and Reconnaissance capabilities.

The 2015 SDSR outlined a Joint Force 2025 requirement of:

- 3 x Rivet Joint
- 6 x E-3D Sentry
- 8 x Shadow

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<sup>41</sup> "RAF to field retained Tranche 1 Typhoons as stand-alone air defence forces", Jane's Defence Weekly, 4 April 2016

<sup>42</sup> PQ10200, 9 October 2017

<sup>43</sup> [HL516](#), 12 July 2017

<sup>44</sup> PQ46550, 12 October 2016

- >20 x Protector

The SDSR announced plans to buy nine new Boeing **P-8A Maritime Patrol Aircraft**. These will be based in Scotland. This decision restores a capability the UK cut in the 2010 SDSR (a role previously fulfilled by Nimrod) and long called for by the SNP. The MOD separately said it expects to have an initial operating capability by 2020.<sup>45</sup>

The other major procurement announcement was for more than 20 new armed remotely piloted aircraft, known as **Protector**, to replace the ten Reaper aircraft currently in service. The current Reaper fleet cannot fly in UK airspace and the new Protector aircraft are expected to be UK certified MQ9 Reapers.<sup>46</sup> Protector's main role is to provide ISTAR and is expected to be based, as Reaper operators currently are, at RAF Waddington, which is home to the bulk of the ISTAR force. However Protector can be armed and conduct air strikes. Reaper/Protector is the only ISTAR platform that has a weapon capability.

The SDSR committed to retaining the 6 E-3D **Sentry** AEWI aircraft, which provides airborne surveillance and command and control (Sentry has the recognisable disc on top of its frame). It is the RAF's primary airborne warning platform.

The SDSR extended the life of **Sentinel** into the next decade. The Sentinel R1 long-range airborne surveillance aircraft can identify and track numerous targets over great distances, providing intelligence to ground and air forces. It was to have been withdrawn from service after the end of operations in Afghanistan according to the 2010 SDSR. However the MOD decided in 2013 to extend its life until 2018.<sup>47</sup> The 2015 SDSR extended it further into the 2020s, with the SDSR factsheet giving a specific date of 2021. The RAF has four Sentinel aircraft, two of which are in service. The MOD said that it is looking at a variety of options to replace the Sentinel's wide-area surveillance capability, including space-based, manned and unmanned aircraft solutions and the development of a sensor for the P-8A.<sup>48</sup>

The first of the three new RC-135 **Rivet Joint** surveillance aircraft (also known as Airseeker) entered service in 2014. Rivet Joint is an electronic surveillance aircraft (for example intercepting and listening to communications) and will remain in service until 2035.

**Shadow**, which provides ISTAR to and supports Special Forces, will continue in service until at least 2030, having originally been expected to be withdrawn when combat operations in Afghanistan ended. The RAF has five, of which four are described as being in service, and the SDSR commits to increasing the number to eight for Joint Force 2025.

The number of crews for Sentry, Shadow and Rivet Joint will be increased, according to the SDSR 2015 factsheets.

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<sup>45</sup> DEP2015-0948, 3 December 2015

<sup>46</sup> This programme was previously known as Scavenger. The Main Gate is expected to be in March 2016. The Chief of the Defence Staff specifically mentioned UK certified MQ9 Reaper aircraft in his RUSI Christmas Speech 2015.

<sup>47</sup> HC Deb 6 February 2013 c235W

<sup>48</sup> [PQ2551](#), 11 July 2017

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In addition, **Tornado** combat aircraft can also provide ISTAR capabilities when it is flown with the **Raptor Pod**, which can be attached to the aircraft.<sup>49</sup>

### Transport and refuelling aircraft

The SDSR outlines a Joint Force 2025 made up of:

- 14 x Voyager
- 8 x C17
- 22 x A400M Atlas
- 14 x C130J Hercules

RAF Brize Norton is the home of fixed-wing strategic and tactical air transport and air-to-air refuelling aircraft.

**Voyager** is an air tanker aircraft which provides air-to-air refuelling but can also carry up to 291 personnel or cargo. It can also be configured for medical evacuation. It has replaced the now retired Tristars. Nine of an expected fleet of 14 are in service. Voyager is owned, managed and maintained by a contractor, Air Tanker Ltd.<sup>50</sup> One will be adapted to provide, when required, transport for the Royal Family and senior Ministers.

The **C-17 Globemaster** provides the RAF with a long range strategic heavy-lift transport capability – it can deliver troops and cargo and land on relatively short and narrow runways.

The **A400M Atlas** is a new, heavy-lift aircraft which can carry 116 passengers and a 25-tonne payload. The RAF has taken delivery of 15 of an expected fleet of 22 aircraft.

The fleet of **C130J Hercules** was expected to be drawn down once there were sufficient Atlas aircraft in service but the 2015 SDSR instead announced the aircraft will be upgraded and will have its life extended until 2030. The Hercules can deliver personnel or stores by airdrop and is a familiar sight when UK nationals require evacuation or in delivering humanitarian aid. It can also be used for medical evacuation. The RAF has 20 aircraft, of which 14 are in service. The variant C-130K is no longer in service.

### Training aircraft

The RAF also has numerous training aircraft, including Hawk, King Air, Tucano, Tutor, Vigilant and Viking, the latter two are gliders used by the Air Cadet Organisation.

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<sup>49</sup> Detailed analysis of the RAF's ISTAR capabilities can be found in "ISTAR firmament: the future of the RAF's combat air reconnaissance assets", Jane's Defence Weekly, 28 June 2017, from which some of the information in this section was sourced.

<sup>50</sup> The PFI arrangement means the MOD leases the aircraft from Air Tanker as required.

### 3. Army vehicles

This section focuses on vehicles used by the army. It does not include artillery or engineering equipment. Nor does it delve into formations – the number of Corps, Regiments or battalions.

The Defence Committee examined (in section 6) army vehicles in its report [SDSR 2015 and the Army](#) (HC 108 2016-17 29 April 2017) and published the [Government's Response](#) (HC 311 2017-19) on 15 September 2017.

There are over 4,000 Key Land Platforms in the UK armed forces. The majority are Protected Mobility Vehicles (47% of the total) and Armoured Personnel Carriers (43%) with Armoured Fighting Vehicles making up the other 10%:

- There are over 1,900 Protected Mobility Vehicles which include the Coyote, Foxhound, Husky, Jackal, Mastiff, Ridgeback and Wolfhound.
- Bulldog and Warrior make up most of the 1,763 armoured personnel carriers, with less than 100 Viking vehicles.
- Challenger 2 Main Battle Tank and CVR(T) Scimitar make up the 438 armoured fighting vehicles.

As with the other services, the Army's armoured vehicles are about to undergo a refresh.

The Government ordered 589 new armoured vehicles for the Army in a £3.5bn contract placed in September 2014. Known originally as Scout, the family of vehicles have since been renamed **Ajax**. There will be six variants: reconnaissance (Ajax), reconnaissance support (Ares), command and control (Athena), equipment repair (Apollo), equipment recovery (Atlas) and engineering reconnaissance (Argus).

Each of the two new Strike Brigades announced in the 2015 SDSR will be equipped with Ajax vehicles. According to the Defence Committee, each Strike Brigade will have two Ajax regiments and each regiment is expected to have between 50 and 60 vehicles.<sup>51</sup>

The Army is extending the life of the **Challenger 2 Main Battle Tank**. It has 227 in service, and are used by Armoured Infantry Brigades. The £700 million Life Extension Programme will keep the tanks in service until 2035, although the Defence Committee notes that it is as yet unclear how many tanks are to be upgraded and said any reduction in the number of tanks would be "fraught with risk".

The **Warrior** Infantry Fighting Vehicle, of which the Army has 769, is also subject to a Capability Sustainment Project, which will provide enhanced lethality and protection, including a new turret and cannon. Warrior provides protection and support to infantry on foot. The estimated £1.3bn Sustainability Project will extend the out of service date from 2025 to 2040. Again the Defence Committee noted the

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<sup>51</sup> Defence Committee, [SDSR 2015 and the Army](#), 19 April 2017, HC 108 2016-17, para 130

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Army would not commit to the number of vehicles which would be upgraded. The MOD says the number to be upgraded will be decided at the main investment decision.<sup>52</sup> There is some doubt as to when the Warrior CSP will be delivered, with defence analyst Francis Tusa noting the history of the programme, first mooted in 2008, has been reportedly pushed back to 2020.<sup>53</sup> The MOD said in July 2017 the Warrior Capability Sustainment Programme is currently in its demonstration phase but that the “complex nature of the programme has led to significant engineering and technical challenges.”<sup>54</sup> The MOD placed a development contract with Lockheed Martin in 2011 and said on 4 July 2017 it is currently “in commercial discussions about the manufacture contract.”<sup>55</sup>

The Army is also currently exploring options for a new **Mechanised Infantry Vehicle** (MIV) and **Multi-Role Vehicle (Protected)** (MRV-P). The MIV was announced in the 2015 SDSR and will equip the mechanised infantry within the new strike brigades. An off the shelf option is considered most likely. *Jane's Defence Weekly* suggests around 300 to 350 MIV's will be bought with a view to entering service from 2023.<sup>56</sup> The MRV-P will provide a family of protected general purpose vehicles, for example for command and control or protected ambulances.

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<sup>52</sup> [PQ2038](#), 4 July 2017

<sup>53</sup> “Warrior disarmed: the tale of a cannon, two turrets and a bustle-load of past resentment”, *Jane's Defence Weekly*, 28 June 2017

<sup>54</sup> [HL863](#), 24 July 2017

<sup>55</sup> [PQ2038](#), 4 July 2017

<sup>56</sup> *Jane's Defence Weekly*, DVD 2016: Bidders line up for British Army's MIV 8x8 requirement, 9 September 2016

## 4. Helicopters

Helicopters (rotary-wing aircraft) are in use across all three services, plus Joint Force Command.

The 2010 SDSR recommended a rationalised fleet of five platforms operating across all three services. This would consist of Apache and Wildcat for the Army; Wildcat and Merlin for the Royal Navy; and Chinook, Merlin and Puma helicopters for the RAF. The Wildcat would replace the Lynx variants by the end of the decade.

The Government conducted a Defence Rotary Wing Capability Study in 2012 which envisaged four core fleets: Apache, Wildcat, Merlin and Chinook.<sup>57</sup> It also envisaged completing the Puma Life Extension programme which extends the Puma's service life to 2025.

The 2015 SDSR outlined a Joint Force 2025 requirement of:

- Royal Navy – 4 x Merlin Mk 2 squadrons; 2 x Wildcat squadrons
- Land – 4 x Apache squadrons; 4 x Wildcat squadrons; 2 x Puma squadrons; 3 x Chinook squadrons; 2 x Merlin Mk4 squadrons

The armed forces had 353 rotary-wing platforms at 1 April 2017, of which Chinook is the most common type with 60 aircraft. There has been an overall reduction of 19 aircraft since 2016.<sup>58</sup>

The **Apache** is an attack helicopter in service with the army. It first entered service in 2004 and originally had an out of service date of 2030 but this was extended in the 2010 SDSR to 2040. The *Apache Capability Sustainment Programme* has opted to upgrade the fleet with the purchase of 50 Apache AH-64E (replacing the AH-64D) from the US Government under a Foreign Military Sales arrangement. Orders have been placed for 38 helicopters as part of the US Government's order with Boeing, with which it has a multiyear contract. The Government expects the remaining 12 to be ordered by the end of 2017.<sup>59</sup>

The **Wildcat** is a multirole aircraft used by the Army and Royal Navy. The Army uses the AH MK1 variant primarily for reconnaissance, command and control, transportation of troops and material and escort duties, although it will have attack capabilities. 24 of the 34 strong fleet are in service.

The naval variant (**Wildcat HMA Mk2** – HMA stands for Helicopter Maritime Attack) can operate from a variety of surface ships and can perform a variety of roles anti-ship, anti-submarine, ship protection, casualty evacuation, battlefield reconnaissance and general utility, with an attack capability.

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<sup>57</sup> [HC Deb 12 June 2012 c17WS](#)

<sup>58</sup> See table 8 of MOD armed forces equipment and formations for further detail on in-service figures.

<sup>59</sup> [PQ3570](#), 11 July 2017

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In January 2016 the Government gave the forecast costs for the Wildcat aircraft programme, including the development, acquisition, training and in-service support of the aircraft, as £5.2 billion.<sup>60</sup>

The Wildcat will fully replace the Lynx Mk7, Mk8 and Mk9/9a toward the end of this decade and are expected to have a 30-year lifespan.

The **Merlin Mk2** provides maritime protection and an airborne anti-submarine warfare capability (so it can carry depth charges and torpedos) for the Royal Navy. The 30 Mk2s were upgraded via the Merlin Capability Sustainment Programme making it the "[world's most potent sub hunting helicopter](#)". The cost of the Capability Sustainment Programme is £805 million.<sup>61</sup>

The Navy also flies the **Merlin Mk3/3a**, originally procured for the RAF but transferred to the Royal Navy's Commando Helicopter force in 2014 for use by the Royal Marines. The Merlin Mk 3 is currently expected to remain in service until at least 2030.<sup>62</sup>

The Commando Helicopter Force has six Wildcat Mk1 and 25 Merlin Mk3 helicopters.<sup>63</sup> The latter are being upgraded to Mk4/4a standard as part of the Merlin Life Sustainment Programme in a £330 million contract awarded to Leonardo. The upgraded aircraft will be delivered from 2017 to 2020.<sup>64</sup>

The **Chinook** is used primarily to transport troops and carry loads, either internally or underslung. First entering service in 1993 the Government ordered 14 new Chinooks in 2011, to bring the total fleet up to 60. The MOD announced plans to purchase the 14 aircraft at a cost of £841 million including VAT.

The **Puma HC2** variant will go out of service in 2025. The service life of the Puma was extended in the 2010 SDSR in order to ensure that enough medium battlefield support helicopters would be available for service in Afghanistan. Subsequently a number of Puma HC 1 helicopters were converted into the HC2 variant in 2013. The estimated cost of the Puma Life Extension Programme is £339 million.<sup>65</sup> 15 of the 23 Puma's are in service with the RAF.

The Navy's **Sea King Mk7** Airborne Surveillance and Control helicopters will be replaced by the Merlin MK2. 32 Sea King's were taken out of service in 2016 with the end of military provided search and rescue.

MPs debated the [UK helicopter industry](#) in Westminster Hall on 24 January 2017.

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<sup>60</sup> PQ24125, 20 January 2016

<sup>61</sup> HC Deb 21 July 2014, c891W

<sup>62</sup> HC Deb 6 January 2010, c454W

<sup>63</sup> PQ61312, 27 January 2017

<sup>64</sup> "[Leonardo: first Royal Navy AW101 Merlin Mk4 makes its maiden flight](#)", Leonardo press release, 21 November 2016

<sup>65</sup> HC Deb 14 January 2014, c497W

## 5. Further reading

The following is a selection of press and media articles. Please note: the Library is not responsible for either the views or accuracy of external content.

### Press articles

#### [PM's former security adviser warns of Brexit defence cuts](#)

Observer

Michael Savage

14 October 2017

#### [Threat to marine landing ships and navy helicopters in defence review](#)

The Times

Deborah Haynes

6 October 2017

#### [Britain should increase 2% defence spending target, says Michael Fallon](#)

Daily Telegraph

Ben Farmer and Con Coughlin

3 October 2017

#### [HMS Queen Elizabeth: UK's new £3bn aircraft carrier dismissed as 'massive distraction'](#)

Independent

Lizzie Dearden

16 August 2017

#### [Ready for action? U.K. reviews defense capabilities before leaving Europe](#)

Newsweek

Josh Lowe

27 July 2017

#### [Soldiers and spies face review amid fears for defence budget](#)

The Times

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Deborah Haynes

21 July 2017

**[Forces cuts 'mean the UK cannot deploy a division abroad in future war': Damning US report warns defence chiefs will struggle to sustain more than 6,500 troops in a future conflict](#)**

Daily Mail

Larisa Brown and David Williams

31 May 2017

**[Spiralling cost of UK defence projects signals hard choices](#)**

Financial Times

Sam Jones

5 February 2017

### Journal articles

**[UK defence secretary wants to grow budget above NATO 2% GDP target](#)**

Jane's Defence Weekly

Tim Ripley

4 October 2017

**[UK launches defence plans review](#)**

Jane's Defence Weekly

Tim Ripley

25 July 2017

**[Ministry of Defence Facing Tough Financial Choices](#)**

RUSI

Peter Roberts

29 June 2017

**[General Election 2017: A Strategic Moment for Defence?](#)**

John Louth

RUSI

2 June 2017



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